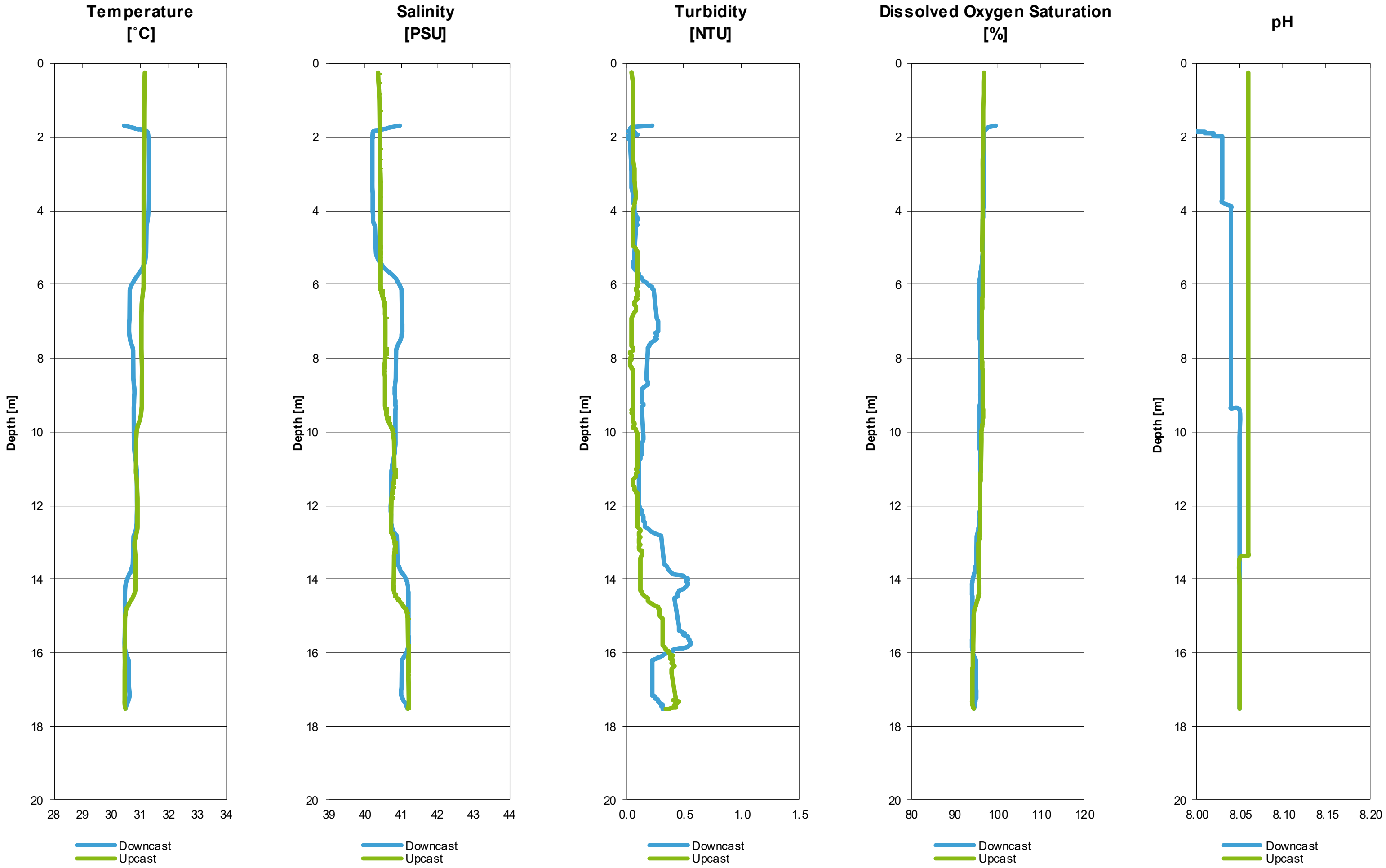
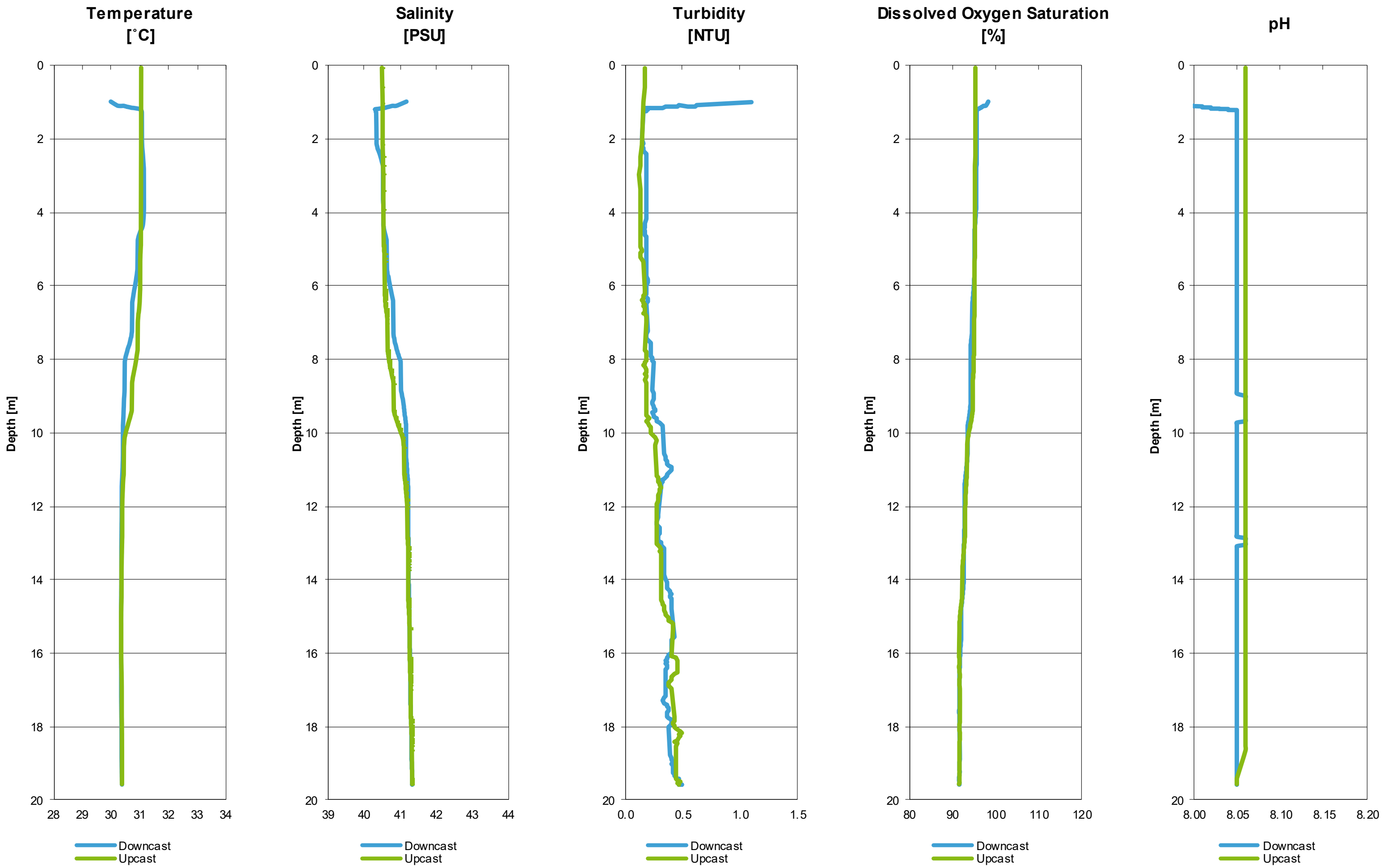
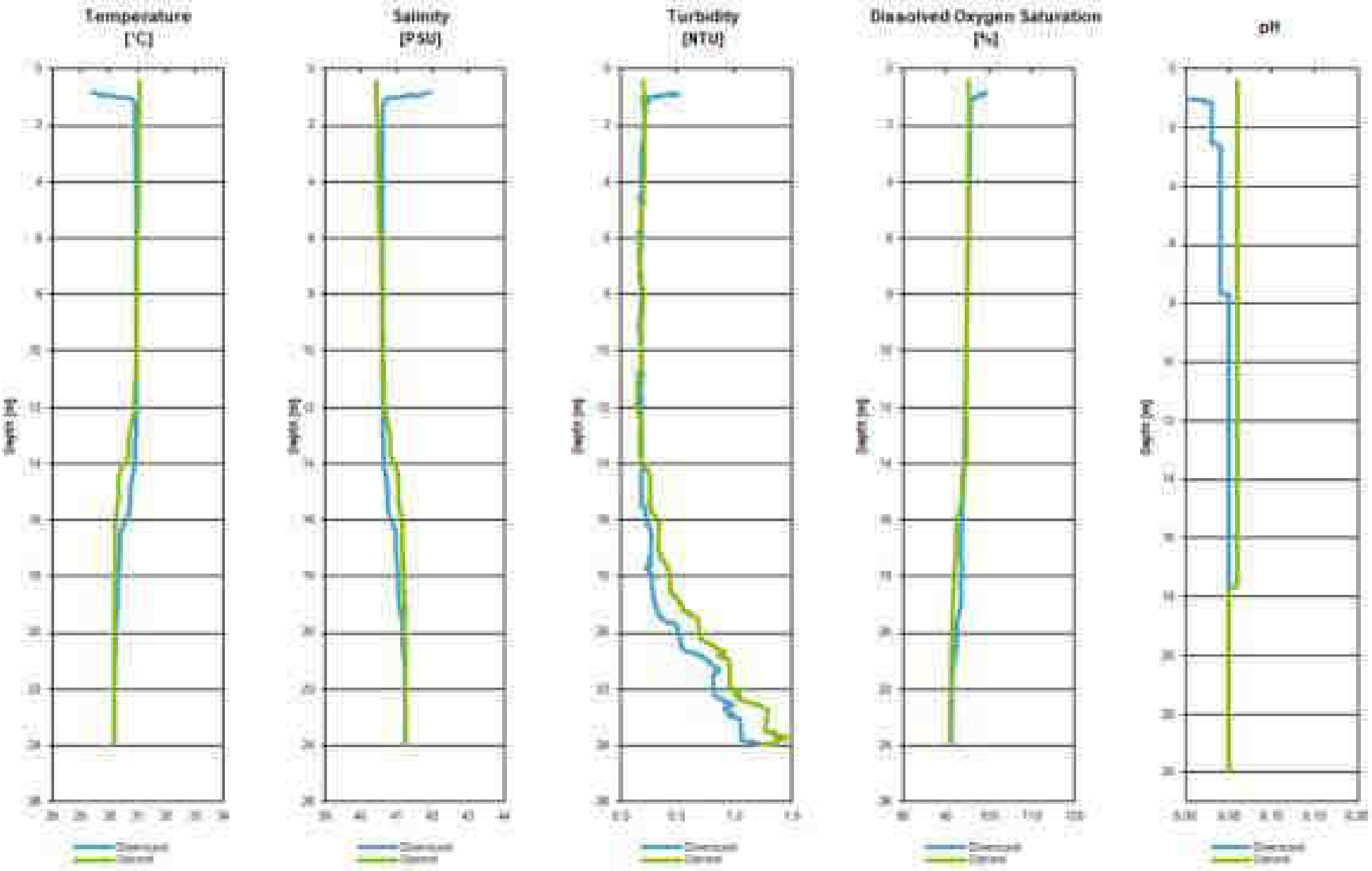
Station R1_ENV_086



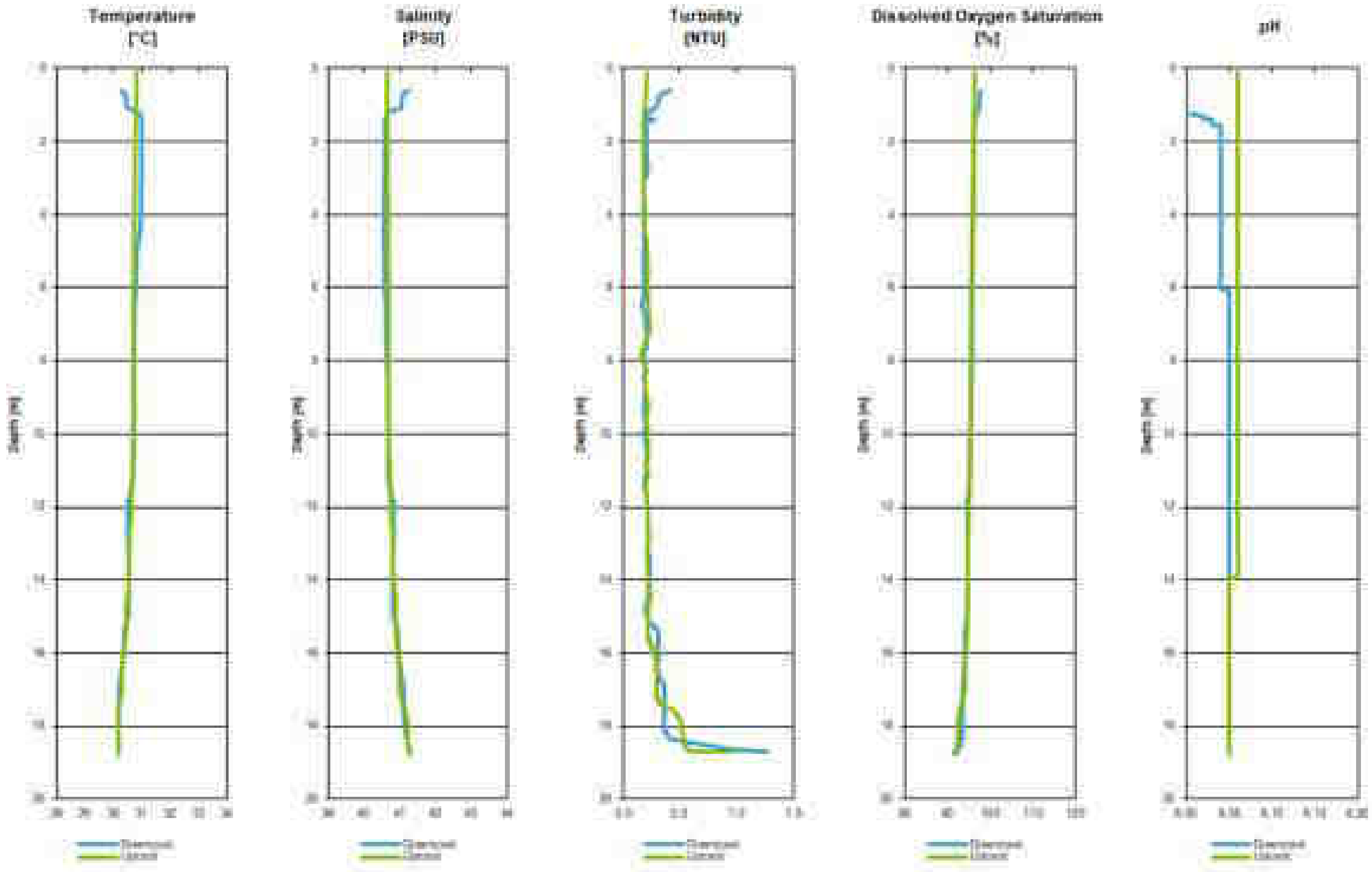
Station R1_ENV_087



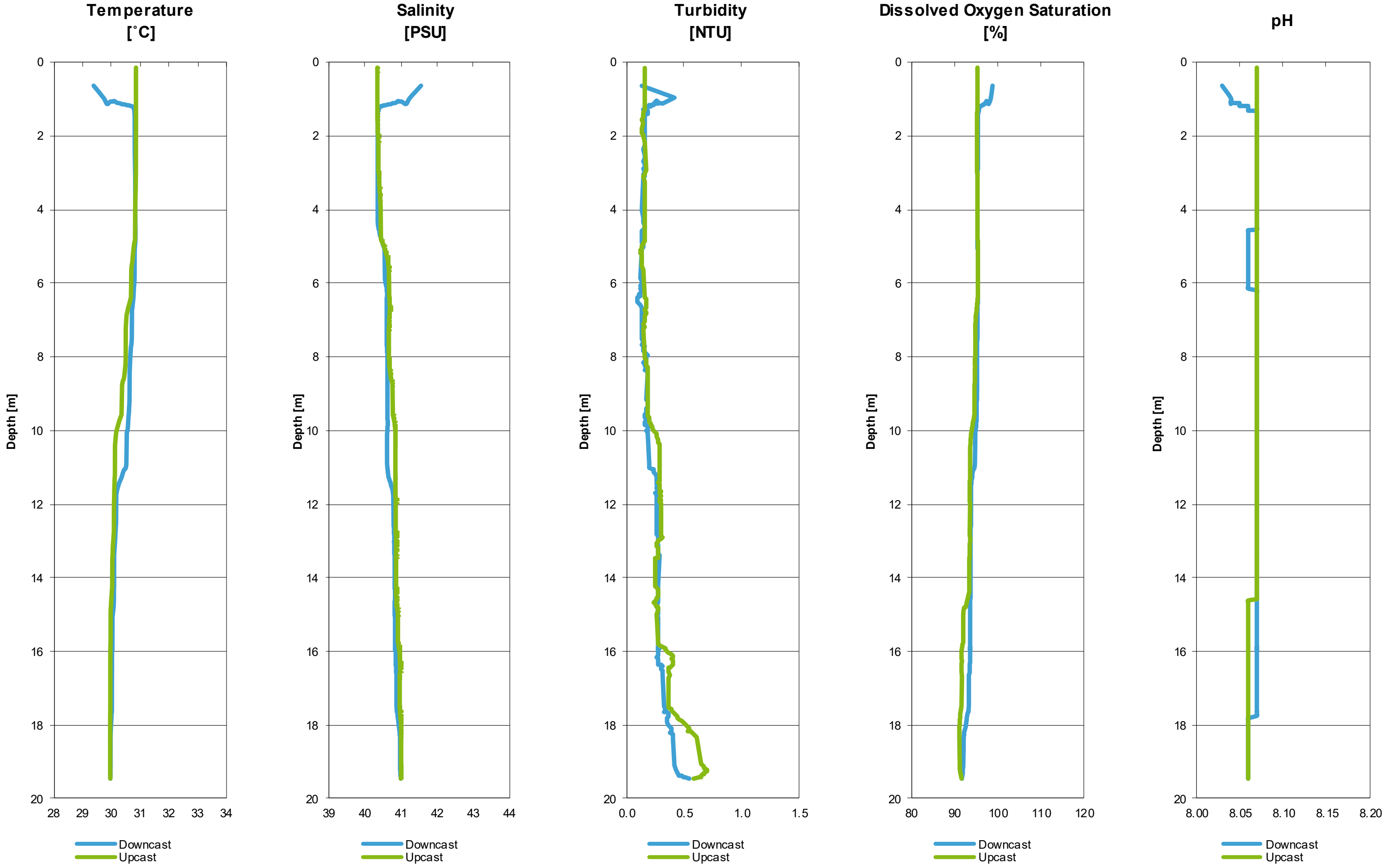
Station R1_ENV_088



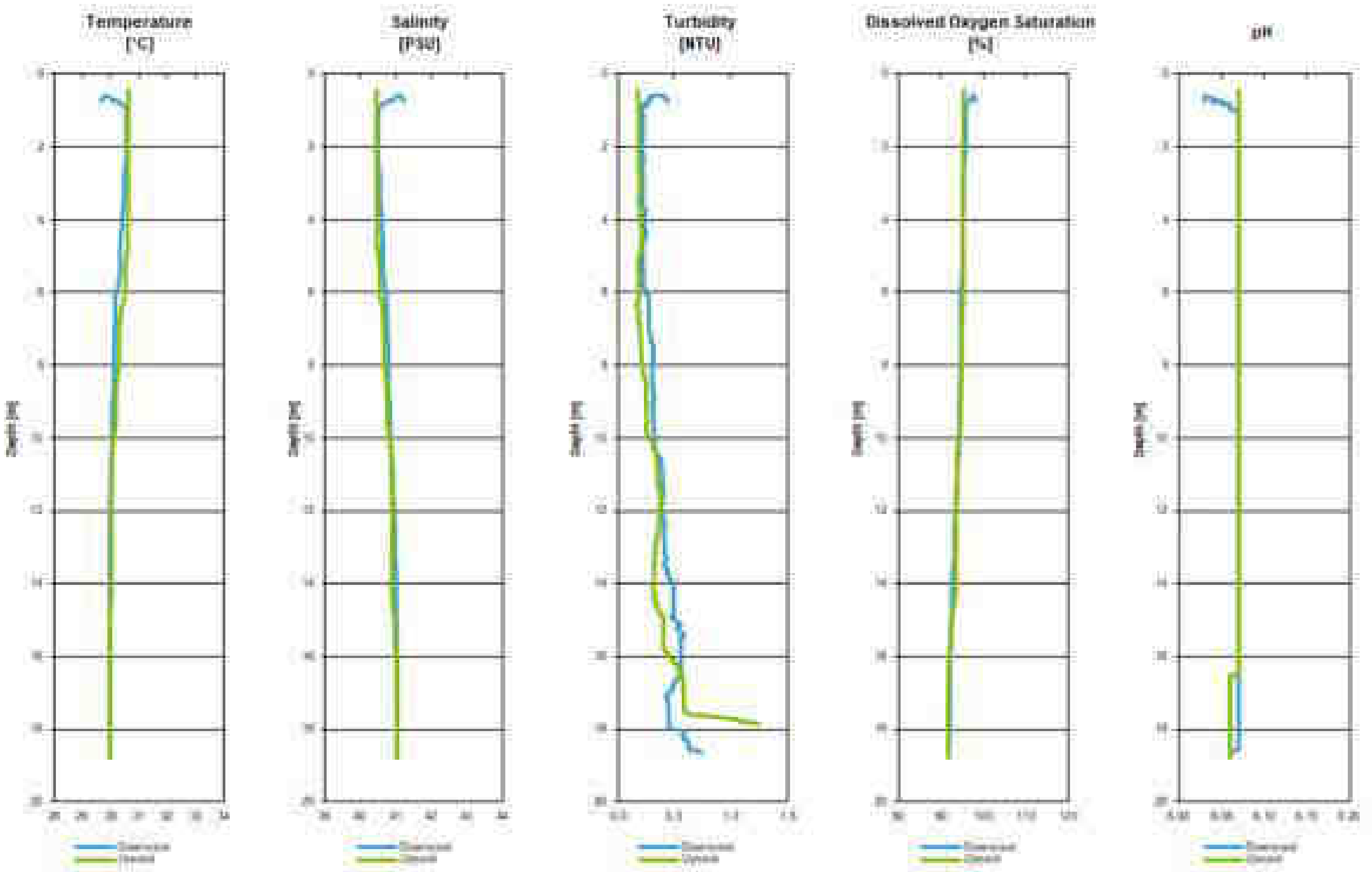
Station R1_ENV_089



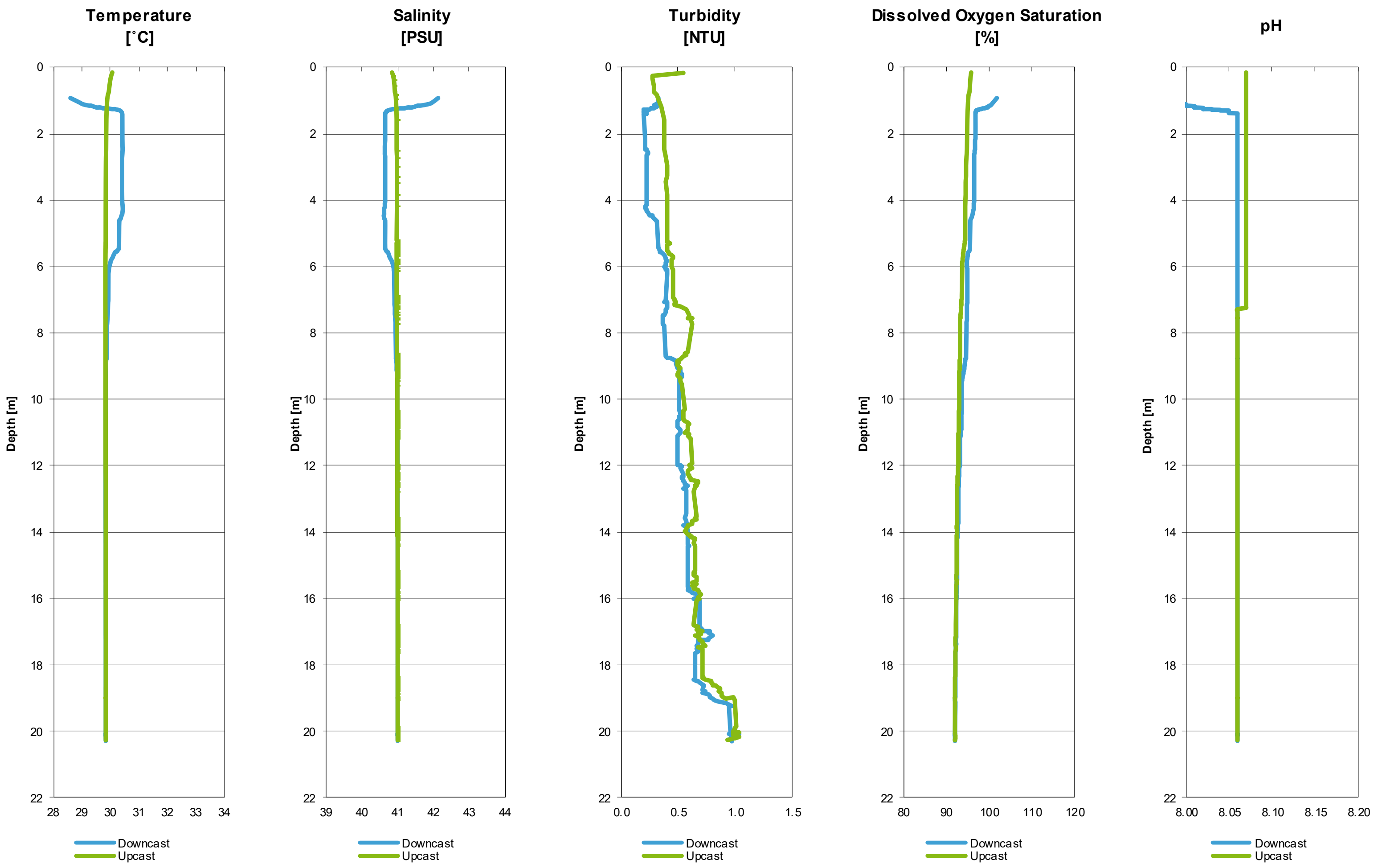
Station R1_ENV_090



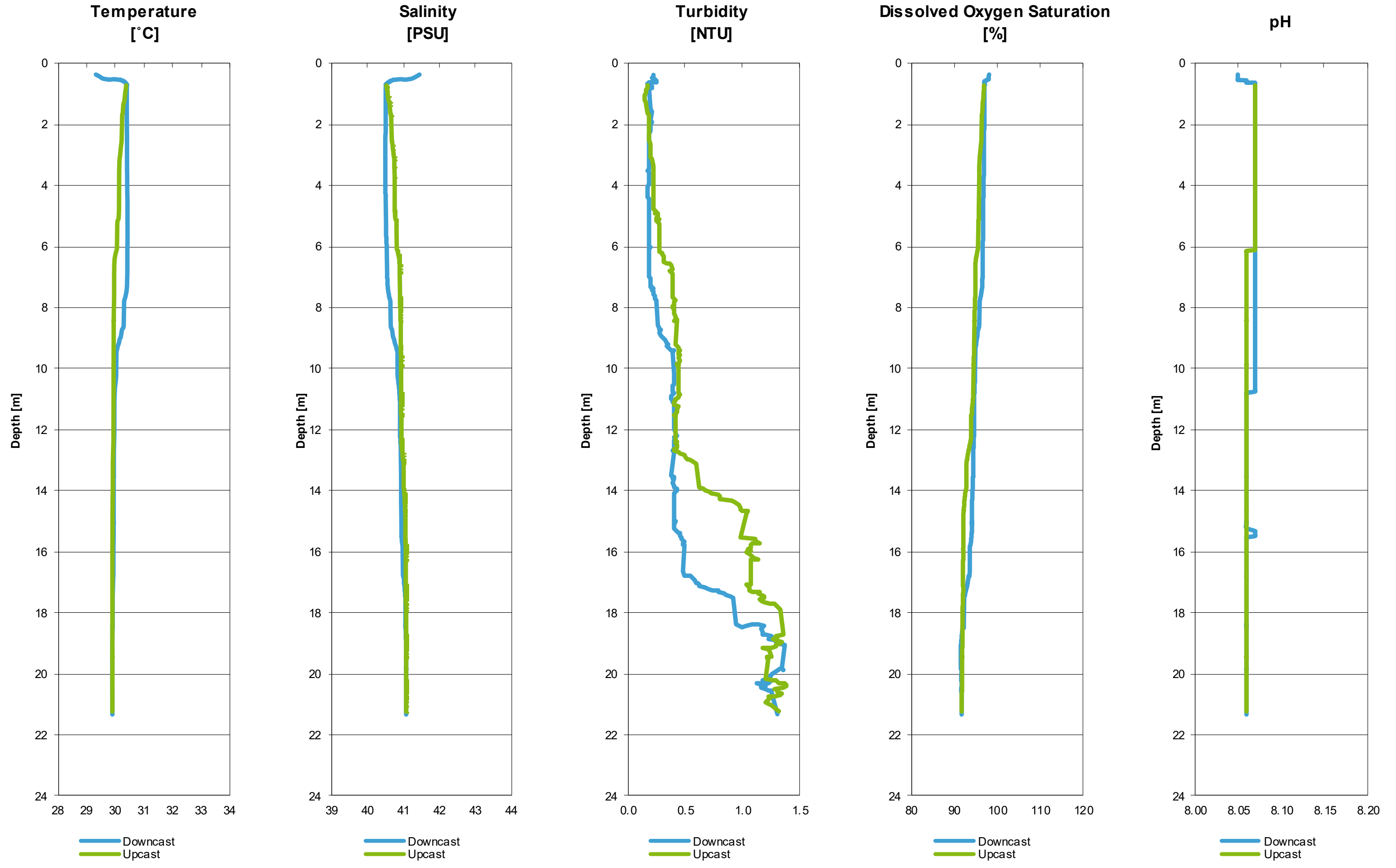
Station R1_ENV_091



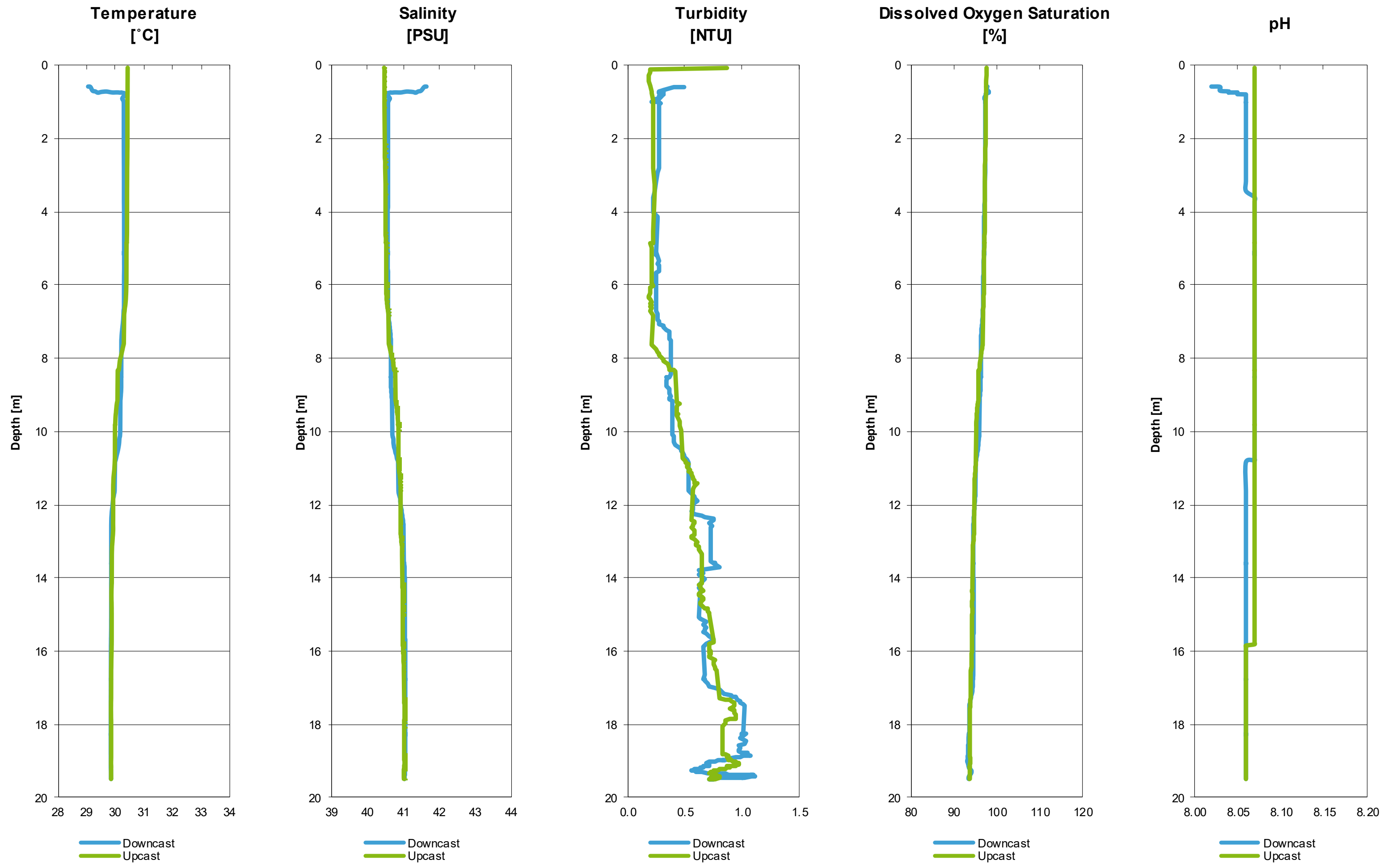
Station R1_ENV_092



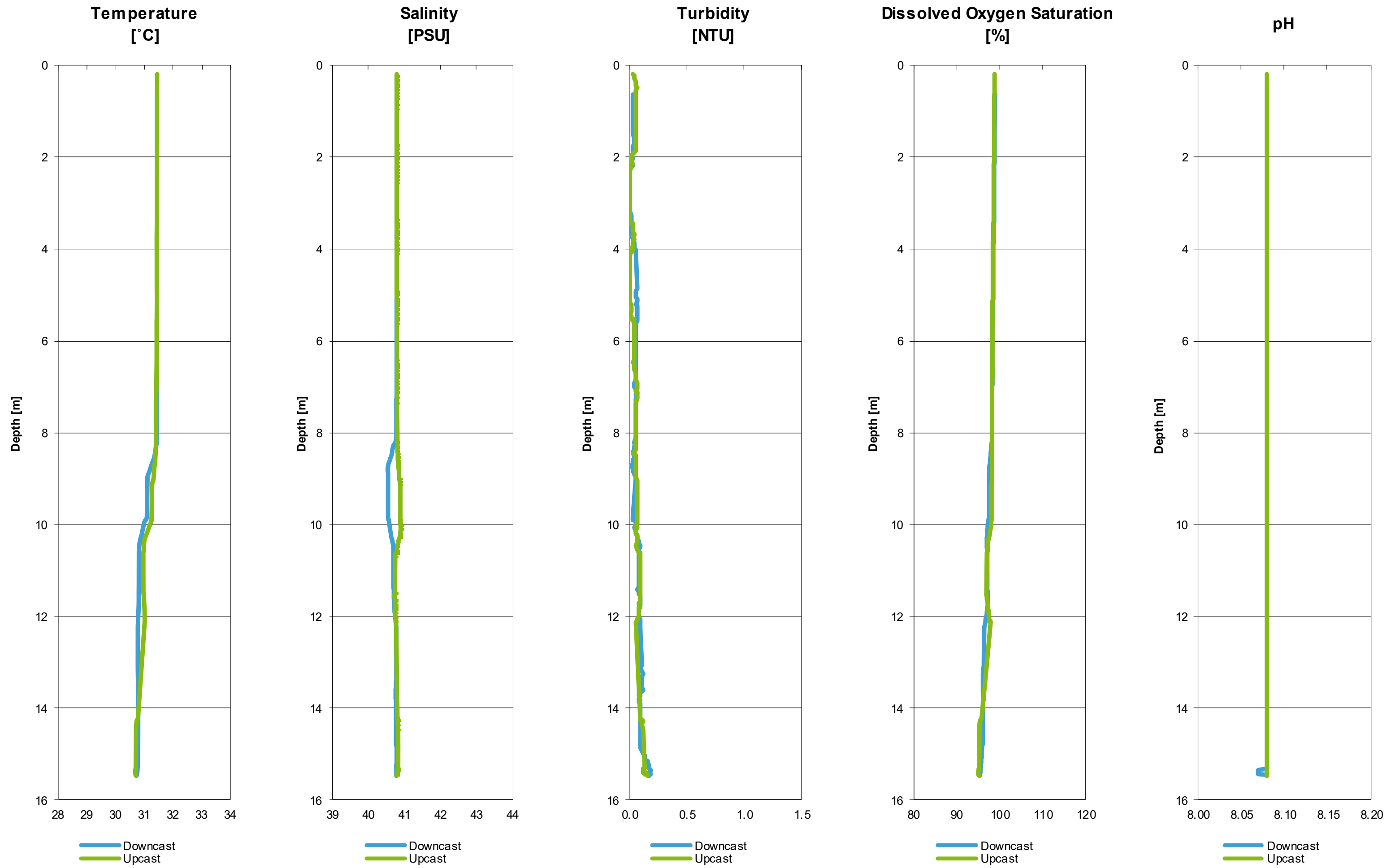
Station R1_ENV_093



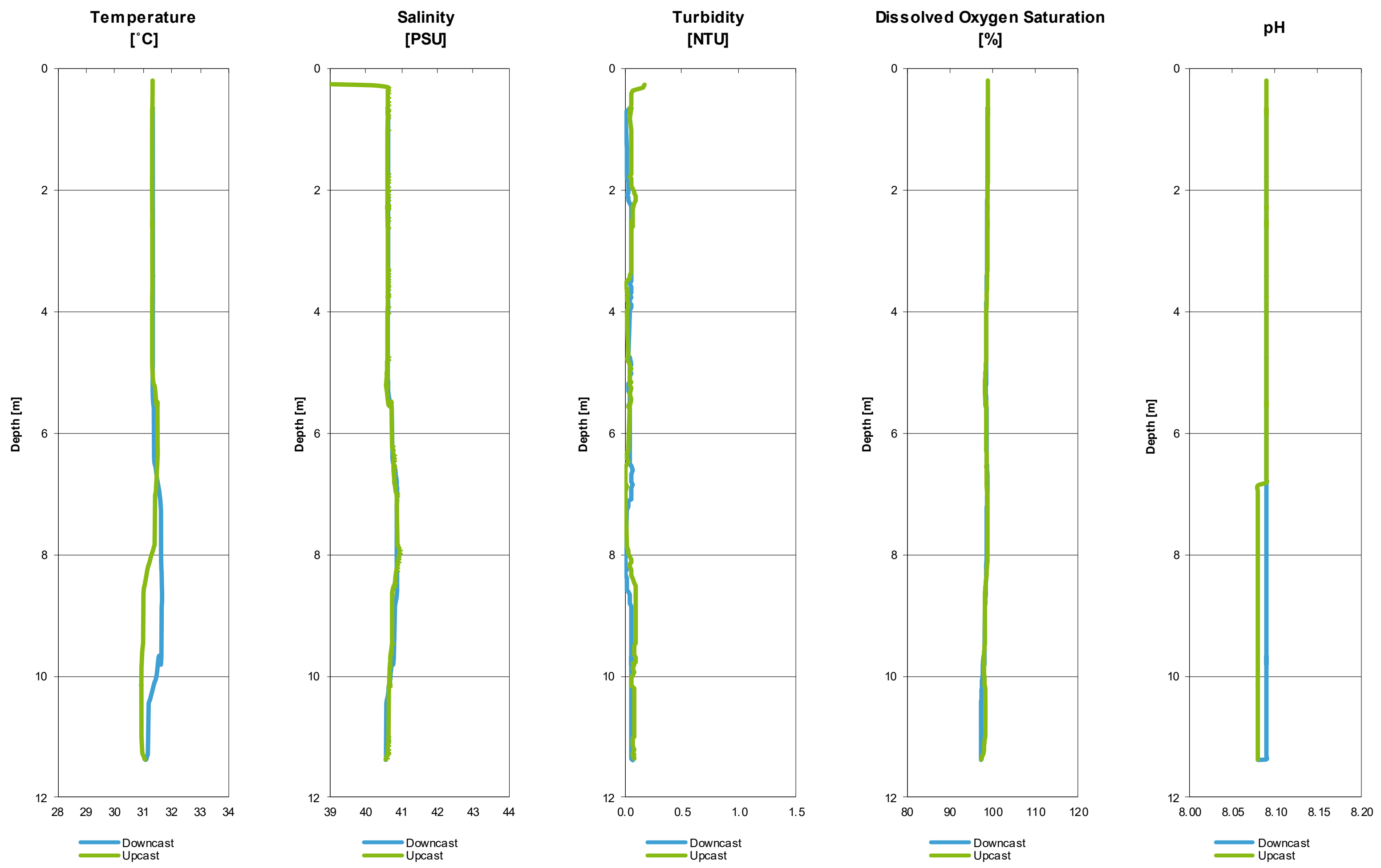
Station R1_ENV_094



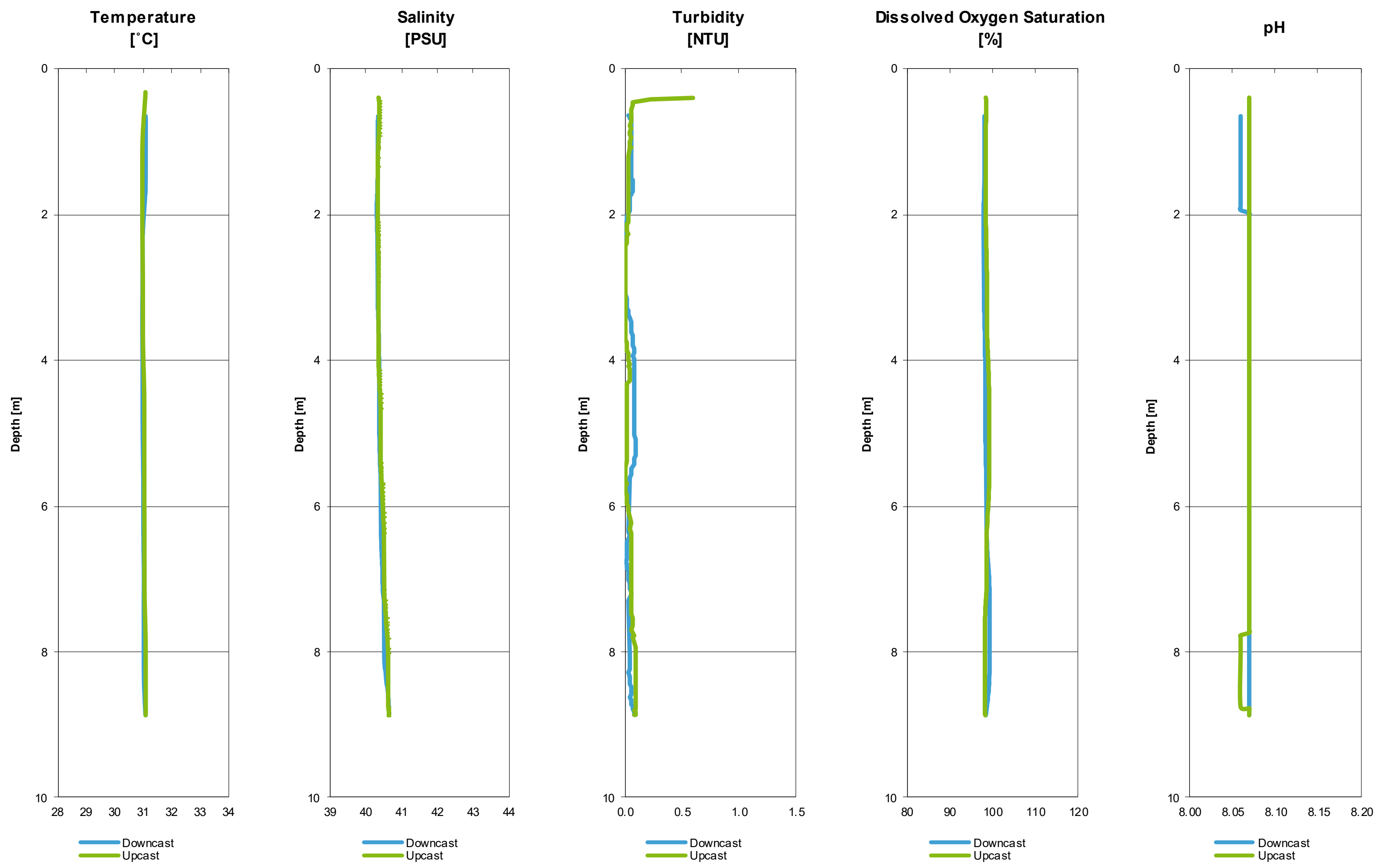
Station R1_ENV_095



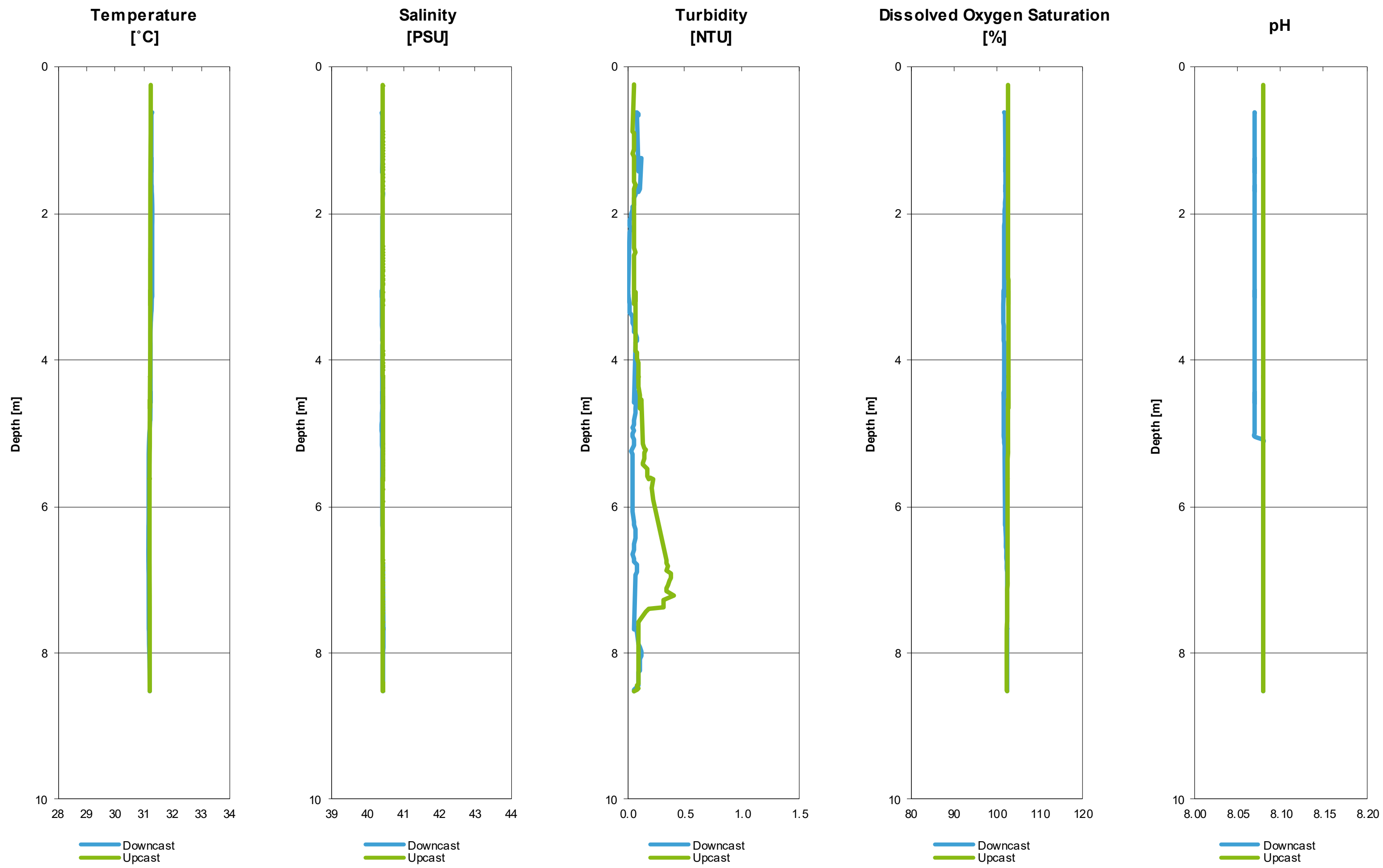
Station R1_ENV_096



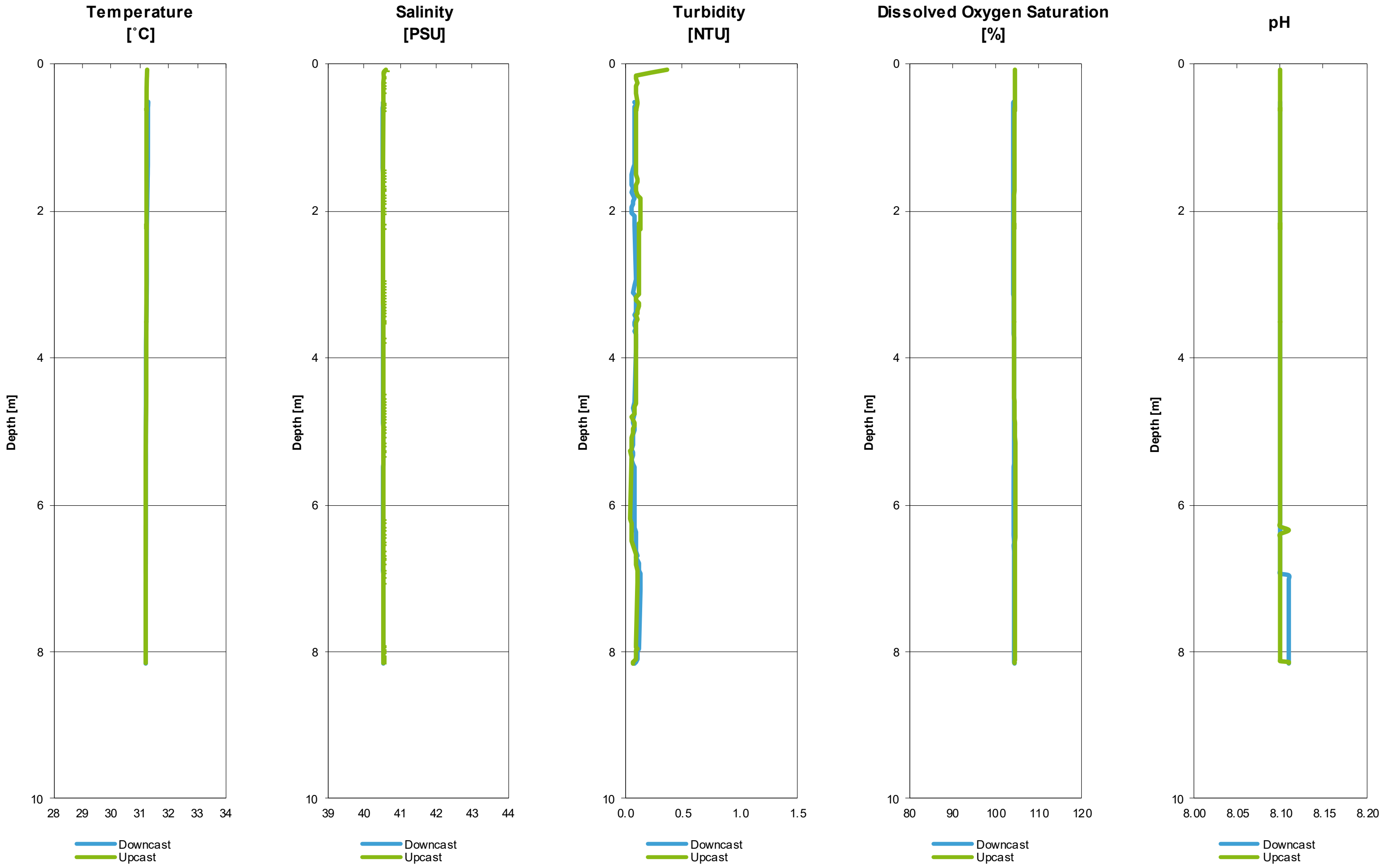
Station R1_ENV_097



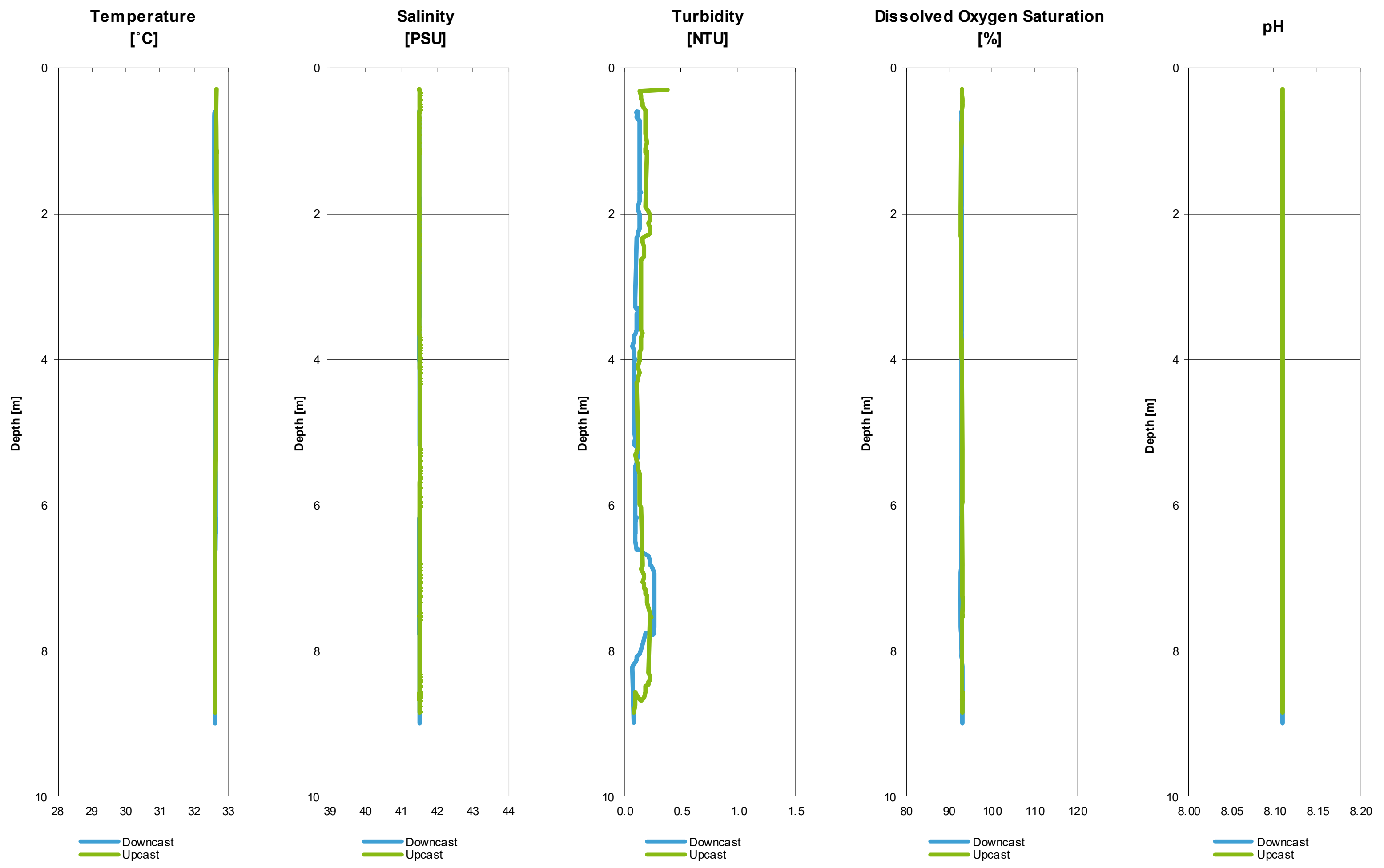
Station R1_ENV_098

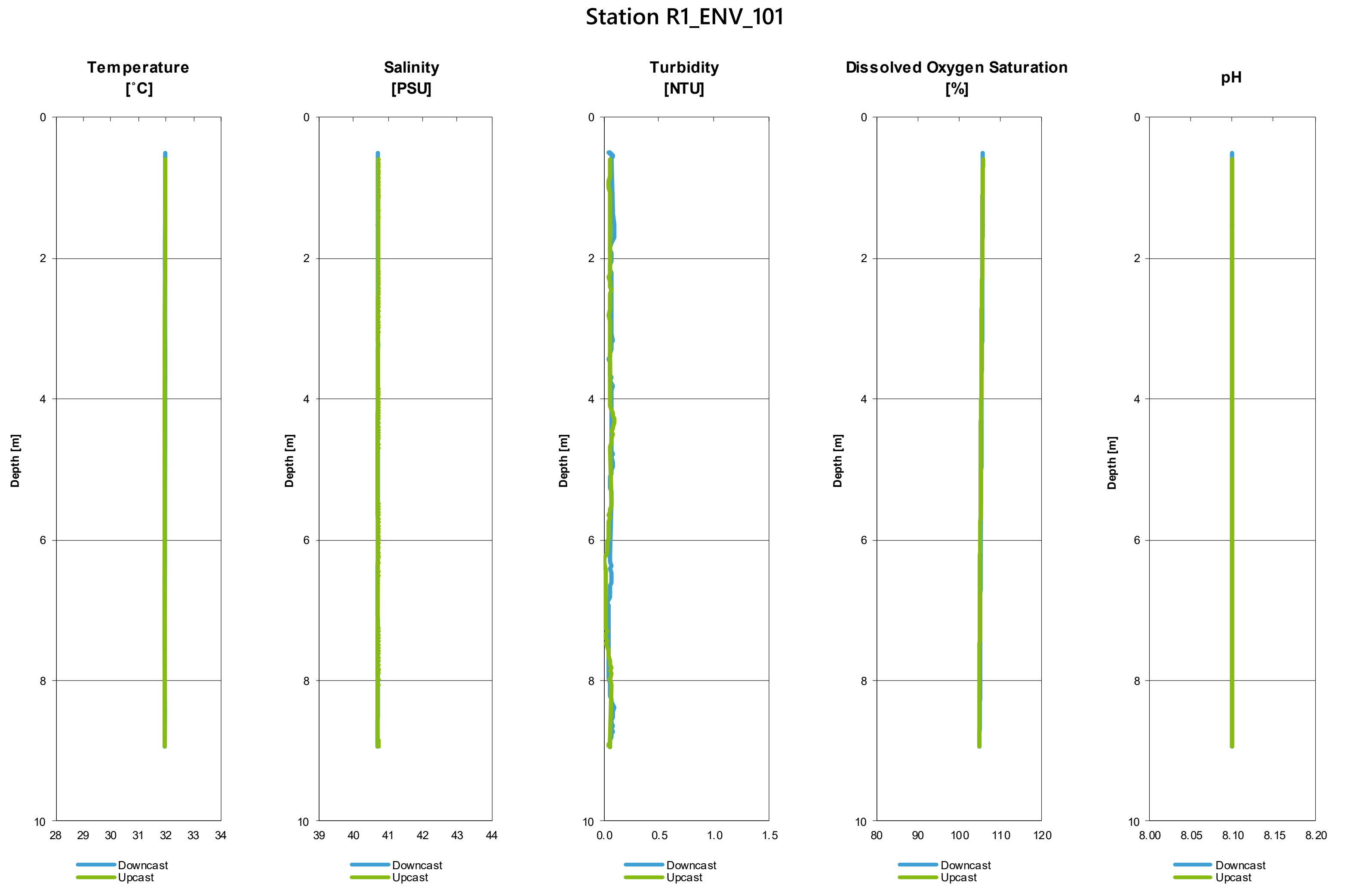


Station R1_ENV_099

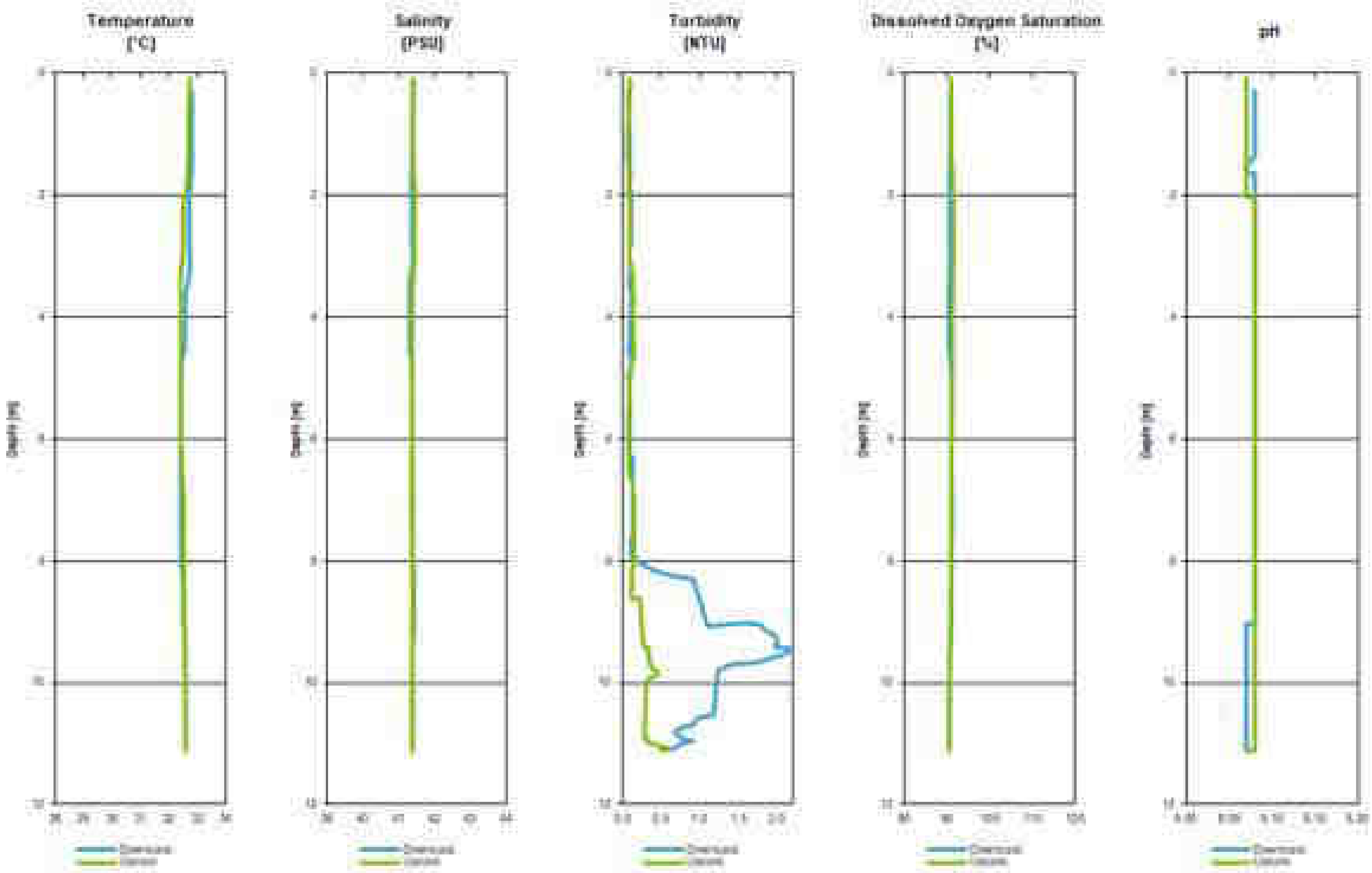


Station R1_ENV_100

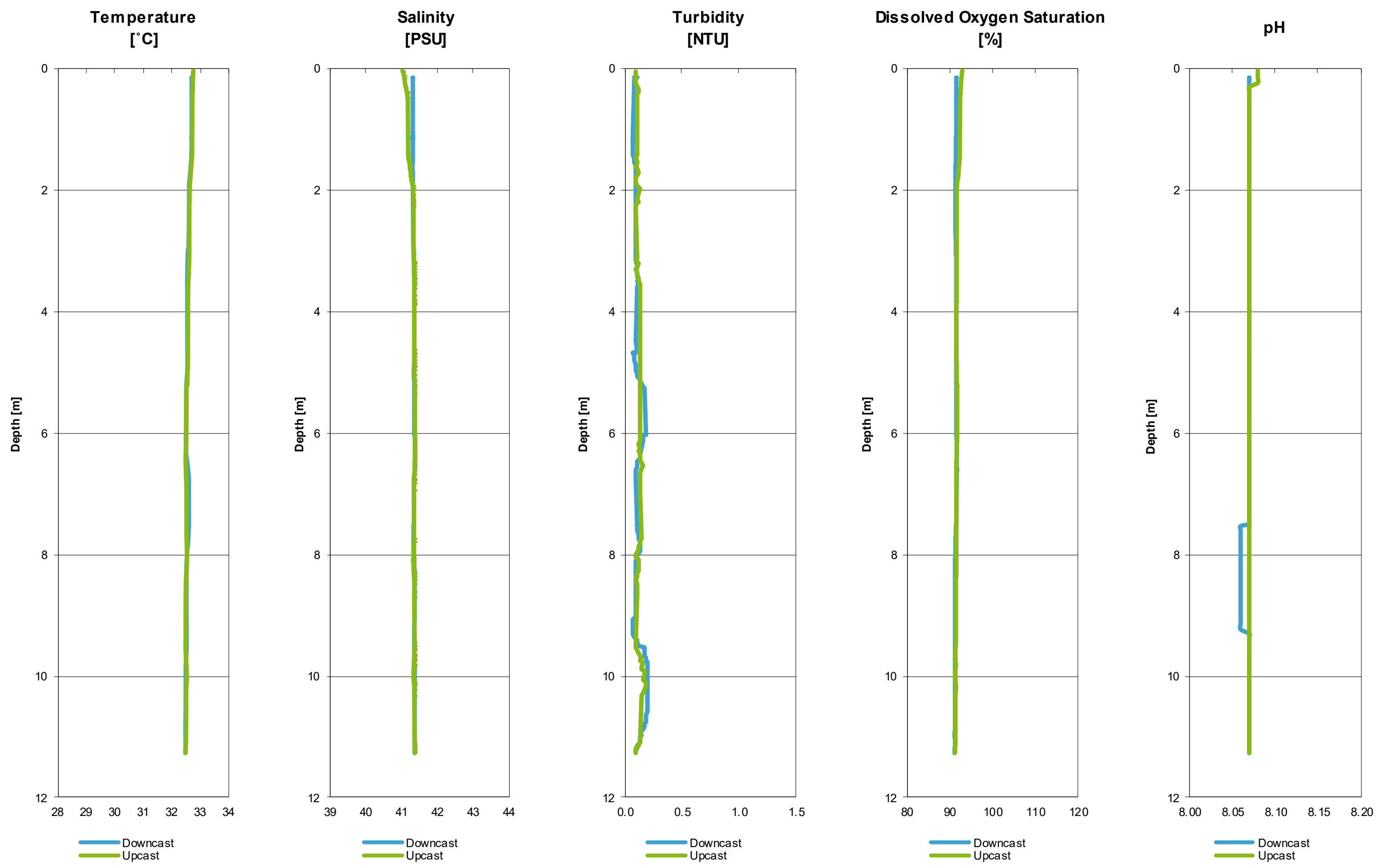



Station R1_ENV_101
Temperature [˚C]
Salinity [PSU]
Turbidity [NTU]
Dissolved Oxygen Saturation [%]
pH
Depth [m]
Downcast
Upcast

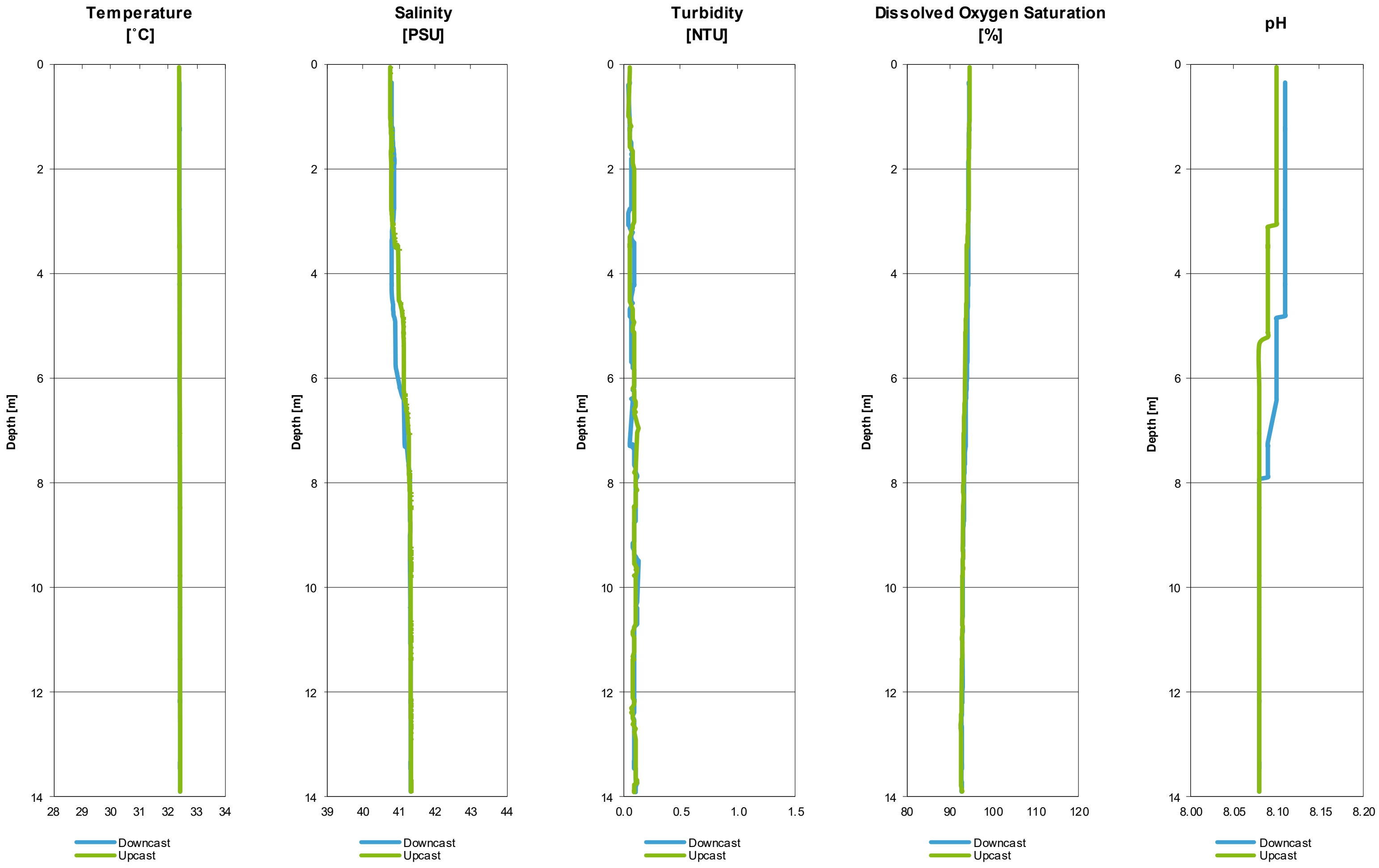
Station R1_ENV_102



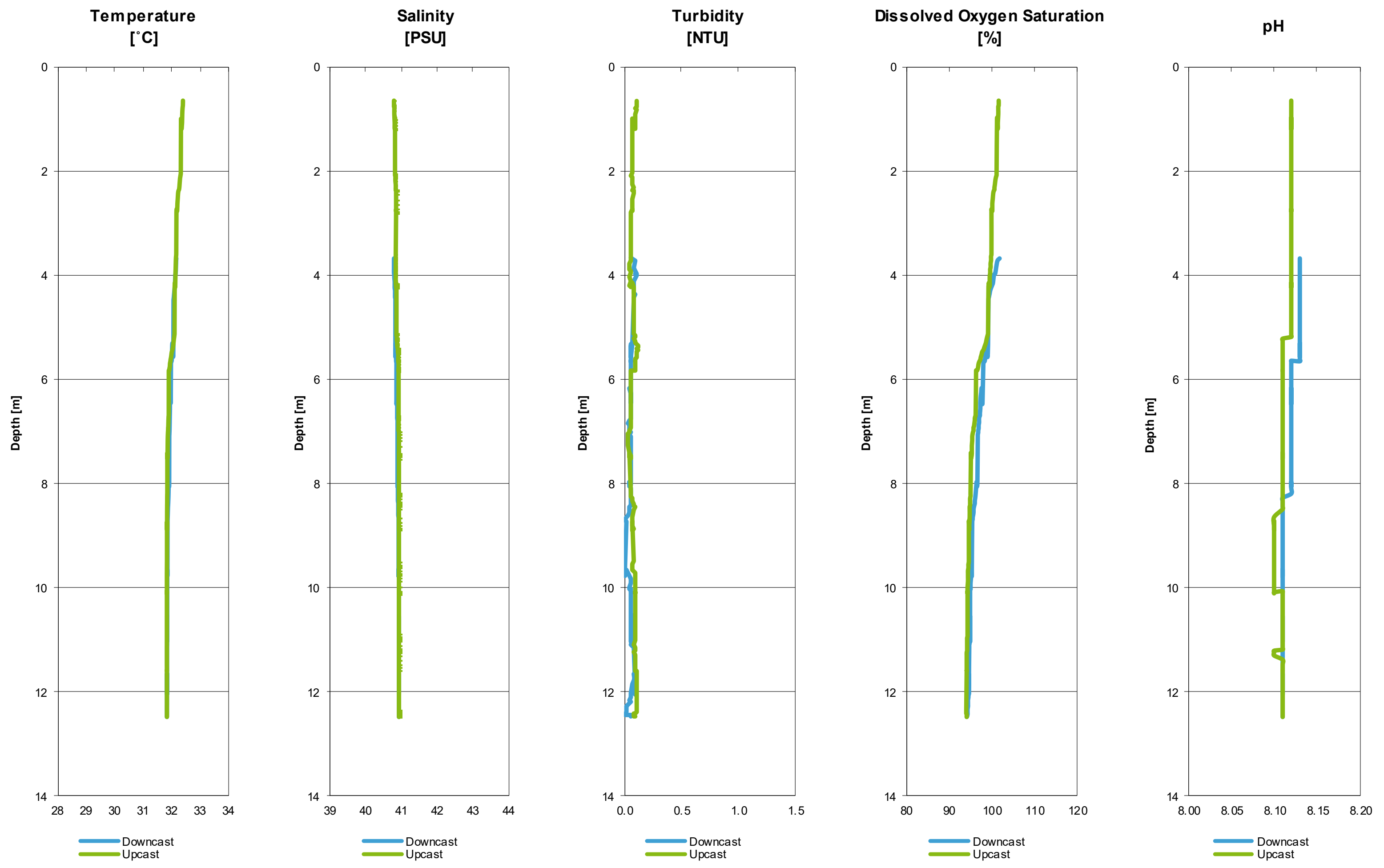
Station R1_ENV_103



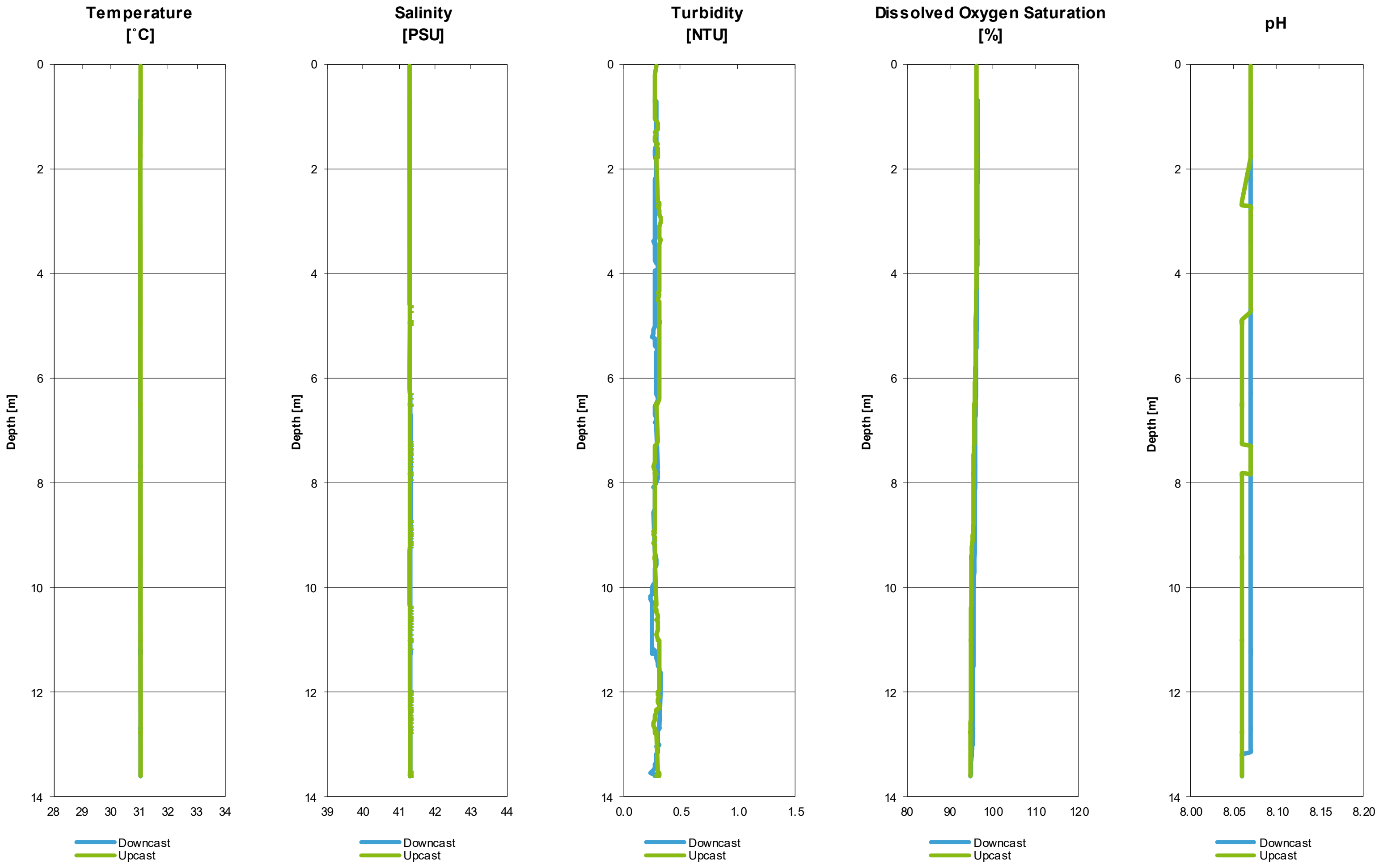
Station R1_ENV_104



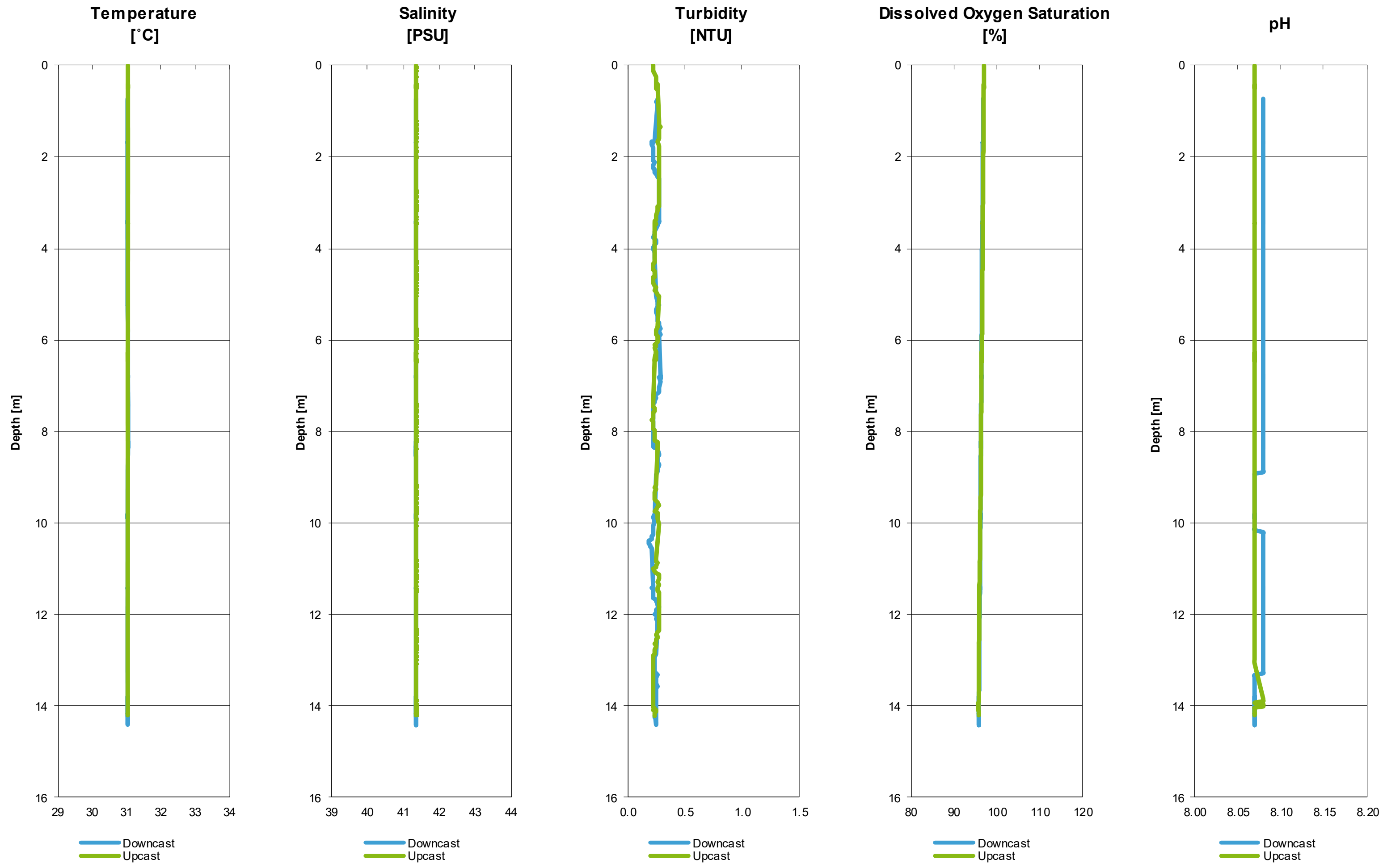
Station R1_ENV_105



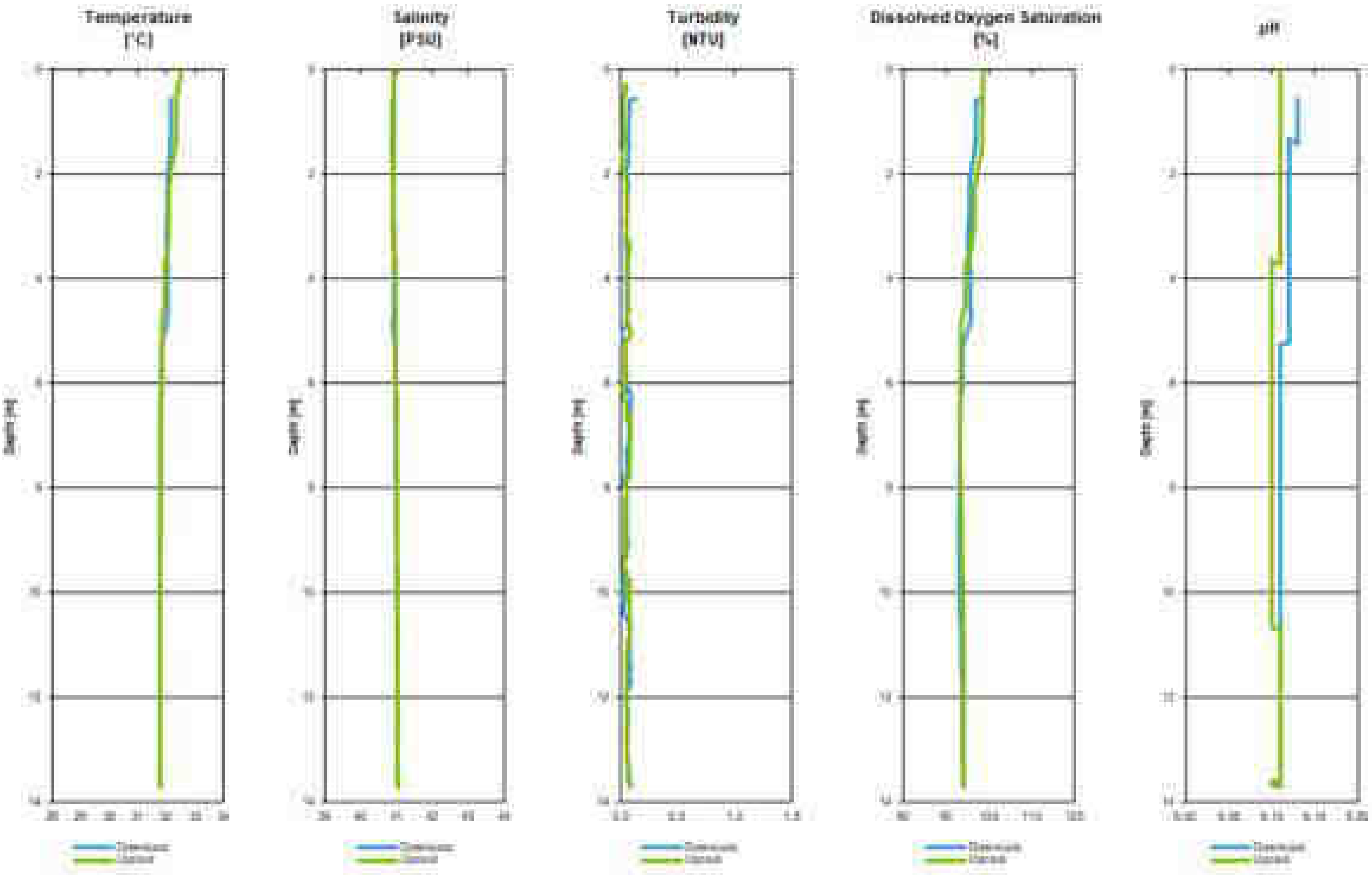
Station R1_ENV_106



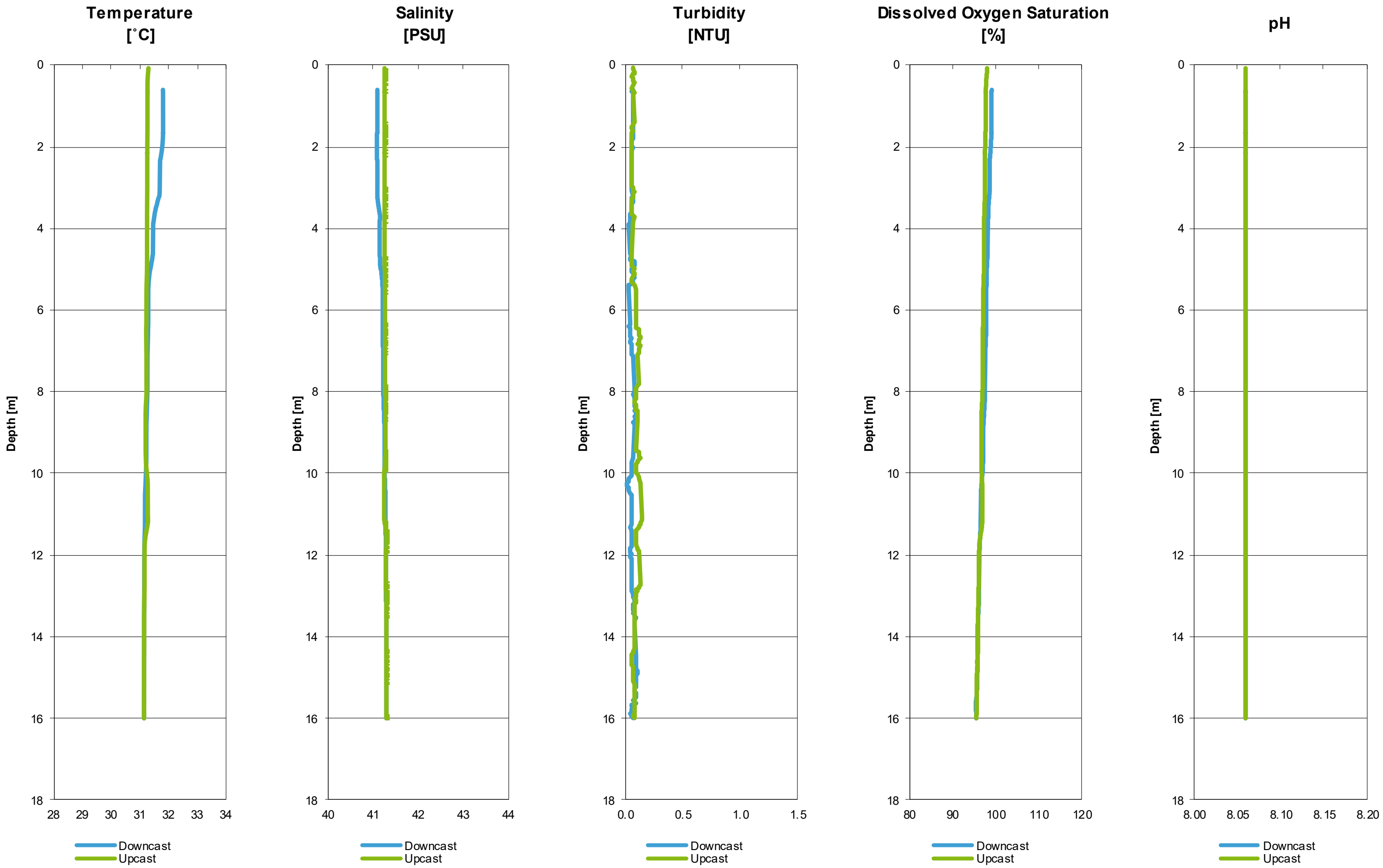
Station R1_ENV_107



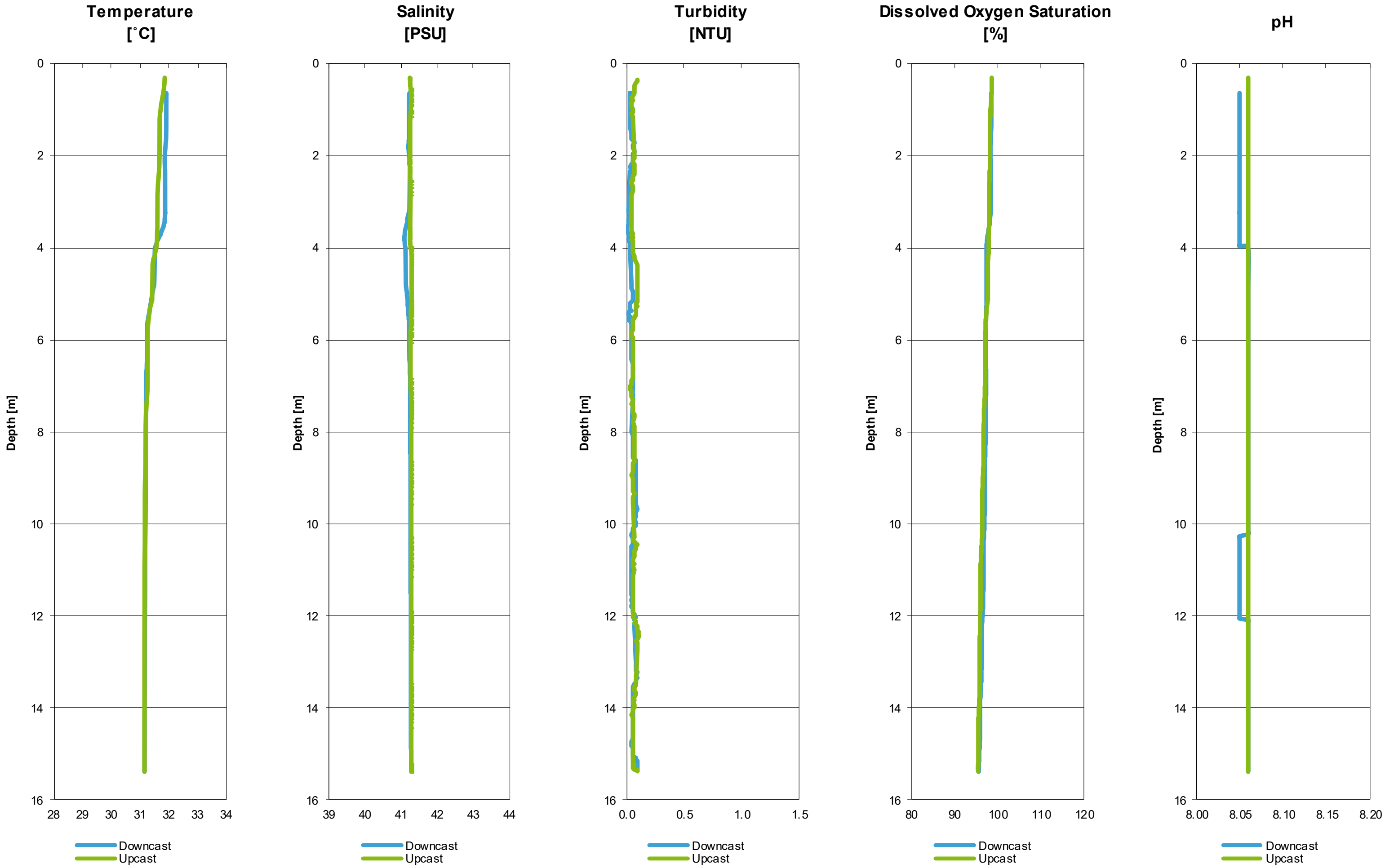
Station R1_ENV_108



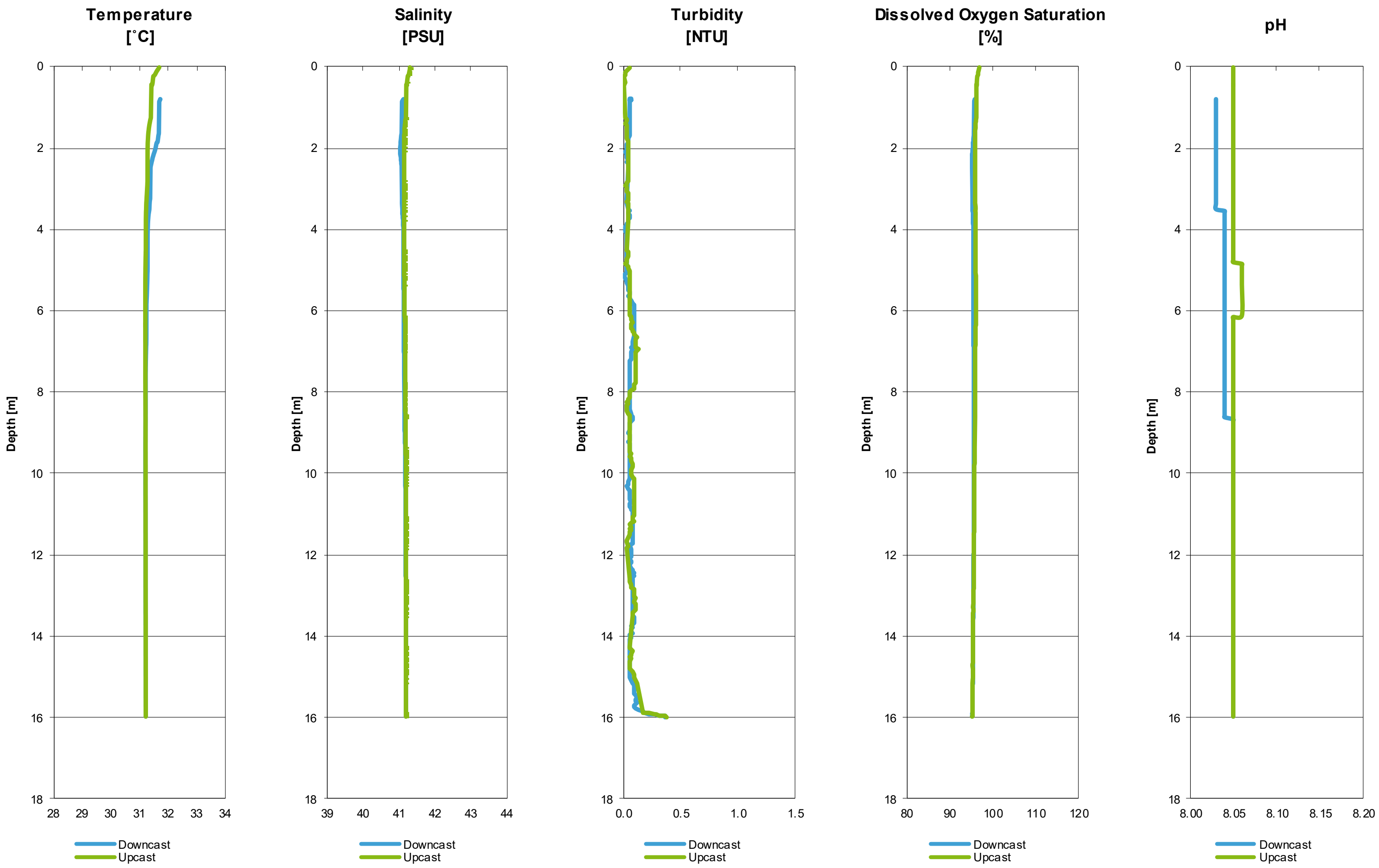
Station R1_ENV_109



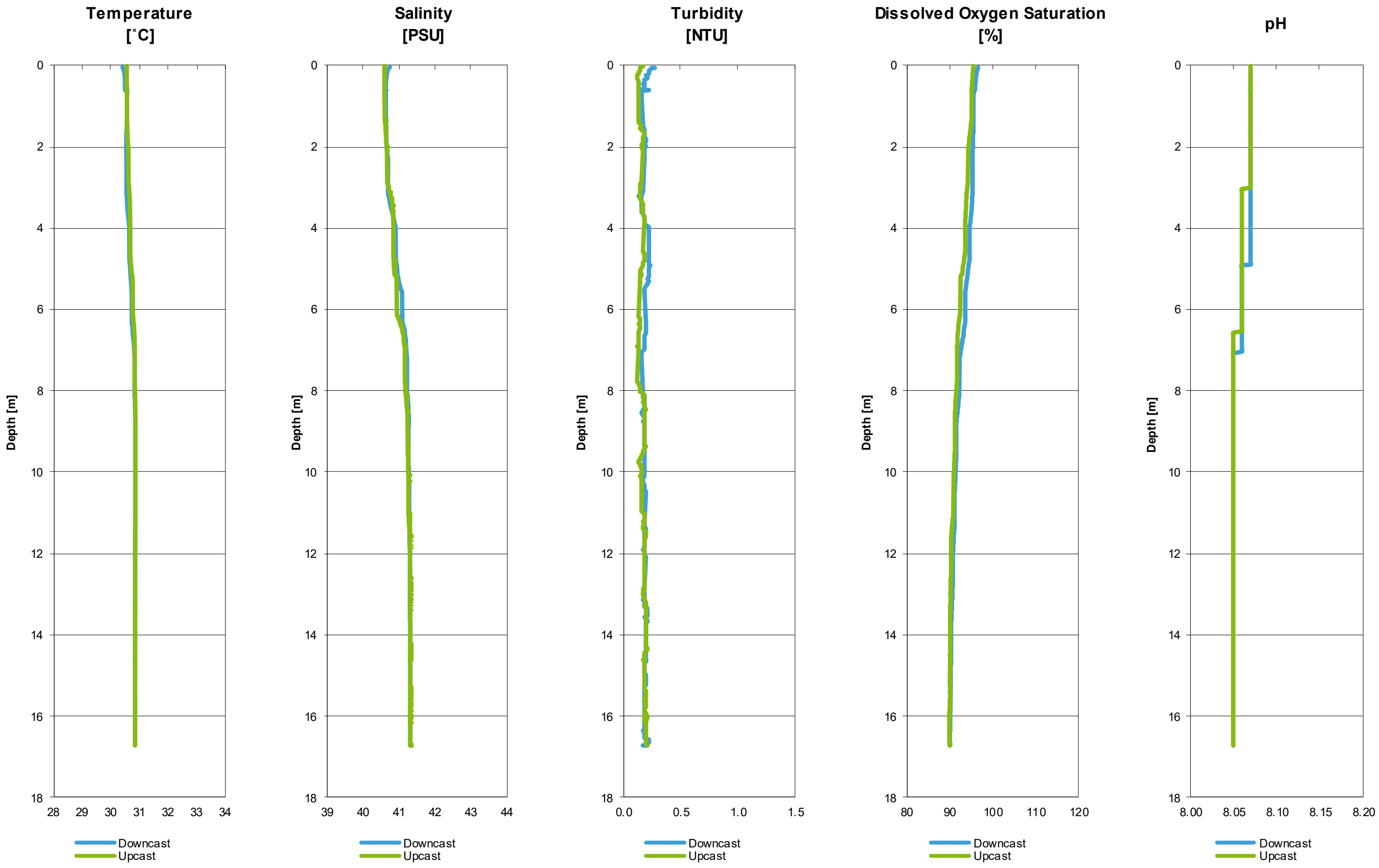
Station R1_ENV_110



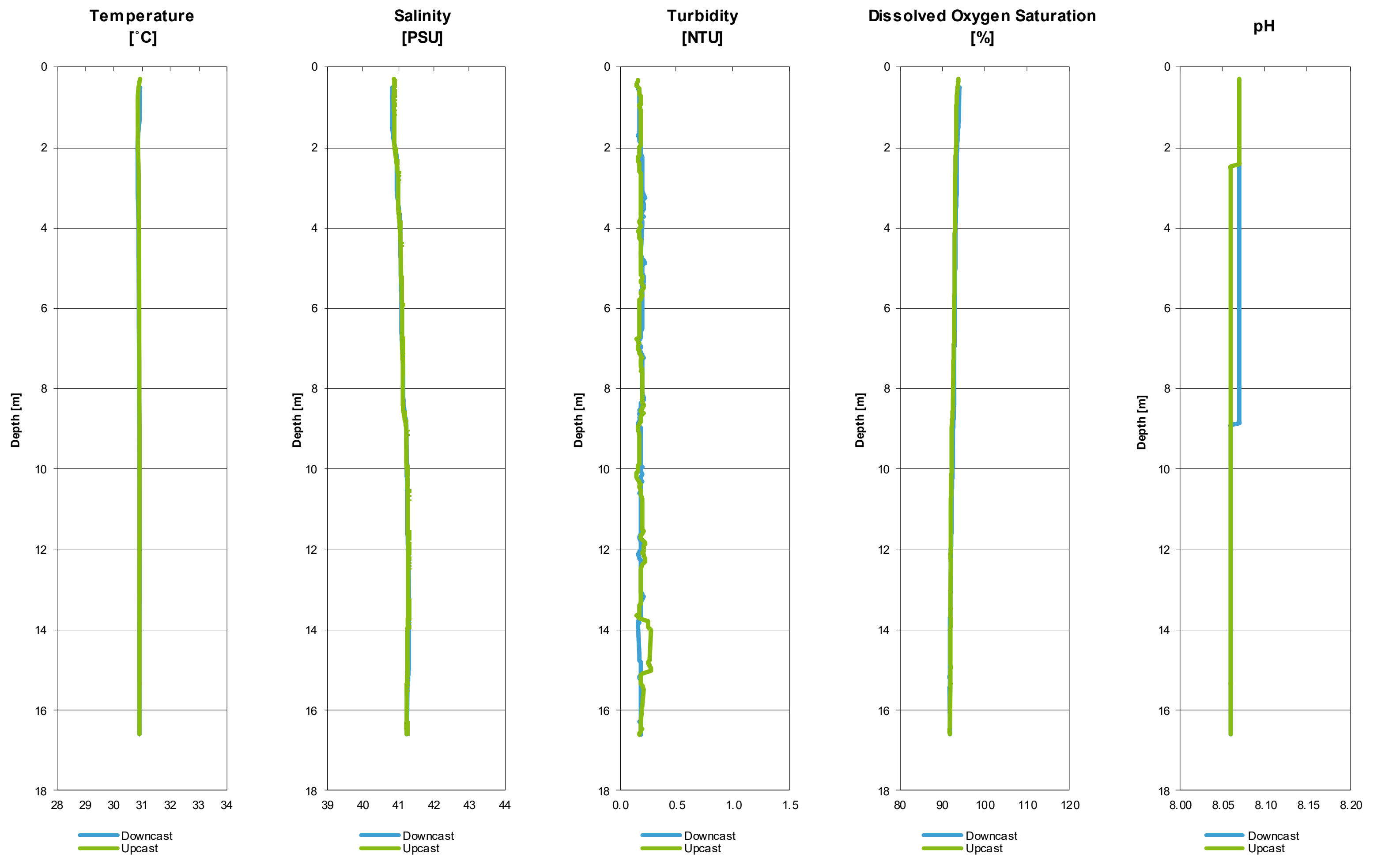
Station R1_ENV_111



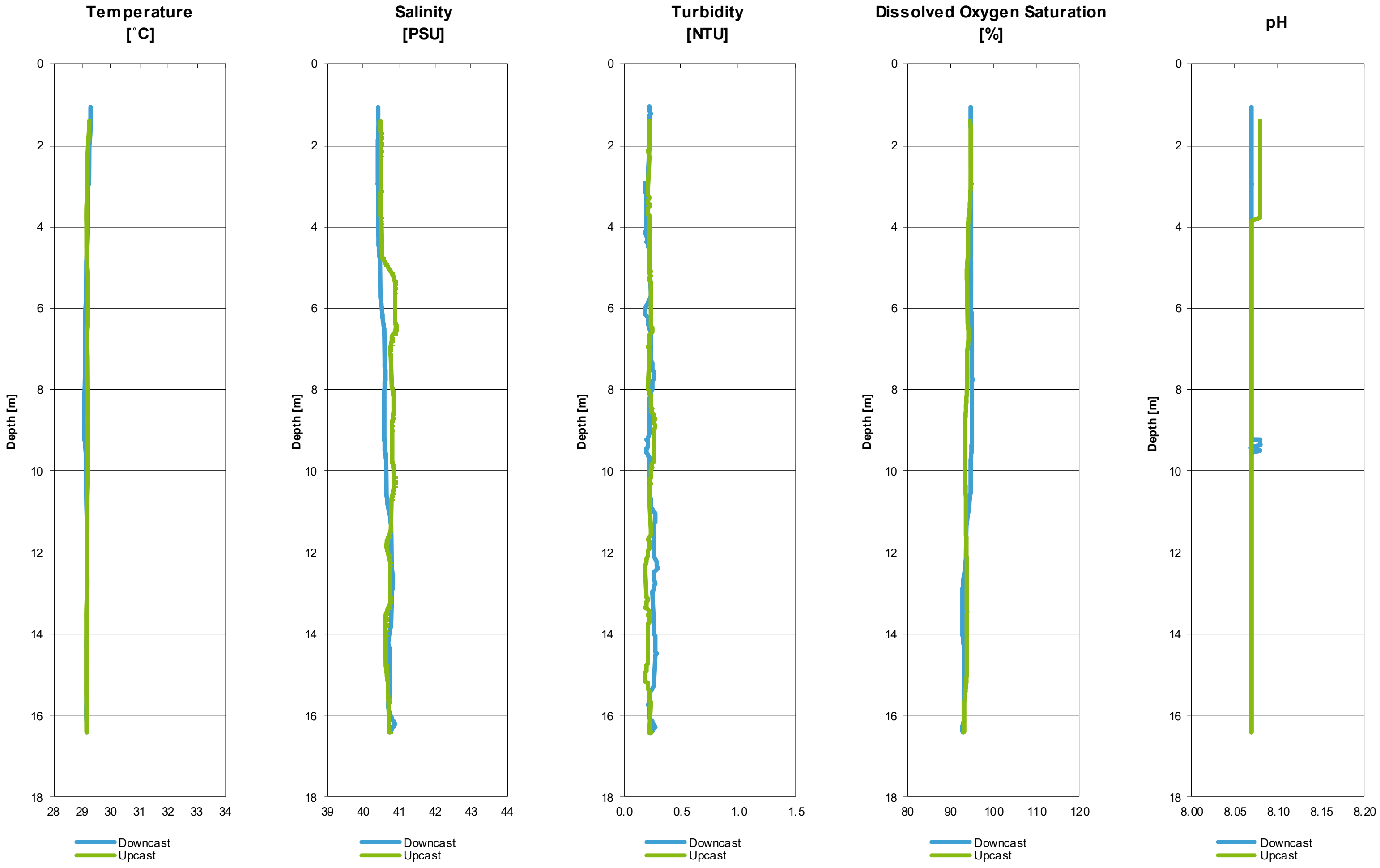
Station R1_ENV_112



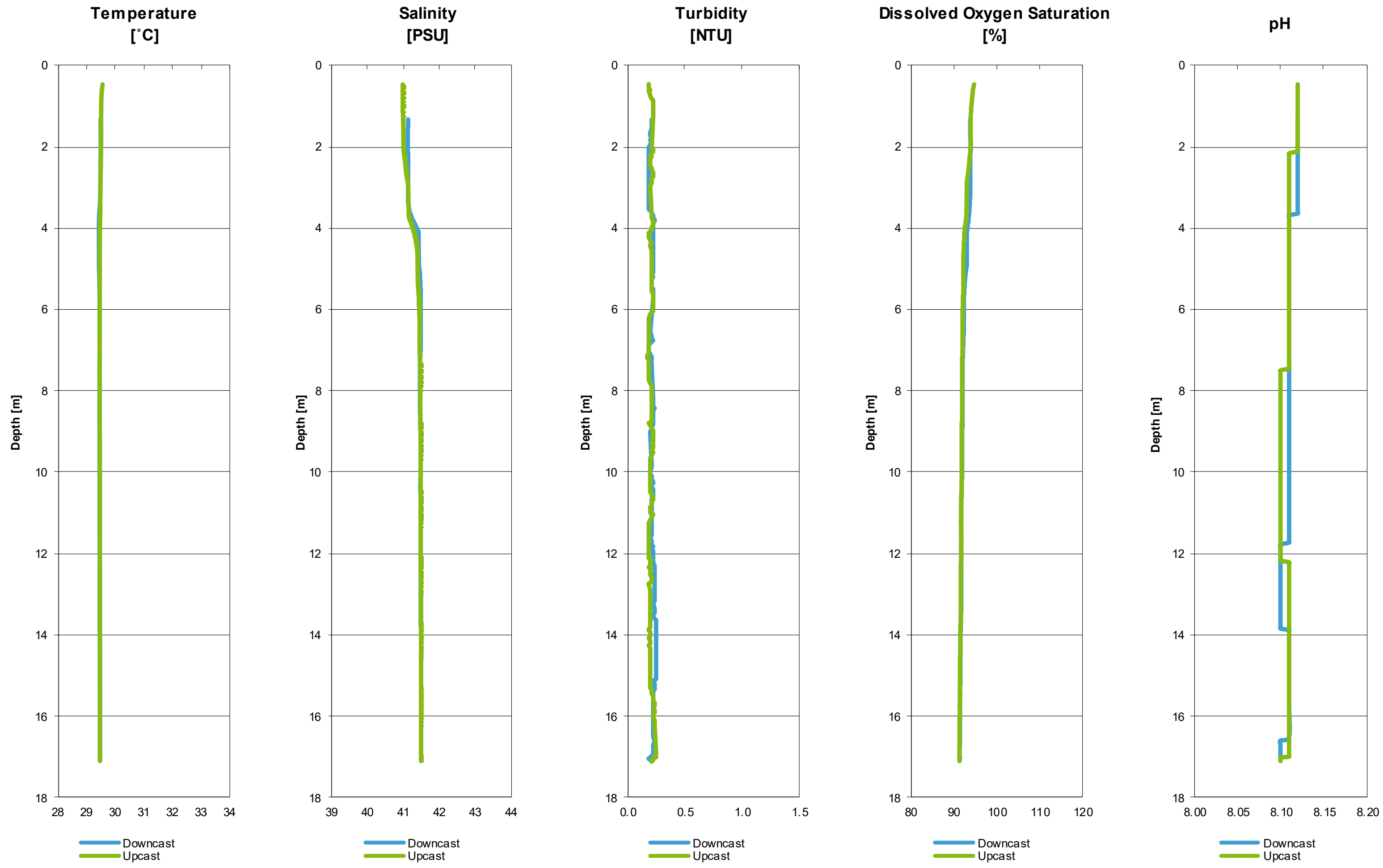
Station R1_ENV_113



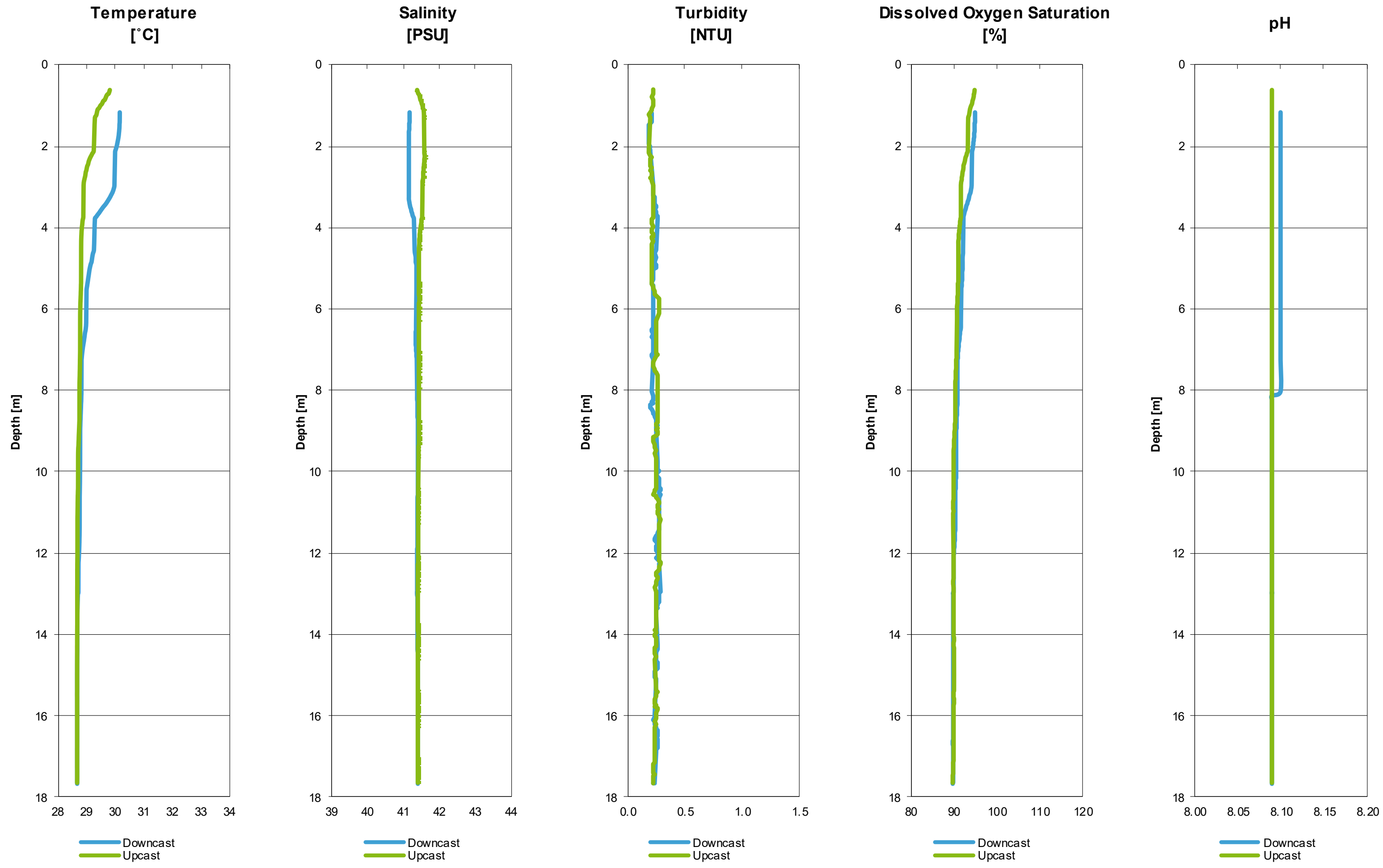
Station R1_ENV_114



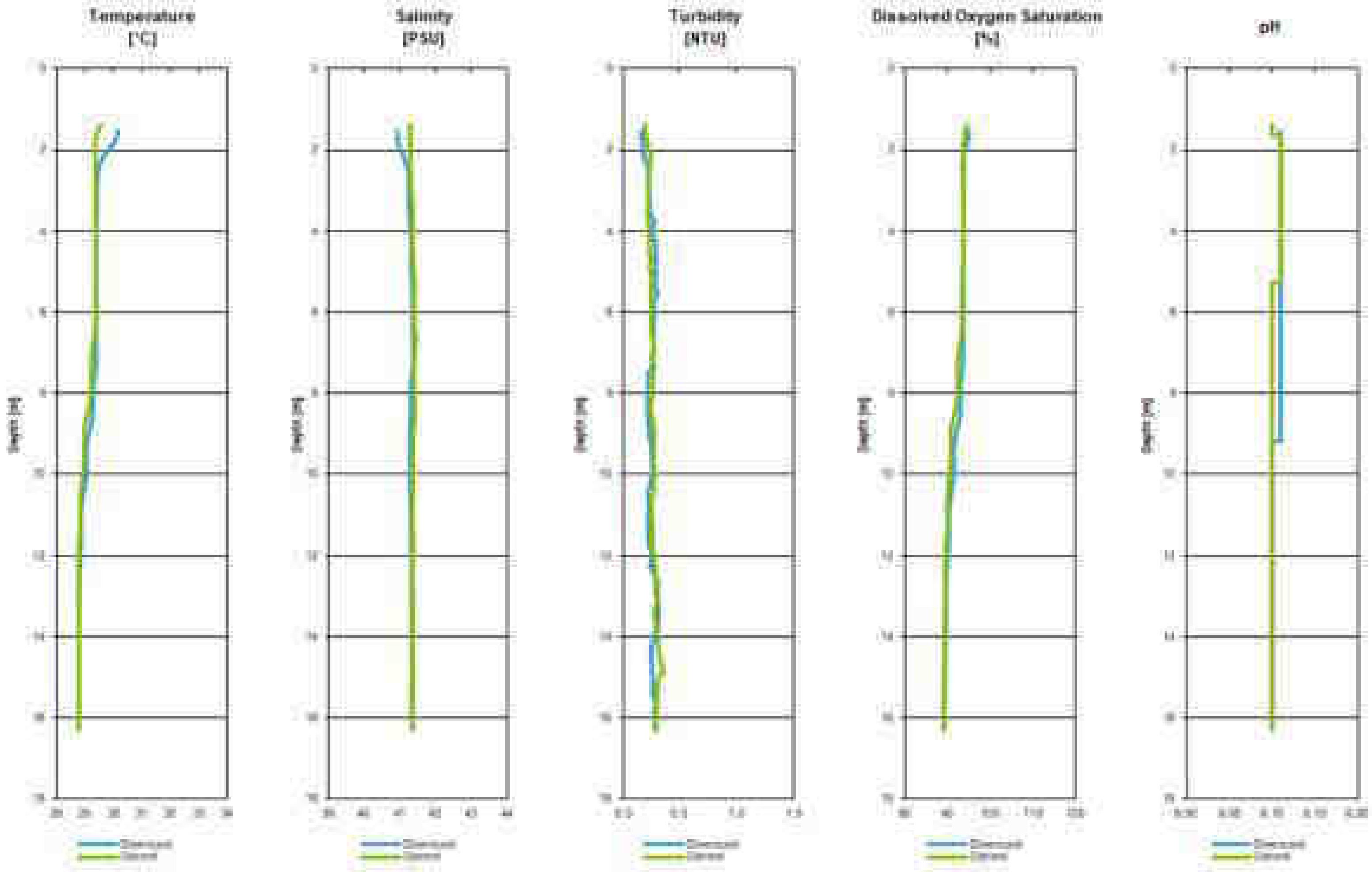
Station R1_ENV_115



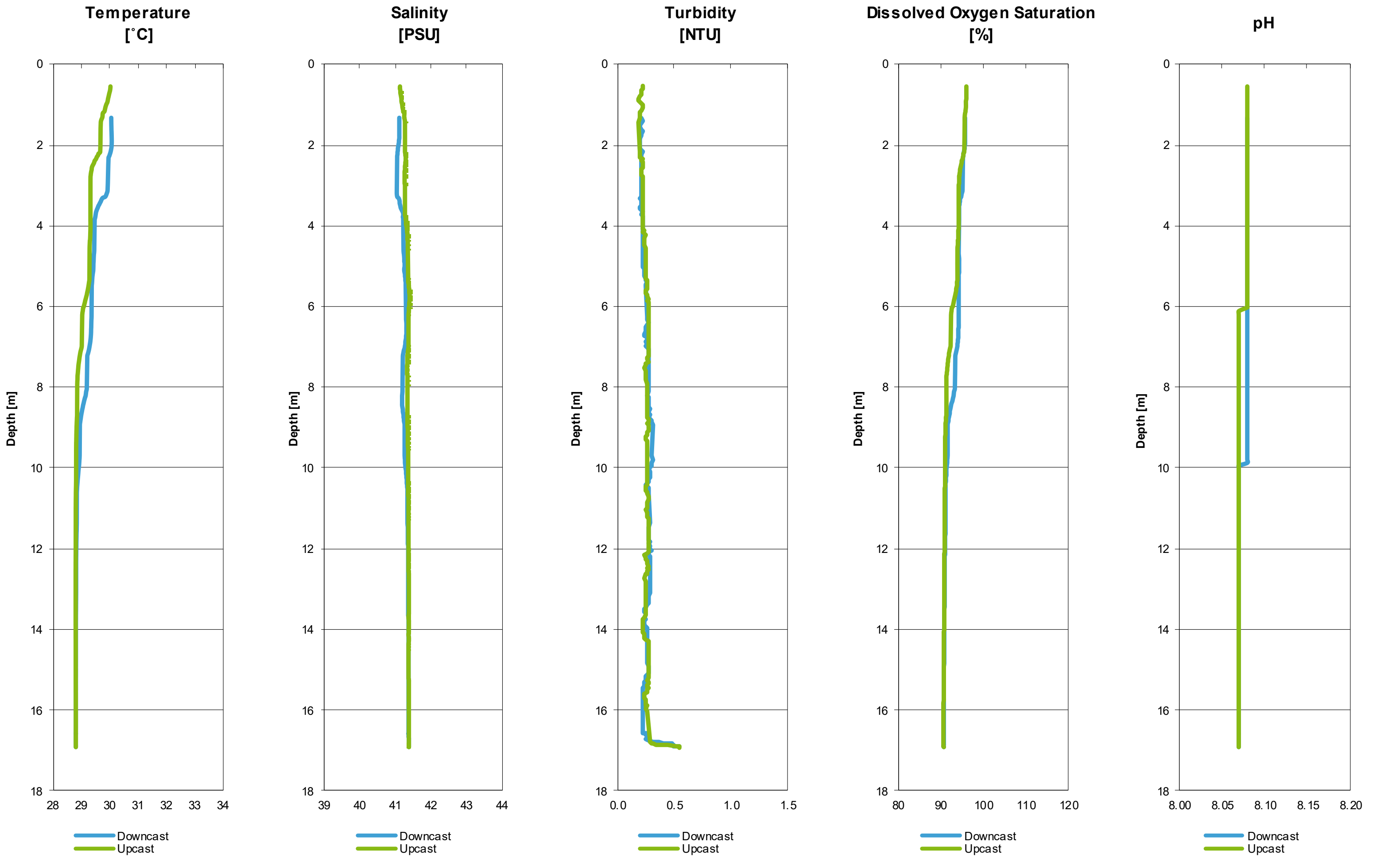
Station R1_ENV_116



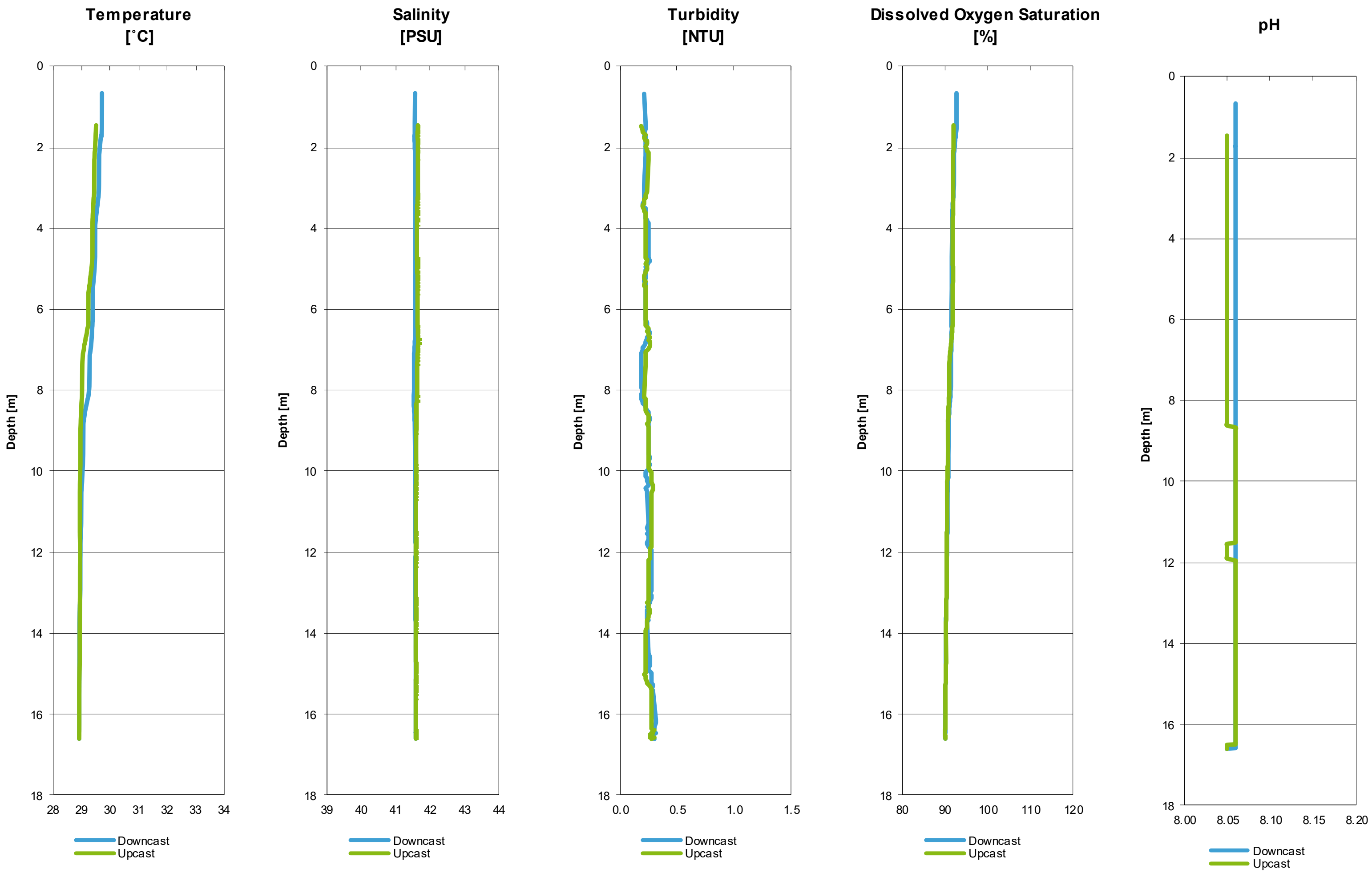
Station R1_ENV_117



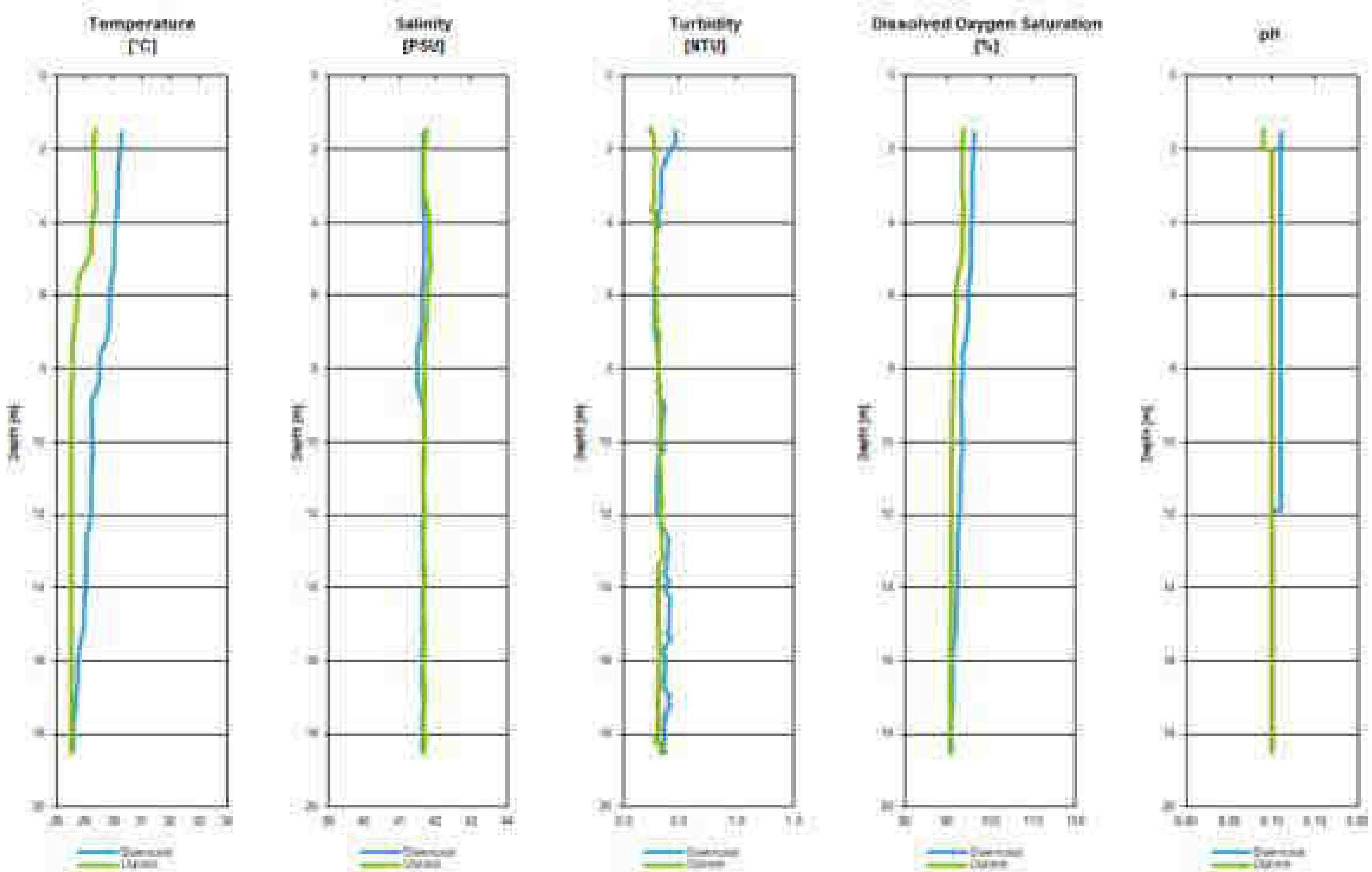
Station R1_ENV_118



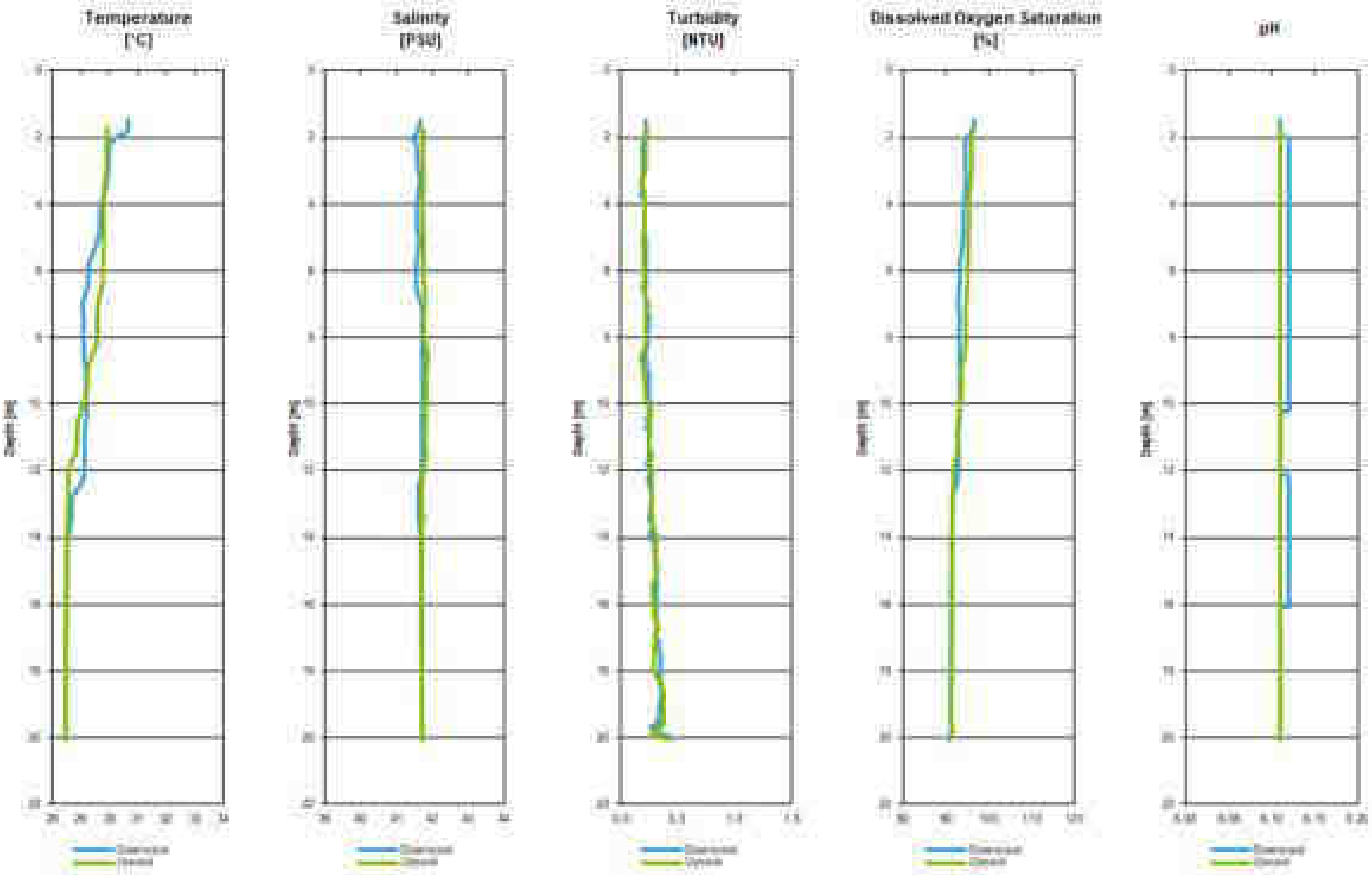
Station R1_ENV_119



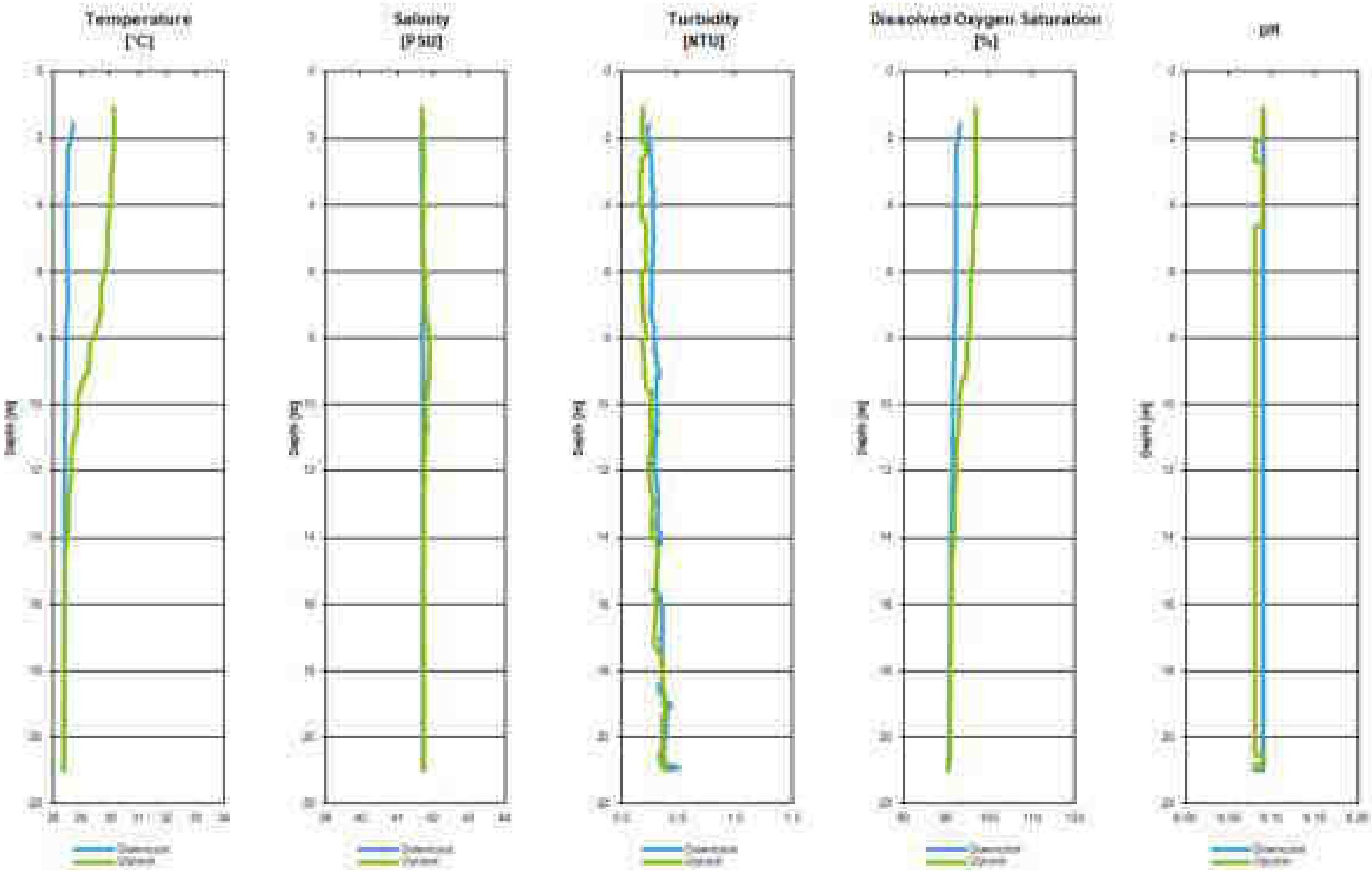
Station R1_ENV_120



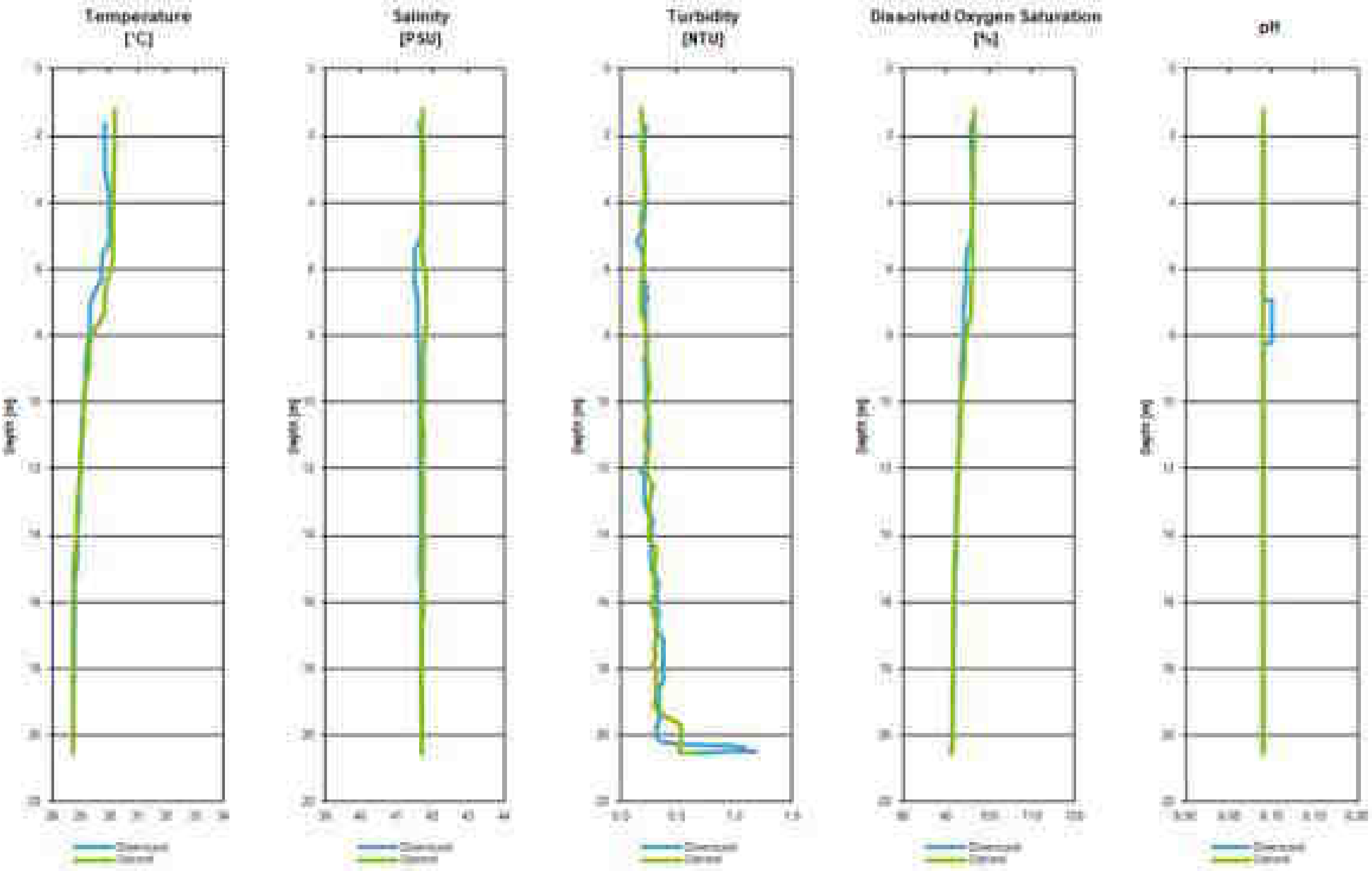
Station R1_ENV_121



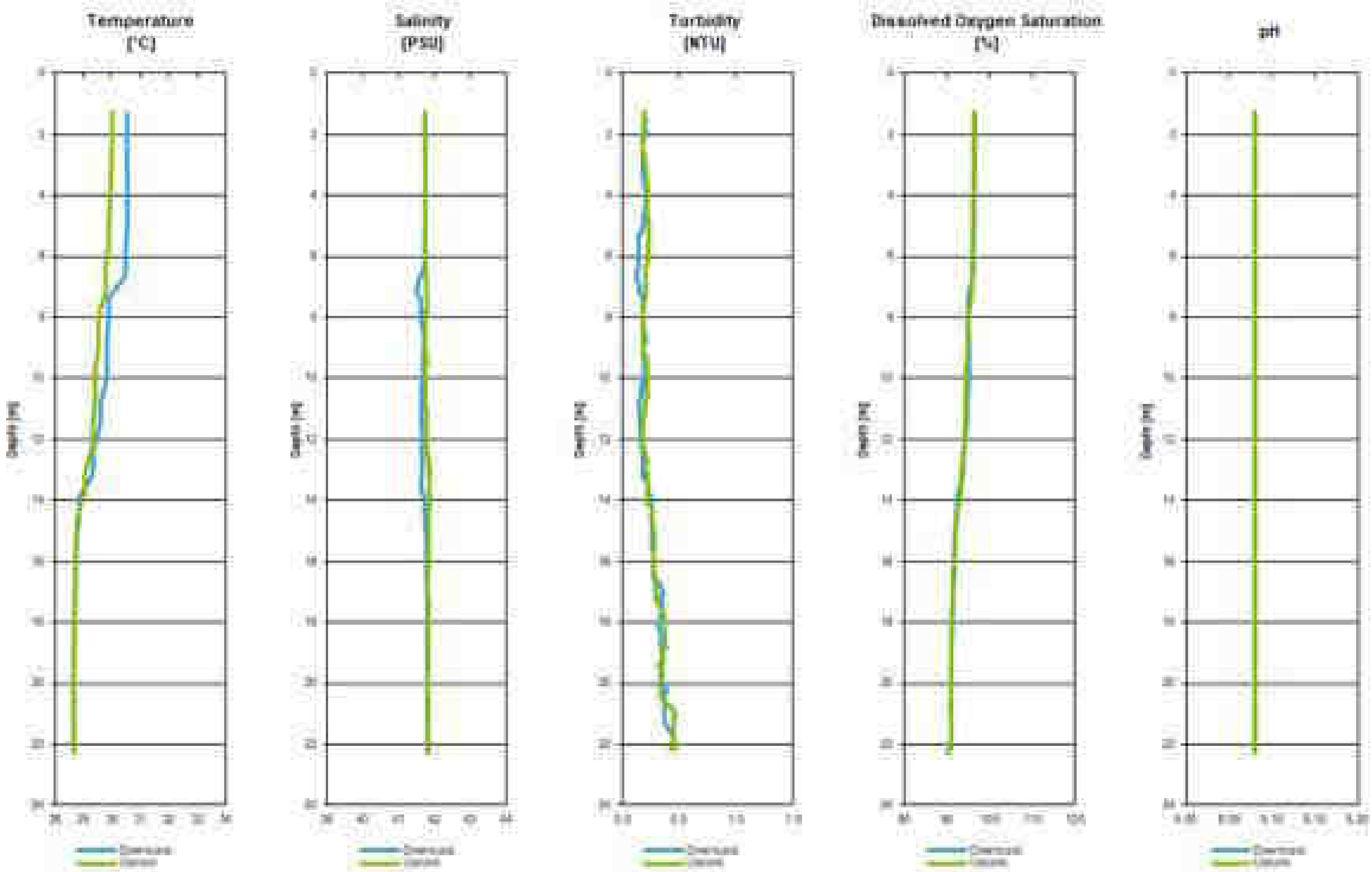
Station R1_ENV_122



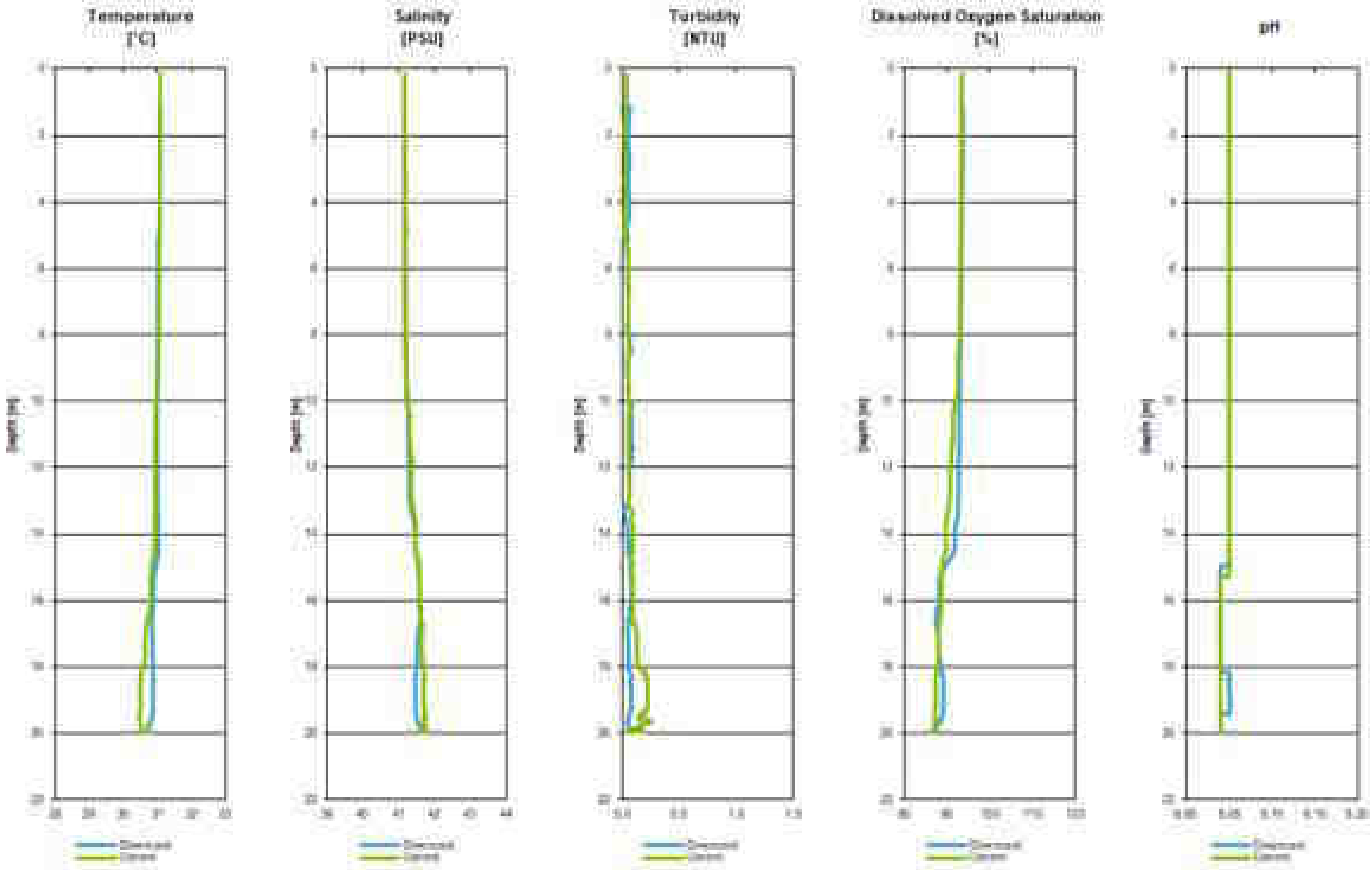
Station R1_ENV_123



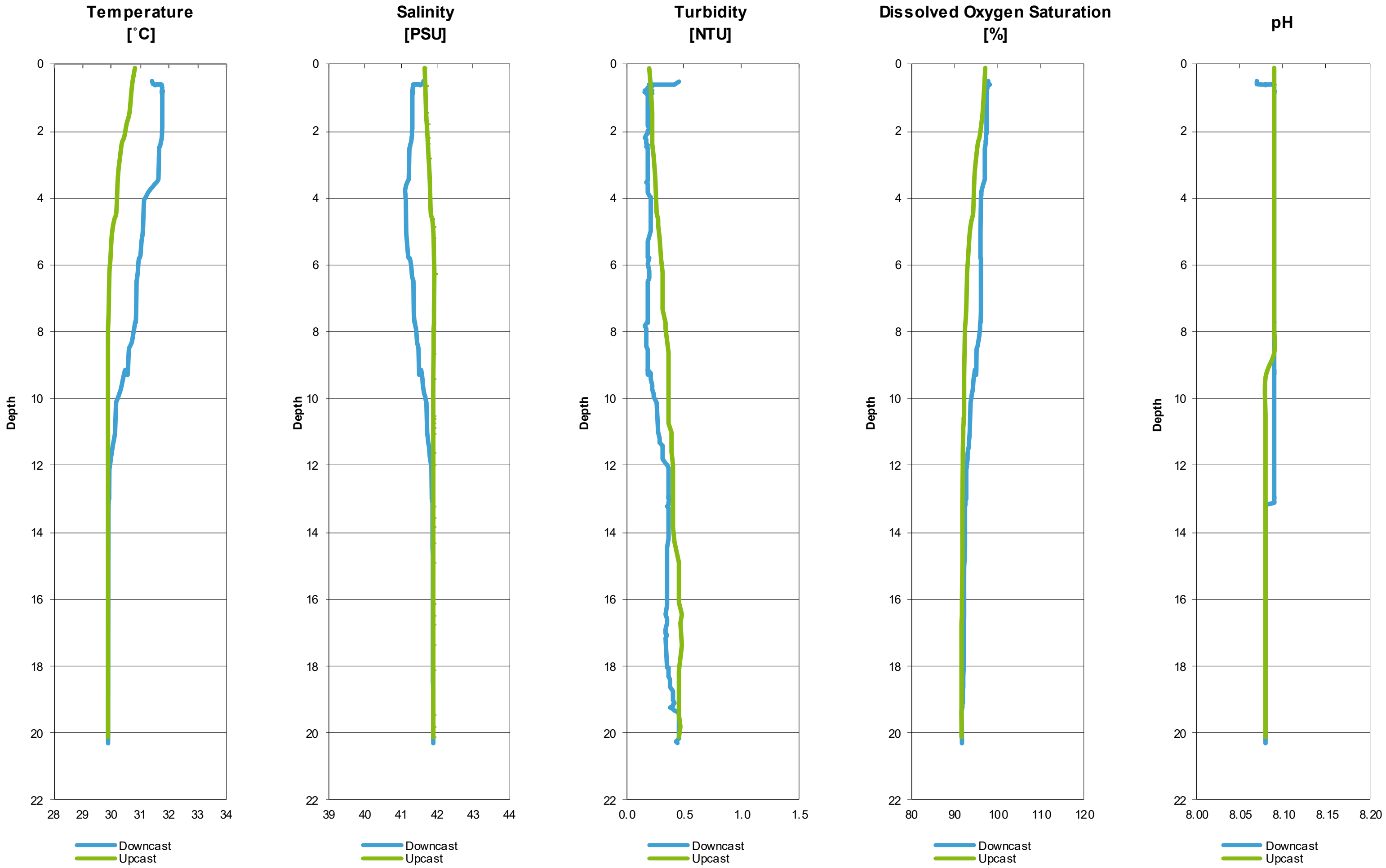
Station R1_ENV_124



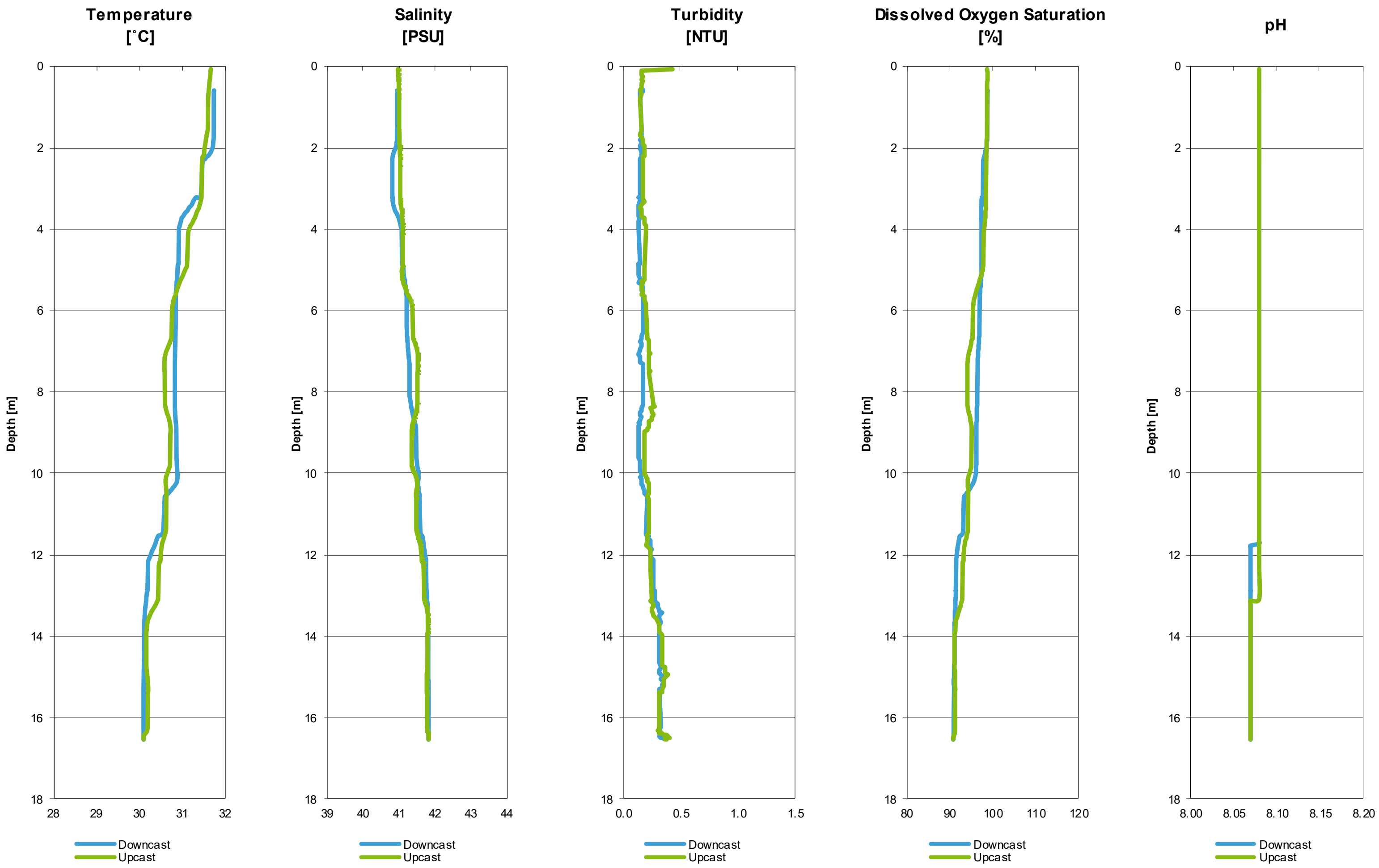
Station R1_ENV_125



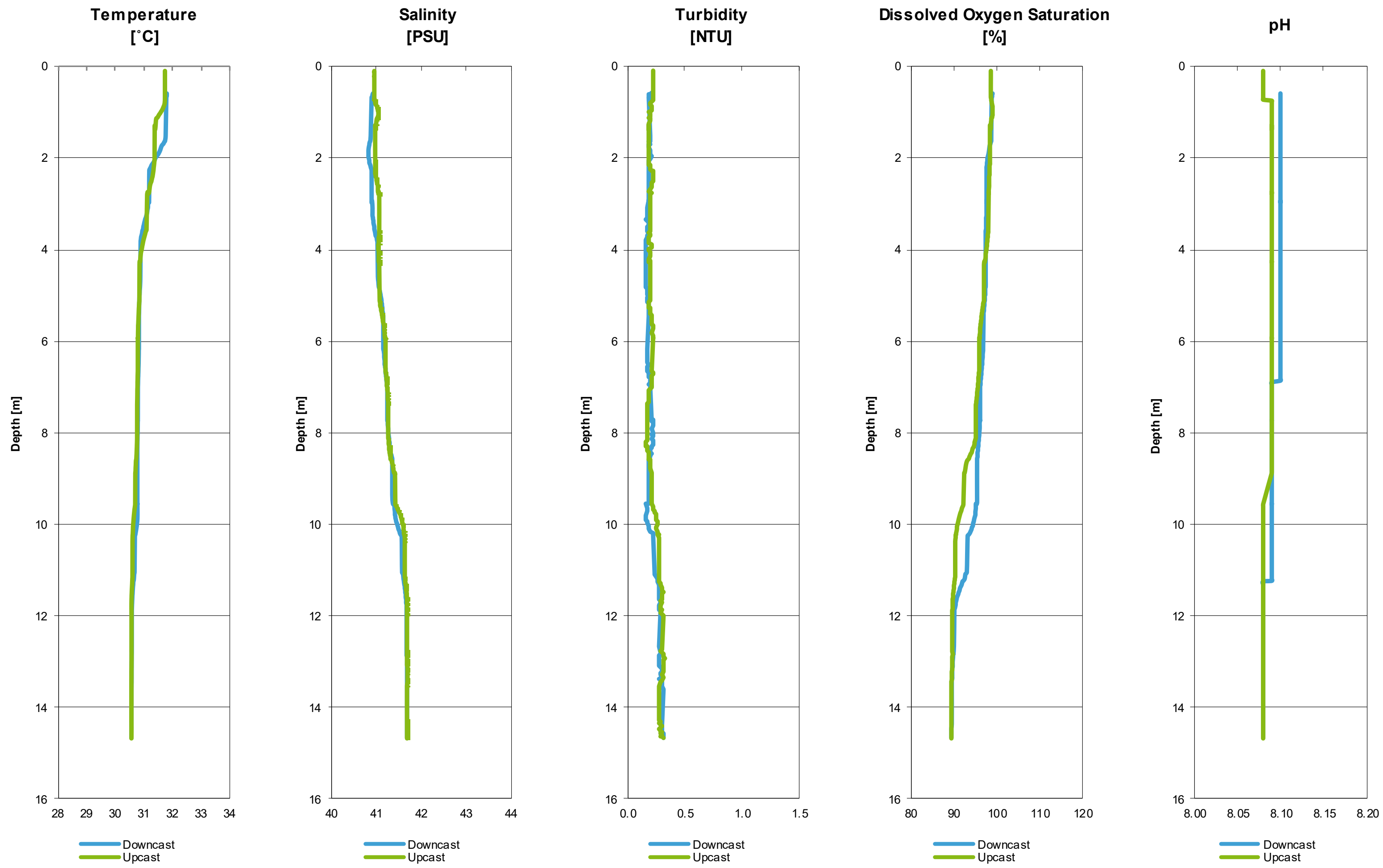
Station R1_ENV_126



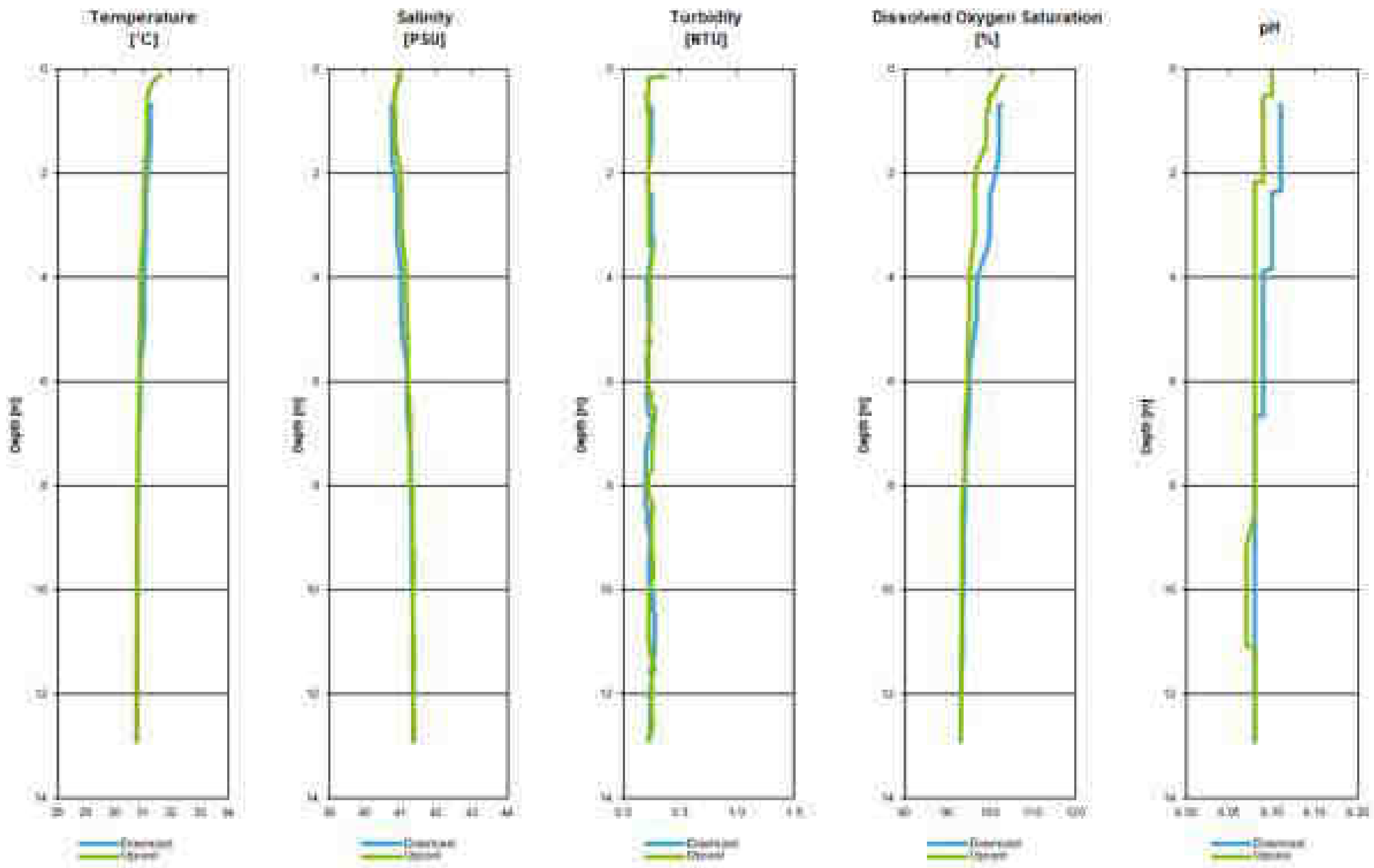
Station R1_ENV_127



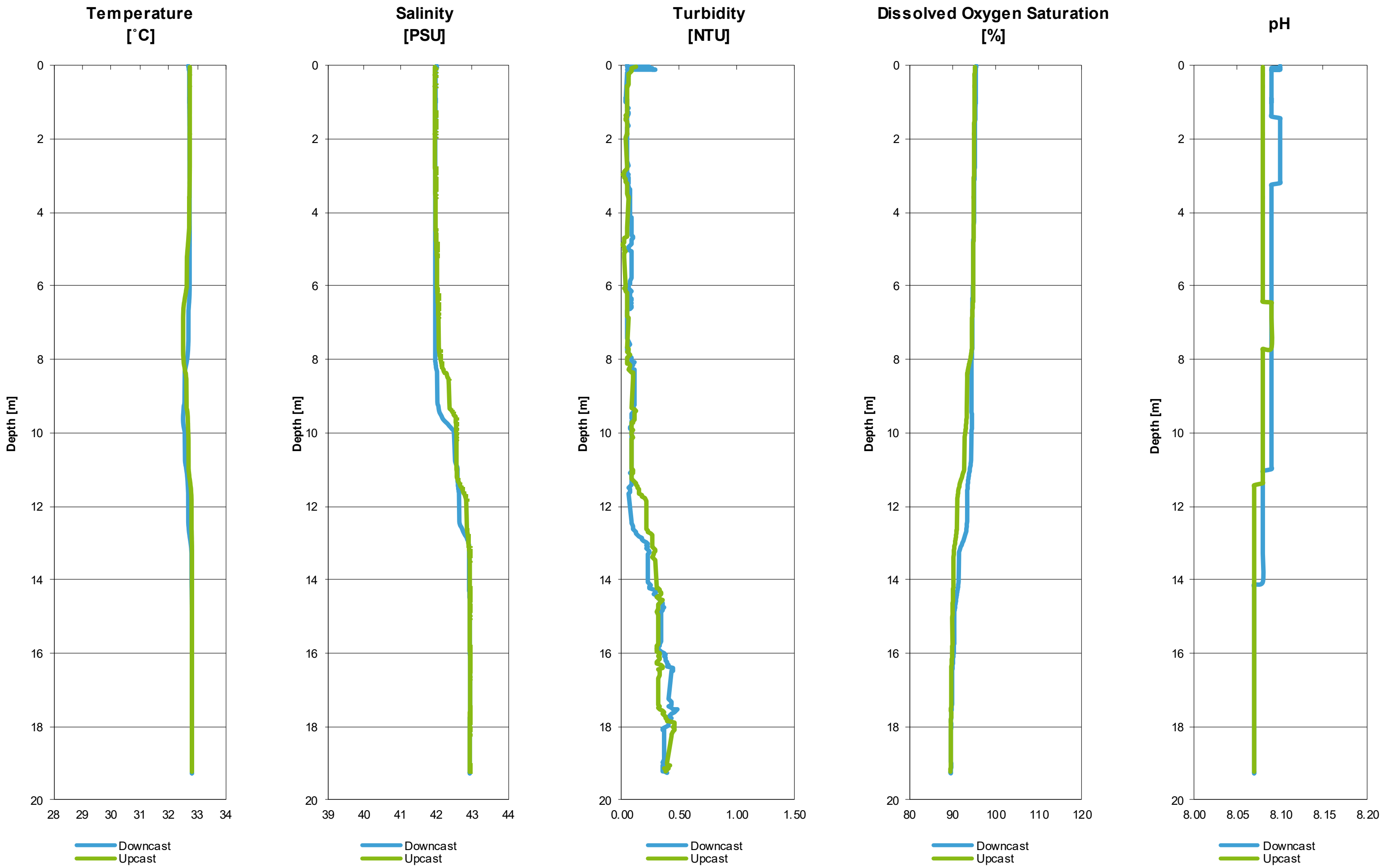
Station R1_ENV_128



Station R1_ENV_129



Station R1_ENV_REF



E. Inorganic Water Quality Parameters

E.1 Summary of Water Quality Parameters

Sample	Parameter																			
	pH	Total Suspended Solids [mg/L]	Total Dissolved Solids [mg/L]	Turbidity [NTU]	Nitrogen (Ammonia) [mg/L]	Ammonium [mg/L]	Sulphide [mg/L]	Total Nitrogen [mg/L]	Total Cyanide [mg/L]	Nitrate [mg/L]	Nitrite [mg/L]	Total Phosphorus [mg/L]	Orthophosphate [mg/L]	Sulphate [mg/L]	Chloride [mg/L]	Silicon* [mg/L]	Chemical Oxygen Demand [mg/L]	Total Organic Carbon [mg/L]	Biochemical Oxygen Demand [mg/L]	Total Coliform [CFU/100 mL]
R1_ENV_001-Top	8.2	< 5.0	51400	1.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	0.04	< 0.06	3030	25500	< 2.8	< 5	1.6	< 2	ND
R1_ENV_001-Middle	8.0	< 5.0	52600	0.9	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.07	< 0.016	< 0.03	< 0.06	3710	26600	< 2.8	< 5	2.0	< 2	ND
R1_ENV_001-Bottom	8.2	< 5.0	51600	2.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	3110	26200	< 2.8	< 5	1.6	< 2	ND
R1_ENV_002-Top	8.2	< 5.0	51500	2.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	0.04	< 0.06	3000	26200	< 2.8	< 5	1.5	< 2	ND
R1_ENV_002-Middle	8.2	< 5.0	51300	0.8	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	3050	25900	< 2.8	< 5	1.8	< 2	ND
R1_ENV_002-Bottom	8.2	< 5.0	51500	3.6	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	3140	26200	< 2.8	< 5	1.9	< 2	ND
R1_ENV_003-Top	8.2	< 5.0	51600	0.6	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	2980	25900	< 2.8	< 5	1.6	< 2	ND
R1_ENV_003-Bottom	8.2	< 5.0	51500	1.7	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	0.04	< 0.06	3160	25500	< 2.8	< 5	1.9	< 2	ND
R1_ENV_004-Top	8.2	< 5.0	51600	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	3030	25500	< 2.8	< 5	1.7	< 2	ND
R1_ENV_004-Bottom	8.2	< 5.0	51600	0.8	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	0.15	< 0.06	3070	25500	< 2.8	< 5	1.7	< 2	ND
R1_ENV_005-Top	8.2	< 5.0	51700	0.8	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	0.10	< 0.06	3110	25900	< 2.8	< 5	1.7	< 2	ND
R1_ENV_005-Bottom	8.2	< 5.0	51500	0.9	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	0.08	< 0.06	2960	26200	< 2.8	< 5	1.7	< 2	ND
R1_ENV_006-Top	8.2	< 5.0	51900	1.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	0.04	< 0.06	3080	26600	< 2.8	< 5	1.8	< 2	ND
R1_ENV_006-Bottom	8.2	< 5.0	51900	1.7	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	0.05	< 0.06	3120	26600	< 2.8	< 5	1.9	< 2	ND
R1_ENV_007-Top	8.2	< 5.0	51500	1.8	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	3150	26200	< 2.8	< 5	1.7	< 2	ND
R1_ENV_007-Bottom	8.2	< 5.0	51600	0.8	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	0.04	< 0.06	3070	26600	< 2.8	< 5	1.8	< 2	ND
R1_ENV_008-Top	8.1	< 5.0	51200	0.7	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	3060	25500	< 2.8	< 5	1.9	< 2	ND
R1_ENV_008-Bottom	8.1	< 5.0	51200	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	2940	25500	< 2.8	< 5	1.7	< 2	ND
R1_ENV_009-Top	8.1	< 5.0	51500	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	2970	25500	< 2.8	< 5	1.8	< 2	ND
R1_ENV_009-Bottom	8.1	< 5.0	51500	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	3000	25500	< 2.8	< 5	1.9	< 2	ND
R1_ENV_010-Top	8.1	< 5.0	51300	0.6	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	3070	25500	< 2.8	< 5	1.8	< 2	ND
R1_ENV_010-Bottom	8.1	< 5.0	51500	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	2960	25500	< 2.8	< 5	1.9	< 2	ND
R1_ENV_011-Top	8.1	< 5.0	51400	0.8	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	3020	25500	< 2.8	< 5	1.8	< 2	ND
R1_ENV_011-Bottom	8.1	< 5.0	51600	0.8	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	3000	25500	< 2.8	< 5	1.8	< 2	ND
R1_ENV_012-Middle	8.1	< 5.0	51500	0.6	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	3090	25900	< 2.8	< 5	1.8	< 2	ND
R1_ENV_013-Middle	8.1	< 5.0	51600	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	2940	25900	< 2.8	< 5	1.8	< 2	ND
R1_ENV_014-Top	8.1	< 5.0	52400	0.7	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	2990	26200	< 2.8	< 5	1.8	< 2	ND
R1_ENV_014-Bottom	8.1	< 5.0	52500	2.9	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	3050	26200	< 2.8	< 5	1.9	< 2	ND

Sample	Parameter																			
	pH	Total Suspended Solids [mg/L]	Total Dissolved Solids [mg/L]	Turbidity [NTU]	Nitrogen (Ammonia) [mg/L]	Ammonium [mg/L]	Sulphide [mg/L]	Total Nitrogen [mg/L]	Total Cyanide [mg/L]	Nitrate [mg/L]	Nitrite [mg/L]	Total Phosphorus [mg/L]	Orthophosphate [mg/L]	Sulphate [mg/L]	Chloride [mg/L]	Silicon* [mg/L]	Chemical Oxygen Demand [mg/L]	Total Organic Carbon [mg/L]	Biochemical Oxygen Demand [mg/L]	Total Coliform [CFU/100 mL]
R1_ENV_015-Top	8.1	< 5.0	52800	0.8	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	3030	26600	< 2.8	< 5	1.9	< 2	ND
R1_ENV_015-Bottom	8.1	< 5.0	52800	0.6	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	2950	26600	< 2.8	< 5	1.9	< 2	ND
R1_ENV_016-Top	8.1	< 5.0	52800	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	2930	26200	< 2.8	< 5	1.9	< 2	ND
R1_ENV_016-Middle	8.1	< 5.0	53000	0.8	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	3120	26200	< 2.8	< 5	2.0	< 2	ND
R1_ENV_016-Bottom	8.1	< 5.0	52800	1.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	3090	26200	< 2.8	< 5	1.9	< 2	ND
R1_ENV_017-Top	8.1	< 5.0	52900	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	2980	26200	< 2.8	< 5	2.1	< 2	ND
R1_ENV_017-Bottom	8.1	< 5.0	52800	0.8	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	3030	26200	< 2.8	< 5	1.9	< 2	ND
R1_ENV_018-Middle	8.1	< 5.0	52700	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	2950	26200	< 2.8	< 5	1.8	< 2	ND
R1_ENV_019-Middle	8.1	< 5.0	52600	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	3090	26600	< 2.8	< 5	1.9	< 2	ND
R1_ENV_020-Middle	8.1	< 5.0	52200	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	3000	25900	< 2.8	< 5	1.9	< 2	ND
R1_ENV_021-Top	8.1	< 5.0	51600	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	3010	25900	< 2.8	< 5	1.7	< 2	ND
R1_ENV_021-Bottom	8.1	< 5.0	52000	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	2990	25900	< 2.8	< 5	1.7	< 2	ND
R1_ENV_022-Top	8.1	< 5.0	50800	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	2980	25200	< 2.8	< 5	1.6	< 2	ND
R1_ENV_022-Bottom	8.1	< 5.0	50800	0.3	< 0.05	< 0.064	< 0.005	< 0.5	0.02	< 0.04	< 0.016	< 0.03	< 0.06	3060	25200	< 2.8	< 5	1.5	< 2	ND
R1_ENV_023-Top	8.1	< 5.0	50800	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	2980	25200	< 2.8	< 5	1.6	< 2	ND
R1_ENV_023-Bottom	8.1	< 5.0	50600	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	3110	25200	< 2.8	< 5	1.5	< 2	ND
R1_ENV_024-Top	8.1	< 5.0	50000	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	3070	24800	< 2.8	< 5	1.4	< 2	ND
R1_ENV_024-Bottom	8.1	< 5.0	50400	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	2930	25200	< 2.8	< 5	1.6	< 2	ND
R1_ENV_025-Top	8.1	< 5.0	50000	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	3100	24800	< 2.8	< 5	1.5	< 2	ND
R1_ENV_025-Middle	8.1	< 5.0	50500	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	3000	25200	< 2.8	< 5	1.7	< 2	ND
R1_ENV_025-Bottom	8.1	< 5.0	50600	0.6	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	3140	25200	< 2.8	< 5	1.6	< 2	ND
R1_ENV_026-Top	8.1	< 5.0	50100	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	3150	24800	< 2.8	< 5	1.6	< 2	ND
R1_ENV_026-Middle	8.1	< 5.0	50200	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	3020	24800	< 2.8	< 5	1.7	< 2	ND
R1_ENV_026-Bottom	8.1	< 5.0	50800	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	2960	25500	< 2.8	< 5	1.8	< 2	ND
R1_ENV_027-Top	8.1	< 5.0	50200	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	2960	24800	< 2.8	< 5	1.5	< 2	ND
R1_ENV_027-Middle	8.1	< 5.0	50200	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	2980	24800	< 2.8	< 5	1.6	< 2	ND
R1_ENV_027-Bottom	8.1	< 5.0	50800	1.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.06	3050	25200	< 2.8	< 5	1.7	< 2	ND
R1_ENV_028-Top	8.0	< 5.0	49100	0.8	< 0.05	< 0.064	< 0.005	0.7	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3410	24500	< 2.8	< 5	2.4	< 2	ND

Sample	Parameter																		
	pH	Total Suspended Solids [mg/L]	Total Dissolved Solids [mg/L]	Turbidity [NTU]	Nitrogen (Ammonia) [mg/L]	Ammonium [mg/L]	Sulphide [mg/L]	Total Nitrogen [mg/L]	Total Cyanide [mg/L]	Nitrate [mg/L]	Nitrite [mg/L]	Total Phosphorus [mg/L]	Orthophosphate [mg/L]	Sulphate [mg/L]	Chloride [mg/L]	Silicon* [mg/L]	Chemical Oxygen Demand [mg/L]	Total Organic Carbon [mg/L]	Biochemical Oxygen Demand [mg/L]	Total Coliform [CFU/100 mL]
R1_ENV_028-Bottom	7.9	< 5.0	49400	0.6	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3400	24800	< 2.8	< 5	1.6	< 2	ND
R1_ENV_029-Top	8.1	< 5.0	48700	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.13	< 0.016	< 0.03	< 0.060	3320	24100	< 2.8	< 5	1.6	< 2	ND
R1_ENV_029-Middle	8.0	< 5.0	48900	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.05	< 0.016	< 0.03	< 0.060	3350	24500	< 2.8	< 5	1.6	< 2	ND
R1_ENV_029-Bottom	8.0	< 5.0	49900	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3350	24800	< 2.8	< 5	1.7	< 2	ND
R1_ENV_030-Top	8.0	< 5.0	48700	0.8	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3260	24500	< 2.8	< 5	1.6	< 2	ND
R1_ENV_030-Middle	8.0	< 5.0	49100	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3460	24500	< 2.8	< 5	1.6	< 2	ND
R1_ENV_030-Bottom	8.0	< 5.0	48900	0.6	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3410	25200	< 2.8	< 5	1.7	< 2	ND
R1_ENV_031-Top	8.0	< 5.0	48700	0.7	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3370	24500	< 2.8	< 5	1.6	< 2	ND
R1_ENV_031-Middle	8.0	< 5.0	48500	0.7	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3270	23800	< 2.8	< 5	1.7	< 2	ND
R1_ENV_031-Bottom	8.0	< 5.0	49600	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3320	24800	< 2.8	< 5	1.8	< 2	ND
R1_ENV_032-Top	8.0	< 5.0	48200	0.8	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3240	23800	< 2.8	< 5	1.6	< 2	ND
R1_ENV_032-Middle	8.0	< 5.0	48600	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3280	24100	< 2.8	< 5	1.7	< 2	ND
R1_ENV_032-Bottom	8.0	< 5.0	49200	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3080	24800	< 2.8	< 5	1.6	< 2	ND
R1_ENV_033-Top	8.0	< 5.0	48100	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3260	26200	< 2.8	< 5	1.6	< 2	ND
R1_ENV_033-Middle	8.0	< 5.0	48300	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3330	24100	< 2.8	< 5	1.6	< 2	ND
R1_ENV_033-Bottom	8.0	< 5.0	49200	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3400	24500	< 2.8	< 5	1.7	< 2	ND
R1_ENV_034-Top	8.0	< 5.0	48900	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3220	23800	< 2.8	< 5	1.6	< 2	ND
R1_ENV_034-Middle	8.0	< 5.0	48300	0.7	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3310	23800	< 2.8	< 5	1.6	< 2	ND
R1_ENV_034-Bottom	8.0	< 5.0	49300	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3310	24500	< 2.8	< 5	1.7	< 2	ND
R1_ENV_035-Top	8.0	< 5.0	46800	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3190	24100	< 2.8	< 5	1.4	< 2	ND
R1_ENV_035-Middle	8.0	< 5.0	47000	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3070	24500	< 2.8	< 5	1.4	< 2	ND
R1_ENV_035-Bottom	7.9	< 5.0	46300	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3270	24800	< 2.8	< 5	1.5	< 2	ND
R1_ENV_036-Top	8.1	< 5.0	48100	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3240	24500	< 2.8	< 5	1.5	< 2	ND
R1_ENV_036-Middle	8.1	< 5.0	48300	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.85	< 0.016	< 0.03	< 0.060	3170	24100	< 2.8	< 5	1.4	< 2	ND
R1_ENV_036-Bottom	8.1	< 5.0	49100	0.6	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3210	24800	< 2.8	< 5	1.6	< 2	ND
R1_ENV_037-Top	8.1	< 5.0	48200	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3080	24800	< 2.8	< 5	1.5	< 2	ND
R1_ENV_037-Middle	8.1	< 5.0	48600	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3270	24500	< 2.8	< 5	1.5	< 2	ND
R1_ENV_037-Bottom	8.1	< 5.0	48600	0.9	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3290	24100	< 2.8	< 5	1.7	< 2	ND

Sample	Parameter																			
	pH	Total Suspended Solids [mg/L]	Total Dissolved Solids [mg/L]	Turbidity [NTU]	Nitrogen (Ammonia) [mg/L]	Ammonium [mg/L]	Sulphide [mg/L]	Total Nitrogen [mg/L]	Total Cyanide [mg/L]	Nitrate [mg/L]	Nitrite [mg/L]	Total Phosphorus [mg/L]	Orthophosphate [mg/L]	Sulphate [mg/L]	Chloride [mg/L]	Silicon* [mg/L]	Chemical Oxygen Demand [mg/L]	Total Organic Carbon [mg/L]	Biochemical Oxygen Demand [mg/L]	Total Coliform [CFU/100 mL]
R1_ENV_038-Top	8.1	< 5.0	49000	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3500	24100	< 2.8	< 5	1.5	< 2	ND
R1_ENV_038-Bottom	8.0	< 5.0	49300	0.7	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3470	24500	< 2.8	< 5	1.5	< 2	ND
R1_ENV_039-Top	7.9	< 5.0	49100	0.9	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3370	24800	< 2.8	< 5	1.4	< 2	ND
R1_ENV_039-Middle	8.1	< 5.0	49200	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3470	24500	< 2.8	< 5	1.5	< 2	ND
R1_ENV_039-Bottom	7.9	< 5.0	49400	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3460	24800	< 2.8	< 5	1.4	< 2	ND
R1_ENV_040-Top	8.0	< 5.0	48900	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.07	< 0.016	< 0.03	< 0.060	3380	23400	< 2.8	< 5	1.6	< 2	ND
R1_ENV_040-Middle	8.0	< 5.0	49300	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.07	< 0.016	< 0.03	< 0.060	3430	24500	< 2.8	< 5	1.6	< 2	ND
R1_ENV_040-Bottom	8.0	< 5.0	48900	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3480	24100	< 2.8	< 5	1.5	< 2	ND
R1_ENV_041-Top	8.0	< 5.0	49200	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3450	24500	< 2.8	< 5	1.4	< 2	ND
R1_ENV_041-Middle	8.0	< 5.0	49300	0.6	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3460	25200	< 2.8	< 5	1.4	< 2	ND
R1_ENV_041-Bottom	7.9	< 5.0	49600	0.6	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.08	< 0.016	< 0.03	< 0.060	3500	25500	< 2.8	< 5	1.5	< 2	ND
R1_ENV_042-Top	8.0	< 5.0	49100	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3310	24500	< 2.8	< 5	1.5	< 2	ND
R1_ENV_042-Middle	8.0	< 5.0	49300	0.8	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3300	24100	< 2.8	< 5	1.6	< 2	ND
R1_ENV_042-Bottom	8.1	< 5.0	49300	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.09	< 0.016	< 0.03	< 0.060	3440	24800	< 2.8	< 5	1.6	< 2	ND
R1_ENV_043-Top	8.0	< 5.0	49300	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3360	25200	< 2.8	< 5	1.5	< 2	ND
R1_ENV_043-Middle	8.0	< 5.0	49500	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3340	25500	< 2.8	< 5	1.6	< 2	ND
R1_ENV_043-Bottom	8.0	< 5.0	49300	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3320	24800	< 2.8	< 5	1.4	< 2	ND
R1_ENV_044-Top	7.9	< 5.0	49100	0.9	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3360	24500	< 2.8	< 5	1.4	< 2	ND
R1_ENV_044-Middle	8.0	< 5.0	49200	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3290	25200	< 2.8	< 5	1.4	< 2	ND
R1_ENV_044-Bottom	7.9	< 5.0	49500	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.08	< 0.016	< 0.03	< 0.060	3370	25500	< 2.8	< 5	1.4	< 2	ND
R1_ENV_045-Top	8.0	< 5.0	49300	0.6	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3370	25500	< 2.8	< 5	1.4	< 2	ND
R1_ENV_045-Middle	8.1	< 5.0	49200	0.6	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3320	24800	< 2.8	< 5	1.4	< 2	ND
R1_ENV_045-Bottom	8.1	< 5.0	49400	0.6	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3260	25200	< 2.8	< 5	1.5	< 2	ND
R1_ENV_046-Top	7.9	< 5.0	49300	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3370	24800	< 2.8	< 5	1.5	< 2	ND
R1_ENV_046-Middle	8.0	< 5.0	48900	0.9	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3320	24100	< 2.8	< 5	1.4	< 2	ND
R1_ENV_046-Bottom	8.0	< 5.0	49100	1.0	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.04	< 0.016	< 0.03	< 0.060	3420	24500	< 2.8	< 5	1.5	< 2	ND
R1_ENV_047-Top	8.1	< 5.0	48900	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3300	23800	< 2.8	< 5	1.4	< 2	ND
R1_ENV_047-Middle	8.1	< 5.0	49100	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3310	24100	< 2.8	< 5	1.4	< 2	ND

Sample	Parameter																			
	pH	Total Suspended Solids [mg/L]	Total Dissolved Solids [mg/L]	Turbidity [NTU]	Nitrogen (Ammonia) [mg/L]	Ammonium [mg/L]	Sulphide [mg/L]	Total Nitrogen [mg/L]	Total Cyanide [mg/L]	Nitrate [mg/L]	Nitrite [mg/L]	Total Phosphorus [mg/L]	Orthophosphate [mg/L]	Sulphate [mg/L]	Chloride [mg/L]	Silicon* [mg/L]	Chemical Oxygen Demand [mg/L]	Total Organic Carbon [mg/L]	Biochemical Oxygen Demand [mg/L]	Total Coliform [CFU/100 mL]
R1_ENV_047-Bottom	8.0	< 5.0	49300	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3270	24800	< 2.8	< 5	1.5	< 2	ND
R1_ENV_048-Top	7.9	< 5.0	49300	0.7	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3210	24500	< 2.8	< 5	1.4	< 2	ND
R1_ENV_048-Middle	8.0	< 5.0	49000	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.04	< 0.016	< 0.03	< 0.060	3200	24100	< 2.8	< 5	1.4	< 2	ND
R1_ENV_048-Bottom	8.0	< 5.0	49100	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3370	24100	< 2.8	< 5	1.5	< 2	ND
R1_ENV_049-Top	8.1	< 5.0	48000	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3210	23400	< 2.8	< 5	1.4	< 2	ND
R1_ENV_049-Middle	8.0	< 5.0	49300	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3320	24800	< 2.8	< 5	1.6	< 2	ND
R1_ENV_049-Bottom	7.9	< 5.0	49500	0.9	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3330	25200	< 2.8	< 5	1.6	< 2	ND
R1_ENV_050-Top	7.9	< 5.0	48500	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3070	24800	< 2.8	< 5	1.4	< 2	ND
R1_ENV_050-Middle	8.0	< 5.0	49300	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.09	< 0.016	< 0.03	< 0.060	3300	25200	< 2.8	< 5	1.5	< 2	ND
R1_ENV_050-Bottom	8.0	< 5.0	49600	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3310	25500	< 2.8	< 5	1.5	< 2	ND
R1_ENV_051-Top	8.1	< 5.0	49100	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3250	25200	< 2.8	< 5	1.5	< 2	ND
R1_ENV_051-Middle	8.1	< 5.0	48600	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3220	24100	< 2.8	< 5	1.5	< 2	ND
R1_ENV_051-Bottom	8.1	< 5.0	49500	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.06	< 0.016	< 0.03	< 0.060	3270	25500	< 2.8	< 5	1.5	< 2	ND
R1_ENV_052-Top	8.0	< 5.0	48200	0.8	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3330	24800	< 2.8	< 5	1.5	< 2	ND
R1_ENV_052-Middle	8.0	< 5.0	48700	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3260	24500	< 2.8	< 5	1.5	< 2	ND
R1_ENV_052-Bottom	8.1	< 5.0	49500	0.8	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.04	< 0.016	< 0.03	< 0.060	3250	25500	< 2.8	< 5	1.6	< 2	ND
R1_ENV_053-Top	8.1	< 5.0	48400	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3220	24800	< 2.8	< 5	1.5	< 2	ND
R1_ENV_053-Middle	7.9	< 5.0	48600	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.06	< 0.016	< 0.03	< 0.060	3210	24500	< 2.8	< 5	1.6	< 2	ND
R1_ENV_053-Bottom	8.0	< 5.0	49100	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3280	24800	< 2.8	< 5	1.6	< 2	ND
R1_ENV_054-Top	8.0	< 5.0	48000	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.05	< 0.016	< 0.03	< 0.060	3140	24100	< 2.8	< 5	1.6	< 2	ND
R1_ENV_054-Middle	8.1	< 5.0	48800	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.06	< 0.016	< 0.03	< 0.060	3240	24500	< 2.8	< 5	1.5	< 2	ND
R1_ENV_054-Bottom	8.0	< 5.0	49200	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.06	< 0.016	< 0.03	< 0.060	3240	25200	< 2.8	< 5	1.5	< 2	ND
R1_ENV_055-Top	8.0	< 5.0	47700	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3110	23800	< 2.8	< 5	1.4	< 2	ND
R1_ENV_055-Middle	8.0	< 5.0	48700	0.5	< 0.05	< 0.064	< 0.005	< 0.5	0.02	0.04	< 0.016	< 0.03	< 0.060	3260	25200	< 2.8	< 5	1.4	< 2	ND
R1_ENV_055-Bottom	8.1	< 5.0	49100	0.8	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3270	24500	< 2.8	< 5	1.4	< 2	ND
R1_ENV_056-Top	7.9	< 5.0	47900	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.06	< 0.016	< 0.03	< 0.060	3140	23800	< 2.8	< 5	1.4	< 2	ND
R1_ENV_056-Middle	8.0	< 5.0	49300	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.10	< 0.016	< 0.03	< 0.060	3300	25200	< 2.8	< 5	1.5	< 2	ND
R1_ENV_056-Bottom	8.0	< 5.0	49100	0.7	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3130	24800	< 2.8	< 5	1.5	< 2	ND

Sample	Parameter																			
	pH	Total Suspended Solids [mg/L]	Total Dissolved Solids [mg/L]	Turbidity [NTU]	Nitrogen (Ammonia) [mg/L]	Ammonium [mg/L]	Sulphide [mg/L]	Total Nitrogen [mg/L]	Total Cyanide [mg/L]	Nitrate [mg/L]	Nitrite [mg/L]	Total Phosphorus [mg/L]	Orthophosphate [mg/L]	Sulphate [mg/L]	Chloride [mg/L]	Silicon* [mg/L]	Chemical Oxygen Demand [mg/L]	Total Organic Carbon [mg/L]	Biochemical Oxygen Demand [mg/L]	Total Coliform [CFU/100 mL]
R1_ENV_057-Top	8.0	< 5.0	47200	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3120	23000	< 2.8	< 5	1.5	< 2	ND
R1_ENV_057-Middle	8.1	< 5.0	48600	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3260	24100	< 2.8	< 5	1.4	< 2	ND
R1_ENV_057-Bottom	8.0	< 5.0	49300	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.06	< 0.016	< 0.03	< 0.060	3300	25500	< 2.8	< 5	1.5	< 2	ND
R1_ENV_058-Top	7.9	< 5.0	47300	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3170	23800	< 2.8	< 5	1.6	< 2	ND
R1_ENV_058-Middle	8.0	< 5.0	48900	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.08	< 0.016	< 0.03	< 0.060	3230	25200	< 2.8	< 5	1.4	< 2	ND
R1_ENV_058-Bottom	8.0	< 5.0	49000	0.8	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.04	< 0.016	< 0.03	< 0.060	3320	24800	< 2.8	< 5	1.5	< 2	ND
R1_ENV_059-Top	7.9	< 5.0	47200	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3080	23400	< 2.8	< 5	1.4	< 2	ND
R1_ENV_059-Middle	8.0	< 5.0	49000	0.6	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.05	< 0.016	< 0.03	< 0.060	3280	25200	< 2.8	< 5	1.5	< 2	ND
R1_ENV_059-Bottom	8.0	< 5.0	48900	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3240	24800	< 2.8	< 5	1.3	< 2	ND
R1_ENV_060-Top	8.0	< 5.0	47500	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.06	< 0.016	< 0.03	< 0.060	3060	23800	< 2.8	< 5	1.3	< 2	ND
R1_ENV_060-Middle	7.9	< 5.0	49000	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3240	24800	< 2.8	< 5	1.4	< 2	ND
R1_ENV_060-Bottom	8.0	< 5.0	48900	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.08	< 0.016	< 0.03	< 0.060	3240	25200	< 2.8	< 5	1.5	< 2	ND
R1_ENV_061-Top	8.1	< 5.0	47100	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3230	23400	< 2.8	< 5	1.4	< 2	ND
R1_ENV_061-Middle	8.1	< 5.0	48600	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.05	< 0.016	< 0.03	< 0.060	3220	24500	< 2.8	< 5	1.4	< 2	ND
R1_ENV_061-Bottom	8.0	< 5.0	48700	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.06	< 0.016	< 0.03	< 0.060	3260	24800	< 2.8	< 5	1.4	< 2	ND
R1_ENV_062-Top	8.1	< 5.0	46500	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3100	23400	< 2.8	< 5	1.6	< 2	ND
R1_ENV_062-Middle	7.9	< 5.0	46400	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3260	23400	< 2.8	< 5	1.5	< 2	ND
R1_ENV_062-Bottom	8.0	< 5.0	46800	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3230	23800	< 2.8	< 5	1.5	< 2	ND
R1_ENV_063-Top	8.0	< 5.0	46700	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3170	23400	< 2.8	< 5	1.6	< 2	ND
R1_ENV_063-Middle	8.0	< 5.0	46300	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3140	23000	< 2.8	< 5	1.4	< 2	ND
R1_ENV_063-Bottom	8.0	< 5.0	48000	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3230	24500	< 2.8	< 5	2.6	< 2	ND
R1_ENV_064-Top	8.1	< 5.0	46400	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3110	23400	< 2.8	< 5	1.4	< 2	ND
R1_ENV_064-Middle	8.0	< 5.0	46900	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.06	< 0.016	< 0.03	< 0.060	3160	23800	< 2.8	< 5	1.5	< 2	ND
R1_ENV_064-Bottom	8.0	< 5.0	48100	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3240	24100	< 2.8	< 5	1.6	< 2	ND
R1_ENV_065-Top	7.9	< 5.0	46200	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.04	< 0.016	< 0.03	< 0.060	3110	23400	< 2.8	< 5	1.4	< 2	ND
R1_ENV_065-Middle	8.0	< 5.0	46600	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3110	23800	< 2.8	< 5	1.4	< 2	ND
R1_ENV_065-Bottom	8.1	< 5.0	47600	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3260	24500	< 2.8	< 5	1.5	< 2	ND
R1_ENV_066-Top	8.0	< 5.0	48000	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3240	24500	< 2.8	< 5	1.4	< 2	ND

Sample	Parameter																			
	pH	Total Suspended Solids [mg/L]	Total Dissolved Solids [mg/L]	Turbidity [NTU]	Nitrogen (Ammonia) [mg/L]	Ammonium [mg/L]	Sulphide [mg/L]	Total Nitrogen [mg/L]	Total Cyanide [mg/L]	Nitrate [mg/L]	Nitrite [mg/L]	Total Phosphorus [mg/L]	Orthophosphate [mg/L]	Sulphate [mg/L]	Chloride [mg/L]	Silicon* [mg/L]	Chemical Oxygen Demand [mg/L]	Total Organic Carbon [mg/L]	Biochemical Oxygen Demand [mg/L]	Total Coliform [CFU/100 mL]
R1_ENV_066-Middle	8.0	< 5.0	47100	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3200	24100	< 2.8	< 5	1.5	< 2	ND
R1_ENV_066-Bottom	7.9	< 5.0	46000	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3090	23400	< 2.8	< 5	1.3	< 2	ND
R1_ENV_067-Top	8.0	< 5.0	45900	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3060	23000	< 2.8	< 5	1.4	< 2	ND
R1_ENV_067-Middle	8.0	< 5.0	46600	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3140	23400	< 2.8	< 5	1.5	< 2	ND
R1_ENV_067-Bottom	8.1	< 5.0	47900	0.7	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3250	24100	< 2.8	< 5	1.5	< 2	ND
R1_ENV_068-Top	8.0	< 5.0	45700	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3050	23000	< 2.8	< 5	1.4	< 2	ND
R1_ENV_068-Middle	8.0	< 5.0	46800	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3020	23400	< 2.8	< 5	1.5	< 2	ND
R1_ENV_068-Bottom	8.0	< 5.0	47700	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3110	23800	< 2.8	< 5	1.5	< 2	ND
R1_ENV_069-Top	8.0	< 5.0	45600	1.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3050	23000	< 2.8	< 5	1.4	< 2	ND
R1_ENV_069-Middle	8.0	< 5.0	46900	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3150	23800	< 2.8	< 5	1.5	< 2	ND
R1_ENV_069-Bottom	7.9	< 5.0	47100	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3110	24100	< 2.8	< 5	1.5	< 2	ND
R1_ENV_070-Top	8.0	< 5.0	45600	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3240	22700	< 2.8	< 5	1.4	< 2	ND
R1_ENV_070-Middle	8.1	< 5.0	46800	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3190	23400	< 2.8	< 5	1.5	< 2	ND
R1_ENV_070-Bottom	8.1	< 5.0	47900	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.07	< 0.016	< 0.03	< 0.060	3300	24100	< 2.8	< 5	1.4	< 2	ND
R1_ENV_071-Top	8.0	< 5.0	45900	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	2940	23000	< 2.8	< 5	1.3	< 2	ND
R1_ENV_071-Middle	7.9	< 5.0	47100	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3250	23400	< 2.8	< 5	1.4	< 2	ND
R1_ENV_071-Bottom	8.1	< 5.0	47800	1.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3250	23800	< 2.8	< 5	1.5	< 2	ND
R1_ENV_072-Top	8.1	< 5.0	46000	1.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3070	23400	< 2.8	< 5	1.4	< 2	ND
R1_ENV_072-Middle	7.9	< 5.0	47100	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.07	< 0.016	< 0.03	< 0.060	3150	23800	< 2.8	< 5	1.4	< 2	ND
R1_ENV_072-Bottom	7.9	< 5.0	47800	1.6	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.19	< 0.016	< 0.03	< 0.060	3270	24100	< 2.8	< 5	1.5	< 2	ND
R1_ENV_073-Top	8.0	< 5.0	46300	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.05	< 0.016	< 0.03	< 0.060	3100	23400	< 2.8	< 5	1.4	< 2	ND
R1_ENV_073-Middle	8.0	< 5.0	46400	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.15	< 0.016	< 0.03	< 0.060	3230	23400	< 2.8	< 5	1.4	< 2	ND
R1_ENV_073-Bottom	8.0	< 5.0	47400	1.9	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3270	24100	< 2.8	< 5	1.5	< 2	ND
R1_ENV_074-Top	8.0	< 5.0	45600	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3170	22300	< 2.8	< 5	1.5	< 2	ND
R1_ENV_074-Middle	8.0	< 5.0	46900	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3020	23400	< 2.8	< 5	1.4	< 2	ND
R1_ENV_074_Bottom	8.0	< 5.0	47100	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3280	24500	< 2.8	< 5	1.5	< 2	ND
R1_ENV_075-Top	8.1	< 5.0	45500	1.7	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3200	22300	< 2.8	< 5	1.3	< 2	ND
R1_ENV_075-Middle	8.1	< 5.0	46700	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3170	23000	< 2.8	< 5	1.4	< 2	ND

Sample	Parameter																		
	pH	Total Suspended Solids [mg/L]	Total Dissolved Solids [mg/L]	Turbidity [NTU]	Nitrogen (Ammonia) [mg/L]	Ammonium [mg/L]	Sulphide [mg/L]	Total Nitrogen [mg/L]	Total Cyanide [mg/L]	Nitrate [mg/L]	Nitrite [mg/L]	Total Phosphorus [mg/L]	Orthophosphate [mg/L]	Sulphate [mg/L]	Chloride [mg/L]	Silicon* [mg/L]	Chemical Oxygen Demand [mg/L]	Total Organic Carbon [mg/L]	Biochemical Oxygen Demand [mg/L]	Total Coliform [CFU/100 mL]
R1_ENV_075_Bottom	8.0	< 5.0	47200	0.9	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.05	< 0.016	< 0.03	< 0.060	3230	24100	< 2.8	< 5	1.6	< 2	ND
R1_ENV_076-Top	8.0	< 5.0	45600	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3020	22700	< 2.8	< 5	1.4	< 2	ND
R1_ENV_076-Middle	8.0	< 5.0	46500	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.15	< 0.016	< 0.03	< 0.060	3090	23400	< 2.8	< 5	1.4	< 2	ND
R1_ENV_076_Bottom	8.0	< 5.0	47200	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3270	24500	< 2.8	< 5	1.5	< 2	ND
R1_ENV_077-Top	7.9	< 5.0	45700	0.1	< 0.05	< 0.064	< 0.005	< 0.5	0.01	0.04	< 0.016	< 0.03	< 0.060	3070	22700	< 2.8	< 5	1.5	< 2	ND
R1_ENV_077-Middle	7.9	< 5.0	46900	1.0	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.06	< 0.016	< 0.03	< 0.060	3180	24100	< 2.8	< 5	1.4	< 2	ND
R1_ENV_077_Bottom	8.0	< 5.0	47200	1.7	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3190	24500	< 2.8	< 5	1.5	< 2	ND
R1_ENV_078-Top	7.9	< 5.0	45800	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3190	22300	< 2.8	< 5	1.5	< 2	ND
R1_ENV_078-Middle	8.0	< 5.0	47000	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.08	< 0.016	< 0.03	< 0.060	3020	24500	< 2.8	< 5	1.5	< 2	ND
R1_ENV_078_Bottom	8.0	< 5.0	47100	1.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3160	24500	< 2.8	< 5	1.4	< 2	ND
R1_ENV_079-Top	8.0	< 5.0	45500	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.07	< 0.016	< 0.03	< 0.060	2970	22300	< 2.8	< 5	1.5	< 2	ND
R1_ENV_079-Middle	7.9	< 5.0	47100	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.06	< 0.016	< 0.03	< 0.060	3080	24500	< 2.8	< 5	1.6	< 2	ND
R1_ENV_079_Bottom	8.0	< 5.0	47000	1.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.10	< 0.016	< 0.03	< 0.060	3130	24100	< 2.8	< 5	1.6	< 2	ND
R1_ENV_080-Top	8.0	< 5.0	45800	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3000	22300	< 2.8	< 5	1.5	< 2	ND
R1_ENV_080-Middle	8.0	< 5.0	47000	0.8	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3090	24100	< 2.8	< 5	1.5	< 2	ND
R1_ENV_080_Bottom	8.1	< 5.0	47100	1.8	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3150	24500	< 2.8	< 5	1.5	< 2	ND
R1_ENV_081-Top	8.0	< 5.0	46100	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.38	< 0.016	< 0.03	< 0.060	3100	23000	< 2.8	< 5	1.4	< 2	ND
R1_ENV_081-Middle	8.0	< 5.0	47000	0.6	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3040	23400	< 2.8	< 5	1.3	< 2	ND
R1_ENV_081-Bottom	8.0	< 5.0	46400	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3170	23000	< 2.8	< 5	1.3	< 2	ND
R1_ENV_082-Top	8.0	< 5.0	45700	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3090	22300	< 2.8	< 5	1.2	< 2	ND
R1_ENV_082-Middle	8.0	< 5.0	46300	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.12	< 0.016	< 0.03	< 0.060	3140	23000	< 2.8	< 5	1.3	< 2	ND
R1_ENV_082-Bottom	8.0	< 5.0	47900	0.6	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.04	< 0.016	< 0.03	< 0.060	3300	24500	< 2.8	< 5	1.3	< 2	ND
R1_ENV_083-Top	8.0	< 5.0	45600	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3100	22300	< 2.8	< 5	1.2	< 2	ND
R1_ENV_083-Middle	8.0	< 5.0	46600	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.15	0.017	< 0.03	< 0.060	3210	23400	< 2.8	< 5	1.3	< 2	ND
R1_ENV_083-Bottom	8.1	< 5.0	46800	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3170	23800	< 2.8	< 5	1.3	< 2	ND
R1_ENV_084-Top	8.1	< 5.0	45500	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3100	22300	< 2.8	< 5	1.3	< 2	ND
R1_ENV_084-Middle	8.0	< 5.0	46900	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3160	23800	< 2.8	< 5	1.3	< 2	ND
R1_ENV_084-Bottom	8.0	< 5.0	46800	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.05	< 0.016	< 0.03	< 0.060	3170	23400	< 2.8	< 5	1.3	< 2	ND

Sample	Parameter																			
	pH	Total Suspended Solids [mg/L]	Total Dissolved Solids [mg/L]	Turbidity [NTU]	Nitrogen (Ammonia) [mg/L]	Ammonium [mg/L]	Sulphide [mg/L]	Total Nitrogen [mg/L]	Total Cyanide [mg/L]	Nitrate [mg/L]	Nitrite [mg/L]	Total Phosphorus [mg/L]	Orthophosphate [mg/L]	Sulphate [mg/L]	Chloride [mg/L]	Silicon* [mg/L]	Chemical Oxygen Demand [mg/L]	Total Organic Carbon [mg/L]	Biochemical Oxygen Demand [mg/L]	Total Coliform [CFU/100 mL]
R1_ENV_085-Top	8.1	< 5.0	46400	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3070	23400	< 2.8	< 5	1.2	< 2	ND
R1_ENV_085-Middle	8.0	< 5.0	47000	0.7	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3140	24100	< 2.8	< 5	1.3	< 2	ND
R1_ENV_085-Bottom	8.0	< 5.0	47100	0.6	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3130	23800	< 2.8	< 5	1.3	< 2	ND
R1_ENV_086-Top	8.1	< 5.0	45900	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3090	23000	< 2.8	< 5	1.3	< 2	ND
R1_ENV_086-Middle	8.0	< 5.0	47200	0.6	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3240	24100	< 2.8	< 5	1.4	< 2	ND
R1_ENV_086-Bottom	8.1	< 5.0	46800	0.6	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3200	23800	< 2.8	< 5	1.3	< 2	ND
R1_ENV_087-Top	8.0	< 5.0	46200	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3130	23400	< 2.8	< 5	1.2	< 2	ND
R1_ENV_087-Middle	8.0	< 5.0	47100	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3230	24100	< 2.8	< 5	1.3	< 2	ND
R1_ENV_087-Bottom	8.0	< 5.0	47400	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3190	24100	< 2.8	< 5	1.4	< 2	ND
R1_ENV_088-Top	8.1	< 5.0	46400	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3210	23000	< 2.8	< 5	1.3	< 2	ND
R1_ENV_088-Middle	8.1	< 5.0	46500	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3080	23800	< 2.8	< 5	1.3	< 2	ND
R1_ENV_088-Bottom	8.0	< 5.0	47100	0.9	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3130	23400	< 2.8	< 5	1.3	< 2	ND
R1_ENV_089-Top	8.0	< 5.0	46400	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.06	< 0.016	< 0.03	< 0.060	3100	23400	< 2.8	< 5	1.2	< 2	ND
R1_ENV_089-Middle	8.0	< 5.0	46400	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3210	23000	< 2.8	< 5	1.4	< 2	ND
R1_ENV_089-Bottom	8.0	< 5.0	46900	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3360	23800	< 2.8	< 5	1.5	< 2	ND
R1_ENV_090-Top	8.0	< 5.0	46500	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3170	23000	< 2.8	< 5	1.4	< 2	ND
R1_ENV_090-Middle	8.1	< 5.0	46500	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3150	23400	< 2.8	< 5	1.3	< 2	ND
R1_ENV_090-Bottom	8.0	< 5.0	47400	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3230	23800	< 2.8	< 5	1.5	< 2	ND
R1_ENV_091-Top	8.0	< 5.0	47500	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.08	< 0.016	< 0.03	< 0.060	3190	23000	< 2.8	< 5	1.4	< 2	ND
R1_ENV_091-Middle	8.0	< 5.0	46700	1.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3230	23400	< 2.8	< 5	1.5	< 2	ND
R1_ENV_091-Bottom	8.0	< 5.0	47600	0.7	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.04	< 0.016	< 0.03	< 0.060	3210	23400	< 2.8	< 5	1.4	< 2	ND
R1_ENV_092-Top	8.0	< 5.0	47200	1.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3160	23000	< 2.8	< 5	1.3	< 2	ND
R1_ENV_092-Middle	8.0	< 5.0	47400	1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3280	23800	< 2.8	< 5	1.4	< 2	ND
R1_ENV_092-Bottom	8.0	< 5.0	47500	1.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.10	< 0.016	< 0.03	< 0.060	3210	23400	< 2.8	< 5	1.4	< 2	ND
R1_ENV_093-Top	8.0	< 5.0	47000	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3200	23000	< 2.8	< 5	1.4	< 2	ND
R1_ENV_093-Middle	8.0	< 5.0	46500	0.8	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3160	23800	< 2.8	< 5	1.5	< 2	ND
R1_ENV_093-Bottom	8.0	< 5.0	47500	0.8	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3260	23800	< 2.8	< 5	1.5	< 2	ND
R1_ENV_094-Top	8.0	< 5.0	46400	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3140	23000	< 2.8	< 5	1.4	< 2	ND

Sample	Parameter																			
	pH	Total Suspended Solids [mg/L]	Total Dissolved Solids [mg/L]	Turbidity [NTU]	Nitrogen (Ammonia) [mg/L]	Ammonium [mg/L]	Sulphide [mg/L]	Total Nitrogen [mg/L]	Total Cyanide [mg/L]	Nitrate [mg/L]	Nitrite [mg/L]	Total Phosphorus [mg/L]	Orthophosphate [mg/L]	Sulphate [mg/L]	Chloride [mg/L]	Silicon* [mg/L]	Chemical Oxygen Demand [mg/L]	Total Organic Carbon [mg/L]	Biochemical Oxygen Demand [mg/L]	Total Coliform [CFU/100 mL]
R1_ENV_094-Middle	8.0	< 5.0	47200	0.9	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.06	< 0.016	< 0.03	< 0.060	3150	23400	< 2.8	< 5	1.4	< 2	ND
R1_ENV_094-Bottom	8.0	< 5.0	47600	0.7	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.12	< 0.016	< 0.03	< 0.060	3220	23400	< 2.8	< 5	1.4	< 2	ND
R1_ENV_095-Top	8.0	< 5.0	46600	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.06	< 0.016	< 0.03	< 0.060	3110	23800	< 2.8	< 5	1.4	< 2	ND
R1_ENV_095-Middle	8.0	< 5.0	46400	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3060	23400	< 2.8	< 5	1.4	< 2	ND
R1_ENV_095_Bottom	7.9	< 5.0	46200	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3070	23800	< 2.8	< 5	1.5	< 2	ND
R1_ENV_096-Top	8.0	< 5.0	46600	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.05	< 0.016	< 0.03	< 0.060	3100	23800	< 2.8	< 5	1.4	< 2	ND
R1_ENV_096-Middle	8.0	< 5.0	46700	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3090	23800	< 2.8	< 5	1.4	< 2	ND
R1_ENV_096_Bottom	8.0	< 5.0	46500	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3080	23400	< 2.8	< 5	1.4	< 2	ND
R1_ENV_097-Top	8.0	< 5.0	46300	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3060	22700	< 2.8	< 5	1.4	< 2	ND
R1_ENV_097-Middle	8.0	< 5.0	46700	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3080	23000	< 2.8	< 5	1.3	< 2	ND
R1_ENV_097-Bottom	8.0	< 5.0	46700	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.06	< 0.016	< 0.03	< 0.060	3120	23400	< 2.8	< 5	1.3	< 2	ND
R1_ENV_098-Top	8.0	< 5.0	46500	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3080	23800	< 2.8	< 5	1.3	< 2	ND
R1_ENV_098-Bottom	8.0	< 5.0	46500	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3060	23000	< 2.8	< 5	1.3	< 2	ND
R1_ENV_099-Top	8.0	< 5.0	46400	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3060	23400	< 2.8	< 5	1.3	< 2	ND
R1_ENV_099-Bottom	8.0	< 5.0	46800	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.05	< 0.016	< 0.03	< 0.060	3040	23000	< 2.8	< 5	1.4	< 2	ND
R1_ENV_100-Top	8.0	< 5.0	47300	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3130	23800	< 2.8	< 5	1.3	< 2	ND
R1_ENV_100-Bottom	8.0	< 5.0	47400	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3050	24100	< 2.8	< 5	1.4	< 2	ND
R1_ENV_101-Top	8.0	< 5.0	46500	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3190	23800	< 2.8	< 5	1.3	< 2	ND
R1_ENV_101-Middle	8.0	< 5.0	46500	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.05	< 0.016	< 0.03	< 0.060	3030	23400	< 2.8	< 5	1.3	< 2	ND
R1_ENV_101-Bottom	8.0	< 5.0	47000	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3070	23000	< 2.8	< 5	1.3	< 2	ND
R1_ENV_102-Top	8.0	< 5.0	47300	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3080	23400	< 2.8	< 5	1.2	< 2	ND
R1_ENV_102-Middle	8.0	< 5.0	47100	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3050	24100	< 2.8	< 5	1.3	< 2	ND
R1_ENV_102-Bottom	8.0	< 5.0	47400	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3070	23800	< 2.8	< 5	1.4	< 2	ND
R1_ENV_103-Top	8.1	< 5.0	46400	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3090	23000	< 2.8	< 5	1.3	< 2	ND
R1_ENV_103-Middle	8.0	< 5.0	46900	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3060	23400	< 2.8	< 5	1.3	< 2	ND
R1_ENV_103-Bottom	8.0	< 5.0	46900	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3110	23000	< 2.8	< 5	1.3	< 2	ND
R1_ENV_104-Top	8.1	< 5.0	46500	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3040	23800	< 2.8	< 5	1.3	< 2	ND
R1_ENV_104-Middle	8.0	< 5.0	46700	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3120	24100	< 2.8	< 5	1.3	< 2	ND

Sample	Parameter																			
	pH	Total Suspended Solids [mg/L]	Total Dissolved Solids [mg/L]	Turbidity [NTU]	Nitrogen (Ammonia) [mg/L]	Ammonium [mg/L]	Sulphide [mg/L]	Total Nitrogen [mg/L]	Total Cyanide [mg/L]	Nitrate [mg/L]	Nitrite [mg/L]	Total Phosphorus [mg/L]	Orthophosphate [mg/L]	Sulphate [mg/L]	Chloride [mg/L]	Silicon* [mg/L]	Chemical Oxygen Demand [mg/L]	Total Organic Carbon [mg/L]	Biochemical Oxygen Demand [mg/L]	Total Coliform [CFU/100 mL]
R1_ENV_104_Bottom	8.1	< 5.0	47000	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3220	24500	< 2.8	< 5	1.4	< 2	ND
R1_ENV_105-Top	8.0	< 5.0	46600	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.06	< 0.016	< 0.03	< 0.060	3060	23800	< 2.8	< 5	1.4	< 2	ND
R1_ENV_105-Middle	7.9	< 5.0	46600	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3120	23400	< 2.8	< 5	1.3	< 2	ND
R1_ENV_105_Bottom	8.0	< 5.0	47300	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3150	23800	< 2.8	< 5	1.3	< 2	ND
R1_ENV_106-Top	8.1	< 5.0	46400	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.06	< 0.016	< 0.03	< 0.060	3180	23000	< 2.8	< 5	1.4	< 2	ND
R1_ENV_106-Middle	8.0	< 5.0	46900	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3290	24100	< 2.8	< 5	1.4	< 2	ND
R1_ENV_106_Bottom	8.0	< 5.0	47000	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3130	24100	< 2.8	< 5	1.3	< 2	ND
R1_ENV_107-Top	8.0	< 5.0	47900	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3220	23800	< 2.8	< 5	1.2	< 2	ND
R1_ENV_107-Middle	8.0	< 5.0	46800	0.9	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3240	24100	< 2.8	< 5	1.3	< 2	ND
R1_ENV_107-Bottom	8.0	< 5.0	47700	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.06	< 0.016	< 0.03	< 0.060	3290	23800	< 2.8	< 5	1.2	< 2	ND
R1_ENV_108-Top	8.1	< 5.0	46800	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.08	< 0.016	< 0.03	< 0.060	3040	23800	< 2.8	< 5	1.4	< 2	ND
R1_ENV_108-Middle	7.9	< 5.0	46700	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3050	24100	< 2.8	< 5	1.5	< 2	ND
R1_ENV_108_Bottom	7.9	< 5.0	46900	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3090	24500	< 2.8	< 5	1.4	< 2	ND
R1_ENV_109-Top	8.0	< 5.0	46800	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3110	23400	< 2.8	< 5	1.3	< 2	ND
R1_ENV_109-Middle	8.0	< 5.0	47100	0.7	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3190	24100	< 2.8	< 5	1.2	< 2	ND
R1_ENV_109-Bottom	8.0	< 5.0	46800	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3180	23800	< 2.8	< 5	1.3	< 2	ND
R1_ENV_110-Top	8.1	< 5.0	46700	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3240	23800	< 2.8	< 5	1.3	< 2	ND
R1_ENV_110-Middle	8.0	< 5.0	46800	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3210	24100	< 2.8	< 5	1.2	< 2	ND
R1_ENV_110-Bottom	8.0	< 5.0	47300	0.6	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.06	< 0.016	< 0.03	< 0.060	3160	24100	< 2.8	< 5	1.3	< 2	ND
R1_ENV_111-Top	8.0	< 5.0	47200	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3190	23800	< 2.8	< 5	1.4	< 2	ND
R1_ENV_111-Middle	8.0	< 5.0	47100	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3210	24100	< 2.8	< 5	1.3	< 2	ND
R1_ENV_111-Bottom	8.0	< 5.0	47200	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3170	23800	< 2.8	< 5	1.3	< 2	ND
R1_ENV_112-Top	8.0	< 5.0	46700	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.19	< 0.016	< 0.03	< 0.060	3290	23000	< 2.8	< 5	1.3	< 2	ND
R1_ENV_112-Middle	8.0	< 5.0	47000	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3180	23800	< 2.8	< 5	1.3	< 2	ND
R1_ENV_112-Bottom	8.0	< 5.0	47300	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3240	24100	< 2.8	< 5	1.4	< 2	ND
R1_ENV_113-Top	8.0	< 5.0	46700	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3230	23000	< 2.8	< 5	1.3	< 2	ND
R1_ENV_113-Middle	8.0	< 5.0	46900	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3300	23400	< 2.8	< 5	1.4	< 2	ND
R1_ENV_113-Bottom	8.0	< 5.0	47100	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3300	23800	< 2.8	< 5	1.4	< 2	ND

Sample	Parameter																			
	pH	Total Suspended Solids [mg/L]	Total Dissolved Solids [mg/L]	Turbidity [NTU]	Nitrogen (Ammonia) [mg/L]	Ammonium [mg/L]	Sulphide [mg/L]	Total Nitrogen [mg/L]	Total Cyanide [mg/L]	Nitrate [mg/L]	Nitrite [mg/L]	Total Phosphorus [mg/L]	Orthophosphate [mg/L]	Sulphate [mg/L]	Chloride [mg/L]	Silicon* [mg/L]	Chemical Oxygen Demand [mg/L]	Total Organic Carbon [mg/L]	Biochemical Oxygen Demand [mg/L]	Total Coliform [CFU/100 mL]
R1_ENV_114-Top	8.0	< 5.0	46800	0.8	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3010	23000	< 2.8	< 5	1.3	< 2	ND
R1_ENV_114-Middle	8.1	< 5.0	47000	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3050	23000	< 2.8	< 5	1.2	< 2	ND
R1_ENV_114-Bottom	8.0	< 5.0	46500	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3100	23400	< 2.8	< 5	1.3	< 2	ND
R1_ENV_115-Top	8.0	< 5.0	46300	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3100	24500	< 2.8	< 5	1.4	< 2	ND
R1_ENV_115-Middle	8.0	< 5.0	47000	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3050	24500	< 2.8	< 5	1.3	< 2	ND
R1_ENV_115-Bottom	8.0	< 5.0	47800	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3040	23400	< 2.8	< 5	1.3	< 2	ND
R1_ENV_116-Top	8.0	< 5.0	47100	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3120	23000	< 2.8	< 5	1.2	< 2	ND
R1_ENV_116-Middle	8.0	< 5.0	46900	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	2960	24800	< 2.8	< 5	1.3	< 2	ND
R1_ENV_116-Bottom	8.0	< 5.0	47100	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.05	< 0.016	< 0.03	< 0.060	3010	24100	< 2.8	< 5	1.3	< 2	ND
R1_ENV_117-Top	8.1	< 5.0	47800	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.06	< 0.016	< 0.03	< 0.060	3070	23000	< 2.8	< 5	1.3	< 2	ND
R1_ENV_117-Middle	8.0	< 5.0	48100	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3140	23400	< 2.8	< 5	1.3	< 2	ND
R1_ENV_117-Bottom	8.0	< 5.0	47300	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3120	24500	< 2.8	< 5	1.3	< 2	ND
R1_ENV_118-Top	8.1	< 5.0	47800	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3080	24800	< 2.8	< 5	1.2	< 2	ND
R1_ENV_118-Middle	8.1	< 5.0	47400	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3100	23800	< 2.8	< 5	1.4	< 2	ND
R1_ENV_118-Bottom	8.0	< 5.0	47500	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3070	24100	< 2.8	< 5	1.3	< 2	ND
R1_ENV_119-Top	8.0	< 5.0	47400	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3090	23000	< 2.8	< 5	1.3	< 2	ND
R1_ENV_119-Middle	8.0	< 5.0	48500	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3100	24500	< 2.8	< 5	1.3	< 2	ND
R1_ENV_119-Bottom	8.0	< 5.0	48000	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3030	24500	< 2.8	< 5	1.4	< 2	ND
R1_ENV_120-Top	8.1	< 5.0	47500	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.07	< 0.016	< 0.03	< 0.060	3130	24500	< 2.8	< 5	1.3	< 2	ND
R1_ENV_120-Middle	8.1	< 5.0	47400	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3150	24100	< 2.8	< 5	1.3	< 2	ND
R1_ENV_120-Bottom	8.0	< 5.0	47600	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3060	24100	< 2.8	< 5	1.4	< 2	ND
R1_ENV_121-Top	8.1	< 5.0	47400	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3150	24100	< 2.8	< 5	1.3	< 2	ND
R1_ENV_121-Middle	8.1	< 5.0	47200	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3090	24500	< 2.8	< 5	1.4	< 2	ND
R1_ENV_121-Bottom	8.1	< 5.0	47700	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3090	25200	< 2.8	< 5	1.4	< 2	ND
R1_ENV_122-Top	8.1	< 5.0	47600	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.05	< 0.016	< 0.03	< 0.060	3100	24500	< 2.8	< 5	1.3	< 2	ND
R1_ENV_122-Middle	8.1	< 5.0	47200	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3130	24800	< 2.8	< 5	1.4	< 2	ND
R1_ENV_122-Bottom	8.1	< 5.0	47700	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3140	24500	< 2.8	< 5	1.3	< 2	ND
R1_ENV_123-Top	8.1	< 5.0	47300	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3230	24100	< 2.8	< 5	1.3	< 2	ND

Sample	Parameter																			
	pH	Total Suspended Solids [mg/L]	Total Dissolved Solids [mg/L]	Turbidity [NTU]	Nitrogen (Ammonia) [mg/L]	Ammonium [mg/L]	Sulphide [mg/L]	Total Nitrogen [mg/L]	Total Cyanide [mg/L]	Nitrate [mg/L]	Nitrite [mg/L]	Total Phosphorus [mg/L]	Orthophosphate [mg/L]	Sulphate [mg/L]	Chloride [mg/L]	Silicon* [mg/L]	Chemical Oxygen Demand [mg/L]	Total Organic Carbon [mg/L]	Biochemical Oxygen Demand [mg/L]	Total Coliform [CFU/100 mL]
R1_ENV_123-Middle	8.1	< 5.0	47600	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.04	< 0.016	< 0.03	< 0.060	3260	24800	< 2.8	< 5	1.3	< 2	ND
R1_ENV_123-Bottom	8.1	< 5.0	47300	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3150	24100	< 2.8	< 5	1.3	< 2	ND
R1_ENV_124-Top	8.0	< 5.0	46900	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3110	23800	< 2.8	< 5	1.3	< 2	ND
R1_ENV_124-Middle	8.1	< 5.0	47300	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3140	24100	< 2.8	< 5	1.3	< 2	ND
R1_ENV_124-Bottom	8.0	< 5.0	47600	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.05	< 0.016	< 0.03	< 0.060	3060	24500	< 2.8	< 5	1.3	< 2	ND
R1_ENV_125-Top	8.0	< 5.0	47100	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3130	23800	< 2.8	< 5	1.4	< 2	ND
R1_ENV_125-Middle	8.0	< 5.0	47300	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3120	24100	< 2.8	< 5	1.2	< 2	ND
R1_ENV_125-Bottom	8.0	< 5.0	47800	0.7	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.2	< 0.016	< 0.03	< 0.060	3260	24500	< 2.8	< 5	1.3	< 2	ND
R1_ENV_126-Top	8.0	< 5.0	47300	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3260	23400	< 2.8	< 5	1.4	< 2	ND
R1_ENV_126-Middle	8.0	< 5.0	47500	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3310	23400	< 2.8	< 5	1.4	< 2	ND
R1_ENV_126-Bottom	8.0	< 5.0	48100	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.21	< 0.016	< 0.03	< 0.060	3390	23800	< 2.8	< 5	1.5	< 2	ND
R1_ENV_127-Top	8.0	< 5.0	46500	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3250	23800	< 2.8	< 5	1.3	< 2	ND
R1_ENV_127-Middle	8.0	< 5.0	47800	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3320	23400	< 2.8	< 5	1.5	< 2	ND
R1_ENV_127-Bottom	8.0	< 5.0	48000	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.06	< 0.016	< 0.03	< 0.060	3320	23400	< 2.8	< 5	1.3	< 2	ND
R1_ENV_128-Top	8.0	< 5.0	46800	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3310	23000	< 2.8	< 5	1.4	< 2	ND
R1_ENV_128-Middle	8.1	< 5.0	47000	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3240	23800	< 2.8	< 5	1.4	< 2	ND
R1_ENV_128-Bottom	8.0	< 5.0	47500	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3360	23400	< 2.8	< 5	1.4	< 2	ND
R1_ENV_129-Top	8.0	< 5.0	46600	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3310	23000	< 2.8	< 5	1.4	< 2	ND
R1_ENV_129-Middle	8.0	< 5.0	47100	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.11	< 0.016	< 0.03	< 0.060	3270	23800	< 2.8	< 5	1.4	< 2	ND
R1_ENV_129-Bottom	8.0	< 5.0	47300	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.08	< 0.016	< 0.03	< 0.060	3350	23800	< 2.8	< 5	1.4	< 2	ND
R1_ENV_REF-Top	8.1	< 5.0	48800	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3180	24800	< 2.8	< 5	1.4	< 2	ND
R1_ENV_REF-Middle	8.1	< 5.0	49300	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3290	24800	< 2.8	< 5	1.4	< 2	ND
R1_ENV_REF-Bottom	8.0	< 5.0	49100	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3260	25200	< 2.8	< 5	1.4	< 2	ND
Minimum	**7.9**	**< 5.0**	**45500**	**< 0.1**	**< 0.05**	**< 0.064**	**< 0.005**	**< 0.5**	**< 0.01**	**< 0.04**	**< 0.016**	**< 0.03**	**< 0.060**	**2930**	**22300**	**< 2.8**	**< 5**	**1.2**	**< 2**	**ND**
Maximum	**8.2**	**< 5.0**	**53000**	**3.6**	**< 0.05**	**< 0.064**	**< 0.005**	**0.7**	**0.02**	**0.85**	**0.017**	**0.15**	**< 0.060**	**3710**	**26600**	**< 2.8**	**< 5**	**2.6**	**< 2**	**ND**
Mean	8.0	-	48200	0.4	-	-	-	-	-	-	-		-	3170	24200	-	-	1.5	-	-
Standard Deviation	0.07	-	1770	0.44	-	-	-	-	-	-	-		-	125	950	-	-	0.19	-	-
RSD [%]	1	-	4	105	-	-	-	-	-	-	-		-	4	4	-	-	13	-	-

Sample	Parameter																			
	pH	Total Suspended Solids [mg/L]	Total Dissolved Solids [mg/L]	Turbidity [NTU]	Nitrogen (Ammonia) [mg/L]	Ammonium [mg/L]	Sulphide [mg/L]	Total Nitrogen [mg/L]	Total Cyanide [mg/L]	Nitrate [mg/L]	Nitrite [mg/L]	Total Phosphorus [mg/L]	Orthophosphate [mg/L]	Sulphate [mg/L]	Chloride [mg/L]	Silicon* [mg/L]	Chemical Oxygen Demand [mg/L]	Total Organic Carbon [mg/L]	Biochemical Oxygen Demand [mg/L]	Total Coliform [CFU/100 mL]
Water Standards (QCC, 2017)																				
General use areas	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	35
Marine protected areas	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	35
US EPA Saltwater Quality Standards (US EPA, 2020)																				
CMC	-	-	-	-	-	-	-	-	0.001†	-	-	-		-	-	-	-	-	-	-
CCC	6.5 – 8.5	-	-	-	-	-	-	-	0.001†	-	-	-		-	-	-	-	-	-	-

Notes

For statistical evaluation, results < MRV were treated as absolute values determined by MRV/2
NTU = Nephelometric Turbidity Units
ND = Not detected
QCC = Abu Dhabi Quality and Conformity Council
CMC = Criterion maximum concentration
MRV = Minimum reporting value
* = Silicon as SiO_2
= This recommended water quality criterion is expressed as mg free cyanide (as CN)/L

pH measured at 20 °C
CFU/100 mL = Coliform forming units per 100 mL
RSD = Relative standard deviation
CCC = Criterion continuous concentration
US EPA = United States Environment Protection Agency

Key:	Below Water Standards	Above Water Standard for General Use Areas	Above Water Standard Marine Protected Areas

F. Water Column Hydrocarbons

F.1 Summary of Water Column Hydrocarbon Content Analysis

Summary of Water Column Hydrocarbon Content Analysis				
Sample	VPH (C5-C10)*	EPH (C10-C40)*	Dissolved and Emulsified Oil†	Free Oil‡
R1_ENV_001-Top	< 7	< 10	< 10	< 0.01
R1_ENV_001-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_001-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_002-Top	< 7	< 10	< 10	< 0.01
R1_ENV_002-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_002-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_003-Top	< 7	< 10	< 10	< 0.01
R1_ENV_003-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_004-Top	< 7	< 10	< 10	< 0.01
R1_ENV_004-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_005-Top	< 7	< 10	< 10	< 0.01
R1_ENV_005-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_006-Top	< 7	< 10	< 10	< 0.01
R1_ENV_006-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_007-Top	< 7	< 10	< 10	< 0.01
R1_ENV_007-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_008-Top	< 7	< 10	< 10	< 0.01
R1_ENV_008-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_009-Top	< 7	< 10	< 10	< 0.01
R1_ENV_009-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_010-Top	< 7	< 10	< 10	< 0.01
R1_ENV_010-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_011-Top	< 7	< 10	< 10	< 0.01
R1_ENV_011-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_012-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_013-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_014-Top	< 7	< 10	< 10	< 0.01
R1_ENV_014-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_015-Top	< 7	< 10	< 10	< 0.01
R1_ENV_015-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_016-Top	< 7	< 10	< 10	< 0.01

Summary of Water Column Hydrocarbon Content Analysis				
Sample	VPH (C5-C10)*	EPH (C10-C40)*	Dissolved and Emulsified Oil†	Free Oil‡
R1_ENV_016-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_016-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_017-Top	< 7	< 10	< 10	< 0.01
R1_ENV_017-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_018-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_019-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_020-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_021-Top	< 7	< 10	< 10	< 0.01
R1_ENV_021-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_022-Top	< 7	< 10	< 10	< 0.01
R1_ENV_022-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_023-Top	< 7	< 10	< 10	< 0.01
R1_ENV_023-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_024-Top	< 7	< 10	< 10	< 0.01
R1_ENV_024-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_025-Top	< 7	< 10	< 10	< 0.01
R1_ENV_025-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_025-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_026-Top	< 7	< 10	< 10	< 0.01
R1_ENV_026-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_026-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_027-Top	< 7	< 10	< 10	< 0.01
R1_ENV_027-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_027-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_028-Top	< 7	< 10	< 10	< 0.01
R1_ENV_028-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_029-Top	< 7	< 10	< 10	< 0.01
R1_ENV_029-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_029-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_030-Top	< 7	< 10	< 10	< 0.01
R1_ENV_030-Middle	< 7	< 10	< 10	< 0.01

Summary of Water Column Hydrocarbon Content Analysis				
Sample	VPH (C5-C10)*	EPH (C10-C40)*	Dissolved and Emulsified Oil†	Free Oil‡
R1_ENV_030-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_031-Top	< 7	< 10	< 10	< 0.01
R1_ENV_031-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_031-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_032-Top	< 7	< 10	< 10	< 0.01
R1_ENV_032-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_032-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_033-Top	< 7	< 10	< 10	< 0.01
R1_ENV_033-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_033-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_034-Top	< 7	< 10	< 10	< 0.01
R1_ENV_034-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_034-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_035-Top	< 7	< 10	< 10	< 0.01
R1_ENV_035-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_035-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_036-Top	< 7	< 10	< 10	0.02
R1_ENV_036-Middle	< 7	< 10	< 10	0.02
R1_ENV_036-Bottom	< 7	< 10	< 10	0.02
R1_ENV_037-Top	< 7	< 10	< 10	0.02
R1_ENV_037-Middle	< 7	< 10	< 10	0.02
R1_ENV_037-Bottom	< 7	< 10	< 10	0.02
R1_ENV_038-Top	< 7	< 10	< 10	< 0.01
R1_ENV_038-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_039-Top	< 7	< 10	< 10	< 0.01
R1_ENV_039-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_039-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_040-Top	< 7	< 10	< 10	< 0.01
R1_ENV_040-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_040-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_041-Top	< 7	< 10	< 10	< 0.01

Summary of Water Column Hydrocarbon Content Analysis				
Sample	VPH (C5-C10)*	EPH (C10-C40)*	Dissolved and Emulsified Oil†	Free Oil‡
R1_ENV_041-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_041-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_042-Top	< 7	< 10	< 10	< 0.01
R1_ENV_042-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_042-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_043-Top	< 7	< 10	< 10	< 0.01
R1_ENV_043-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_043-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_044-Top	< 7	< 10	< 10	< 0.01
R1_ENV_044-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_044-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_045-Top	< 7	< 10	< 10	< 0.01
R1_ENV_045-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_045-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_046-Top	< 7	< 10	< 10	< 0.01
R1_ENV_046-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_046-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_047-Top	< 7	< 10	< 10	< 0.01
R1_ENV_047-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_047-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_048-Top	< 7	< 10	< 10	< 0.01
R1_ENV_048-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_048-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_049-Top	< 7	< 10	< 10	< 0.01
R1_ENV_049-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_049-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_050-Top	< 7	< 10	< 10	< 0.01
R1_ENV_050-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_050-Bottom	< 7	< 10	< 20	< 0.01
R1_ENV_051-Top	< 7	< 10	< 10	< 0.01
R1_ENV_051-Middle	< 7	< 10	< 10	< 0.01

Summary of Water Column Hydrocarbon Content Analysis				
Sample	VPH (C5-C10)*	EPH (C10-C40)*	Dissolved and Emulsified Oil†	Free Oil‡
R1_ENV_051-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_052-Top	< 7	< 10	< 10	< 0.01
R1_ENV_052-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_052-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_053-Top	< 7	< 10	< 10	< 0.01
R1_ENV_053-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_053-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_054-Top	< 7	< 10	< 10	< 0.01
R1_ENV_054-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_054-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_055-Top	< 7	< 10	< 10	< 0.01
R1_ENV_055-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_055-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_056-Top	< 7	< 10	< 10	< 0.01
R1_ENV_056-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_056-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_057-Top	< 7	< 10	< 10	< 0.01
R1_ENV_057-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_057-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_058-Top	< 7	< 10	< 10	< 0.01
R1_ENV_058-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_058-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_059-Top	< 7	< 10	< 10	< 0.01
R1_ENV_059-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_059-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_060-Top	< 7	< 10	< 10	< 0.01
R1_ENV_060-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_060-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_061-Top	< 7	< 10	< 10	< 0.01
R1_ENV_061-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_061-Bottom	< 7	< 10	< 10	< 0.01

Summary of Water Column Hydrocarbon Content Analysis				
Sample	VPH (C5-C10)*	EPH (C10-C40)*	Dissolved and Emulsified Oil†	Free Oil‡
R1_ENV_062-Top	< 7	< 10	< 10	< 0.01
R1_ENV_062-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_062-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_063-Top	< 7	< 10	< 10	< 0.01
R1_ENV_063-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_063-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_064-Top	< 7	< 10	< 10	< 0.01
R1_ENV_064-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_064-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_065-Top	< 7	< 10	< 10	< 0.01
R1_ENV_065-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_065-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_066-Top	< 7	< 10	< 10	< 0.01
R1_ENV_066-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_066-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_067-Top	< 7	< 10	< 10	< 0.01
R1_ENV_067-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_067-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_068-Top	< 7	< 10	< 10	< 0.01
R1_ENV_068-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_068-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_069-Top	< 7	< 10	< 10	< 0.01
R1_ENV_069-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_069-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_070-Top	< 7	< 10	< 10	< 0.01
R1_ENV_070-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_070-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_071-Top	< 7	< 10	< 10	< 0.01
R1_ENV_071-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_071-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_072-Top	< 7	< 10	< 10	< 0.01

Summary of Water Column Hydrocarbon Content Analysis				
Sample	VPH (C5-C10)*	EPH (C10-C40)*	Dissolved and Emulsified Oil†	Free Oil‡
R1_ENV_072-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_072-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_073-Top	< 7	< 10	< 10	< 0.01
R1_ENV_073-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_073-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_074_Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_074-Top	< 7	< 10	< 10	< 0.01
R1_ENV_074-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_075_Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_075-Top	< 7	< 10	< 10	< 0.01
R1_ENV_075-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_076_Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_076-Top	< 7	< 10	< 10	< 0.01
R1_ENV_076-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_077_Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_077-Top	< 7	< 10	< 10	< 0.01
R1_ENV_077-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_078_Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_078-Top	< 7	< 10	< 10	< 0.01
R1_ENV_078-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_079_Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_079-Top	< 7	< 10	< 10	< 0.01
R1_ENV_079-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_080_Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_080-Top	< 7	< 10	< 10	< 0.01
R1_ENV_080-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_081-Top	< 7	< 10	< 10	< 0.01
R1_ENV_081-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_081-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_082-Top	< 7	< 10	< 10	< 0.01
R1_ENV_082-Middle	< 7	< 10	< 10	< 0.01

Summary of Water Column Hydrocarbon Content Analysis				
Sample	VPH (C5-C10)*	EPH (C10-C40)*	Dissolved and Emulsified Oil†	Free Oil‡
R1_ENV_082-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_083-Top	< 7	< 10	< 10	< 0.01
R1_ENV_083-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_083-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_084-Top	< 7	< 10	< 10	< 0.01
R1_ENV_084-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_084-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_085-Top	< 7	< 10	< 10	< 0.01
R1_ENV_085-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_085-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_086-Top	< 7	< 10	< 10	< 0.01
R1_ENV_086-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_086-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_087-Top	< 7	< 10	< 10	< 0.01
R1_ENV_087-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_087-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_088-Top	< 7	< 10	< 10	< 0.01
R1_ENV_088-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_088-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_089-Top	< 7	< 10	< 10	< 0.01
R1_ENV_089-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_089-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_090-Top	< 7	< 10	< 10	< 0.01
R1_ENV_090-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_090-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_091-Top	< 7	< 10	< 10	< 0.01
R1_ENV_091-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_091-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_092-Top	< 7	< 10	< 10	< 0.01
R1_ENV_092-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_092-Bottom	< 7	< 10	< 10	< 0.01

Summary of Water Column Hydrocarbon Content Analysis				
Sample	VPH (C5-C10)*	EPH (C10-C40)*	Dissolved and Emulsified Oil†	Free Oil‡
R1_ENV_093-Top	< 7	< 10	< 10	< 0.01
R1_ENV_093-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_093-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_094-Top	< 7	< 10	< 10	< 0.01
R1_ENV_094-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_094-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_095_Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_095-Top	< 7	< 10	< 10	< 0.01
R1_ENV_095-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_096_Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_096-Top	< 7	< 10	< 10	< 0.01
R1_ENV_096-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_097-Top	< 7	< 10	< 10	< 0.01
R1_ENV_097-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_097-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_098-Top	< 7	< 10	< 10	< 0.01
R1_ENV_098-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_099-Top	< 7	< 10	< 10	< 0.01
R1_ENV_099-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_100-Top	< 7	< 10	< 10	< 0.01
R1_ENV_100-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_101-Top	< 7	< 10	< 10	< 0.01
R1_ENV_101-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_101-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_102-Top	< 7	< 10	< 10	< 0.01
R1_ENV_102-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_102-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_103-Top	< 7	< 10	< 10	< 0.01
R1_ENV_103-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_103-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_104_Bottom	< 7	< 10	< 10	< 0.01

Summary of Water Column Hydrocarbon Content Analysis				
Sample	VPH (C5-C10)*	EPH (C10-C40)*	Dissolved and Emulsified Oil†	Free Oil‡
R1_ENV_104-Top	< 7	< 10	< 10	< 0.01
R1_ENV_104-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_105_Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_105-Top	< 7	< 10	< 10	< 0.01
R1_ENV_105-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_106_Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_106-Top	< 7	< 10	< 10	< 0.01
R1_ENV_106-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_107-Top	< 7	< 10	< 10	< 0.01
R1_ENV_107-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_107-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_108_Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_108-Top	< 7	< 10	< 10	< 0.01
R1_ENV_108-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_109-Top	< 7	< 10	< 10	< 0.01
R1_ENV_109-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_109-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_110-Top	< 7	< 10	< 10	< 0.01
R1_ENV_110-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_110-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_111-Top	< 7	< 10	< 10	< 0.01
R1_ENV_111-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_111-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_112-Top	< 7	< 10	< 10	< 0.01
R1_ENV_112-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_112-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_113-Top	< 7	< 10	< 10	< 0.01
R1_ENV_113-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_113-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_114-Top	< 7	< 10	< 10	< 0.01
R1_ENV_114-Middle	< 7	< 10	< 10	< 0.01

Summary of Water Column Hydrocarbon Content Analysis				
Sample	VPH (C5-C10)*	EPH (C10-C40)*	Dissolved and Emulsified Oil†	Free Oil‡
R1_ENV_114-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_115-Top	< 7	< 10	< 10	< 0.01
R1_ENV_115-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_115-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_116-Top	< 7	< 10	< 10	< 0.01
R1_ENV_116-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_116-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_117-Top	< 7	< 10	< 10	< 0.01
R1_ENV_117-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_117-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_118-Top	< 7	< 10	< 10	< 0.01
R1_ENV_118-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_118-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_119-Top	< 7	< 10	< 10	0.02
R1_ENV_119-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_119-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_120-Top	< 7	< 10	< 10	0.02
R1_ENV_120-Middle	< 7	< 10	< 10	0.02
R1_ENV_120-Bottom	< 7	< 10	< 10	0.02
R1_ENV_121-Top	< 7	< 10	< 10	0.02
R1_ENV_121-Middle	< 7	< 10	< 10	0.02
R1_ENV_121-Bottom	< 7	< 10	< 10	0.02
R1_ENV_122-Top	< 7	< 10	< 10	0.02
R1_ENV_122-Middle	< 7	< 10	< 10	0.02
R1_ENV_122-Bottom	< 7	< 10	< 10	0.02
R1_ENV_123-Top	< 7	< 10	< 10	0.02
R1_ENV_123-Middle	< 7	< 10	< 10	0.02
R1_ENV_123-Bottom	< 7	< 10	< 10	0.02
R1_ENV_124-Top	< 7	< 10	< 10	< 0.01
R1_ENV_124-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_124-Bottom	< 7	< 10	< 10	< 0.01

Summary of Water Column Hydrocarbon Content Analysis				
Sample	VPH (C5-C10)*	EPH (C10-C40)*	Dissolved and Emulsified Oil†	Free Oil‡
R1_ENV_125-Top	< 7	< 10	< 10	< 0.01
R1_ENV_125-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_125-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_126-Top	< 7	< 10	< 10	< 0.01
R1_ENV_126-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_126-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_127-Top	< 7	< 10	< 10	< 0.01
R1_ENV_127-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_127-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_128-Top	< 7	< 10	< 10	< 0.01
R1_ENV_128-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_128-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_129-Top	< 7	< 10	< 10	< 0.01
R1_ENV_129-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_129-Bottom	< 7	< 10	< 10	< 0.01
R1_ENV_REF-Top	< 7	< 10	< 10	< 0.01
R1_ENV_REF-Middle	< 7	< 10	< 10	< 0.01
R1_ENV_REF-Bottom	< 7	< 10	< 10	< 0.01
Minimum	**< 7**	**< 10**	**< 10**	**< 0.01**
Maximum	**< 7**	**< 10**	**< 10**	**0.02**
Water Standards (QCC, 2017)				
General use areas	-	7.0#	-	-
Marine protected areas	-	7.0#	-	-

Notes

VPH = Volatile petroleum hydrocarbons
EPH = Extractable petroleum hydrocarbons
QCC = Abu Dhabi Quality and Conformity Council

* = Data expressed as µg/L

= n-Alkane range not specified

Key:	Below Water Standards	Above Water Standard for General Use Areas	Above Water Standard for Marine Protected Areas

F.2 Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content

Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R1_ENV_001-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_001-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.01	< 0.01
R1_ENV_001-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	0.01
R1_ENV_002-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_002-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_002-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_003-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_003-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_004-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_004-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	0.03	0.01
R1_ENV_005-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_005-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_006-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content

Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R1_ENV_006-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_007-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_007-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_008-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_008-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_009-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_009-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_010-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_010-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_011-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_011-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_012-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_013-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content																
Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R1_ENV_014-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_014-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_015-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_015-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_016-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_016-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_016-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_017-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_017-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	0.05	< 0.01
R1_ENV_018-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_019-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_020-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_021-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content																
Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R1_ENV_021-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_022-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_022-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_023-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_023-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_024-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_024-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_025-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_025-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_025-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_026-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_026-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_026-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content																
Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R1_ENV_027-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_027-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_027-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_028-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.01	< 0.01
R1_ENV_028-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_029-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_029-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_029-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_030-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_030-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_030-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_031-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_031-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content																
Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R1_ENV_031-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_032-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_032-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_032-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_033-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_033-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_033-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_034-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_034-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_034-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_035-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_035-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_035-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content																
Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R1_ENV_036-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_036-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_036-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_037-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_037-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_037-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_038-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_038-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_039-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_039-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_039-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_040-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_040-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content

Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R1_ENV_040-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_041-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_041-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_041-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_042-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_042-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_042-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_043-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_043-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_043-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_044-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_044-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_044-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content																
Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R1_ENV_045-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_045-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_045-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_046-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_046-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_046-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_047-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_047-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_047-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_048-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_048-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_048-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_049-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content																
Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R1_ENV_049-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_049-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_050-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_050-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_050-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_051-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_051-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_051-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_052-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_052-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_052-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_053-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_053-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content																
Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R1_ENV_053-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_054-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_054-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_054-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_055-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_055-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_055-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_056-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_056-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_056-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_057-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_057-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_057-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content																
Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R1_ENV_058-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_058-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_058-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_059-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_059-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_059-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_060-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_060-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_060-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_061-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_061-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	0.02	< 0.01
R1_ENV_061-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_062-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content

Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R1_ENV_062-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_062-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_063-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_063-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_063-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_064-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_064-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_064-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_065-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_065-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_065-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_066-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_066-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content

Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R1_ENV_066-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_067-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_067-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_067-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_068-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_068-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_068-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_069-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_069-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_069-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_070-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_070-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_070-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content																
Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R1_ENV_071-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_071-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_071-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_072-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_072-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_072-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_073-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_073-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_073-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_074_Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_074-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_074-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_075_Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content																
Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R1_ENV_075-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_075-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_076_Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_076-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_076-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_077_Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_077-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_077-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_078_Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_078-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_078-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_079_Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_079-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content																
Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R1_ENV_079-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_080_Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_080-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.01	< 0.01
R1_ENV_080-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_081-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_081-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_081-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_082-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_082-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_082-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_083-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_083-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_083-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content

Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R1_ENV_084-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_084-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_084-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_085-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_085-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_085-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_086-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_086-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_086-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_087-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_087-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_087-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_088-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content

Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R1_ENV_088-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_088-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_089-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_089-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_089-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_090-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_090-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_090-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_091-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_091-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_091-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_092-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_092-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content

Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R1_ENV_092-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_093-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_093-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_093-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_094-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_094-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_094-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_095_Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_095-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.01	< 0.01
R1_ENV_095-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_096_Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_096-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_096-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content

Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R1_ENV_097-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_097-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_097-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_098-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_098-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_099-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_099-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_100-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_100-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_101-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_101-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_101-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_102-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content																
Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R1_ENV_102-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_102-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_103-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_103-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_103-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_104_Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_104-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_104-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_105_Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_105-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_105-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_106_Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_106-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content																
Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R1_ENV_106-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_107-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_107-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_107-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_108_Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_108-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.01	< 0.01
R1_ENV_108-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_109-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_109-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_109-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_110-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_110-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_110-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content

Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R1_ENV_111-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_111-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_111-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_112-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_112-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_112-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_113-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_113-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_113-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_114-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_114-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_114-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_115-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content																
Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R1_ENV_115-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_115-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_116-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_116-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_116-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_117-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_117-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_117-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_118-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_118-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_118-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_119-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_119-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content																
Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R1_ENV_119-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_120-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_120-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_120-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_121-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_121-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_121-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_122-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_122-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_122-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_123-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_123-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_123-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content

Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R1_ENV_124-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_124-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_124-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_125-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_125-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_125-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_126-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_126-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_126-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_127-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_127-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_127-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_128-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content																
Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R1_ENV_128-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_128-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_129-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_129-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_129-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_REF-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_REF-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R1_ENV_REF-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
Minimum	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.02**	**< 0.01**	**< 0.01**
Maximum	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**0.02**	**0.05**	**0.01**

Notes

Concentrations expressed as µg/L of water PAH = Polycyclic aromatic hydrocarbon

F.3 Summary of Water Column Benzene, Toluene, Ethylbenzene and Xylene (BTEX) Concentrations

Summary of Water Column Benzene, Toluene, Ethylbenzene and Xylene (BTEX) Concentrations					
Sample	Benzene [µg/L]	Toluene [µg/L]	Ethylbenzene [µg/L]	m&p-Xylene [µg/L]	o-Xylene [µg/L]
R1_ENV_001-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_001-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_001-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_002-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_002-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_002-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_003-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_003-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_004-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_004-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_005-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_005-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_006-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_006-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_007-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_007-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_008-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_008-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_009-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_009-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_010-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_010-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_011-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_011-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_012-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_013-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_014-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_014-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_015-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_015-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_016-Top	< 7	< 7	< 7	< 14	< 7

Summary of Water Column Benzene, Toluene, Ethylbenzene and Xylene (BTEX) Concentrations					
Sample	Benzene [µg/L]	Toluene [µg/L]	Ethylbenzene [µg/L]	m&p-Xylene [µg/L]	o-Xylene [µg/L]
R1_ENV_016-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_016-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_017-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_017-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_018-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_019-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_020-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_021-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_021-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_022-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_022-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_023-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_023-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_024-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_024-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_025-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_025-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_025-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_026-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_026-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_026-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_027-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_027-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_027-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_028-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_028-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_029-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_029-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_029-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_030-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_030-Middle	< 7	< 7	< 7	< 14	< 7

Summary of Water Column Benzene, Toluene, Ethylbenzene and Xylene (BTEX) Concentrations					
Sample	Benzene [µg/L]	Toluene [µg/L]	Ethylbenzene [µg/L]	m&p-Xylene [µg/L]	o-Xylene [µg/L]
R1_ENV_030-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_031-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_031-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_031-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_032-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_032-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_032-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_033-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_033-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_033-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_034-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_034-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_034-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_035-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_035-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_035-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_036-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_036-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_036-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_037-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_037-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_037-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_038-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_038-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_039-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_039-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_039-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_040-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_040-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_040-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_041-Top	< 7	< 7	< 7	< 14	< 7

Summary of Water Column Benzene, Toluene, Ethylbenzene and Xylene (BTEX) Concentrations					
Sample	Benzene [µg/L]	Toluene [µg/L]	Ethylbenzene [µg/L]	m&p-Xylene [µg/L]	o-Xylene [µg/L]
R1_ENV_041-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_041-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_042-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_042-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_042-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_043-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_043-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_043-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_044-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_044-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_044-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_045-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_045-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_045-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_046-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_046-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_046-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_047-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_047-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_047-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_048-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_048-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_048-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_049-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_049-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_049-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_050-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_050-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_050-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_051-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_051-Middle	< 7	< 7	< 7	< 14	< 7

Summary of Water Column Benzene, Toluene, Ethylbenzene and Xylene (BTEX) Concentrations					
Sample	Benzene [µg/L]	Toluene [µg/L]	Ethylbenzene [µg/L]	m&p-Xylene [µg/L]	o-Xylene [µg/L]
R1_ENV_051-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_052-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_052-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_052-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_053-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_053-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_053-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_054-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_054-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_054-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_055-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_055-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_055-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_056-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_056-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_056-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_057-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_057-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_057-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_058-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_058-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_058-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_059-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_059-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_059-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_060-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_060-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_060-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_061-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_061-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_061-Bottom	< 7	< 7	< 7	< 14	< 7

Summary of Water Column Benzene, Toluene, Ethylbenzene and Xylene (BTEX) Concentrations					
Sample	Benzene [µg/L]	Toluene [µg/L]	Ethylbenzene [µg/L]	m&p-Xylene [µg/L]	o-Xylene [µg/L]
R1_ENV_062-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_062-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_062-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_063-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_063-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_063-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_064-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_064-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_064-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_065-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_065-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_065-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_066-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_066-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_066-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_067-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_067-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_067-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_068-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_068-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_068-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_069-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_069-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_069-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_070-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_070-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_070-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_071-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_071-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_071-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_072-Top	< 7	< 7	< 7	< 14	< 7

Summary of Water Column Benzene, Toluene, Ethylbenzene and Xylene (BTEX) Concentrations					
Sample	Benzene [µg/L]	Toluene [µg/L]	Ethylbenzene [µg/L]	m&p-Xylene [µg/L]	o-Xylene [µg/L]
R1_ENV_072-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_072-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_073-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_073-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_073-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_074_Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_074-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_074-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_075_Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_075-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_075-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_076_Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_076-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_076-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_077_Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_077-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_077-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_078_Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_078-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_078-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_079_Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_079-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_079-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_080_Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_080-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_080-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_081-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_081-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_081-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_082-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_082-Middle	< 7	< 7	< 7	< 14	< 7

Summary of Water Column Benzene, Toluene, Ethylbenzene and Xylene (BTEX) Concentrations					
Sample	Benzene [µg/L]	Toluene [µg/L]	Ethylbenzene [µg/L]	m&p-Xylene [µg/L]	o-Xylene [µg/L]
R1_ENV_082-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_083-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_083-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_083-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_084-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_084-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_084-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_085-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_085-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_085-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_086-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_086-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_086-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_087-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_087-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_087-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_088-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_088-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_088-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_089-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_089-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_089-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_090-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_090-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_090-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_091-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_091-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_091-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_092-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_092-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_092-Bottom	< 7	< 7	< 7	< 14	< 7

Summary of Water Column Benzene, Toluene, Ethylbenzene and Xylene (BTEX) Concentrations					
Sample	Benzene [µg/L]	Toluene [µg/L]	Ethylbenzene [µg/L]	m&p-Xylene [µg/L]	o-Xylene [µg/L]
R1_ENV_093-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_093-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_093-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_094-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_094-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_094-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_095_Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_095-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_095-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_096_Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_096-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_096-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_097-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_097-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_097-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_098-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_098-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_099-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_099-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_100-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_100-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_101-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_101-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_101-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_102-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_102-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_102-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_103-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_103-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_103-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_104_Bottom	< 7	< 7	< 7	< 14	< 7

Summary of Water Column Benzene, Toluene, Ethylbenzene and Xylene (BTEX) Concentrations					
Sample	Benzene [μg/L]	Toluene [μg/L]	Ethylbenzene [μg/L]	m&p-Xylene [μg/L]	o-Xylene [μg/L]
R1_ENV_104-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_104-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_105_Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_105-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_105-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_106_Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_106-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_106-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_107-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_107-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_107-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_108_Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_108-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_108-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_109-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_109-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_109-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_110-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_110-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_110-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_111-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_111-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_111-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_112-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_112-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_112-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_113-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_113-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_113-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_114-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_114-Middle	< 7	< 7	< 7	< 14	< 7

Summary of Water Column Benzene, Toluene, Ethylbenzene and Xylene (BTEX) Concentrations					
Sample	Benzene [µg/L]	Toluene [µg/L]	Ethylbenzene [µg/L]	m&p-Xylene [µg/L]	o-Xylene [µg/L]
R1_ENV_114-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_115-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_115-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_115-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_116-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_116-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_116-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_117-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_117-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_117-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_118-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_118-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_118-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_119-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_119-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_119-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_120-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_120-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_120-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_121-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_121-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_121-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_122-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_122-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_122-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_123-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_123-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_123-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_124-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_124-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_124-Bottom	< 7	< 7	< 7	< 14	< 7

Summary of Water Column Benzene, Toluene, Ethylbenzene and Xylene (BTEX) Concentrations					
Sample	Benzene [µg/L]	Toluene [µg/L]	Ethylbenzene [µg/L]	m&p-Xylene [µg/L]	o-Xylene [µg/L]
R1_ENV_125-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_125-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_125-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_126-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_126-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_126-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_127-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_127-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_127-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_128-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_128-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_128-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_129-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_129-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_129-Bottom	< 7	< 7	< 7	< 14	< 7
R1_ENV_REF-Top	< 7	< 7	< 7	< 14	< 7
R1_ENV_REF-Middle	< 7	< 7	< 7	< 14	< 7
R1_ENV_REF-Bottom	< 7	< 7	< 7	< 14	< 7
Minimum	**< 7**	**< 7**	**< 7**	**< 14**	**< 7**
Maximum	**< 7**	**< 7**	**< 7**	**< 14**	**< 7**
CCME Marine Long Term Water Quality Guidelines for the Protection of Aquatic Life (CCME, 2020)					
CCME Limit	110	215	25	-	-

Notes
Concentrations expressed as µg/L of water
m&p-Xylene = m-Xylene and p-Xylene

Key:	Below CCME Guideline	Above CCME Guideline

F.4 Summary of Water Column Phenol Concentrations

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R1_ENV_001-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_001-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_001-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_002-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_002-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_002-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_003-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_003-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_004-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_004-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_005-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_005-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_006-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_006-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations																
Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R1_ENV_007-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_007-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_008-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_008-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_009-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_009-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_010-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_010-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_011-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_011-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_012-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_013-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_014-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_014-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations																
Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R1_ENV_015-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_015-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_016-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_016-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_016-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_017-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_017-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_018-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_019-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_020-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_021-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_021-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_022-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_022-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R1_ENV_023-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_023-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_024-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_024-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_025-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_025-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_025-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_026-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_026-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_026-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_027-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_027-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_027-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_028-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations																
Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R1_ENV_028-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_029-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_029-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_029-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_030-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_030-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_030-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_031-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_031-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_031-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_032-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_032-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_032-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_033-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R1_ENV_033-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_033-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_034-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_034-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_034-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_035-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_035-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_035-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_036-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_036-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_036-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_037-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_037-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_037-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R1_ENV_038-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_038-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_039-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_039-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_039-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_040-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_040-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_040-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_041-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_041-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_041-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_042-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_042-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_042-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R1_ENV_043-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_043-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_043-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_044-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_044-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_044-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_045-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_045-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_045-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_046-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_046-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_046-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_047-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_047-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R1_ENV_047-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_048-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_048-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_048-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_049-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_049-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_049-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_050-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_050-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_050-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_051-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_051-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_051-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_052-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R1_ENV_052-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_052-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_053-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_053-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_053-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_054-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_054-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_054-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_055-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_055-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_055-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_056-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_056-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_056-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R1_ENV_057-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_057-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_057-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_058-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_058-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_058-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_059-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_059-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_059-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_060-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_060-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_060-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_061-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_061-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations																
Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R1_ENV_061-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_062-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_062-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_062-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_063-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_063-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_063-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_064-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_064-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_064-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_065-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_065-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_065-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_066-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations																
Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R1_ENV_066-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_066-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_067-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_067-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_067-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_068-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_068-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_068-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_069-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_069-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_069-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_070-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_070-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_070-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R1_ENV_071-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_071-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_071-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_072-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_072-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_072-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_073-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_073-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_073-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_074_Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_074-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_074-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_075_Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_075-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R1_ENV_075-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_076_Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_076-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_076-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_077_Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_077-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_077-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_078_Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_078-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_078-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_079_Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_079-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_079-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_080_Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R1_ENV_080-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_080-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_081-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_081-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_081-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_082-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_082-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_082-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_083-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_083-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_083-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_084-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_084-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_084-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R1_ENV_085-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_085-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_085-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_086-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_086-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_086-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_087-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_087-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_087-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_088-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_088-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_088-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_089-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_089-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R1_ENV_089-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_090-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_090-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_090-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_091-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_091-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_091-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_092-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_092-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_092-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_093-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_093-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_093-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_094-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R1_ENV_094-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_094-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_095_Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_095-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_095-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_096_Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_096-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_096-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_097-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_097-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_097-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_098-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_098-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_099-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R1_ENV_099-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_100-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_100-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_101-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_101-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_101-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_102-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_102-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_102-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_103-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_103-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_103-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_104_Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_104-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations																
Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R1_ENV_104-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_105_Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_105-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_105-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_106_Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_106-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_106-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_107-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_107-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_107-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_108_Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_108-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_108-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_109-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R1_ENV_109-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_109-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_110-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_110-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_110-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_111-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_111-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_111-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_112-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_112-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_112-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_113-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_113-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_113-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R1_ENV_114-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_114-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_114-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_115-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_115-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_115-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_116-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_116-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_116-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_117-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_117-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_117-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_118-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_118-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations																
Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R1_ENV_118-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_119-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_119-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_119-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_120-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_120-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_120-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_121-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_121-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_121-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_122-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_122-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_122-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_123-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations																
Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R1_ENV_123-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_123-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_124-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_124-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_124-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_125-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_125-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_125-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_126-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_126-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_126-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_127-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_127-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_127-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R1_ENV_128-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_128-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_128-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_129-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_129-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_129-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_REF-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_REF-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R1_ENV_REF-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
Minimum	**< 1.0**	**< 1.0**	**< 1.0**	**< 1.0**	**< 1.0**	**< 1.0**	**< 1.0**	**< 1.0**	**< 1.0**	**< 1.0**	**< 1.0**	**< 1.0**	**< 1.0**	**< 1.0**	**< 1.0**	**< 0.5**
Maximum	**< 1.0**	**< 1.0**	**< 1.0**	**< 1.0**	**< 1.0**	**< 1.0**	**< 1.0**	**< 1.0**	**< 1.0**	**< 1.0**	**< 1.0**	**< 1.0**	**< 1.0**	**< 1.0**	**< 1.0**	**< 0.5**

Notes
Concentrations expressed in µg/L

G. Water Column Major and Trace Elements

G.1 Summary of Water Column Major and Trace Element Analysis

Summary of Water Column Major and Trace Element Analysis												
Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
R1_ENV_001-Top	0.033	0.0029	< 0.0005	0.0076	< 0.0001	< 0.0001	< 0.0003	0.03	< 0.0010	< 0.0002	0.0024	0.020
R1_ENV_001-Middle	< 0.005	0.0027	< 0.0005	0.0077	< 0.0001	0.0023	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0027	0.023
R1_ENV_001-Bottom	0.030	0.0028	< 0.0005	0.0084	< 0.0001	< 0.0001	0.0004	< 0.02	< 0.0010	< 0.0002	0.0021	0.022
R1_ENV_002-Top	0.041	0.0024	< 0.0005	0.0073	< 0.0001	0.0004	< 0.0003	0.08	< 0.0010	< 0.0002	0.0022	0.013
R1_ENV_002-Middle	0.028	0.0027	< 0.0005	0.0080	< 0.0001	< 0.0001	< 0.0003	0.02	< 0.0010	< 0.0002	0.0022	0.015
R1_ENV_002-Bottom	0.041	0.0029	< 0.0005	0.0085	< 0.0001	0.0003	< 0.0003	< 0.02	< 0.0010	< 0.0002	0.0024	0.019
R1_ENV_003-Top	0.028	0.0025	< 0.0005	0.0082	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0010	0.0003	0.0022	0.016
R1_ENV_003-Bottom	0.046	0.0027	< 0.0005	0.0081	< 0.0001	0.0005	0.0005	0.04	< 0.0010	0.0007	0.0021	0.018
R1_ENV_004-Top	0.032	0.0029	< 0.0005	0.0086	< 0.0001	0.0005	< 0.0003	< 0.02	< 0.0010	0.0019	0.0022	0.020
R1_ENV_004-Bottom	0.025	0.0026	< 0.0005	0.0074	< 0.0001	0.0004	0.0005	0.03	< 0.0010	0.0008	0.0031	0.026
R1_ENV_005-Top	0.023	0.0017	< 0.0005	0.0075	0.0001	0.0004	0.0005	0.04	< 0.0010	0.0007	0.0026	0.023
R1_ENV_005-Bottom	0.011	0.0022	< 0.0005	0.0070	< 0.0001	0.0001	< 0.0003	0.03	< 0.0010	0.0004	0.0027	0.017
R1_ENV_006-Top	0.009	0.0028	< 0.0005	0.0067	< 0.0001	0.0002	< 0.0003	0.02	< 0.0010	0.0004	0.0029	0.031
R1_ENV_006-Bottom	0.010	0.0021	< 0.0005	0.0070	0.0001	< 0.0001	0.0004	0.03	< 0.0010	0.0003	0.0026	0.017
R1_ENV_007-Top	0.005	0.0025	< 0.0005	0.0068	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0010	0.0002	0.0028	0.019
R1_ENV_007-Bottom	< 0.005	0.0018	< 0.0005	0.0063	< 0.0001	0.0002	< 0.0003	< 0.02	< 0.0010	0.0002	0.0028	0.023
R1_ENV_008-Top	< 0.005	0.0018	< 0.0005	0.0031	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0010	< 0.0002	0.0026	< 0.002
R1_ENV_008-Bottom	< 0.005	0.0023	< 0.0005	0.0035	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0010	< 0.0002	0.0025	0.025
R1_ENV_009-Top	< 0.005	0.0015	< 0.0005	0.0046	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0010	< 0.0002	0.0024	< 0.002

Summary of Water Column Major and Trace Element Analysis												
Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
R1_ENV_009-Bottom	< 0.005	0.0020	< 0.0005	0.0041	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0010	< 0.0002	0.0026	0.004
R1_ENV_010-Top	< 0.005	0.0024	< 0.0005	0.0034	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0010	< 0.0002	0.0027	< 0.002
R1_ENV_010-Bottom	< 0.005	0.0024	< 0.0005	0.0041	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0010	< 0.0002	0.0029	0.007
R1_ENV_011-Top	< 0.005	0.0020	< 0.0005	0.0039	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0010	< 0.0002	0.0027	< 0.002
R1_ENV_011-Bottom	< 0.005	0.0025	< 0.0005	0.0039	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0010	< 0.0002	0.0024	0.014
R1_ENV_012-Middle	< 0.005	0.0024	< 0.0005	0.0043	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0010	< 0.0002	0.0026	< 0.002
R1_ENV_013-Middle	< 0.005	0.0026	< 0.0005	0.0037	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0010	0.0007	0.0027	< 0.002
R1_ENV_014-Top	< 0.005	0.0020	< 0.0005	0.0043	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0010	< 0.0002	0.0023	0.004
R1_ENV_014-Bottom	< 0.005	0.0024	< 0.0005	0.0042	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0010	< 0.0002	0.0026	0.013
R1_ENV_015-Top	< 0.005	0.0015	< 0.0005	0.0042	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0010	< 0.0002	0.0027	< 0.002
R1_ENV_015-Bottom	< 0.005	0.0026	< 0.0005	0.0047	< 0.0001	< 0.0001	< 0.0003	0.04	< 0.0010	0.0036	0.0027	0.010
R1_ENV_016-Top	< 0.005	0.0028	< 0.0005	0.0044	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0010	< 0.0002	0.0028	< 0.002
R1_ENV_016-Middle	< 0.005	0.0018	< 0.0005	0.0046	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0010	< 0.0002	0.0023	< 0.002
R1_ENV_016-Bottom	< 0.005	0.0017	< 0.0005	0.0044	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0010	< 0.0002	0.0026	< 0.002
R1_ENV_017-Top	< 0.005	0.0015	< 0.0005	0.0053	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0010	< 0.0002	0.0025	< 0.002
R1_ENV_017-Bottom	< 0.005	0.0020	< 0.0005	0.0044	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0010	< 0.0002	0.0025	< 0.002
R1_ENV_018-Middle	< 0.005	0.0024	< 0.0005	0.0045	< 0.0001	0.0011	< 0.0003	< 0.02	< 0.0010	< 0.0002	0.0027	< 0.002
R1_ENV_019-Middle	< 0.005	0.0028	< 0.0005	0.0048	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0029	< 0.002
R1_ENV_020-Middle	< 0.005	0.0027	< 0.0005	0.0044	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0029	< 0.002

Summary of Water Column Major and Trace Element Analysis												
Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
R1_ENV_021-Top	< 0.005	0.0033	< 0.0005	0.0031	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0030	< 0.002
R1_ENV_021-Bottom	< 0.005	0.0033	< 0.0005	0.0038	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0033	< 0.002
R1_ENV_022-Top	< 0.005	0.0027	< 0.0005	0.0027	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0012	0.0029	< 0.002
R1_ENV_022-Bottom	< 0.005	0.0027	< 0.0005	0.0025	< 0.0001	0.0007	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0032	0.002
R1_ENV_023-Top	< 0.005	0.0026	< 0.0005	0.0032	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0028	0.013
R1_ENV_023-Bottom	< 0.005	0.0027	< 0.0005	0.0025	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0033	0.006
R1_ENV_024-Top	< 0.005	0.0022	< 0.0005	0.0032	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0027	0.012
R1_ENV_024-Bottom	< 0.005	0.0020	< 0.0005	0.0031	< 0.0001	0.0002	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0026	< 0.002
R1_ENV_025-Top	< 0.005	0.0027	< 0.0005	0.0028	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0030	< 0.002
R1_ENV_025-Middle	< 0.005	0.0029	< 0.0005	0.0027	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0031	0.002
R1_ENV_025-Bottom	< 0.005	0.0020	< 0.0005	0.0035	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0030	< 0.002
R1_ENV_026-Top	< 0.005	0.0028	< 0.0005	0.0022	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0032	< 0.002
R1_ENV_026-Middle	< 0.005	0.0030	< 0.0005	0.0027	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0031	0.002
R1_ENV_026-Bottom	< 0.005	0.0023	< 0.0005	0.0032	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0027	0.005
R1_ENV_027-Top	< 0.005	0.0025	< 0.0005	0.0031	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0032	0.006
R1_ENV_027-Middle	< 0.005	0.0038	< 0.0005	0.0025	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0032	0.007
R1_ENV_027-Bottom	< 0.005	0.0028	< 0.0005	0.0029	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0033	0.004
R1_ENV_028-Top	< 0.005	0.0022	< 0.0005	0.0052	< 0.0001	0.0029	0.0003	< 0.02	< 0.0001	< 0.0002	0.0020	0.012
R1_ENV_028-Bottom	0.024	0.0021	< 0.0005	0.0056	< 0.0001	0.0018	0.0027	< 0.02	< 0.0001	< 0.0002	0.0016	0.027

Summary of Water Column Major and Trace Element Analysis												
Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
R1_ENV_029-Top	< 0.005	0.0028	< 0.0005	0.0028	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0002	0.0032	0.008
R1_ENV_029-Middle	< 0.005	0.0034	< 0.0005	0.0040	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0035	< 0.002
R1_ENV_029-Bottom	0.006	0.0031	< 0.0005	0.0050	< 0.0001	0.0002	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0028	< 0.002
R1_ENV_030-Top	< 0.005	0.0028	< 0.0005	0.0032	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0031	0.002
R1_ENV_030-Middle	< 0.005	0.0025	< 0.0005	0.0043	< 0.0001	0.0023	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	< 0.002
R1_ENV_030-Bottom	< 0.005	0.0035	< 0.0005	0.0031	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0029	0.004
R1_ENV_031-Top	< 0.005	0.0035	< 0.0005	0.0033	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	< 0.002
R1_ENV_031-Middle	< 0.005	0.0025	< 0.0005	0.0029	< 0.0001	0.0002	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0027	< 0.002
R1_ENV_031-Bottom	< 0.005	0.0035	< 0.0005	0.0043	< 0.0001	0.0002	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0029	< 0.002
R1_ENV_032-Top	0.019	0.0037	< 0.0005	0.0030	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0025	< 0.002
R1_ENV_032-Middle	< 0.005	0.0032	< 0.0005	0.0041	< 0.0001	0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0028	< 0.002
R1_ENV_032-Bottom	< 0.005	0.0027	< 0.0005	0.0041	< 0.0001	0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0027	< 0.002
R1_ENV_033-Top	< 0.005	0.0031	< 0.0005	0.0033	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0030	< 0.002
R1_ENV_033-Middle	0.009	0.0031	< 0.0005	0.0024	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0027	< 0.002
R1_ENV_033-Bottom	< 0.005	0.0030	< 0.0005	0.0032	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0028	< 0.002
R1_ENV_034-Top	< 0.005	0.0022	< 0.0005	0.0023	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0028	< 0.002
R1_ENV_034-Middle	0.007	0.0027	< 0.0005	0.0033	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0028	< 0.002
R1_ENV_034-Bottom	0.017	0.0027	< 0.0005	0.0041	< 0.0001	0.0004	< 0.0003	0.02	< 0.0001	< 0.0002	0.0027	0.040
R1_ENV_035-Top	< 0.005	0.0027	< 0.0005	0.0029	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0029	0.006

Summary of Water Column Major and Trace Element Analysis												
Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
R1_ENV_035-Middle	< 0.005	0.0025	< 0.0005	0.0029	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0031	0.004
R1_ENV_035-Bottom	< 0.005	0.0029	< 0.0005	0.0040	< 0.0001	0.0002	< 0.0003	< 0.02	< 0.0001	0.0005	0.0028	0.017
R1_ENV_036-Top	< 0.005	0.0032	< 0.0005	0.0038	0.0001	0.0003	< 0.0003	< 0.02	< 0.0001	0.0006	0.0030	< 0.002
R1_ENV_036-Middle	< 0.005	0.0032	< 0.0005	0.0045	< 0.0001	0.0002	0.0123	< 0.02	< 0.0001	0.0005	0.0030	< 0.002
R1_ENV_036-Bottom	0.0250	0.0032	< 0.0005	0.0053	< 0.0001	0.0005	< 0.0003	< 0.02	< 0.0001	0.0015	0.0023	< 0.002
R1_ENV_037-Top	< 0.005	0.0030	< 0.0005	0.0034	0.0001	0.0002	< 0.0003	< 0.02	< 0.0001	0.0005	0.0028	< 0.002
R1_ENV_037-Middle	< 0.005	0.0033	< 0.0005	0.0045	< 0.0001	0.0001	< 0.0003	< 0.02	< 0.0001	0.0004	0.0026	< 0.002
R1_ENV_037-Bottom	< 0.005	0.0034	< 0.0005	0.0040	< 0.0001	0.0002	< 0.0003	< 0.02	< 0.0001	0.0008	0.0028	< 0.002
R1_ENV_038-Top	< 0.005	0.0019	< 0.0005	0.0035	< 0.0001	0.0018	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0019	0.004
R1_ENV_038-Bottom	< 0.005	0.0023	< 0.0005	0.0058	< 0.0001	0.0020	0.0072	< 0.02	< 0.0001	< 0.0002	0.0016	0.041
R1_ENV_039-Top	0.022	0.0026	< 0.0005	0.0046	< 0.0001	0.0015	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0019	< 0.002
R1_ENV_039-Middle	< 0.005	0.0031	< 0.0005	0.0053	< 0.0001	0.0021	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0020	< 0.002
R1_ENV_039-Bottom	< 0.005	0.0021	< 0.0005	0.0051	0.0001	0.0023	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	0.002
R1_ENV_040-Top	< 0.005	0.0022	< 0.0005	0.0047	< 0.0001	0.0011	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0018	0.013
R1_ENV_040-Middle	< 0.005	0.0025	< 0.0005	0.0042	< 0.0001	0.0018	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	< 0.002
R1_ENV_040-Bottom	< 0.005	0.0022	< 0.0005	0.0051	< 0.0001	0.0027	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	0.019
R1_ENV_041-Top	< 0.005	0.0024	< 0.0005	0.0043	< 0.0001	0.0025	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0024	0.003
R1_ENV_041-Middle	< 0.005	0.0018	< 0.0005	0.0047	< 0.0001	0.0025	0.0130	< 0.02	< 0.0001	< 0.0002	0.0027	0.008
R1_ENV_041-Bottom	< 0.005	0.0035	< 0.0005	0.0059	< 0.0001	0.0013	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0028	< 0.002

Summary of Water Column Major and Trace Element Analysis

Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
R1_ENV_042-Top	< 0.005	0.0025	< 0.0005	0.0049	< 0.0001	0.0015	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0028	< 0.002
R1_ENV_042-Middle	< 0.005	0.0024	< 0.0005	0.0055	< 0.0001	0.0019	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0033	0.005
R1_ENV_042-Bottom	< 0.005	0.0029	< 0.0005	0.0046	< 0.0001	0.0021	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0035	0.002
R1_ENV_043-Top	< 0.005	0.0030	< 0.0005	0.0047	< 0.0001	0.0024	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0029	< 0.002
R1_ENV_043-Middle	< 0.005	0.0021	< 0.0005	0.0044	< 0.0001	0.0022	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0027	< 0.002
R1_ENV_043-Bottom	< 0.005	0.0015	< 0.0005	0.0047	< 0.0001	0.0015	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0024	< 0.002
R1_ENV_044-Top	< 0.005	0.0024	< 0.0005	0.0055	< 0.0001	0.0020	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0027	< 0.002
R1_ENV_044-Middle	< 0.005	0.0031	< 0.0005	0.0049	< 0.0001	0.0021	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0030	< 0.002
R1_ENV_044-Bottom	0.022	0.0025	< 0.0005	0.0058	< 0.0001	0.0038	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0027	0.020
R1_ENV_045-Top	< 0.005	0.0029	< 0.0005	0.0056	< 0.0001	0.0022	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0033	0.010
R1_ENV_045-Middle	0.008	0.0026	< 0.0005	0.0045	< 0.0001	0.0020	< 0.0003	< 0.02	< 0.0001	0.0003	0.0032	< 0.002
R1_ENV_045-Bottom	0.100	0.0031	< 0.0005	0.0079	0.0001	0.0015	0.0012	0.03	< 0.0001	0.0009	0.0033	0.012
R1_ENV_046-Top	< 0.005	0.0021	< 0.0005	0.0043	< 0.0001	0.0018	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0033	0.005
R1_ENV_046-Middle	< 0.005	0.0030	< 0.0005	0.0046	< 0.0001	0.0015	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0029	< 0.002
R1_ENV_046-Bottom	< 0.005	0.0026	< 0.0005	0.0062	< 0.0001	0.0020	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0031	< 0.002
R1_ENV_047-Top	< 0.005	0.0027	< 0.0005	0.0048	< 0.0001	0.0019	< 0.0003	0.02	< 0.0001	< 0.0002	0.0020	< 0.002
R1_ENV_047-Middle	< 0.005	0.0032	< 0.0005	0.0045	< 0.0001	0.0020	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	< 0.002
R1_ENV_047-Bottom	< 0.005	0.0029	< 0.0005	0.0049	< 0.0001	0.0017	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0025	0.002
R1_ENV_048-Top	< 0.005	0.0028	< 0.0005	0.0047	< 0.0001	0.0003	< 0.0003	0.05	< 0.0001	< 0.0002	0.0022	0.023

Summary of Water Column Major and Trace Element Analysis												
Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
R1_ENV_048-Middle	< 0.005	0.0018	< 0.0005	0.0043	< 0.0001	0.0017	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.004
R1_ENV_048-Bottom	< 0.005	0.0022	< 0.0005	0.0043	< 0.0001	0.0006	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0027	0.009
R1_ENV_049-Top	< 0.005	0.0015	< 0.0005	0.0045	0.0001	0.0026	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0029	0.021
R1_ENV_049-Middle	< 0.005	0.0039	< 0.0005	0.0044	< 0.0001	0.0016	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0026	0.014
R1_ENV_049-Bottom	< 0.005	0.0050	< 0.0005	0.0049	< 0.0001	0.0015	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0025	0.012
R1_ENV_050-Top	< 0.005	0.0043	< 0.0005	0.0041	< 0.0001	0.0017	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0027	0.019
R1_ENV_050-Middle	< 0.005	0.0052	< 0.0005	0.0039	< 0.0001	0.0025	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0024	0.025
R1_ENV_050-Bottom	0.009	0.0045	< 0.0005	0.0046	< 0.0001	0.0035	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0029	0.012
R1_ENV_051-Top	< 0.005	0.0035	< 0.0005	0.0047	< 0.0001	0.0055	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0026	0.012
R1_ENV_051-Middle	< 0.005	0.0041	< 0.0005	0.0038	< 0.0001	0.0019	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0028	0.005
R1_ENV_051-Bottom	< 0.005	0.0047	< 0.0005	0.0044	< 0.0001	0.0027	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0026	0.011
R1_ENV_052-Top	< 0.005	0.0053	< 0.0005	0.0034	< 0.0001	0.0020	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0024	0.011
R1_ENV_052-Middle	< 0.005	0.0048	< 0.0005	0.0044	< 0.0001	0.0019	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0024	0.010
R1_ENV_052-Bottom	< 0.005	0.0051	< 0.0005	0.0047	< 0.0001	0.0022	< 0.0003	0.06	< 0.0001	< 0.0002	0.0026	0.008
R1_ENV_053-Top	< 0.005	0.0035	< 0.0005	0.0034	< 0.0001	0.0016	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	0.016
R1_ENV_053-Middle	< 0.005	0.0039	< 0.0005	0.0039	< 0.0001	0.0022	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0026	0.013
R1_ENV_053-Bottom	< 0.005	0.0045	< 0.0005	0.0042	< 0.0001	0.0013	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0030	0.017
R1_ENV_054-Top	< 0.005	0.0043	< 0.0005	0.0042	< 0.0001	0.0019	< 0.0003	0.02	< 0.0001	0.0008	0.0023	0.011
R1_ENV_054-Middle	< 0.005	0.0039	< 0.0005	0.0042	< 0.0001	0.0024	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0025	0.006

Summary of Water Column Major and Trace Element Analysis												
Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
R1_ENV_054-Bottom	< 0.005	0.0036	< 0.0005	0.0051	< 0.0001	0.0010	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0024	0.019
R1_ENV_055-Top	< 0.005	0.0039	< 0.0005	0.0036	< 0.0001	0.0021	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0024	0.022
R1_ENV_055-Middle	< 0.005	0.0042	< 0.0005	0.0045	< 0.0001	0.0014	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0031	0.014
R1_ENV_055-Bottom	< 0.005	0.0041	< 0.0005	0.0041	< 0.0001	0.0011	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0027	0.014
R1_ENV_056-Top	< 0.005	0.0036	< 0.0005	0.0051	< 0.0001	0.0017	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.023
R1_ENV_056-Middle	< 0.005	0.0038	< 0.0005	0.0046	< 0.0001	0.0016	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0026	0.009
R1_ENV_056-Bottom	< 0.005	0.0036	< 0.0005	0.0051	< 0.0001	0.0028	< 0.0003	< 0.02	< 0.0001	0.0099	0.0025	0.030
R1_ENV_057-Top	< 0.005	0.0038	< 0.0005	0.0044	< 0.0001	0.0021	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	0.018
R1_ENV_057-Middle	< 0.005	0.0036	< 0.0005	0.0049	< 0.0001	0.0006	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0026	0.013
R1_ENV_057-Bottom	< 0.005	0.0041	< 0.0005	0.0055	< 0.0001	0.0011	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	0.005
R1_ENV_058-Top	< 0.005	0.0031	< 0.0005	0.0042	< 0.0001	0.0006	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.007
R1_ENV_058-Middle	< 0.005	0.0033	< 0.0005	0.0049	< 0.0001	0.0010	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0028	0.006
R1_ENV_058-Bottom	< 0.005	0.0037	< 0.0005	0.0050	< 0.0001	0.0010	< 0.0003	0.02	< 0.0001	< 0.0002	0.0023	0.071
R1_ENV_059-Top	< 0.005	0.0038	< 0.0005	0.0040	< 0.0001	0.0011	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.006
R1_ENV_059-Middle	< 0.005	0.0038	< 0.0005	0.0041	< 0.0001	0.0012	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0025	0.011
R1_ENV_059-Bottom	< 0.005	0.0044	< 0.0005	0.0054	< 0.0001	0.0021	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	0.003
R1_ENV_060-Top	< 0.005	0.0034	< 0.0005	0.0042	< 0.0001	0.0015	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0026	0.021
R1_ENV_060-Middle	< 0.005	0.0038	< 0.0005	0.0067	< 0.0001	0.0012	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0020	< 0.002
R1_ENV_060-Bottom	< 0.005	0.0037	< 0.0005	0.0079	< 0.0001	0.0013	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.007

Summary of Water Column Major and Trace Element Analysis												
Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
R1_ENV_061-Top	< 0.005	0.0029	< 0.0005	0.0037	< 0.0001	0.0002	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0024	0.004
R1_ENV_061-Middle	< 0.005	0.0035	< 0.0005	0.0050	< 0.0001	0.0007	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0025	0.007
R1_ENV_061-Bottom	< 0.005	0.0042	< 0.0005	0.0059	< 0.0001	0.0013	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0027	0.009
R1_ENV_062-Top	0.012	0.0012	< 0.0005	0.0075	< 0.0001	< 0.0001	0.0004	< 0.02	< 0.0001	0.0007	0.0022	0.019
R1_ENV_062-Middle	0.011	0.0023	< 0.0005	0.0081	0.0001	< 0.0001	0.0559	< 0.02	< 0.0001	0.0008	0.0022	0.035
R1_ENV_062-Bottom	< 0.005	0.0021	< 0.0005	0.0092	0.0002	< 0.0001	0.0039	< 0.02	< 0.0001	0.0008	0.0021	0.029
R1_ENV_063-Top	0.007	0.0021	< 0.0005	0.0081	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0004	0.0019	0.039
R1_ENV_063-Middle	0.012	0.0018	< 0.0005	0.0082	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0006	0.0023	0.023
R1_ENV_063-Bottom	< 0.005	0.0018	< 0.0005	0.0092	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0005	0.0020	0.020
R1_ENV_064-Top	< 0.005	0.0021	< 0.0005	0.0075	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0004	0.0019	0.021
R1_ENV_064-Middle	0.014	0.0025	< 0.0005	0.0087	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0008	0.0025	0.022
R1_ENV_064-Bottom	< 0.005	0.0012	< 0.0005	0.01	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0004	0.0022	0.020
R1_ENV_065-Top	0.006	0.0035	< 0.0005	0.0093	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0008	0.0021	0.034
R1_ENV_065-Middle	< 0.005	0.0014	< 0.0005	0.0079	< 0.0001	< 0.0001	0.0043	< 0.02	< 0.0001	0.0005	0.0019	0.017
R1_ENV_065-Bottom	0.010	0.0018	< 0.0005	0.0108	0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0008	0.0024	0.028
R1_ENV_066-Top	0.009	0.0021	< 0.0005	0.0095	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0005	0.0021	0.025
R1_ENV_066-Middle	< 0.005	0.0017	< 0.0005	0.0101	< 0.0001	< 0.0001	0.0035	0.03	< 0.0001	0.0011	0.0024	0.025
R1_ENV_066-Bottom	0.007	0.0024	< 0.0005	0.0084	0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0014	0.0020	0.019
R1_ENV_067-Top	< 0.005	0.0021	< 0.0005	0.0075	< 0.0001	< 0.0001	0.0012	< 0.02	< 0.0001	0.0008	0.0024	0.019

Summary of Water Column Major and Trace Element Analysis												
Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
R1_ENV_067-Middle	< 0.005	0.0016	< 0.0005	0.0076	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0006	0.0024	0.038
R1_ENV_067-Bottom	0.010	0.0030	< 0.0005	0.0167	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0006	0.0022	0.042
R1_ENV_068-Top	< 0.005	0.0025	< 0.0005	0.0069	0.0001	< 0.0001	0.0013	< 0.02	< 0.0001	0.0005	0.0020	0.023
R1_ENV_068-Middle	0.021	0.0032	< 0.0005	0.0088	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0007	0.0020	0.035
R1_ENV_068-Bottom	< 0.005	0.0026	< 0.0005	0.0093	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0004	0.0020	0.037
R1_ENV_069-Top	< 0.005	0.0017	< 0.0005	0.0062	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	0.021
R1_ENV_069-Middle	0.006	0.0023	< 0.0005	0.0079	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0004	0.0021	0.040
R1_ENV_069-Bottom	< 0.005	0.0021	< 0.0005	0.009	0.0002	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0009	0.0017	0.027
R1_ENV_070-Top	< 0.005	0.0021	< 0.0005	0.0066	0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0005	0.0022	0.022
R1_ENV_070-Middle	0.016	0.0024	< 0.0005	0.0081	< 0.0001	< 0.0001	< 0.0003	0.03	< 0.0001	0.0011	0.0024	0.045
R1_ENV_070-Bottom	< 0.005	0.0027	< 0.0005	0.0077	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0006	0.0019	0.022
R1_ENV_071-Top	0.019	0.0019	< 0.0005	0.0074	< 0.0001	< 0.0001	0.0036	< 0.02	< 0.0001	0.0011	0.0019	0.024
R1_ENV_071-Middle	< 0.005	0.0029	< 0.0005	0.0077	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0003	0.0024	0.041
R1_ENV_071-Bottom	< 0.005	0.0032	< 0.0005	0.0110	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0006	0.0023	0.031
R1_ENV_072-Top	0.017	0.0029	< 0.0005	0.0066	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0009	0.0024	0.017
R1_ENV_072-Middle	0.021	0.0027	< 0.0005	0.0079	< 0.0001	< 0.0001	0.0028	< 0.02	< 0.0001	0.0006	0.0023	0.031
R1_ENV_072-Bottom	0.015	0.0034	< 0.0005	0.0118	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0003	0.0024	0.021
R1_ENV_073-Top	0.016	0.0025	< 0.0005	0.0072	< 0.0001	< 0.0001	0.0023	< 0.02	< 0.0001	0.0005	0.0023	0.025
R1_ENV_073-Middle	0.008	0.0030	< 0.0005	0.0067	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0005	0.0020	0.024

Summary of Water Column Major and Trace Element Analysis												
Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
R1_ENV_073-Bottom	0.005	0.0025	< 0.0005	0.0091	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0005	0.0022	0.107
R1_ENV_074-Top	0.005	0.0024	< 0.0005	0.0078	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0023	0.0025	0.032
R1_ENV_074-Middle	0.006	0.0022	< 0.0005	0.0127	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0023	0.0027	0.029
R1_ENV_074_Bottom	< 0.005	0.0022	< 0.0005	0.0119	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0020	0.0025	0.017
R1_ENV_075-Top	< 0.005	0.0011	< 0.0005	0.0073	< 0.0001	< 0.0001	< 0.0003	0.02	< 0.0001	0.0018	0.0022	0.132
R1_ENV_075-Middle	0.007	0.0025	< 0.0005	0.0163	0.0001	< 0.0001	0.0006	< 0.02	< 0.0001	0.0036	0.0023	0.068
R1_ENV_075_Bottom	< 0.005	0.0020	< 0.0005	0.0133	< 0.0001	< 0.0001	0.0036	< 0.02	< 0.0001	0.0019	0.0024	0.040
R1_ENV_076-Top	0.011	0.0018	< 0.0005	0.0076	< 0.0001	< 0.0001	< 0.0003	0.12	< 0.0001	0.0035	0.0023	0.116
R1_ENV_076-Middle	0.006	0.0020	< 0.0005	0.0091	< 0.0001	< 0.0001	0.0016	< 0.02	< 0.0001	0.0011	0.0027	0.014
R1_ENV_076_Bottom	< 0.005	0.0034	< 0.0005	0.0160	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0011	0.0024	0.019
R1_ENV_077-Top	0.011	0.0028	< 0.0005	0.0077	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0020	0.0024	0.028
R1_ENV_077-Middle	< 0.005	0.0016	< 0.0005	0.0112	< 0.0001	< 0.0001	0.0003	0.03	< 0.0001	0.0027	0.0026	0.028
R1_ENV_077_Bottom	< 0.005	0.0024	< 0.0005	0.0235	< 0.0001	< 0.0001	0.1300	< 0.02	< 0.0001	0.0175	0.0024	0.022
R1_ENV_078-Top	0.020	0.0022	< 0.0005	0.0081	< 0.0001	< 0.0001	0.0030	0.04	< 0.0001	0.0029	0.0026	0.039
R1_ENV_078-Middle	0.010	0.0018	< 0.0005	0.0073	< 0.0001	< 0.0001	0.0049	0.13	< 0.0001	0.0019	0.0024	0.046
R1_ENV_078_Bottom	< 0.005	0.0023	< 0.0005	0.0219	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0021	0.0027	0.033
R1_ENV_079-Top	0.017	0.0016	< 0.0005	0.0078	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0026	0.0025	0.029
R1_ENV_079-Middle	< 0.005	0.0026	< 0.0005	0.0121	< 0.0001	< 0.0001	0.0013	< 0.02	< 0.0001	0.0046	0.0028	0.024
R1_ENV_079_Bottom	< 0.005	0.0024	< 0.0005	0.0123	< 0.0001	< 0.0001	0.0007	< 0.02	< 0.0001	0.0025	0.0026	0.049

Summary of Water Column Major and Trace Element Analysis

Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
R1_ENV_080-Top	< 0.005	0.0014	< 0.0005	0.0080	< 0.0001	< 0.0001	0.0005	0.02	< 0.0001	0.0029	0.0026	0.060
R1_ENV_080-Middle	< 0.005	0.0026	< 0.0005	0.0108	< 0.0001	< 0.0001	< 0.0003	0.10	< 0.0001	0.0023	0.0027	0.030
R1_ENV_080_Bottom	0.012	0.0019	< 0.0005	0.0175	< 0.0001	< 0.0001	0.0076	0.08	< 0.0001	0.0030	0.0015	0.036
R1_ENV_081-Top	< 0.005	0.0031	< 0.0005	0.0072	0.0019	< 0.0001	0.0031	< 0.02	< 0.0001	0.0136	0.0036	0.108
R1_ENV_081-Middle	< 0.005	0.0036	< 0.0005	0.0066	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0030	< 0.002
R1_ENV_081-Bottom	0.031	0.0029	< 0.0005	0.0066	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.012
R1_ENV_082-Top	0.038	0.0026	< 0.0005	0.0051	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0024	0.023
R1_ENV_082-Middle	0.029	0.0030	< 0.0005	0.0074	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0020	0.005
R1_ENV_082-Bottom	0.025	0.0025	< 0.0005	0.0086	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0025	0.006
R1_ENV_083-Top	0.027	0.0030	< 0.0005	0.0053	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0020	0.040
R1_ENV_083-Middle	0.028	0.0026	< 0.0005	0.0086	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	0.015
R1_ENV_083-Bottom	0.036	0.0035	< 0.0005	0.0076	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0020	0.021
R1_ENV_084-Top	0.035	0.0018	< 0.0005	0.0053	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0011	0.027
R1_ENV_084-Middle	0.027	0.0017	< 0.0005	0.0084	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0020	0.005
R1_ENV_084-Bottom	0.029	0.0031	< 0.0005	0.0087	0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	0.018
R1_ENV_085-Top	0.028	0.0022	< 0.0005	0.0059	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0019	0.005
R1_ENV_085-Middle	0.029	0.0023	< 0.0005	0.0088	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0024	< 0.002
R1_ENV_085-Bottom	0.028	0.0016	< 0.0005	0.0080	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0020	0.010
R1_ENV_086-Top	0.025	0.0025	< 0.0005	0.0055	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0026	0.009

Summary of Water Column Major and Trace Element Analysis												
Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
R1_ENV_086-Middle	0.026	0.0020	< 0.0005	0.0082	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0027	0.010
R1_ENV_086-Bottom	0.028	0.0023	< 0.0005	0.0082	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0019	0.012
R1_ENV_087-Top	0.034	0.0030	< 0.0005	0.0057	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0025	0.003
R1_ENV_087-Middle	0.028	0.0028	< 0.0005	0.0073	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0027	0.005
R1_ENV_087-Bottom	0.032	0.0019	< 0.0005	0.0079	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	< 0.002
R1_ENV_088-Top	0.024	0.0032	< 0.0005	0.0058	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0024	0.011
R1_ENV_088-Middle	0.031	0.0026	< 0.0005	0.0060	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0025	0.002
R1_ENV_088-Bottom	0.044	0.0030	< 0.0005	0.0097	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0027	0.009
R1_ENV_089-Top	0.027	0.0032	< 0.0005	0.0058	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0027	0.038
R1_ENV_089-Middle	< 0.005	0.0028	< 0.0005	0.0096	< 0.0001	< 0.0001	0.0024	< 0.02	< 0.0001	0.0007	0.0034	0.015
R1_ENV_089-Bottom	< 0.005	0.0029	< 0.0005	0.0122	< 0.0001	< 0.0001	0.0016	< 0.02	< 0.0001	< 0.0002	0.0036	< 0.002
R1_ENV_090-Top	< 0.005	0.0039	< 0.0005	0.0099	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0034	< 0.002
R1_ENV_090-Middle	< 0.005	0.0041	< 0.0005	0.0114	< 0.0001	< 0.0001	0.0006	< 0.02	< 0.0001	0.0003	0.0028	< 0.002
R1_ENV_090-Bottom	< 0.005	0.0045	< 0.0005	0.0149	< 0.0001	< 0.0001	0.0010	< 0.02	< 0.0001	0.0006	0.0030	< 0.002
R1_ENV_091-Top	< 0.005	0.0043	< 0.0005	0.0110	< 0.0001	< 0.0001	0.0009	< 0.02	< 0.0001	< 0.0002	0.0034	0.012
R1_ENV_091-Middle	< 0.005	0.0035	< 0.0005	0.0187	< 0.0001	< 0.0001	0.0007	< 0.02	< 0.0001	0.0002	0.0033	< 0.002
R1_ENV_091-Bottom	< 0.005	0.0028	< 0.0005	0.0169	< 0.0001	< 0.0001	0.0006	< 0.02	< 0.0001	0.0004	0.0029	< 0.002
R1_ENV_092-Top	< 0.005	0.0045	< 0.0005	0.0087	< 0.0001	< 0.0001	0.0004	< 0.02	< 0.0001	0.0002	0.0029	< 0.002
R1_ENV_092-Middle	< 0.005	0.0026	< 0.0005	0.0178	< 0.0001	< 0.0001	0.0007	< 0.02	< 0.0001	0.0003	0.0033	< 0.002

Summary of Water Column Major and Trace Element Analysis												
Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
R1_ENV_092-Bottom	< 0.005	0.0034	< 0.0005	0.0143	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0028	< 0.002
R1_ENV_093-Top	< 0.005	0.0038	< 0.0005	0.0106	< 0.0001	< 0.0001	0.0015	< 0.02	< 0.0001	0.0003	0.0026	< 0.002
R1_ENV_093-Middle	< 0.005	0.0040	< 0.0005	0.0135	< 0.0001	< 0.0001	0.0004	< 0.02	< 0.0001	< 0.0002	0.0030	< 0.002
R1_ENV_093-Bottom	< 0.005	0.0034	< 0.0005	0.0152	< 0.0001	< 0.0001	0.0006	< 0.02	< 0.0001	0.0006	0.0032	< 0.002
R1_ENV_094-Top	< 0.005	0.0036	< 0.0005	0.0108	< 0.0001	< 0.0001	0.0007	< 0.02	< 0.0001	0.0006	0.0030	< 0.002
R1_ENV_094-Middle	< 0.005	0.0035	< 0.0005	0.0134	< 0.0001	< 0.0001	0.0005	< 0.02	< 0.0001	0.0009	0.0028	< 0.002
R1_ENV_094-Bottom	< 0.005	0.0042	< 0.0005	0.0178	< 0.0001	< 0.0001	0.0024	0.19	< 0.0001	0.0018	0.0031	0.024
R1_ENV_095-Top	0.006	0.0028	< 0.0005	0.0086	0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0019	0.0024	0.028
R1_ENV_095-Middle	< 0.005	0.0017	< 0.0005	0.0093	< 0.0001	< 0.0001	< 0.0003	0.14	< 0.0001	0.0025	0.0025	0.032
R1_ENV_095_Bottom	< 0.005	0.0017	< 0.0005	0.0132	< 0.0001	< 0.0001	0.0021	0.04	< 0.0001	0.0032	0.0024	0.156
R1_ENV_096-Top	< 0.005	0.0021	< 0.0005	0.0093	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0023	0.0026	0.036
R1_ENV_096-Middle	0.005	0.0019	< 0.0005	0.0172	< 0.0001	< 0.0001	0.0005	< 0.02	< 0.0001	0.0039	0.0027	0.041
R1_ENV_096_Bottom	< 0.005	0.0025	< 0.0005	0.0207	< 0.0001	< 0.0001	0.0019	< 0.02	< 0.0001	0.0022	0.0026	0.027
R1_ENV_097-Top	< 0.005	0.0024	< 0.0005	0.0062	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0028	< 0.002
R1_ENV_097-Middle	< 0.005	0.0029	< 0.0005	0.0070	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0034	< 0.002
R1_ENV_097-Bottom	< 0.005	0.0035	< 0.0005	0.0067	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0032	< 0.002
R1_ENV_098-Top	< 0.005	0.0025	< 0.0005	0.0066	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0002	0.0033	< 0.002
R1_ENV_098-Bottom	< 0.005	0.0038	< 0.0005	0.0065	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0034	< 0.002
R1_ENV_099-Top	< 0.005	0.0032	< 0.0005	0.0077	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0036	< 0.002

Summary of Water Column Major and Trace Element Analysis												
Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
R1_ENV_099-Bottom	< 0.005	0.0029	< 0.0005	0.0073	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0008	0.0031	< 0.002
R1_ENV_100-Top	< 0.005	< 0.0005	< 0.0005	0.0007	< 0.0001	0.0005	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	< 0.002
R1_ENV_100-Bottom	< 0.005	0.0009	< 0.0005	0.0016	< 0.0001	0.0012	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0027	0.022
R1_ENV_101-Top	< 0.005	0.0034	< 0.0005	0.0065	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0038	< 0.002
R1_ENV_101-Middle	< 0.005	0.0031	< 0.0005	0.0069	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0008	0.0035	< 0.002
R1_ENV_101-Bottom	< 0.005	0.0035	< 0.0005	0.0070	< 0.0001	< 0.0001	0.0023	< 0.02	< 0.0001	< 0.0002	0.0032	< 0.002
R1_ENV_102-Top	< 0.005	0.0008	< 0.0005	0.0010	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	< 0.002
R1_ENV_102-Middle	< 0.005	< 0.0005	< 0.0005	0.0010	< 0.0001	0.0008	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0024	< 0.002
R1_ENV_102-Bottom	< 0.005	< 0.0005	< 0.0005	0.0012	< 0.0001	0.0015	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	< 0.002
R1_ENV_103-Top	< 0.005	< 0.0005	< 0.0005	< 0.0005	< 0.0001	0.0006	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0024	< 0.002
R1_ENV_103-Middle	< 0.005	0.0005	< 0.0005	0.0008	< 0.0001	0.0011	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0026	< 0.002
R1_ENV_103-Bottom	< 0.005	< 0.0005	< 0.0005	0.0012	< 0.0001	0.0009	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0024	< 0.002
R1_ENV_104-Top	< 0.005	< 0.0005	< 0.0005	0.0006	< 0.0001	0.0004	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0029	< 0.002
R1_ENV_104-Middle	< 0.005	0.0029	< 0.0005	0.0100	0.0001	< 0.0001	0.0046	0.07	< 0.0001	0.0025	0.0027	0.046
R1_ENV_104_Bottom	< 0.005	0.0021	< 0.0005	0.0096	< 0.0001	< 0.0001	0.0021	< 0.02	< 0.0001	0.0024	0.0027	0.077
R1_ENV_105-Top	< 0.005	0.0018	< 0.0005	0.0098	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0018	0.0022	0.044
R1_ENV_105-Middle	< 0.005	0.0018	< 0.0005	0.0098	< 0.0001	< 0.0001	0.0029	0.02	< 0.0001	0.0025	0.0022	0.036
R1_ENV_105_Bottom	0.015	0.0025	< 0.0005	0.0109	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0043	0.0027	0.040
R1_ENV_106-Top	< 0.005	0.0032	< 0.0005	0.0091	< 0.0001	< 0.0001	0.0056	< 0.02	< 0.0001	0.0023	0.0026	0.026

Summary of Water Column Major and Trace Element Analysis												
Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
R1_ENV_106-Middle	0.059	0.0021	< 0.0005	0.0105	< 0.0001	< 0.0001	< 0.0003	0.17	< 0.0001	0.0026	0.0026	0.035
R1_ENV_106_Bottom	0.013	0.0025	< 0.0005	0.0099	< 0.0001	< 0.0001	0.0009	< 0.02	< 0.0001	0.0033	0.0029	0.030
R1_ENV_107-Top	< 0.005	0.0043	< 0.0005	0.0120	< 0.0001	< 0.0001	0.0007	< 0.02	< 0.0001	0.0005	0.0029	< 0.002
R1_ENV_107-Middle	< 0.005	0.0039	< 0.0005	0.0123	< 0.0001	< 0.0001	0.0041	< 0.02	< 0.0001	0.0010	0.0030	0.028
R1_ENV_107-Bottom	< 0.005	0.0032	< 0.0005	0.0117	< 0.0001	< 0.0001	0.0008	< 0.02	< 0.0001	0.0006	0.0029	0.044
R1_ENV_108-Top	< 0.005	0.0013	< 0.0005	0.0100	< 0.0001	< 0.0001	0.0019	< 0.02	< 0.0001	0.0025	0.0024	0.027
R1_ENV_108-Middle	< 0.005	0.0017	< 0.0005	0.0099	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0021	0.0023	0.036
R1_ENV_108_Bottom	< 0.005	0.0010	< 0.0005	0.0109	< 0.0001	< 0.0001	0.0034	< 0.02	< 0.0001	0.0029	0.0026	0.031
R1_ENV_109-Top	0.033	0.0025	< 0.0005	0.0075	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0020	0.012
R1_ENV_109-Middle	0.028	0.0017	< 0.0005	0.0077	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0025	0.009
R1_ENV_109-Bottom	0.027	0.0034	< 0.0005	0.0082	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	0.017
R1_ENV_110-Top	0.038	0.0030	< 0.0005	0.0084	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.032
R1_ENV_110-Middle	0.031	0.0031	< 0.0005	0.0078	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	0.018
R1_ENV_110-Bottom	0.029	0.0034	< 0.0005	0.0073	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0020	0.018
R1_ENV_111-Top	0.033	0.0017	< 0.0005	0.0082	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0026	0.020
R1_ENV_111-Middle	0.028	0.0022	< 0.0005	0.0073	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	0.003
R1_ENV_111-Bottom	0.029	0.0017	< 0.0005	0.0076	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.028
R1_ENV_112-Top	< 0.005	0.0036	< 0.0005	0.0098	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0029	< 0.002
R1_ENV_112-Middle	< 0.005	0.0038	< 0.0005	0.0115	< 0.0001	< 0.0001	0.0008	< 0.02	< 0.0001	0.0003	0.0031	< 0.002

Summary of Water Column Major and Trace Element Analysis

Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
R1_ENV_112-Bottom	< 0.005	0.0038	< 0.0005	0.0115	< 0.0001	< 0.0001	0.0004	< 0.02	< 0.0001	0.0003	0.0034	< 0.002
R1_ENV_113-Top	< 0.005	0.0034	< 0.0005	0.0109	< 0.0001	< 0.0001	0.0014	< 0.02	< 0.0001	0.0003	0.0032	< 0.002
R1_ENV_113-Middle	< 0.005	0.0033	< 0.0005	0.0111	< 0.0001	< 0.0001	0.0007	< 0.02	< 0.0001	0.0006	0.0030	< 0.002
R1_ENV_113-Bottom	< 0.005	0.0028	< 0.0005	0.0114	< 0.0001	< 0.0001	0.0016	< 0.02	< 0.0001	0.0154	0.0029	< 0.002
R1_ENV_114-Top	0.011	0.0030	< 0.0005	0.0063	< 0.0001	0.0002	0.0015	< 0.02	< 0.0001	0.0008	0.0027	0.012
R1_ENV_114-Middle	< 0.005	0.0018	< 0.0005	0.0065	< 0.0001	0.0003	0.0005	< 0.02	< 0.0001	0.0010	0.0024	< 0.002
R1_ENV_114-Bottom	< 0.005	0.0030	< 0.0005	0.0043	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0026	0.017
R1_ENV_115-Top	0.013	0.0032	< 0.0005	0.0038	< 0.0001	0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0030	0.004
R1_ENV_115-Middle	0.018	0.0034	< 0.0005	0.0049	0.0002	0.0005	0.0006	< 0.02	< 0.0001	0.0035	0.0032	0.040
R1_ENV_115-Bottom	0.008	0.0032	< 0.0005	0.0067	< 0.0001	0.0003	< 0.0003	< 0.02	< 0.0001	0.0008	0.0022	< 0.002
R1_ENV_116-Top	0.013	0.0029	< 0.0005	0.0046	< 0.0001	< 0.0001	0.0008	< 0.02	< 0.0001	< 0.0002	0.0030	0.004
R1_ENV_116-Middle	0.011	0.0029	< 0.0005	0.0038	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0028	0.022
R1_ENV_116-Bottom	< 0.005	0.0023	< 0.0005	0.0045	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0027	0.007
R1_ENV_117-Top	< 0.005	0.0025	< 0.0005	0.0041	0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	0.008
R1_ENV_117-Middle	< 0.005	0.0033	< 0.0005	0.0041	0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0007	0.0021	0.013
R1_ENV_117-Bottom	< 0.005	0.0031	< 0.0005	0.0037	0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0020	0.011
R1_ENV_118-Top	0.005	0.0025	< 0.0005	0.0046	0.0002	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0003	0.0024	0.012
R1_ENV_118-Middle	0.009	0.0024	< 0.0005	0.0062	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.006
R1_ENV_118-Bottom	< 0.005	0.0024	< 0.0005	0.0049	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0024	0.004

Summary of Water Column Major and Trace Element Analysis												
Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
R1_ENV_119-Top	< 0.005	0.0030	< 0.0005	0.0048	0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0025	< 0.002
R1_ENV_119-Middle	< 0.005	0.0027	< 0.0005	0.0047	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	0.002
R1_ENV_119-Bottom	< 0.005	0.0037	< 0.0005	0.0048	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.003
R1_ENV_120-Top	< 0.005	0.0028	< 0.0005	0.0047	0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.010
R1_ENV_120-Middle	< 0.005	0.0032	< 0.0005	0.0036	0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0026	0.005
R1_ENV_120-Bottom	< 0.005	0.0027	< 0.0005	0.0034	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.023
R1_ENV_121-Top	< 0.005	0.0029	< 0.0005	0.0054	< 0.0001	0.0003	0.0004	< 0.02	< 0.0001	0.0006	0.0049	< 0.002
R1_ENV_121-Middle	< 0.005	0.0025	< 0.0005	0.0054	0.0001	0.0005	< 0.0003	< 0.02	< 0.0001	0.0007	0.0030	< 0.002
R1_ENV_121-Bottom	< 0.005	0.0030	< 0.0005	0.0056	< 0.0001	0.0005	< 0.0003	< 0.02	< 0.0001	0.0007	0.0023	< 0.002
R1_ENV_122-Top	< 0.005	0.0028	< 0.0005	0.0057	< 0.0001	0.0002	< 0.0003	< 0.02	< 0.0001	0.0005	0.0027	< 0.002
R1_ENV_122-Middle	< 0.005	0.0025	< 0.0005	0.0052	< 0.0001	0.0001	< 0.0003	< 0.02	< 0.0001	0.0005	0.0032	< 0.002
R1_ENV_122-Bottom	< 0.005	0.0021	< 0.0005	0.0055	< 0.0001	0.0002	< 0.0003	< 0.02	< 0.0001	0.0007	0.0029	< 0.002
R1_ENV_123-Top	< 0.005	0.0032	< 0.0005	0.0060	< 0.0001	0.0001	< 0.0003	< 0.02	< 0.0001	0.0005	0.0025	< 0.002
R1_ENV_123-Middle	< 0.005	0.0029	< 0.0005	0.0049	< 0.0001	0.0002	< 0.0003	< 0.02	< 0.0001	0.0006	0.0026	< 0.002
R1_ENV_123-Bottom	< 0.005	0.0027	< 0.0005	0.0054	< 0.0001	0.0003	< 0.0003	< 0.02	< 0.0001	0.0008	0.0028	< 0.002
R1_ENV_124-Top	0.031	0.0024	< 0.0005	0.0066	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0020	0.015
R1_ENV_124-Middle	0.028	0.0024	< 0.0005	0.0074	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	0.006
R1_ENV_124-Bottom	0.028	0.0022	< 0.0005	0.0071	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0020	< 0.002
R1_ENV_125-Top	0.033	0.0027	< 0.0005	0.0071	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	< 0.002

Summary of Water Column Major and Trace Element Analysis												
Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
R1_ENV_125-Middle	0.027	0.0030	< 0.0005	0.0067	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.006
R1_ENV_125-Bottom	0.030	0.0024	< 0.0005	0.0074	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0026	0.006
R1_ENV_126-Top	< 0.005	0.0032	< 0.0005	0.0124	< 0.0001	< 0.0001	0.0010	< 0.02	< 0.0001	0.0006	0.0029	< 0.002
R1_ENV_126-Middle	< 0.005	0.0032	< 0.0005	0.0115	< 0.0001	< 0.0001	0.0016	0.03	< 0.0001	0.0009	0.0030	< 0.002
R1_ENV_126-Bottom	< 0.005	0.0033	< 0.0005	0.0107	< 0.0001	< 0.0001	0.0010	< 0.02	< 0.0001	0.0003	0.0032	< 0.002
R1_ENV_127-Top	< 0.005	0.0033	< 0.0005	0.0114	< 0.0001	< 0.0001	0.0016	< 0.02	< 0.0001	0.0005	0.0031	< 0.002
R1_ENV_127-Middle	< 0.005	0.0038	< 0.0005	0.0118	< 0.0001	< 0.0001	0.0011	< 0.02	< 0.0001	0.0009	0.0029	< 0.002
R1_ENV_127-Bottom	< 0.005	0.0041	< 0.0005	0.0129	< 0.0001	< 0.0001	0.0008	< 0.02	< 0.0001	0.0003	0.0034	0.023
R1_ENV_128-Top	< 0.005	0.0035	< 0.0005	0.0105	< 0.0001	< 0.0001	0.0009	< 0.02	< 0.0001	0.0002	0.0032	< 0.002
R1_ENV_128-Middle	< 0.005	0.0036	< 0.0005	0.0109	< 0.0001	< 0.0001	0.0016	< 0.02	< 0.0001	0.0006	0.0033	< 0.002
R1_ENV_128-Bottom	< 0.005	0.0032	< 0.0005	0.0106	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0003	0.0030	< 0.002
R1_ENV_129-Top	< 0.005	0.0037	< 0.0005	0.0109	< 0.0001	< 0.0001	0.0006	< 0.02	< 0.0001	0.0003	0.0030	< 0.002
R1_ENV_129-Middle	< 0.005	0.0028	< 0.0005	0.0107	< 0.0001	< 0.0001	0.0006	< 0.02	< 0.0001	0.0002	0.0028	< 0.002
R1_ENV_129-Bottom	< 0.005	0.0035	< 0.0005	0.0109	< 0.0001	< 0.0001	0.0005	< 0.02	< 0.0001	0.0004	0.0032	< 0.002
R1_ENV_REF-Top	< 0.005	< 0.0005	< 0.0005	0.0016	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	< 0.002
R1_ENV_REF-Middle	< 0.005	0.0010	< 0.0005	0.0022	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	< 0.002
R1_ENV_REF-Bottom	< 0.005	0.0007	< 0.0005	0.0019	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0027	< 0.002
Minimum	**< 0.005**	**< 0.0005**	**< 0.0005**	**< 0.0005**	**< 0.0001**	**< 0.0001**	**< 0.0003**	**< 0.02**	**< 0.0001**	**< 0.0002**	**0.0011**	**< 0.002**
Maximum	**0.100**	**0.0053**	**< 0.0005**	**0.0235**	**0.0019**	**0.0055**	**0.1300**	**0.19**	**< 0.0001**	**0.0175**	**0.0049**	**0.156**

Summary of Water Column Major and Trace Element Analysis

Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
Mean	-	0.0027	-	0.0068	-	-	-	-	-	-	0.0026	0.014
Standard Deviation	-	0.00087	-	0.00362	-	-	-	-	-	-	0.00043	0.0191
RSD [%]	-	32	-	53	-	-	-	-	-	-	17	134
Water Standards (QCC, 2017)												
General use areas	-	-	-	-	0.0007	0.0002	0.003	-	0.0001	0.0022	-	0.015
Marine protected areas	-	-	-	-	0.0003	0.0002	0.003	-	0.0001	0.0022	-	0.015
US EPA Saltwater Quality Standards (US EPA, 2020)												
CCC	-	0.036	-	-	0.0079	0.050*	0.0031	-	0.00094	0.0056	-	0.081
CMC	-	0.069	0.0019	-	0.033	1.100*	0.0048	-	0.0018	0.140	-	0.090

Notes
Concentrations expressed in mg/L
For statistical evaluation, results < MRV were treated as absolute values determined by MRV/2
Al = Aluminium, As = Arsenic, Ag = Silver, Ba = Barium, Cd = Cadmium, Cr = Chromium, Cu = Copper, Fe = Iron
Hg = Mercury, P = Phosphorus, Pb = Lead, Si = Silicon, V = Vanadium, Zn = Zinc
RSD = Relative standard deviation
CCC = Criterion continuous concentration
CMC = Criterion maximum concentration
QCC = Abu Dhabi Quality and Conformity Council
US EPA = United States Environmental Protection Agency
MRV = Minimum reporting value
* = Standards based on the most toxic oxidation state (chromium VI). Data for current survey is total chromium

Key:	Below Water Standards	Above Water Standard for General Use Areas	Above Water Standard for Marine Protected Areas	Above CCC	Above CMC

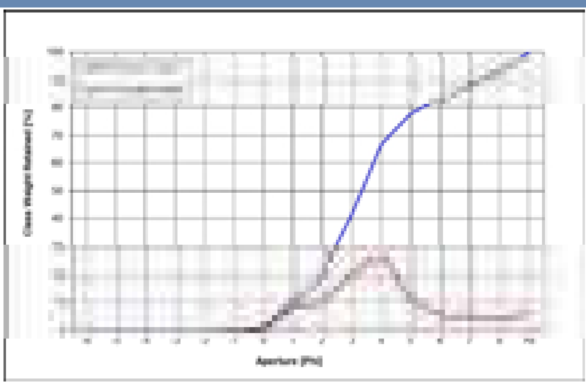
H. Sediment Characteristics

H.1 Sediment Particle Size and Grab Sample Photographs

STATION R1_ENV_001

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.1	0.1
2000.0	-1	0.4	0.6
1000.0	0	1.0	1.6
500.0	1	8.6	10.2
250.0	2	10.5	20.6
125.0	3	20.8	41.4
62.5	4	25.4	66.8
31.2	5	11.0	77.9
15.6	6	5.4	83.3
7.8	7	5.5	88.8
3.9	8	4.6	93.4
< 3.9	> 8	6.6	100.0
Total		100	100

Particle Size Distribution



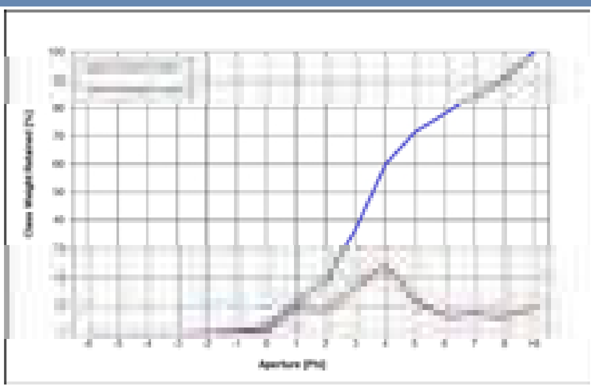
Sorting [µm] †	2.49	Very poorly sorted
Skewness [µm] †	0.28	Fine skewed
Kurtosis [µm] †	1.44	Leptokurtic
Mean [µm]* †	78.4	Very fine sand
Mean [phi]* †	3.67	
Median [µm]* †	98.9	Very fine sand
Median [phi]* †	3.34	
Gravel [%]*	0.6	Slightly gravelly muddy sand
Sand [%]*	66.3	
Mud [%]*	33.2	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_002

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.4	0.4
2000.0	-1	0.8	1.2
1000.0	0	1.5	2.7
500.0	1	8.5	11.2
250.0	2	8.4	19.6
125.0	3	16.9	36.5
62.5	4	23.4	59.9
31.2	5	11.6	71.5
15.6	6	6.5	78.0
7.8	7	7.1	85.1
3.9	8	6.2	91.3
< 3.9	> 8	8.7	100
Total		100	100

Particle Size Distribution



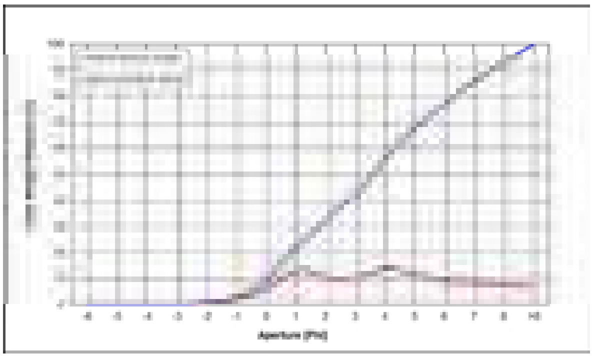
Sorting [µm] †	2.83	Very poorly sorted
Skewness [µm] †	0.29	Fine skewed
Kurtosis [µm] †	1.27	Leptokurtic
Mean [µm]* †	62.5	Very fine sand
Mean [phi]* †	4.00	
Median [µm]* †	83.7	Very fine sand
Median [phi]* †	3.58	
Gravel [%]*	1.2	Slightly gravelly muddy sand
Sand [%]*	58.7	
Mud [%]*	40.1	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_014

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.6	0.6
2000.0	-1	2.3	2.9
1000.0	0	6.4	9.3
500.0	1	13.0	22.2
250.0	2	10.5	32.7
125.0	3	10.3	43.0
62.5	4	13.8	56.8
31.2	5	11.6	68.4
15.6	6	8.8	77.3
7.8	7	8.6	85.9
3.9	8	7.4	93.3
< 3.9	> 8	6.7	100
Total		100	100

Particle Size Distribution



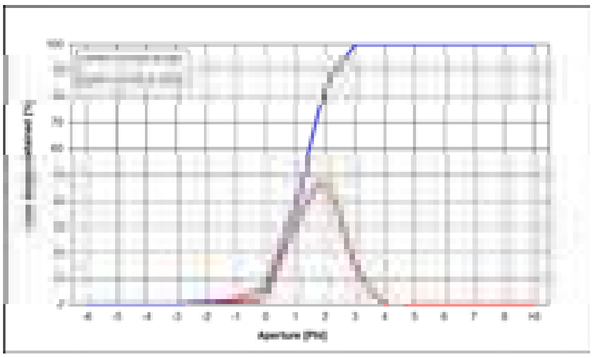
Sorting [µm] †	3.08	Very poorly sorted
Skewness [µm] †	0.11	Fine skewed
Kurtosis [µm] †	0.92	Mesokurtic
Mean [µm]* †	82.3	Very fine sand
Mean [phi]* †	3.60	
Median [µm]* †	87.9	Very fine sand
Median [phi]* †	3.51	
Gravel [%]*	2.9	Slightly gravelly muddy sand
Sand [%]*	53.9	
Mud [%]*	43.2	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_029

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	1.4	1.4
2000.0	-1	0.8	2.2
1000.0	0	4.5	6.7
500.0	1	32.0	38.7
250.0	2	46.5	85.2
125.0	3	14.8	99.9
62.5	4	0.1	100
31.2	5	0.0	100
15.6	6	0.0	100
7.8	7	0.0	100
3.9	8	0.0	100
< 3.9	> 8	0.0	100
Total		100	100

Particle Size Distribution



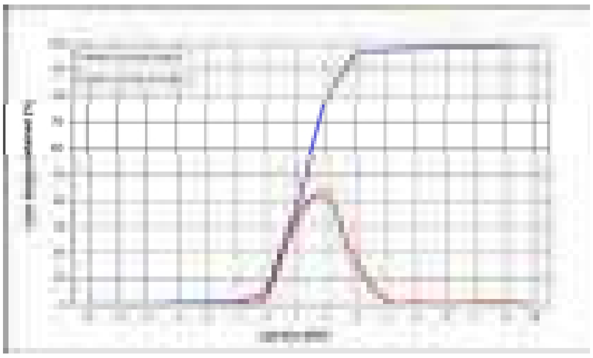
Sorting [µm] †	0.88	Moderately sorted
Skewness [µm] †	-0.10	Symmetrical
Kurtosis [µm] †	1.03	Mesokurtic
Mean [µm]* †	444.5	Medium sand
Mean [phi]* †	1.17	
Median [µm]* †	422.4	Medium sand
Median [phi]* †	1.24	
Gravel [%]*	2.2	Slightly gravelly sand
Sand [%]*	97.8	
Mud [%]*	0.0	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_030

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.5	0.5
4000.0	-2	0.1	0.6
2000.0	-1	0.4	1.0
1000.0	0	3.4	4.4
500.0	1	32.8	37.2
250.0	2	42.6	79.8
125.0	3	16.2	96.0
62.5	4	1.7	97.7
31.2	5	0.6	98.3
15.6	6	0.4	98.7
7.8	7	0.5	99.2
3.9	8	0.6	99.8
< 3.9	> 8	0.2	100.0
Total		100	100

Particle Size Distribution



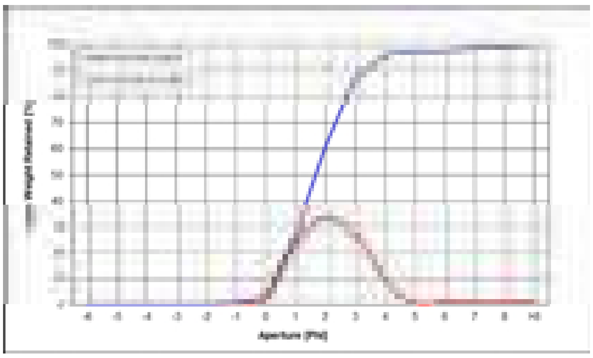
Sorting [µm] †	0.92	Moderately sorted
Skewness [µm] †	0.06	Symmetrical
Kurtosis [µm] †	0.95	Mesokurtic
Mean [µm]* †	405.0	Medium sand
Mean [phi]* †	1.30	
Median [µm]* †	406.0	Medium sand
Median [phi]* †	1.30	
Gravel [%]*	1.0	Slightly gravelly sand
Sand [%]*	96.8	
Mud [%]*	2.3	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_031

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.1	0.1
2000.0	-1	0.5	0.6
1000.0	0	2.6	3.3
500.0	1	24.4	27.6
250.0	2	33.5	61.1
125.0	3	26.3	87.4
62.5	4	8.7	96.1
31.2	5	0.5	96.6
15.6	6	0.9	97.5
7.8	7	1.0	98.5
3.9	8	1.0	99.5
< 3.9	> 8	0.5	100
Total		100	100

Particle Size Distribution



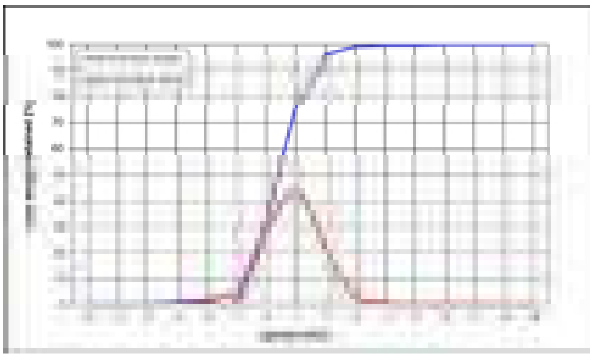
Sorting [µm] †	1.16	Poorly sorted
Skewness [µm] †	0.09	Symmetrical
Kurtosis [µm] †	0.95	Mesokurtic
Mean [µm]* †	310.5	Medium sand
Mean [phi]* †	1.69	
Median [µm]* †	314.6	Medium sand
Median [phi]* †	1.67	
Gravel [%]*	0.6	Slightly gravelly sand
Sand [%]*	95.5	
Mud [%]*	3.9	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_038

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.6	0.6
4000.0	-2	1.5	2.1
2000.0	-1	1.5	3.6
1000.0	0	28.7	32.3
500.0	1	43.5	75.8
250.0	2	20.3	96.1
125.0	3	3.1	99.2
62.5	4	0.5	99.7
31.2	5	0.1	99.8
15.6	6	0.1	99.9
7.8	7	0.1	100
3.9	8	0.0	100
< 3.9	> 8	0.0	100
Total		100	100

Particle Size Distribution



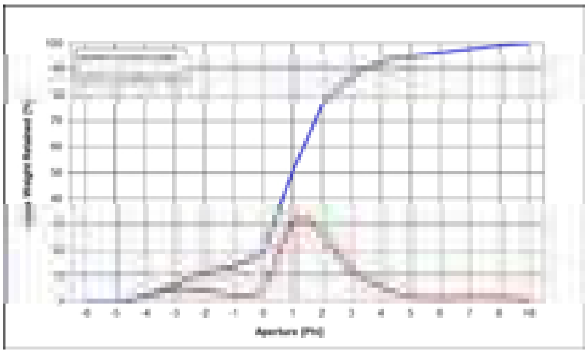
Sorting [µm] †	0.93	Moderately sorted
Skewness [µm] †	0.04	Symmetrical
Kurtosis [µm] †	0.96	Mesokurtic
Mean [µm]* †	750.5	Coarse sand
Mean [phi]* †	0.41	
Median [µm]* †	754.2	Coarse sand
Median [phi]* †	0.41	
Gravel [%]*	3.6	Slightly gravelly sand
Sand [%]*	96.1	
Mud [%]*	0.3	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_039

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	2.0	2.0
8000.0	-3	4.6	6.6
4000.0	-2	4.5	11.1
2000.0	-1	2.5	13.5
1000.0	0	5.7	19.2
500.0	1	30.8	50.0
250.0	2	26.2	76.1
125.0	3	11.7	87.9
62.5	4	5.5	93.4
31.2	5	1.8	95.1
15.6	6	1.2	96.3
7.8	7	1.5	97.9
3.9	8	1.4	99.3
< 3.9	> 8	0.7	100
Total		100	100

Particle Size Distribution



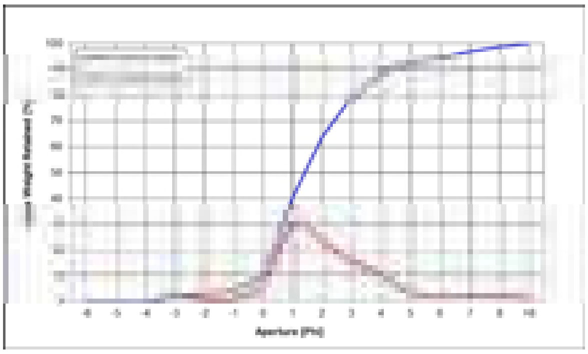
Sorting [µm] †	2.06	Very poorly sorted
Skewness [µm] †	-0.01	Symmetrical
Kurtosis [µm] †	1.91	Very leptokurtic
Mean [µm]* †	488.0	Medium sand
Mean [phi]* †	1.04	
Median [µm]* †	499.8	Medium sand
Median [phi]* †	1.00	
Gravel [%]*	13.5	Gravelly sand
Sand [%]*	79.9	
Mud [%]*	6.6	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_040

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	2.0	2.0
4000.0	-2	0.8	2.7
2000.0	-1	1.0	3.8
1000.0	0	7.0	10.7
500.0	1	29.8	40.6
250.0	2	23.2	63.8
125.0	3	15.5	79.2
62.5	4	9.9	89.1
31.2	5	3.4	92.5
15.6	6	1.9	94.4
7.8	7	2.4	96.8
3.9	8	2.0	98.8
< 3.9	> 8	1.2	100
Total		100	100

Particle Size Distribution



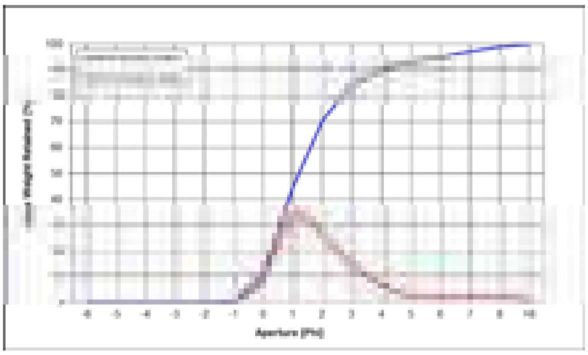
Sorting [µm] †	1.90	Poorly sorted
Skewness [µm] †	0.31	Very fine skewed
Kurtosis [µm] †	1.29	Leptokurtic
Mean [µm]* †	310.2	Medium sand
Mean [phi]* †	1.69	
Median [µm]* †	377.2	Medium sand
Median [phi]* †	1.41	
Gravel [%]*	3.8	Slightly gravelly muddy sand
Sand [%]*	85.4	
Mud [%]*	10.9	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_041

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.0	0.0
2000.0	-1	0.7	0.7
1000.0	0	10.6	11.3
500.0	1	33.2	44.5
250.0	2	25.7	70.3
125.0	3	14.0	84.3
62.5	4	6.3	90.6
31.2	5	2.4	93.0
15.6	6	1.9	94.9
7.8	7	2.3	97.1
3.9	8	1.9	99.0
< 3.9	> 8	1.0	100
Total		100	100

Particle Size Distribution



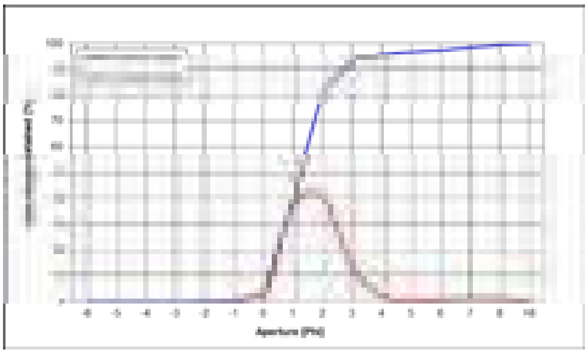
Sorting [µm] †	1.72	Poorly sorted
Skewness [µm] †	0.35	Very fine skewed
Kurtosis [µm] †	1.41	Leptokurtic
Mean [µm]* †	367.4	Medium sand
Mean [phi]* †	1.44	
Median [µm]* †	431.4	Medium sand
Median [phi]* †	1.21	
Gravel [%]*	0.7	Slightly gravelly sand
Sand [%]*	89.9	
Mud [%]*	9.4	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_043

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.2	0.2
2000.0	-1	0.3	0.5
1000.0	0	2.0	2.5
500.0	1	37.6	40.1
250.0	2	40.7	80.9
125.0	3	13.0	93.8
62.5	4	1.9	95.7
31.2	5	0.8	96.6
15.6	6	0.8	97.4
7.8	7	1.1	98.5
3.9	8	1.0	99.5
< 3.9	> 8	0.5	100
Total		100	100

Particle Size Distribution



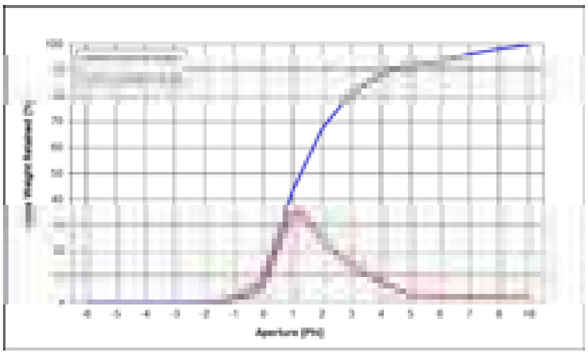
Sorting [µm] †	1.01	Poorly sorted
Skewness [µm] †	0.20	Fine skewed
Kurtosis [µm] †	1.16	Leptokurtic
Mean [µm]* †	411.6	Medium sand
Mean [phi]* †	1.28	
Median [µm]* †	422.6	Medium sand
Median [phi]* †	1.24	
Gravel [%]*	0.5	Slightly gravelly sand
Sand [%]*	95.2	
Mud [%]*	4.3	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_044

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.2	0.2
2000.0	-1	1.4	1.5
1000.0	0	7.7	9.2
500.0	1	34.0	43.2
250.0	2	23.9	67.1
125.0	3	14.1	81.2
62.5	4	7.8	89.0
31.2	5	2.6	91.6
15.6	6	2.0	93.6
7.8	7	2.5	96.0
3.9	8	2.3	98.4
< 3.9	> 8	1.6	100
Total		100	100

Particle Size Distribution



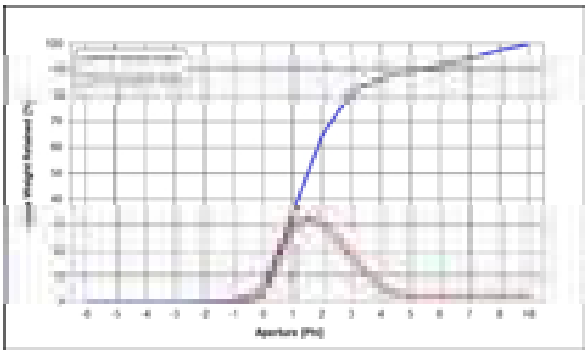
Sorting [µm] †	1.87	Poorly sorted
Skewness [µm] †	0.40	Very fine skewed
Kurtosis [µm] †	1.39	Leptokurtic
Mean [µm]* †	326.7	Medium sand
Mean [phi]* †	1.61	
Median [µm]* †	410.9	Medium sand
Median [phi]* †	1.28	
Gravel [%]*	1.5	Slightly gravelly muddy sand
Sand [%]*	87.4	
Mud [%]*	11.0	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_045

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.2	0.2
2000.0	-1	0.4	0.5
1000.0	0	4.2	4.7
500.0	1	29.3	34.1
250.0	2	30.4	64.5
125.0	3	17.1	81.6
62.5	4	5.4	87.0
31.2	5	2.5	89.5
15.6	6	2.2	91.7
7.8	7	2.9	94.6
3.9	8	2.9	97.5
< 3.9	> 8	2.5	100
Total		100	100

Particle Size Distribution



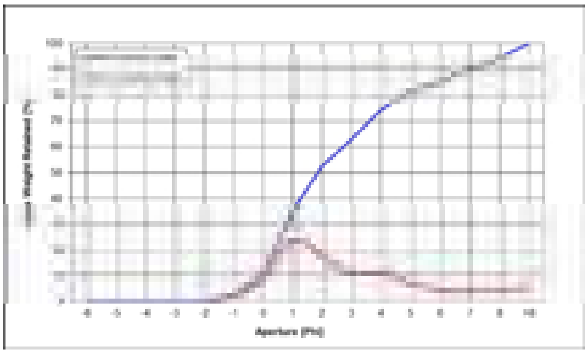
Sorting [µm] †	1.85	Poorly sorted
Skewness [µm] †	0.42	Very fine skewed
Kurtosis [µm] †	1.52	Very leptokurtic
Mean [µm]* †	289.9	Medium sand
Mean [phi]* †	1.79	
Median [µm]* †	347.7	Medium sand
Median [phi]* †	1.52	
Gravel [%]*	0.5	Slightly gravelly muddy sand
Sand [%]*	86.4	
Mud [%]*	13.0	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_046

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.1	0.1
2000.0	-1	2.3	2.4
1000.0	0	9.1	11.5
500.0	1	24.0	35.5
250.0	2	17.0	52.5
125.0	3	10.7	63.2
62.5	4	11.2	74.4
31.2	5	7.1	81.5
15.6	6	4.2	85.7
7.8	7	4.2	89.9
3.9	8	4.6	94.5
< 3.9	> 8	5.5	100
Total		100	100

Particle Size Distribution



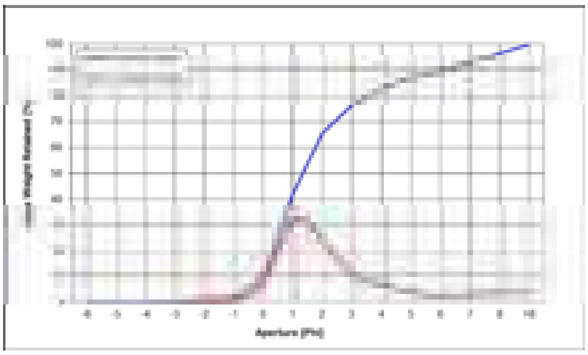
Sorting [µm] †	2.75	Very poorly sorted
Skewness [µm] †	0.41	Very fine skewed
Kurtosis [µm] †	1.07	Mesokurtic
Mean [µm]* †	171.2	Fine sand
Mean [phi]* †	2.55	Fine sand
Median [µm]* †	276.8	Medium sand
Median [phi]* †	1.85	Medium sand
Gravel [%]*	2.4	Slightly gravelly muddy sand
Sand [%]*	72.0	Slightly gravelly muddy sand
Mud [%]*	25.6	Slightly gravelly muddy sand

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_048

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.6	0.6
4000.0	-2	0.5	1.1
2000.0	-1	0.7	1.9
1000.0	0	8.1	10.0
500.0	1	32.0	42.0
250.0	2	23.6	65.6
125.0	3	10.7	76.3
62.5	4	6.9	83.2
31.2	5	3.8	87.0
15.6	6	2.6	89.7
7.8	7	3.2	92.9
3.9	8	3.5	96.4
< 3.9	> 8	3.6	100
Total		100	100

Particle Size Distribution



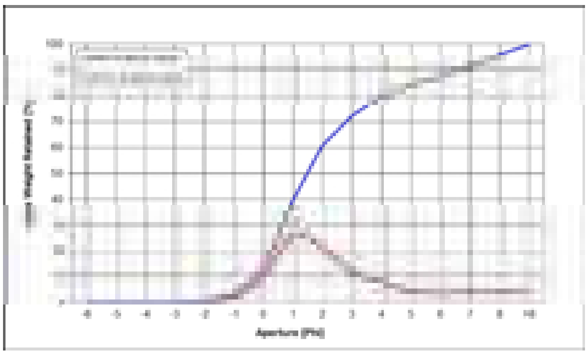
Sorting [µm] †	2.25	Very poorly sorted
Skewness [µm] †	0.48	Very fine skewed
Kurtosis [µm] †	1.40	Leptokurtic
Mean [µm]* †	265.6	Medium sand
Mean [phi]* †	1.91	
Median [µm]* †	395.4	Medium sand
Median [phi]* †	1.34	
Gravel [%]*	1.9	Slightly gravelly muddy sand
Sand [%]*	81.3	
Mud [%]*	16.8	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_049

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.6	0.6
2000.0	-1	2.3	2.9
1000.0	0	10.6	13.5
500.0	1	26.1	39.6
250.0	2	21.1	60.6
125.0	3	11.6	72.2
62.5	4	7.7	79.9
31.2	5	4.3	84.2
15.6	6	3.4	87.6
7.8	7	4.1	91.7
3.9	8	4.2	95.9
< 3.9	> 8	4.1	100
Total		100	100

Particle Size Distribution



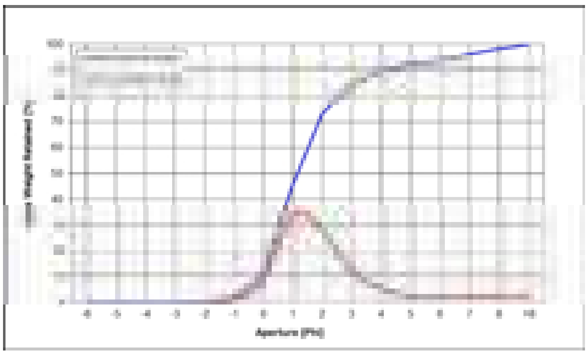
Sorting [µm] †	2.52	Very poorly sorted
Skewness [µm] †	0.44	Very fine skewed
Kurtosis [µm] †	1.20	Leptokurtic
Mean [µm]* †	220.3	Fine sand
Mean [phi]* †	2.18	
Median [µm]* †	354.9	Medium sand
Median [phi]* †	1.49	
Gravel [%]*	2.9	Slightly gravelly muddy sand
Sand [%]*	77.0	
Mud [%]*	20.1	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_050

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.4	0.4
2000.0	-1	1.3	1.6
1000.0	0	9.8	11.5
500.0	1	33.8	45.3
250.0	2	27.6	72.8
125.0	3	11.8	84.7
62.5	4	5.0	89.7
31.2	5	2.4	92.0
15.6	6	1.7	93.8
7.8	7	2.3	96.1
3.9	8	2.3	98.4
< 3.9	> 8	1.6	100
Total		100	100

Particle Size Distribution



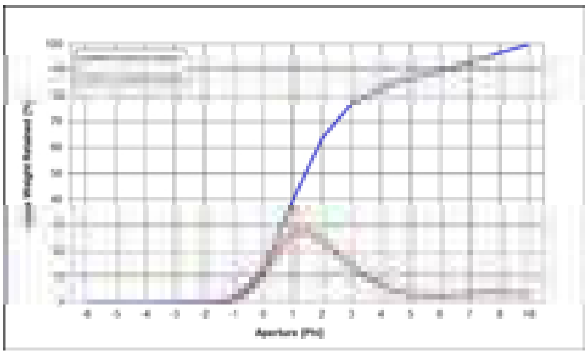
Sorting [µm] †	1.79	Poorly sorted
Skewness [µm] †	0.38	Very fine skewed
Kurtosis [µm] †	1.65	Very leptokurtic
Mean [µm]* †	374.7	Medium sand
Mean [phi]* †	1.42	
Median [µm]* †	443.9	Medium sand
Median [phi]* †	1.17	
Gravel [%]*	1.6	Slightly gravelly muddy sand
Sand [%]*	88.0	
Mud [%]*	10.3	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_052

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.1	0.1
4000.0	-2	0.2	0.3
2000.0	-1	1.1	1.4
1000.0	0	11.3	12.7
500.0	1	27.0	39.7
250.0	2	23.9	63.5
125.0	3	13.6	77.2
62.5	4	6.4	83.6
31.2	5	3.2	86.9
15.6	6	2.7	89.6
7.8	7	3.5	93.1
3.9	8	3.6	96.7
< 3.9	> 8	3.3	100
Total		100	100

Particle Size Distribution



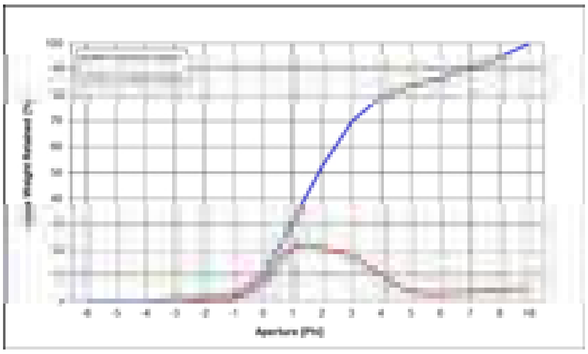
Sorting [µm] †	2.24	Very poorly sorted
Skewness [µm] †	0.42	Very fine skewed
Kurtosis [µm] †	1.41	Leptokurtic
Mean [µm]* †	269.3	Medium sand
Mean [phi]* †	1.89	
Median [µm]* †	370.4	Medium sand
Median [phi]* †	1.43	
Gravel [%]*	1.4	Slightly gravelly muddy sand
Sand [%]*	82.2	
Mud [%]*	16.4	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_053

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	1.2	1.2
4000.0	-2	0.2	1.4
2000.0	-1	1.4	2.8
1000.0	0	7.7	10.5
500.0	1	21.1	31.7
250.0	2	20.8	52.4
125.0	3	17.4	69.9
62.5	4	9.7	79.5
31.2	5	4.0	83.5
15.6	6	3.3	86.8
7.8	7	3.7	90.5
3.9	8	4.4	94.8
< 3.9	> 8	5.2	100
Total		100	100

Particle Size Distribution



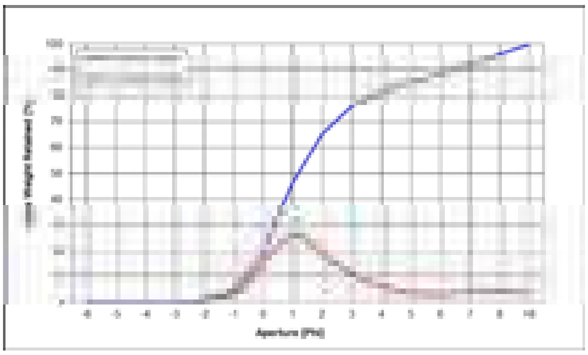
Sorting [µm] †	2.57	Very poorly sorted
Skewness [µm] †	0.38	Very fine skewed
Kurtosis [µm] †	1.28	Leptokurtic
Mean [µm]* †	185.4	Fine Sand
Mean [phi]* †	2.43	
Median [µm]* †	271.1	Medium sand
Median [phi]* †	1.88	
Gravel [%]*	2.8	Slightly gravelly muddy sand
Sand [%]*	76.8	
Mud [%]*	20.5	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_054

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.9	0.9
2000.0	-1	3.8	4.8
1000.0	0	16.0	20.7
500.0	1	25.8	46.6
250.0	2	18.7	65.2
125.0	3	10.7	75.9
62.5	4	6.0	82.0
31.2	5	3.4	85.3
15.6	6	3.1	88.4
7.8	7	3.9	92.3
3.9	8	4.0	96.2
< 3.9	> 8	3.8	100
Total		100	100

Particle Size Distribution



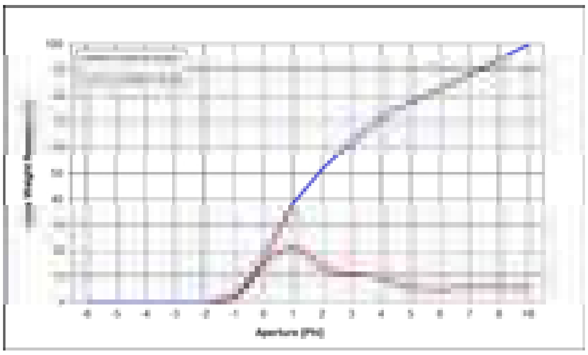
Sorting [µm] †	2.54	Very poorly sorted
Skewness [µm] †	0.45	Very fine skewed
Kurtosis [µm] †	1.29	Leptokurtic
Mean [µm]* †	281.0	Medium sand
Mean [phi]* †	1.83	
Median [µm]* †	440.1	Medium sand
Median [phi]* †	1.18	
Gravel [%]*	4.8	Slightly gravelly muddy sand
Sand [%]*	77.2	
Mud [%]*	18.0	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_055

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.0	0.0
2000.0	-1	2.1	2.1
1000.0	0	15.1	17.2
500.0	1	21.0	38.2
250.0	2	13.2	51.4
125.0	3	10.9	62.3
62.5	4	9.6	71.9
31.2	5	5.7	77.6
15.6	6	5.1	82.7
7.8	7	5.9	88.6
3.9	8	5.6	94.2
< 3.9	> 8	5.8	100
Total		100	100

Particle Size Distribution



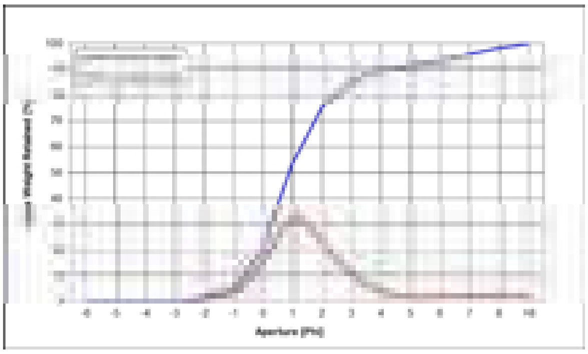
Sorting [µm] †	3.02	Very poorly sorted
Skewness [µm] †	0.40	Very fine skewed
Kurtosis [µm] †	0.94	Mesokurtic
Mean [µm]* †	156.5	Fine sand
Mean [phi]* †	2.68	
Median [µm]* †	269.5	Medium sand
Median [phi]* †	1.89	
Gravel [%]*	2.1	Slightly gravelly muddy sand
Sand [%]*	69.8	
Mud [%]*	28.1	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_056

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	1.3	1.3
2000.0	-1	4.0	5.3
1000.0	0	15.7	21.0
500.0	1	32.4	53.4
250.0	2	22.1	75.5
125.0	3	10.2	85.8
62.5	4	4.0	89.7
31.2	5	1.7	91.4
15.6	6	1.9	93.3
7.8	7	2.5	95.9
3.9	8	2.3	98.2
< 3.9	> 8	1.8	100
Total		100	100

Particle Size Distribution



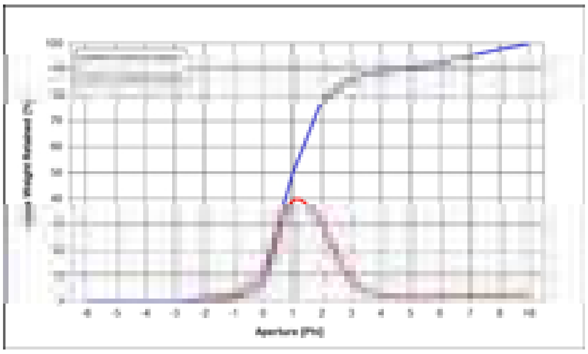
Sorting [µm] †	1.96	Poorly sorted
Skewness [µm] †	0.36	Very fine skewed
Kurtosis [µm] †	1.71	Very leptokurtic
Mean [µm]* †	455.7	Medium sand
Mean [phi]* †	1.13	
Median [µm]* †	537.8	Coarse sand
Median [phi]* †	0.89	
Gravel [%]*	5.3	Gravelly muddy sand
Sand [%]*	84.4	
Mud [%]*	10.3	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_057

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	1.1	1.1
2000.0	-1	1.4	2.5
1000.0	0	8.2	10.7
500.0	1	39.0	49.7
250.0	2	28.8	78.5
125.0	3	7.9	86.4
62.5	4	2.6	89.0
31.2	5	1.6	90.6
15.6	6	1.8	92.4
7.8	7	2.7	95.1
3.9	8	2.7	97.8
< 3.9	> 8	2.2	100
Total		100	100

Particle Size Distribution



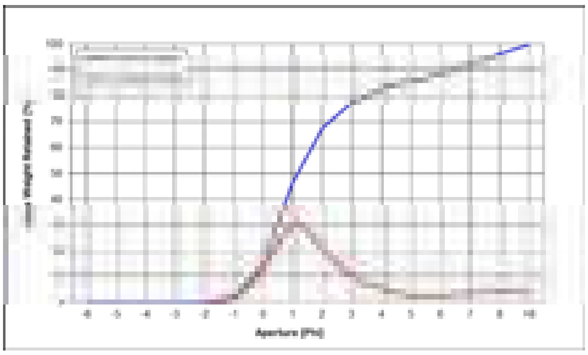
Sorting [µm] †	1.80	Poorly sorted
Skewness [µm] †	0.44	Very fine skewed
Kurtosis [µm] †	2.07	Very Leptokurtic
Mean [µm]* †	411.6	Medium sand
Mean [phi]* †	1.28	
Median [µm]* †	496.7	Medium sand
Median [phi]* †	1.01	
Gravel [%]*	2.5	Slightly gravelly muddy sand
Sand [%]*	86.5	
Mud [%]*	11.0	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_058

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.1	0.1
2000.0	-1	2.0	2.2
1000.0	0	13.8	16.0
500.0	1	30.4	46.4
250.0	2	20.9	67.3
125.0	3	10.0	77.3
62.5	4	5.6	82.9
31.2	5	2.9	85.8
15.6	6	2.8	88.6
7.8	7	3.6	92.2
3.9	8	3.9	96.1
< 3.9	> 8	3.9	100
Total		100	100

Particle Size Distribution



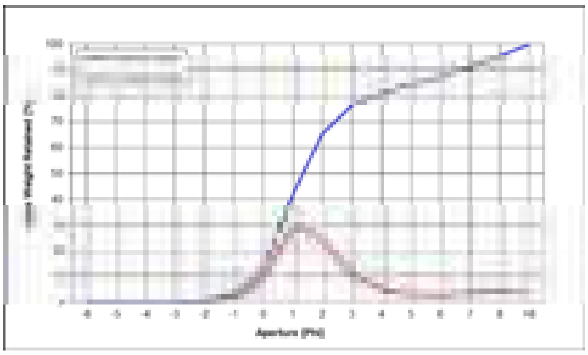
Sorting [µm] †	2.39	Very poorly sorted
Skewness [µm] †	0.50	Very fine skewed
Kurtosis [µm] †	1.41	Leptokurtic
Mean [µm]* †	276.8	Medium sand
Mean [phi]* †	1.85	
Median [µm]* †	444.0	Medium sand
Median [phi]* †	1.17	
Gravel [%]*	2.2	Slightly gravelly muddy sand
Sand [%]*	80.7	
Mud [%]*	17.1	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_059

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.7	0.7
2000.0	-1	2.5	3.1
1000.0	0	10.3	13.5
500.0	1	28.2	41.7
250.0	2	23.6	65.2
125.0	3	10.9	76.1
62.5	4	5.2	81.3
31.2	5	3.2	84.6
15.6	6	3.0	87.5
7.8	7	3.8	91.3
3.9	8	4.2	95.5
< 3.9	> 8	4.5	100
Total		100	100

Particle Size Distribution



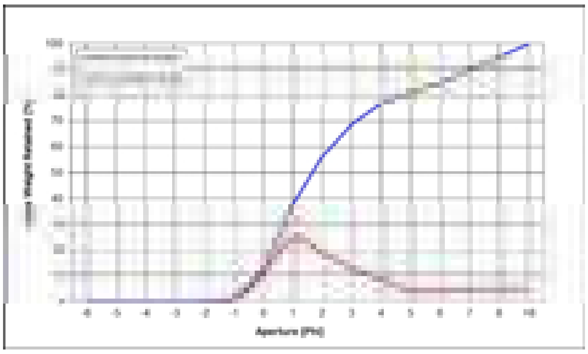
Sorting [µm] †	2.50	Very poorly sorted
Skewness [µm] †	0.48	Very fine skewed
Kurtosis [µm] †	1.43	Leptokurtic
Mean [µm]* †	235.0	Fine sand
Mean [phi]* †	2.09	
Median [µm]* †	391.2	Medium sand
Median [phi]* †	1.35	
Gravel [%]*	3.1	Slightly gravelly muddy sand
Sand [%]*	78.2	
Mud [%]*	18.7	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_060

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.1	0.1
2000.0	-1	1.1	1.2
1000.0	0	11.6	12.8
500.0	1	24.8	37.6
250.0	2	18.4	56.0
125.0	3	12.6	68.6
62.5	4	8.2	76.9
31.2	5	4.2	81.1
15.6	6	4.0	85.1
7.8	7	5.0	90.0
3.9	8	5.0	95.0
< 3.9	> 8	5.0	100
Total		100	100

Particle Size Distribution



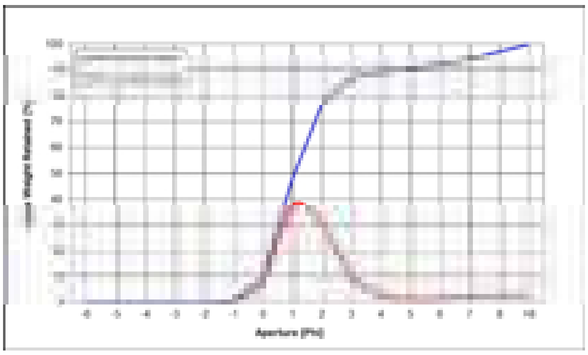
Sorting [µm] †	2.71	Very poorly sorted
Skewness [µm] †	0.45	Very fine skewed
Kurtosis [µm] †	1.08	Mesokurtic
Mean [µm]* †	175.4	Fine sand
Mean [phi]* †	2.51	
Median [µm]* †	313.3	Medium sand
Median [phi]* †	1.67	
Gravel [%]*	1.2	Slightly gravelly muddy sand
Sand [%]*	75.7	
Mud [%]*	23.1	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_061

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.0	0.0
2000.0	-1	0.9	1.0
1000.0	0	9.0	10.0
500.0	1	37.6	47.6
250.0	2	29.6	77.2
125.0	3	9.8	87.0
62.5	4	2.3	89.3
31.2	5	1.3	90.7
15.6	6	1.4	92.1
7.8	7	2.3	94.3
3.9	8	2.9	97.2
< 3.9	> 8	2.8	100
Total		100	100

Particle Size Distribution



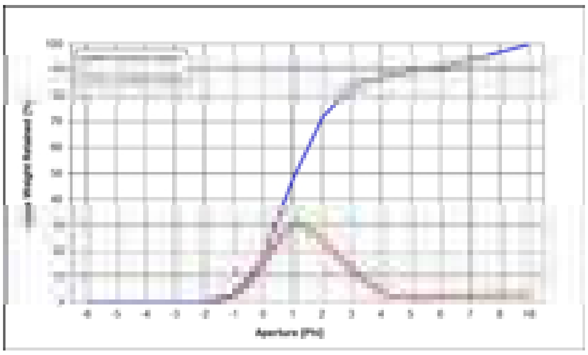
Sorting [µm] †	1.81	Poorly sorted
Skewness [µm] †	0.43	Very fine skewed
Kurtosis [µm] †	2.09	Very leptokurtic
Mean [µm]* †	403.1	Medium sand
Mean [phi]* †	1.31	
Median [µm]* †	472.7	Medium sand
Median [phi]* †	1.08	
Gravel [%]*	1.0	Slightly gravelly muddy sand
Sand [%]*	88.4	
Mud [%]*	10.7	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_064

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.2	0.2
2000.0	-1	3.0	3.1
1000.0	0	15.0	18.1
500.0	1	29.6	47.7
250.0	2	23.6	71.3
125.0	3	12.5	83.8
62.5	4	3.9	87.7
31.2	5	1.5	89.2
15.6	6	1.9	91.2
7.8	7	2.7	93.9
3.9	8	3.1	97.0
< 3.9	> 8	3.0	100
Total		100	100

Particle Size Distribution



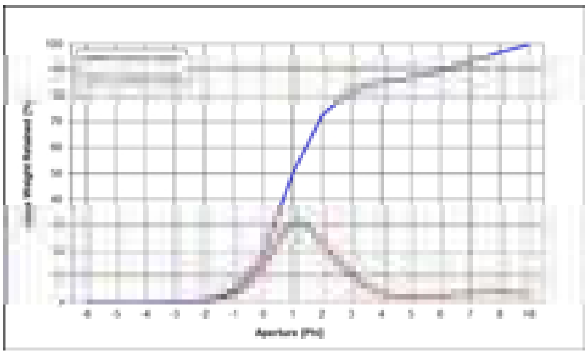
Sorting [µm] †	2.05	Very poorly sorted
Skewness [µm] †	0.37	Very fine skewed
Kurtosis [µm] †	1.64	Very leptokurtic
Mean [µm]* †	396.5	Medium sand
Mean [phi]* †	1.33	
Median [µm]* †	467.8	Medium sand
Median [phi]* †	1.10	
Gravel [%]*	3.1	Slightly gravelly muddy sand
Sand [%]*	84.6	
Mud [%]*	12.3	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_065

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.3	0.3
4000.0	-2	0.4	0.7
2000.0	-1	3.8	4.5
1000.0	0	14.6	19.0
500.0	1	31.0	50.1
250.0	2	22.3	72.4
125.0	3	9.9	82.3
62.5	4	3.1	85.4
31.2	5	1.8	87.2
15.6	6	2.5	89.7
7.8	7	3.5	93.3
3.9	8	3.6	96.8
< 3.9	> 8	3.2	100
Total		100	100

Particle Size Distribution



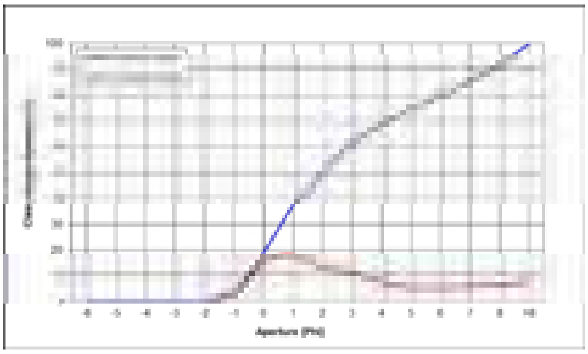
Sorting [µm] †	2.22	Very poorly sorted
Skewness [µm] †	0.45	Very fine skewed
Kurtosis [µm] †	1.67	Very leptokurtic
Mean [µm]* †	366.2	Medium sand
Mean [phi]* †	1.45	
Median [µm]* †	500.6	Coarse Sand
Median [phi]* †	1.00	
Gravel [%]*	4.5	Slightly gravelly muddy sand
Sand [%]*	80.9	
Mud [%]*	14.6	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_066

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.0	0.0
2000.0	-1	3.3	3.4
1000.0	0	15.6	19.0
500.0	1	18.2	37.2
250.0	2	13.3	50.5
125.0	3	11.2	61.7
62.5	4	7.5	69.2
31.2	5	5.4	74.5
15.6	6	5.4	79.9
7.8	7	5.7	85.6
3.9	8	6.2	91.9
< 3.9	> 8	8.1	100
Total		100	100

Particle Size Distribution



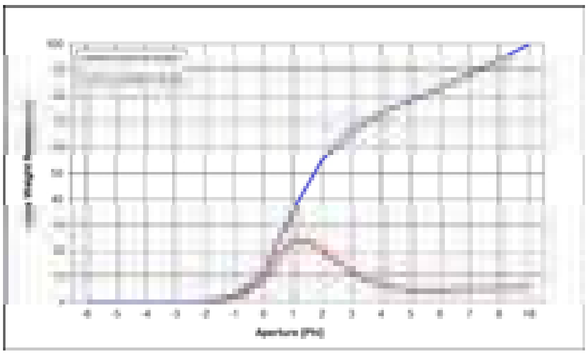
Sorting [µm] †	3.38	Very poorly sorted
Skewness [µm] †	0.43	Very FINE skewed
Kurtosis [µm] †	0.94	Mesokurtic
Mean [µm]* †	140.8	Fine Sand
Mean [phi]* †	2.83	
Median [µm]* †	256.8	Medium sand
Median [phi]* †	1.96	
Gravel [%]*	3.4	Slightly gravelly muddy sand
Sand [%]*	65.8	
Mud [%]*	30.8	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_067

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.1	0.1
2000.0	-1	2.2	2.4
1000.0	0	9.3	11.7
500.0	1	23.8	35.5
250.0	2	19.6	55.1
125.0	3	11.6	66.6
62.5	4	6.6	73.3
31.2	5	5.1	78.3
15.6	6	4.9	83.2
7.8	7	5.4	88.6
3.9	8	5.4	94.0
< 3.9	> 8	6.0	100
Total		100	100

Particle Size Distribution



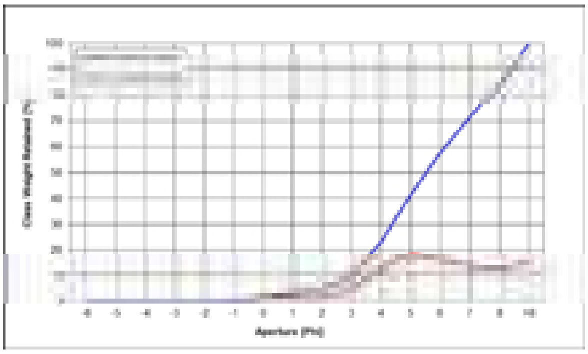
Sorting [µm] †	2.95	Very poorly sorted
Skewness [µm] †	0.48	Very fine skewed
Kurtosis [µm] †	1.04	Mesokurtic
Mean [µm]* †	154.7	Fine sand
Mean [phi]* †	2.69	
Median [µm]* †	299.1	Medium sand
Median [phi]* †	1.74	
Gravel [%]*	2.4	Slightly gravelly muddy sand
Sand [%]*	70.9	
Mud [%]*	26.7	

Notes Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_068

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.0	0.0
2000.0	-1	0.2	0.2
1000.0	0	1.4	1.6
500.0	1	1.6	3.2
250.0	2	1.7	4.9
125.0	3	5.3	10.2
62.5	4	13.1	23.3
31.2	5	18.2	41.6
15.6	6	16.1	57.7
7.8	7	13.7	71.4
3.9	8	12.8	84.2
< 3.9	> 8	15.8	100
Total		100	100

Particle Size Distribution



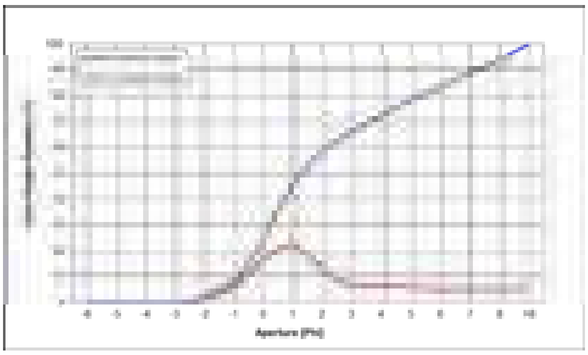
Sorting [µm] †	2.59	Very poorly sorted
Skewness [µm] †	0.18	Fine skewed
Kurtosis [µm] †	1.23	Leptokurtic
Mean [µm]* †	19.9	Medium silt
Mean [phi]* †	5.65	
Median [µm]* †	21.8	Medium silt
Median [phi]* †	5.52	
Gravel [%]*	0.2	Slightly gravelly sandy mud
Sand [%]*	23.2	
Mud [%]*	76.7	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_069

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	1.6	1.6
2000.0	-1	6.7	8.3
1000.0	0	17.0	25.3
500.0	1	21.5	46.8
250.0	2	12.6	59.4
125.0	3	6.8	66.2
62.5	4	6.4	72.6
31.2	5	5.7	78.3
15.6	6	5.3	83.5
7.8	7	5.4	88.9
3.9	8	5.2	94.1
< 3.9	> 8	5.9	100
Total		100	100

Particle Size Distribution



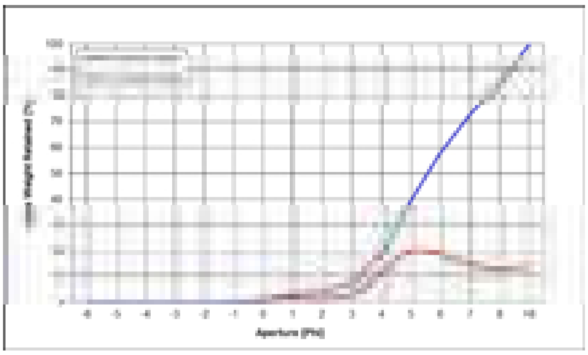
Sorting [µm] †	3.22	Very poorly sorted
Skewness [µm] †	0.46	Very fine skewed
Kurtosis [µm] †	0.95	Mesokurtic
Mean [µm]* †	208.0	Fine sand
Mean [phi]* †	2.27	
Median [µm]* †	419.4	Medium sand
Median [phi]* †	1.25	
Gravel [%]*	8.3	Gravelly muddy sand
Sand [%]*	64.3	
Mud [%]*	27.4	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_070

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.1	0.1
2000.0	-1	0.1	0.2
1000.0	0	0.9	1.0
500.0	1	1.7	2.7
250.0	2	1.3	4.0
125.0	3	3.3	7.4
62.5	4	12.0	19.4
31.2	5	20.1	39.5
15.6	6	18.4	57.9
7.8	7	14.9	72.8
3.9	8	12.8	85.5
< 3.9	> 8	14.5	100
Total		100	100

Particle Size Distribution



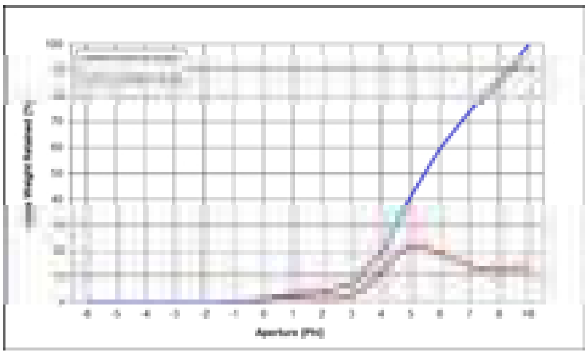
Sorting [µm] †	2.43	Very poorly sorted
Skewness [µm] †	0.20	Fine skewed
Kurtosis [µm] †	1.30	Leptokurtic
Mean [µm]* †	18.9	Medium silt
Mean [phi]* †	5.72	
Median [µm]* †	21.0	Medium silt
Median [phi]* †	5.57	
Gravel [%]*	0.2	Slightly gravelly sandy mud
Sand [%]*	19.2	
Mud [%]*	80.6	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_071

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.0	0.0
2000.0	-1	0.1	0.1
1000.0	0	1.0	1.1
500.0	1	1.9	3.0
250.0	2	1.3	4.3
125.0	3	2.9	7.1
62.5	4	12.6	19.7
31.2	5	21.7	41.4
15.6	6	18.6	59.9
7.8	7	14.1	74.0
3.9	8	12.0	86.0
< 3.9	> 8	14.0	100
Total		100	100

Particle Size Distribution



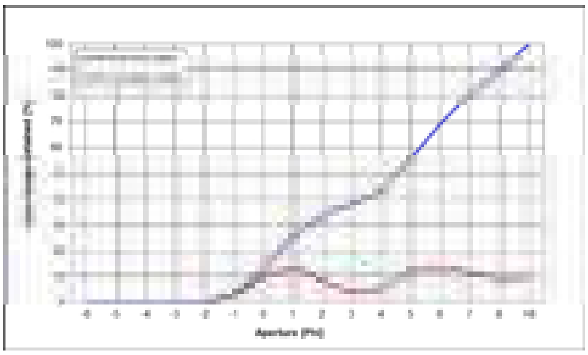
Sorting [µm] †	2.42	Very poorly sorted
Skewness [µm] †	0.22	Fine skewed
Kurtosis [µm] †	1.32	Leptokurtic
Mean [µm]* †	19.7	Medium silt
Mean [phi]* †	5.67	
Median [µm]* †	22.6	Medium silt
Median [phi]* †	5.46	
Gravel [%]*	0.1	Slightly gravelly sandy mud
Sand [%]*	19.6	
Mud [%]*	80.3	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_072

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.1	0.1
2000.0	-1	3.2	3.3
1000.0	0	9.8	13.1
500.0	1	12.7	25.8
250.0	2	8.4	34.2
125.0	3	3.9	38.1
62.5	4	5.7	43.8
31.2	5	12.0	55.7
15.6	6	13.4	69.2
7.8	7	11.5	80.7
3.9	8	9.3	90.0
< 3.9	> 8	10.0	100
Total		100	100

Particle Size Distribution



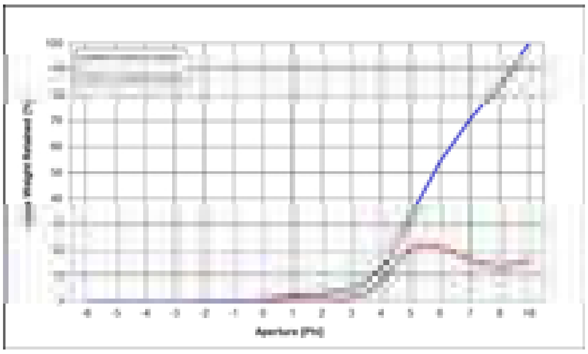
Sorting [µm] †	3.52	Very poorly sorted
Skewness [µm] †	-0.07	Symmetrical
Kurtosis [µm] †	0.84	Platykurtic
Mean [µm]* †	61.0	Coarse silt
Mean [phi]* †	4.03	
Median [µm]* †	43.6	Coarse silt
Median [phi]* †	4.52	
Gravel [%]*	3.3	Slightly gravelly sandy mud
Sand [%]*	40.5	
Mud [%]*	56.2	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_073

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.1	0.1
2000.0	-1	0.1	0.2
1000.0	0	0.7	0.9
500.0	1	1.1	2.0
250.0	2	1.3	3.3
125.0	3	1.5	4.8
62.5	4	8.5	13.3
31.2	5	20.2	33.5
15.6	6	20.7	54.2
7.8	7	16.2	70.4
3.9	8	13.7	84.1
< 3.9	> 8	15.9	100
Total		100	100

Particle Size Distribution



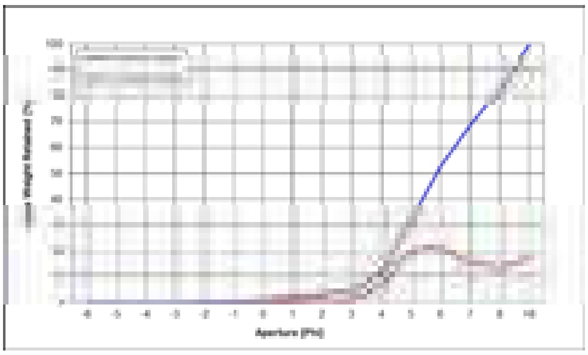
Sorting [µm] †	2.27	Very poorly sorted
Skewness [µm] †	0.25	Fine skewed
Kurtosis [µm] †	1.28	Leptokurtic
Mean [µm]* †	15.9	Medium silt
Mean [phi]* †	5.97	
Median [µm]* †	18.0	Medium silt
Median [phi]* †	5.80	
Gravel [%]*	0.2	Slightly gravelly sandy mud
Sand [%]*	13.1	
Mud [%]*	86.7	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_074

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.1	0.1
2000.0	-1	0.2	0.3
1000.0	0	0.8	1.2
500.0	1	0.7	1.9
250.0	2	1.4	3.3
125.0	3	1.4	4.7
62.5	4	7.7	12.4
31.2	5	19.5	31.9
15.6	6	20.6	52.5
7.8	7	15.9	68.4
3.9	8	14.0	82.4
< 3.9	> 8	17.6	100
Total		100	100

Particle Size Distribution



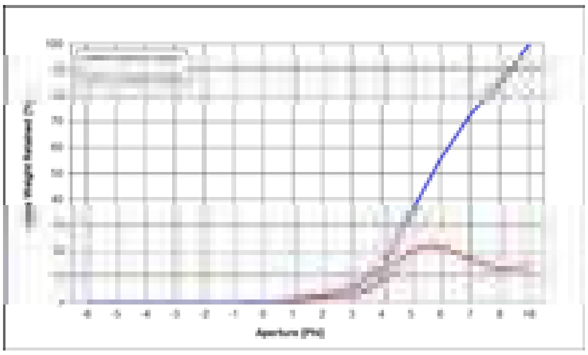
Sorting [µm] †	2.39	Very poorly sorted
Skewness [µm] †	0.28	Fine skewed
Kurtosis [µm] †	1.27	Leptokurtic
Mean [µm]* †	13.8	Fine silt
Mean [phi]* †	6.18	
Median [µm]* †	17.0	Medium silt
Median [phi]* †	5.88	
Gravel [%]*	0.3	Slightly gravelly sandy mud
Sand [%]*	12.0	
Mud [%]*	87.6	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_075

Aperture [μm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.0	0.0
2000.0	-1	0.0	0.0
1000.0	0	0.5	0.5
500.0	1	0.6	1.1
250.0	2	1.7	2.8
125.0	3	2.9	5.7
62.5	4	9.0	14.7
31.2	5	19.8	34.6
15.6	6	21.2	55.8
7.8	7	16.8	72.6
3.9	8	13.1	85.6
< 3.9	> 8	14.4	100
Total		100	100

Particle Size Distribution



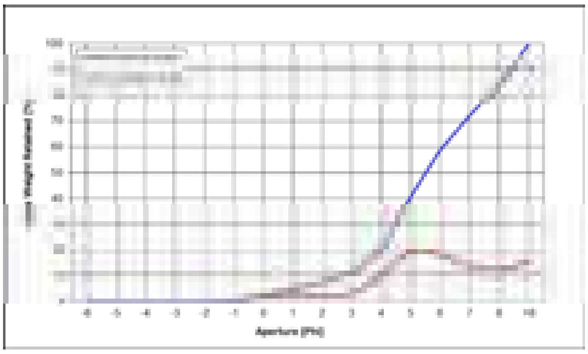
Sorting [μm] †	2.27	Very poorly sorted
Skewness [μm] †	0.22	Fine skewed
Kurtosis [μm] †	1.34	Leptokurtic
Mean [μm]* †	16.9	Medium silt
Mean [phi]* †	5.89	
Median [μm]* †	18.9	Medium silt
Median [phi]* †	5.73	
Gravel [%]*	0.0	Slightly gravelly sandy mud
Sand [%]*	14.7	
Mud [%]*	85.3	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_076

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.0	0.0
2000.0	-1	0.3	0.3
1000.0	0	2.1	2.4
500.0	1	2.6	5.0
250.0	2	2.5	7.5
125.0	3	3.4	10.9
62.5	4	10.3	21.2
31.2	5	19.7	40.9
15.6	6	18.0	58.9
7.8	7	13.4	72.2
3.9	8	12.2	84.4
< 3.9	> 8	15.6	100
Total		100	100

Particle Size Distribution



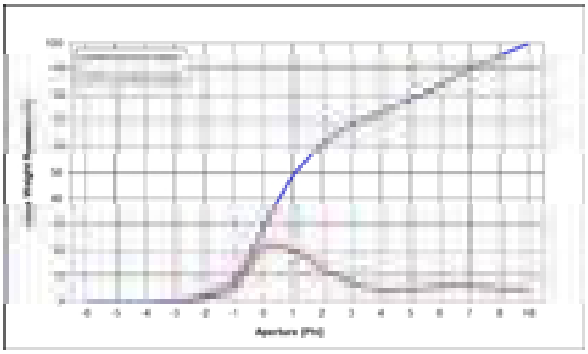
Sorting [µm] †	2.72	Very poorly sorted
Skewness [µm] †	0.12	Fine skewed
Kurtosis [µm] †	1.43	Leptokurtic
Mean [µm]* †	19.8	Medium silt
Mean [phi]* †	5.66	
Median [µm]* †	22.0	Medium silt
Median [phi]* †	5.51	
Gravel [%]*	0.3	Slightly gravelly sandy mud
Sand [%]*	20.9	
Mud [%]*	78.8	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_078

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.3	0.3
4000.0	-2	1.5	1.9
2000.0	-1	5.9	7.8
1000.0	0	21.5	29.2
500.0	1	19.4	48.6
250.0	2	12.9	61.5
125.0	3	7.3	68.8
62.5	4	4.6	73.4
31.2	5	5.0	78.4
15.6	6	5.8	84.2
7.8	7	6.1	90.3
3.9	8	5.0	95.3
< 3.9	> 8	4.7	100
Total		100	100

Particle Size Distribution



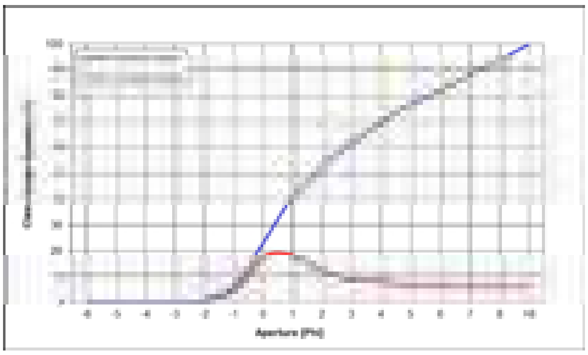
Sorting [µm] †	3.07	Very poorly sorted
Skewness [µm] †	0.46	Very Fine skewed
Kurtosis [µm] †	0.85	Platykurtic
Mean [µm]* †	224.8	Fine sand
Mean [phi]* †	2.15	
Median [µm]* †	464.5	Medium sand
Median [phi]* †	1.11	
Gravel [%]*	7.8	Gravelly muddy sand
Sand [%]*	65.6	
Mud [%]*	26.6	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_079

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.5	0.5
2000.0	-1	5.1	5.6
1000.0	0	17.7	23.3
500.0	1	18.3	41.6
250.0	2	11.5	53.2
125.0	3	9.0	62.2
62.5	4	8.1	70.3
31.2	5	6.5	76.8
15.6	6	5.7	82.5
7.8	7	5.7	88.2
3.9	8	5.6	93.8
< 3.9	> 8	6.2	100
Total		100	100

Particle Size Distribution



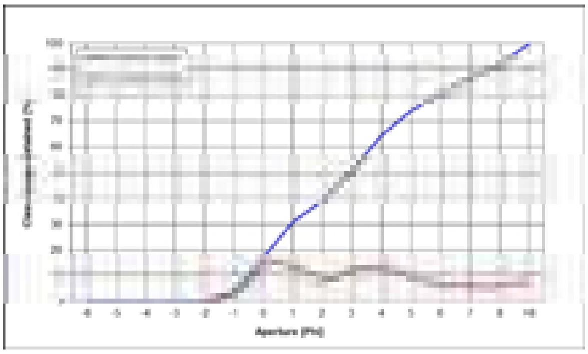
Sorting [µm] †	3.20	Very poorly sorted
Skewness [µm] †	0.40	Very Fine skewed
Kurtosis [µm] †	0.89	Platykurtic
Mean [µm]* †	173.6	Fine sand
Mean [phi]* †	2.53	
Median [µm]* †	302.2	Medium sand
Median [phi]* †	1.73	
Gravel [%]*	5.6	Gravelly muddy sand
Sand [%]*	64.7	
Mud [%]*	29.7	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_080

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.1	0.1
2000.0	-1	3.3	3.4
1000.0	0	13.9	17.4
500.0	1	13.6	30.9
250.0	2	8.0	39.0
125.0	3	12.0	50.9
62.5	4	13.5	64.4
31.2	5	9.4	73.8
15.6	6	6.7	80.5
7.8	7	5.7	86.2
3.9	8	5.9	92.1
< 3.9	> 8	7.9	100
Total		100	100

Particle Size Distribution



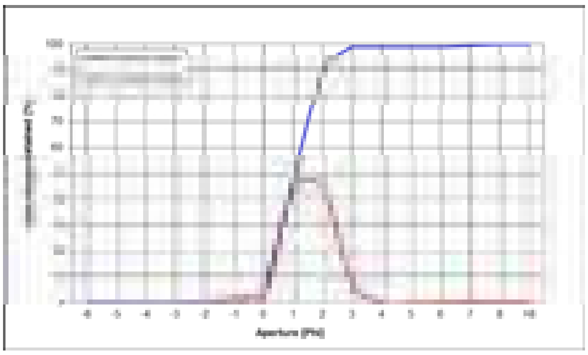
Sorting [µm] †	3.32	Very poorly sorted
Skewness [µm] †	0.20	Fine skewed
Kurtosis [µm] †	0.96	Mesokurtic
Mean [µm]* †	113.0	Very fine sand
Mean [phi]* †	3.15	
Median [µm]* †	131.9	Fine sand
Median [phi]* †	2.92	
Gravel [%]*	3.4	Slightly gravelly muddy sand
Sand [%]*	61.0	
Mud [%]*	35.6	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_081

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.3	0.3
2000.0	-1	1.0	1.3
1000.0	0	2.3	3.6
500.0	1	43.9	47.5
250.0	2	44.6	92.1
125.0	3	6.9	99.0
62.5	4	0.0	99.0
31.2	5	0.0	99.0
15.6	6	0.1	99.0
7.8	7	0.5	99.5
3.9	8	0.4	99.9
< 3.9	> 8	0.1	100
Total		100	100

Particle Size Distribution



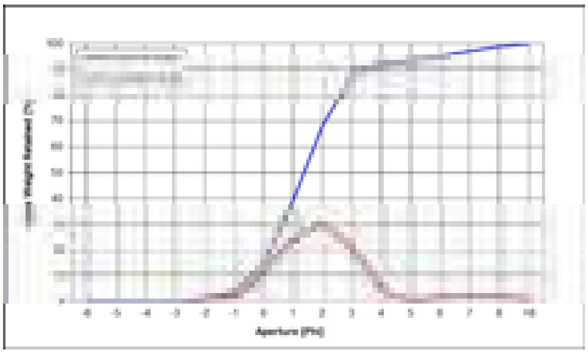
Sorting [µm] †	0.75	Moderately sorted
Skewness [µm] †	0.07	Symmetrical
Kurtosis [µm] †	0.87	Platykurtic
Mean [µm]* †	482.1	Medium sand
Mean [phi]* †	1.05	
Median [µm]* †	480.9	Medium sand
Median [phi]* †	1.06	
Gravel [%]*	1.3	Slightly gravelly sand
Sand [%]*	97.7	
Mud [%]*	1.0	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_082

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	1.1	1.1
2000.0	-1	2.3	3.4
1000.0	0	11.2	14.6
500.0	1	24.0	38.6
250.0	2	29.2	67.7
125.0	3	20.1	87.8
62.5	4	4.6	92.4
31.2	5	1.0	93.4
15.6	6	1.7	95.1
7.8	7	2.0	97.1
3.9	8	1.8	98.9
< 3.9	> 8	1.1	100
Total		100	100

Particle Size Distribution



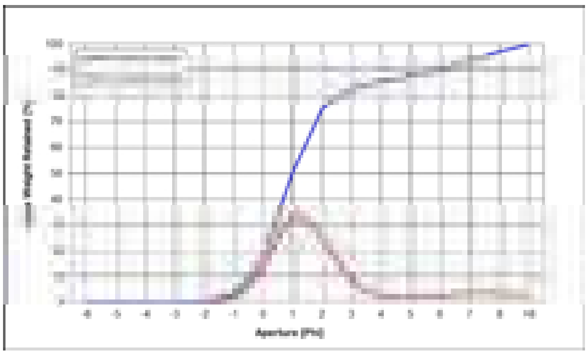
Sorting [µm] †	1.72	Poorly sorted
Skewness [µm] †	0.18	Fine skewed
Kurtosis [µm] †	1.44	Leptokurtic
Mean [µm]* †	373.8	Medium sand
Mean [phi]* †	1.42	
Median [µm]* †	381.1	Medium sand
Median [phi]* †	1.39	
Gravel [%]*	3.4	Slightly gravelly sand
Sand [%]*	89.0	
Mud [%]*	7.6	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_083

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.4	0.4
2000.0	-1	2.5	2.9
1000.0	0	14.5	17.3
500.0	1	33.2	50.5
250.0	2	24.6	75.1
125.0	3	8.3	83.4
62.5	4	2.3	85.7
31.2	5	2.0	87.7
15.6	6	2.6	90.3
7.8	7	3.6	93.8
3.9	8	3.3	97.2
< 3.9	> 8	2.8	100
Total		100	100

Particle Size Distribution



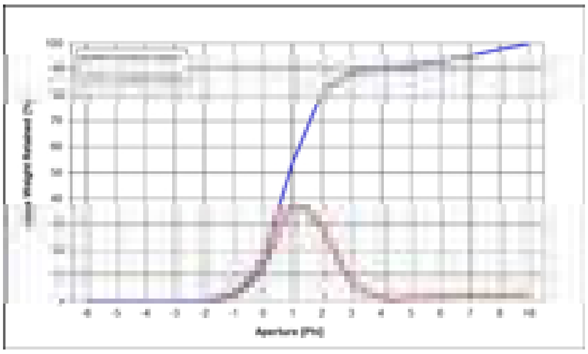
Sorting [µm] †	2.08	Very poorly sorted
Skewness [µm] †	0.45	Very fine skewed
Kurtosis [µm] †	1.90	Very leptokurtic
Mean [µm]* †	384.1	Medium sand
Mean [phi]* †	1.38	
Median [µm]* †	505.3	Coarse sand
Median [phi]* †	0.98	
Gravel [%]*	2.9	Slightly gravelly muddy sand
Sand [%]*	82.9	
Mud [%]*	14.3	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_084

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.3	0.3
2000.0	-1	2.6	2.9
1000.0	0	14.2	17.1
500.0	1	36.9	54.0
250.0	2	27.5	81.5
125.0	3	7.3	88.8
62.5	4	1.2	90.0
31.2	5	1.3	91.3
15.6	6	1.6	92.9
7.8	7	2.4	95.3
3.9	8	2.5	97.8
< 3.9	> 8	2.2	100
Total		100	100

Particle Size Distribution



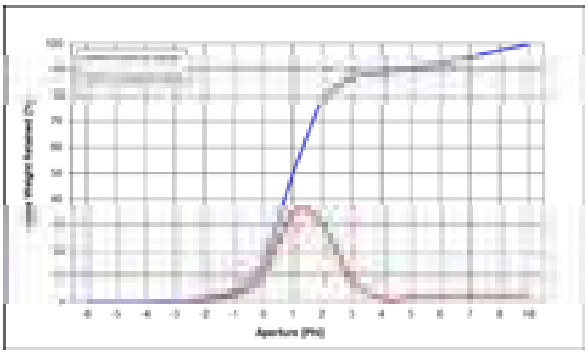
Sorting [µm] †	1.77	Poorly sorted
Skewness [µm] †	0.37	Very fine skewed
Kurtosis [µm] †	2.04	Very leptokurtic
Mean [µm]* †	482.0	Medium sand
Mean [phi]* †	1.05	
Median [µm]* †	539.2	Coarse sand
Median [phi]* †	0.89	
Gravel [%]*	2.9	Slightly gravelly muddy sand
Sand [%]*	87.1	
Mud [%]*	10.0	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_086

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.4	0.4
4000.0	-2	0.7	1.1
2000.0	-1	2.8	3.9
1000.0	0	10.8	14.7
500.0	1	35.2	49.9
250.0	2	29.6	79.4
125.0	3	8.0	87.4
62.5	4	1.1	88.6
31.2	5	1.6	90.2
15.6	6	1.9	92.1
7.8	7	2.8	94.9
3.9	8	2.8	97.7
< 3.9	> 8	2.3	100
Total		100	100

Particle Size Distribution



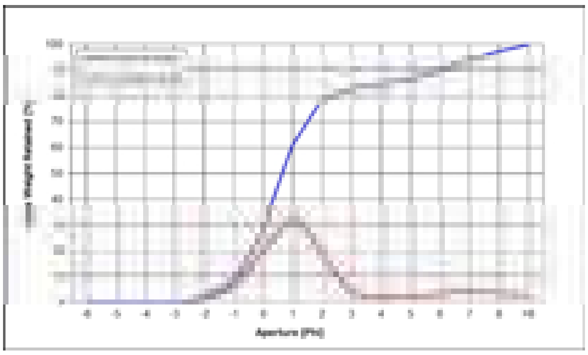
Sorting [µm] †	1.84	Poorly sorted
Skewness [µm] †	0.38	Very fine skewed
Kurtosis [µm] †	2.09	Very leptokurtic
Mean [µm]* †	433.8	Medium sand
Mean [phi]* †	1.21	
Median [µm]* †	498.3	Medium sand
Median [phi]* †	1.00	
Gravel [%]*	3.9	Slightly gravelly muddy sand
Sand [%]*	84.7	
Mud [%]*	11.4	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_087

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	1.6	1.6
2000.0	-1	7.0	8.7
1000.0	0	20.5	29.2
500.0	1	31.7	60.9
250.0	2	17.8	78.7
125.0	3	4.1	82.8
62.5	4	1.6	84.5
31.2	5	2.3	86.7
15.6	6	3.2	90.0
7.8	7	4.1	94.0
3.9	8	3.3	97.4
< 3.9	> 8	2.6	100
Total		100	100

Particle Size Distribution



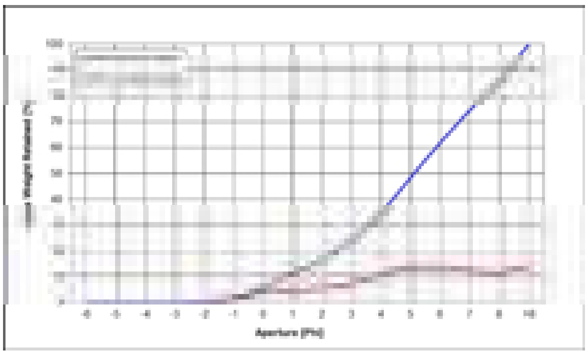
Sorting [µm] †	2.42	Very poorly sorted
Skewness [µm] †	0.45	Very fine skewed
Kurtosis [µm] †	1.81	Very leptokurtic
Mean [µm]* †	422.2	Medium sand
Mean [phi]* †	1.24	
Median [µm]* †	634.3	Coarse sand
Median [phi]* †	0.66	
Gravel [%]*	8.7	Gravelly muddy sand
Sand [%]*	75.8	
Mud [%]*	15.5	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_088

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.3	0.3
2000.0	-1	1.4	1.7
1000.0	0	4.4	6.0
500.0	1	5.0	11.0
250.0	2	5.5	16.5
125.0	3	7.7	24.1
62.5	4	10.5	34.7
31.2	5	13.8	48.5
15.6	6	13.5	62.0
7.8	7	12.4	74.4
3.9	8	11.7	86.0
< 3.9	> 8	14.0	100.0
Total		100	100

Particle Size Distribution



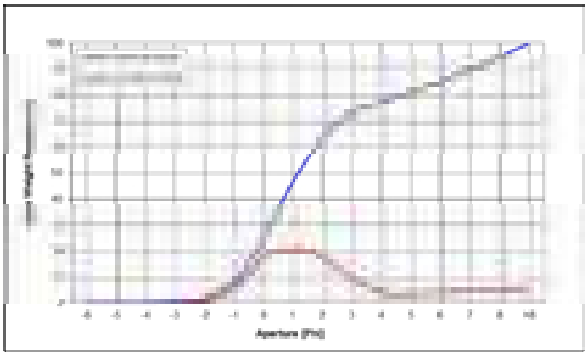
Sorting [µm] †	3.24	No Data
Skewness [µm] †	0.00	No Data
Kurtosis [µm] †	1.20	No Data
Mean [µm]* †	32.3	Coarse silt
Mean [phi]* †	4.95	
Median [µm]* †	28.9	Medium silt
Median [phi]* †	5.11	
Gravel [%]*	1.7	Slightly gravelly sandy mud
Sand [%]*	33.0	
Mud [%]*	65.3	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_089

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.8	0.8
4000.0	-2	0.8	1.6
2000.0	-1	6.2	7.8
1000.0	0	18.1	25.9
500.0	1	20.8	46.7
250.0	2	17.8	64.5
125.0	3	9.2	73.7
62.5	4	3.9	77.6
31.2	5	3.7	81.3
15.6	6	4.0	85.3
7.8	7	4.7	90.0
3.9	8	4.8	94.8
< 3.9	> 8	5.2	100
Total		100	100

Particle Size Distribution



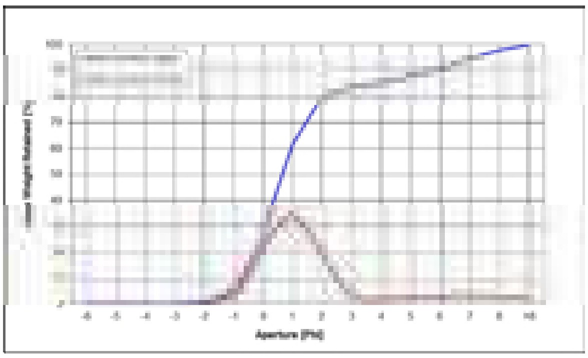
Sorting [µm] †	3.02	Very poorly sorted
Skewness [µm] †	0.45	Very Fine skewed
Kurtosis [µm] †	1.17	leptokurtic
Mean [µm]* †	232.2	Fine sand
Mean [phi]* †	2.11	
Median [µm]* †	439.5	Medium sand
Median [phi]* †	1.19	
Gravel [%]*	7.8	Gravelly muddy sand
Sand [%]*	69.8	
Mud [%]*	22.4	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_091

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.9	0.9
2000.0	-1	4.6	5.4
1000.0	0	22.1	27.6
500.0	1	34.3	61.9
250.0	2	18.1	80.0
125.0	3	3.4	83.4
62.5	4	2.0	85.4
31.2	5	2.5	87.9
15.6	6	3.1	91.0
7.8	7	3.8	94.8
3.9	8	3.0	97.8
< 3.9	> 8	2.2	100
Total		100	100

Particle Size Distribution



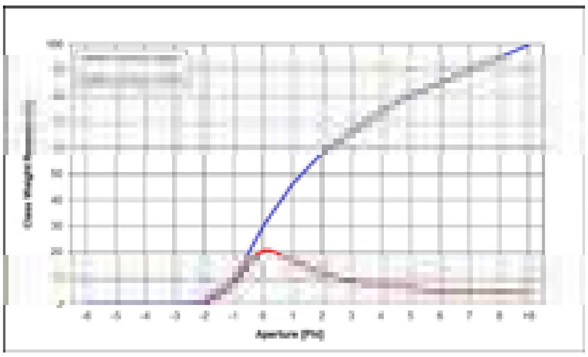
Sorting [µm] †	2.19	Very poorly sorted
Skewness [µm] †	0.48	Very fine skewed
Kurtosis [µm] †	1.82	Very leptokurtic
Mean [µm]* †	452.7	Medium sand
Mean [phi]* †	1.14	
Median [µm]* †	635.7	Coarse sand
Median [phi]* †	0.65	
Gravel [%]*	5.4	Gravelly muddy sand
Sand [%]*	80.0	
Mud [%]*	14.6	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_092

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.5	0.5
2000.0	-1	8.9	9.4
1000.0	0	20.6	30.0
500.0	1	16.4	46.3
250.0	2	11.8	58.1
125.0	3	8.6	66.7
62.5	4	7.8	74.5
31.2	5	6.2	80.7
15.6	6	4.9	85.5
7.8	7	4.9	90.4
3.9	8	4.6	95.0
< 3.9	> 8	5.0	100
Total		100	100

Particle Size Distribution



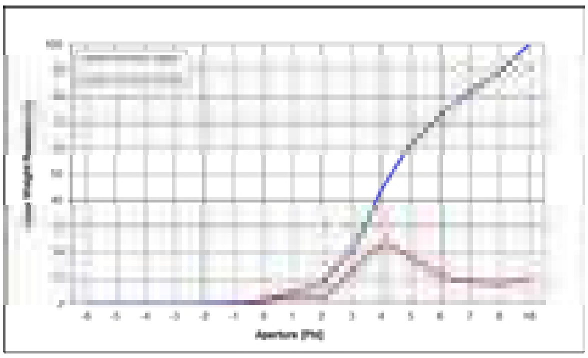
Sorting [µm] †	3.03	Very poorly sorted
Skewness [µm] †	0.39	Very fine skewed
Kurtosis [µm] †	0.90	Platykurtic
Mean [µm]* †	232.4	Fine sand
Mean [phi]* †	2.11	
Median [µm]* †	402.7	Medium sand
Median [phi]* †	1.31	
Gravel [%]*	9.4	gravelly muddy sand
Sand [%]*	65.1	
Mud [%]*	25.5	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_093

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.1	0.1
2000.0	-1	0.2	0.3
1000.0	0	1.5	1.8
500.0	1	3.0	4.8
250.0	2	3.2	8.0
125.0	3	13.1	21.2
62.5	4	23.0	44.1
31.2	5	17.9	62.1
15.6	6	11.0	73.0
7.8	7	8.8	81.9
3.9	8	8.1	90.0
< 3.9	> 8	10.0	100
Total		100	100

Particle Size Distribution



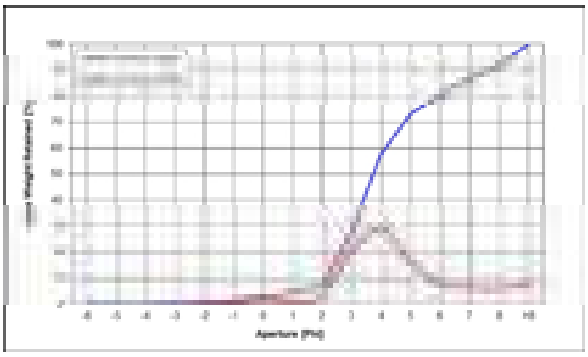
Sorting [µm] †	2.62	Very poorly sorted
Skewness [µm] †	0.29	Fine skewed
Kurtosis [µm] †	1.29	Leptokurtic
Mean [µm]* †	37.6	Coarse silt
Mean [phi]* †	4.73	
Median [µm]* †	49.8	Coarse silt
Median [phi]* †	4.33	
Gravel [%]*	0.3	Slightly gravelly sandy mud
Sand [%]*	43.8	
Mud [%]*	55.9	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_094

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.4	0.4
4000.0	-2	0.2	0.5
2000.0	-1	0.7	1.3
1000.0	0	1.6	2.9
500.0	1	1.2	4.1
250.0	2	3.3	7.4
125.0	3	20.9	28.3
62.5	4	29.2	57.5
31.2	5	15.5	73.0
15.6	6	7.4	80.4
7.8	7	6.1	86.6
3.9	8	5.9	92.5
< 3.9	> 8	7.5	100
Total		100	100

Particle Size Distribution



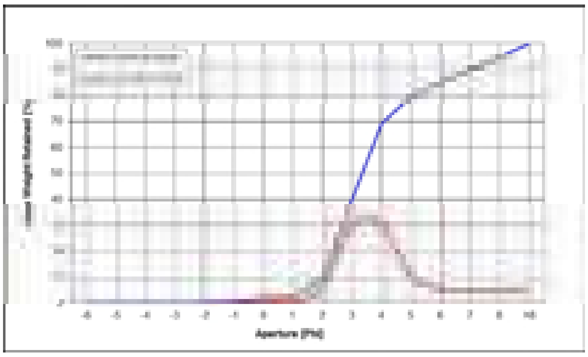
Sorting [µm] †	2.33	Very poorly sorted
Skewness [µm] †	0.39	Very fine skewed
Kurtosis [µm] †	1.43	Leptokurtic
Mean [µm]* †	52.8	Coarse silt
Mean [phi]* †	4.24	
Median [µm]* †	74.7	Very fine sand
Median [phi]* †	3.74	
Gravel [%]*	1.3	Slightly gravelly muddy sand
Sand [%]*	56.3	
Mud [%]*	42.5	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_095

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.1	0.1
2000.0	-1	0.6	0.7
1000.0	0	1.4	2.1
500.0	1	0.9	3.0
250.0	2	6.4	9.4
125.0	3	30.0	39.5
62.5	4	29.5	69.0
31.2	5	10.5	79.5
15.6	6	5.5	85.0
7.8	7	5.1	90.1
3.9	8	4.7	94.8
< 3.9	> 8	5.2	100
Total		100	100

Particle Size Distribution



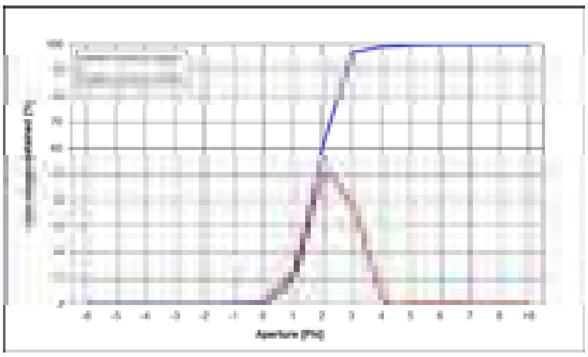
Sorting [µm] †	1.95	Poorly sorted
Skewness [µm] †	0.39	Very fine skewed
Kurtosis [µm] †	1.38	Leptokurtic
Mean [µm]* †	71.9	Very fine sand
Mean [phi]* †	3.80	
Median [µm]* †	97.7	Very fine sand
Median [phi]* †	3.36	
Gravel [%]*	0.7	Slightly gravelly muddy sand
Sand [%]*	68.3	
Mud [%]*	31.0	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_096

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.0	0.0
2000.0	-1	0.1	0.1
1000.0	0	0.6	0.6
500.0	1	11.0	11.7
250.0	2	48.5	60.2
125.0	3	36.6	96.8
62.5	4	2.5	99.3
31.2	5	0.3	99.6
15.6	6	0.4	100
7.8	7	0.0	100
3.9	8	0.0	100
< 3.9	> 8	0.0	100
Total		100	100

Particle Size Distribution



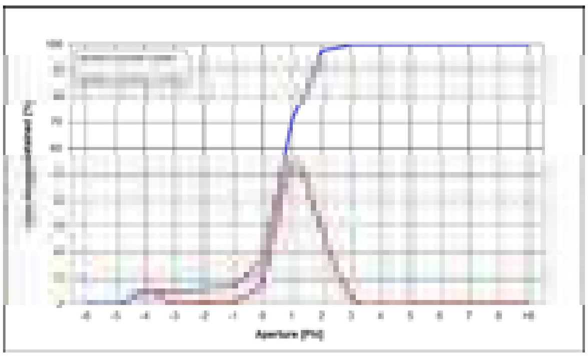
Sorting [µm] †	0.78	Moderately sorted
Skewness [µm] †	0.01	Symmetrical
Kurtosis [µm] †	0.93	Mesokurtic
Mean [µm]* †	278.7	Medium sand
Mean [phi]* †	1.84	
Median [µm]* †	289.1	Medium sand
Median [phi]* †	1.79	
Gravel [%]*	0.1	Slightly gravelly sand
Sand [%]*	99.2	
Mud [%]*	0.7	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_097

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	4.6	4.6
8000.0	-3	0.3	5.0
4000.0	-2	0.8	5.8
2000.0	-1	1.1	6.9
1000.0	0	10.8	17.6
500.0	1	53.3	71.0
250.0	2	26.6	97.6
125.0	3	2.4	100
62.5	4	0.0	100
31.2	5	0.0	100
15.6	6	0.0	100
7.8	7	0.0	100
3.9	8	0.0	100
< 3.9	> 8	0.0	100
Total		100	100

Particle Size Distribution



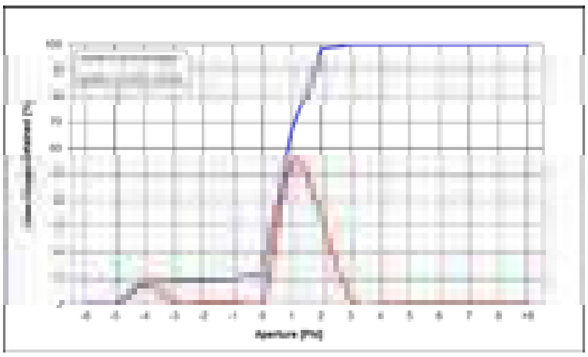
Sorting [µm] †	1.15	Poorly sorted
Skewness [µm] †	-0.20	Coarse skewed
Kurtosis [µm] †	1.98	Very leptokurtic
Mean [µm]* †	637.8	Coarse sand
Mean [phi]* †	0.65	
Median [µm]* †	656.6	Coarse sand
Median [phi]* †	0.61	
Gravel [%]*	6.9	Gravelly sand
Sand [%]*	93.1	
Mud [%]*	0.0	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_099

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	8.2	8.2
8000.0	-3	0.3	8.5
4000.0	-2	0.7	9.2
2000.0	-1	0.6	9.8
1000.0	0	2.0	11.9
500.0	1	54.8	66.7
250.0	2	31.7	98.4
125.0	3	1.6	100
62.5	4	0.0	100
31.2	5	0.0	100
15.6	6	0.0	100
7.8	7	0.0	100
3.9	8	0.0	100
< 3.9	> 8	0.0	100
Total		100	100

Particle Size Distribution



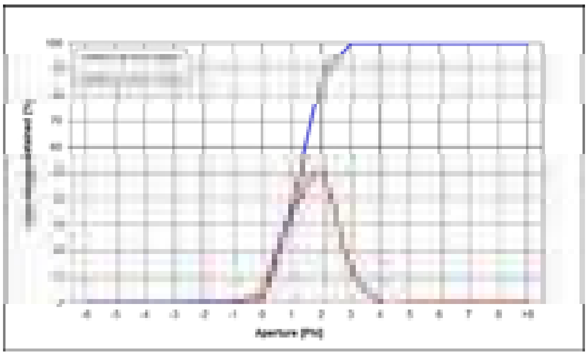
Sorting [µm] †	1.32	Poorly sorted
Skewness [µm] †	-0.23	Coarse skewed
Kurtosis [µm] †	2.51	Very leptokurtic
Mean [µm]* †	585.4	Coarse sand
Mean [phi]* †	0.77	
Median [µm]* †	617.5	Coarse sand
Median [phi]* †	0.70	
Gravel [%]*	9.8	Gravelly sand
Sand [%]*	90.2	
Mud [%]*	0.0	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

STATION R1_ENV_122

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.2	0.2
2000.0	-1	0.1	0.3
1000.0	0	2.7	3.0
500.0	1	35.0	38.1
250.0	2	49.1	87.1
125.0	3	12.9	100
62.5	4	0.0	100
31.2	5	0.0	100
15.6	6	0.0	100
7.8	7	0.0	100
3.9	8	0.0	100
< 3.9	> 8	0.0	100
Total		100	100

Particle Size Distribution



Sorting [µm] †	0.78	Moderately sorted
Skewness [µm] †	-0.02	Symmetrical
Kurtosis [µm] †	0.93	Mesokurtic
Mean [µm]* †	440.3	Medium sand
Mean [phi]* †	1.18	
Median [µm]* †	422.4	Medium sand
Median [phi]* †	1.24	
Gravel [%]*	0.3	Slightly gravelly sand
Sand [%]*	99.7	
Mud [%]*	0.0	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
† = Statistics based on Folk and Ward (1957)

H.2 Summary of Sediment Characteristics

Station	TOC [%]	Carbonate [%]	Fractional Composition			Fines		Folk Description (BGS modified)
			Gravel [%]	Sand [%]	Fines [%]	Silt [%]	Clay [%]	
R1_ENV_001	0.37	74.5	0.55	66.30	33.15	27.82	5.33	Slightly gravelly muddy sand
R1_ENV_002	0.37	73.7	1.20	58.69	40.11	33.05	7.06	Slightly gravelly muddy sand
R1_ENV_014	0.83	88.2	2.89	53.91	43.20	37.74	5.46	Slightly gravelly muddy sand
R1_ENV_024	-	89.6	-	-	-	-	-	-
R1_ENV_029	0.11	97.3	2.20	97.80	0.00	0.00	0.00	Slightly gravelly sand
R1_ENV_030	0.08	96.7	0.96	96.78	2.26	2.11	0.15	Slightly gravelly sand
R1_ENV_031	0.15	95.3	0.60	95.48	3.92	3.51	0.40	Slightly gravelly sand
R1_ENV_038	0.13	99.1	3.63	96.05	0.31	0.31	0.00	Slightly gravelly sand
R1_ENV_039	0.15	97.1	13.52	79.86	6.63	6.03	0.60	Gravelly sand
R1_ENV_040	0.13	95.8	3.75	85.37	10.88	9.91	0.97	Slightly gravelly muddy sand
R1_ENV_041	0.24	97.5	0.71	89.88	9.42	8.62	0.80	Slightly gravelly sand
R1_ENV_043	0.19	98.3	0.54	95.19	4.27	3.89	0.38	Slightly gravelly sand
R1_ENV_044	0.21	96.8	1.54	87.43	11.02	9.70	1.32	Slightly gravelly muddy sand
R1_ENV_045	0.20	97.1	0.55	86.41	13.04	11.00	2.04	Slightly gravelly muddy sand
R1_ENV_046	0.26	95.3	2.37	71.99	25.64	21.16	4.48	Slightly gravelly muddy sand
R1_ENV_048	0.29	96.6	1.87	81.32	16.81	13.89	2.92	Slightly gravelly muddy sand
R1_ENV_049	0.25	95.9	2.87	77.02	20.10	16.79	3.31	Slightly gravelly muddy sand
R1_ENV_050	0.20	97.4	1.63	88.04	10.33	9.00	1.33	Slightly gravelly muddy sand

Station	TOC [%]	Carbonate [%]	Fractional Composition			Fines		Folk Description (BGS modified)
			Gravel [%]	Sand [%]	Fines [%]	Silt [%]	Clay [%]	
R1_ENV_052	0.22	97.7	1.40	82.21	16.39	13.69	2.70	Slightly gravelly muddy sand
R1_ENV_053	0.25	96.3	2.76	76.77	20.47	16.29	4.18	Slightly gravelly muddy sand
R1_ENV_054	0.24	96.4	4.77	77.19	18.04	15.00	3.04	Slightly gravelly muddy sand
R1_ENV_055	0.36	94.3	2.08	69.82	28.10	23.40	4.70	Slightly gravelly muddy sand
R1_ENV_056	0.27	97.6	5.35	84.39	10.26	8.80	1.47	Gravelly muddy sand
R1_ENV_057	0.22	97.7	2.49	86.52	10.99	9.22	1.77	Slightly gravelly muddy sand
R1_ENV_058	0.24	96.2	2.19	80.68	17.13	13.93	3.20	Slightly gravelly muddy sand
R1_ENV_059	0.24	95.9	3.15	78.19	18.67	15.01	3.66	Slightly gravelly muddy sand
R1_ENV_060	0.28	93.9	1.18	75.68	23.14	19.09	4.06	Slightly gravelly muddy sand
R1_ENV_061	0.15	97.8	0.96	88.37	10.66	8.40	2.26	Slightly gravelly muddy sand
R1_ENV_064	0.21	96.3	3.13	84.58	12.29	9.83	2.46	Slightly gravelly muddy sand
R1_ENV_065	0.20	96.7	4.48	80.87	14.64	12.06	2.58	Slightly gravelly muddy sand
R1_ENV_066	0.33	93.9	3.36	65.81	30.83	24.22	6.60	Slightly gravelly muddy sand
R1_ENV_067	0.33	94.8	2.36	70.90	26.74	21.88	4.86	Slightly gravelly muddy sand
R1_ENV_068	0.76	89.3	0.18	23.16	76.66	63.84	12.81	Slightly gravelly sandy mud
R1_ENV_069	0.27	95.5	8.26	64.32	27.42	22.64	4.79	Gravelly muddy sand
R1_ENV_070	0.77	89.5	0.15	19.23	80.62	68.89	11.73	Slightly gravelly sandy mud
R1_ENV_071	0.76	91.1	0.14	19.55	80.31	68.98	11.33	Slightly gravelly sandy mud

Station	TOC [%]	Carbonate [%]	Fractional Composition			Fines		Folk Description (BGS modified)
			Gravel [%]	Sand [%]	Fines [%]	Silt [%]	Clay [%]	
R1_ENV_072	0.75	92.3	3.30	40.48	56.23	48.13	8.09	Slightly gravelly sandy mud
R1_ENV_073	0.70	90.0	0.22	13.08	86.69	73.82	12.87	Slightly gravelly sandy mud
R1_ENV_074	0.83	90.0	0.35	12.02	87.63	73.40	14.23	Slightly gravelly sandy mud
R1_ENV_075	0.73	89.7	0.02	14.72	85.25	73.59	11.66	Slightly gravelly sandy mud
R1_ENV_076	0.80	90.8	0.34	20.88	78.78	66.15	12.63	Slightly gravelly sandy mud
R1_ENV_078	0.26	96.4	7.75	65.62	26.62	22.82	3.81	Gravelly muddy sand
R1_ENV_079	0.29	95.9	5.59	64.68	29.73	24.73	5.00	Gravelly muddy sand
R1_ENV_080	0.37	94.9	3.45	60.97	35.58	29.20	6.39	Slightly gravelly muddy sand
R1_ENV_081	0.16	99.1	1.31	97.66	1.03	0.99	0.04	Slightly gravelly sand
R1_ENV_082	0.28	98.1	3.44	89.01	7.56	6.69	0.87	Slightly gravelly sand
R1_ENV_083	0.18	97.9	2.85	82.85	14.29	12.01	2.29	Slightly gravelly muddy sand
R1_ENV_084	0.22	98.3	2.91	87.13	9.96	8.21	1.75	Slightly gravelly muddy sand
R1_ENV_086	0.18	98.1	3.90	84.66	11.44	9.54	1.90	Slightly gravelly muddy sand
R1_ENV_087	0.22	97.6	8.66	75.80	15.54	13.39	2.14	Gravelly muddy sand
R1_ENV_088	0.74	91.0	1.66	33.00	65.35	54.01	11.33	Slightly gravelly sandy mud
R1_ENV_089	0.19	96.8	7.80	69.78	22.42	18.22	4.20	Gravelly muddy sand
R1_ENV_091	0.26	97.7	5.41	79.99	14.60	12.80	1.81	Gravelly muddy sand
R1_ENV_092	0.35	96.6	9.40	65.08	25.52	21.49	4.03	Gravelly muddy sand

Station	TOC [%]	Carbonate [%]	Fractional Composition			Fines		Folk Description (BGS modified)
			Gravel [%]	Sand [%]	Fines [%]	Silt [%]	Clay [%]	
R1_ENV_093	0.66	93.3	0.30	43.82	55.88	47.75	8.13	Slightly gravelly sandy mud
R1_ENV_094	0.58	95.4	1.26	56.28	42.46	36.37	6.09	Slightly gravelly muddy sand
R1_ENV_095	0.48	95.6	0.72	68.31	30.97	26.73	4.24	Slightly gravelly muddy sand
R1_ENV_096	0.25	99.1	0.05	99.24	0.71	0.71	0.00	Slightly gravelly sand
R1_ENV_097	0.17	99.0	6.85	93.15	0.00	0.00	0.00	Gravelly sand
R1_ENV_099	0.16	99.1	9.81	90.19	0.00	0.00	0.00	Gravelly sand
R1_ENV_122	0.15	98.9	0.34	99.66	0.00	0.00	0.00	Slightly gravelly sand
R1_ENV_124	-	98.7	-	-	-	-	-	-
R1_ENV_125	-	98.6	-	-	-	-	-	-
R1_ENV_126	-	98.5	-	-	-	-	-	-
Minimum	**0.08**	**73.7**	**0.02**	**12.02**	**0.00**	**0.00**	**0.00**	-
Maximum	**0.83**	**99.1**	**13.52**	**99.66**	**87.63**	**73.82**	**14.23**	
Mean	**0.34**	**95.0**	**2.96**	**70.73**	**26.31**	**22.17**	**4.14**	
Standard Deviation	**0.219**	**4.78**	**2.88**	**24.2**	**25.0**	**21.2**	**3.87**	
RSD [%]	**65**	**5**	**97**	**34**	**95**	**96**	**94**	
Zakum Oil Field (Blue Sea Environmental Consultants, 2011)*								
Mean	-	-	**12.61**	**82.0**	**5.39**	-	-	-

Station	TOC [%]	Carbonate [%]	Fractional Composition			Fines		Folk Description (BGS modified)
			Gravel [%]	Sand [%]	Fines [%]	Silt [%]	Clay [%]	
Upper Zakum Pipelines Replacement Project EBS (NPCC, 2019)†								
Mean	0.4692	31.615	-	-	-	-	-	-

Notes
Fines = Silt and clay content
Silt = +4.0 to +8.0 ø units or 3.9 µm to 62.5 µm
Clay = +8.0 to +10.0 ø units or 0.98 µm to 3.9 µm
TOC = Total organic carbon
RSD = Relative standard deviation
* = Mean taken from Environmental Baseline Survey of ADMA OPCO'S Existing Oil Facilities, Zakum Oil Field, (Blue Sea Consultants, 2011).
† = Mean taken from Environmental Baseline Survey Upper Zakum Replacement Project Phase 1 (NPCC, 2019)

H.3 Summary of Particle Size Distribution

Station	Modality	Median [µm]	Mean Particle Size		Sorting Coefficient		Skewness	
			[µm]	Wentworth Description‡	[µm]	Description	[µm]	Description
R1_ENV_001	Bimodal	98.9	78.4	Very fine sand	2.49	Very poorly sorted	0.28	Fine skewed
R1_ENV_002	Trimodal	83.7	62.5	Very fine sand	2.83	Very poorly sorted	0.29	Fine skewed
R1_ENV_014	Bimodal	87.9	82.3	Very fine sand	3.08	Very poorly sorted	0.11	Fine skewed
R1_ENV_029	Unimodal	422	444	Medium sand	0.88	Moderately sorted	-0.10	Symmetrical
R1_ENV_030	Unimodal	406	405	Medium sand	0.92	Moderately sorted	0.06	Symmetrical
R1_ENV_031	Unimodal	315	310	Medium sand	1.16	Poorly sorted	0.09	Symmetrical
R1_ENV_038	Unimodal	754	750	Coarse sand	0.93	Moderately sorted	0.04	Symmetrical
R1_ENV_039	Bimodal	500	488	Medium sand	2.06	Very poorly sorted	-0.01	Symmetrical
R1_ENV_040	Unimodal	377	310	Medium sand	1.90	Poorly sorted	0.31	Very fine skewed
R1_ENV_041	Unimodal	431	367	Medium sand	1.72	Poorly sorted	0.35	Very fine skewed
R1_ENV_043	Unimodal	423	412	Medium sand	1.01	Poorly sorted	0.20	Fine skewed
R1_ENV_044	Unimodal	411	327	Medium sand	1.87	Poorly sorted	0.40	Very fine skewed
R1_ENV_045	Unimodal	348	290	Medium sand	1.85	Poorly sorted	0.42	Very fine skewed
R1_ENV_046	Trimodal	277	171	Fine sand	2.75	Very poorly sorted	0.41	Very fine skewed
R1_ENV_048	Unimodal	395	266	Medium sand	2.25	Very poorly sorted	0.48	Very fine skewed
R1_ENV_049	Bimodal	355	220	Fine sand	2.52	Very poorly sorted	0.44	Very fine skewed
R1_ENV_050	Unimodal	444	375	Medium sand	1.79	Poorly sorted	0.38	Very fine skewed
R1_ENV_052	Unimodal	370	269	Medium sand	2.24	Very poorly sorted	0.42	Very fine skewed
R1_ENV_053	Bimodal	271	185	Fine sand	2.57	Very poorly sorted	0.38	Very fine skewed

Station	Modality	Median [µm]	Mean Particle Size		Sorting Coefficient		Skewness	
			[µm]	Wentworth Description‡	[µm]	Description	[µm]	Description
R1_ENV_054	Bimodal	440	281	Medium sand	2.54	Very poorly sorted	0.45	Very fine skewed
R1_ENV_055	Bimodal	269	157	Fine sand	3.02	Very poorly sorted	0.40	Very fine skewed
R1_ENV_056	Unimodal	538	456	Medium sand	1.96	Poorly sorted	0.36	Very fine skewed
R1_ENV_057	Unimodal	497	412	Medium sand	1.80	Poorly sorted	0.44	Very fine skewed
R1_ENV_058	Unimodal	444	277	Medium sand	2.39	Very poorly sorted	0.50	Very fine skewed
R1_ENV_059	Unimodal	391	235	Fine sand	2.50	Very poorly sorted	0.48	Very fine skewed
R1_ENV_060	Bimodal	313	175	Fine sand	2.71	Very poorly sorted	0.45	Very fine skewed
R1_ENV_061	Unimodal	473	403	Medium sand	1.81	Poorly sorted	0.43	Very fine skewed
R1_ENV_064	Unimodal	468	397	Medium sand	2.05	Very poorly sorted	0.37	Very fine skewed
R1_ENV_065	Unimodal	501	366	Medium sand	2.22	Very poorly sorted	0.45	Very fine skewed
R1_ENV_066	Bimodal	257	141	Fine sand	3.38	Very poorly sorted	0.43	Very fine skewed
R1_ENV_067	Bimodal	299	155	fine sand	2.95	Very poorly sorted	0.48	Very fine skewed
R1_ENV_068	Unimodal	21.8	19.9	Medium silt	2.59	Very poorly sorted	0.18	Fine skewed
R1_ENV_069	Bimodal	419	208	Fine sand	3.22	Very poorly sorted	0.46	Very fine skewed
R1_ENV_070	Unimodal	21.0	18.9	Medium silt	2.43	Very poorly sorted	0.20	Fine skewed
R1_ENV_071	Unimodal	22.6	19.7	Medium silt	2.42	Very poorly sorted	0.22	Fine skewed
R1_ENV_072	Bimodal	43.6	61.0	Coarse silt	3.52	Very poorly sorted	-0.07	Symmetrical
R1_ENV_073	Unimodal	18.0	15.9	Medium silt	2.27	Very poorly sorted	0.25	Fine skewed
R1_ENV_074	Unimodal	17.0	13.8	Fine silt	2.39	Very poorly sorted	0.28	Fine skewed

Station	Modality	Median [µm]	Mean Particle Size		Sorting Coefficient		Skewness	
			[µm]	Wentworth Description‡	[µm]	Description	[µm]	Description
R1_ENV_075	Unimodal	18.9	16.9	Medium silt	2.27	Very poorly sorted	0.22	Fine Skewed
R1_ENV_076	Unimodal	22.0	19.8	Medium silt	2.72	Very poorly sorted	0.12	Fine Skewed
R1_ENV_078	Bimodal	464	225	Fine sand	3.07	Very poorly sorted	0.46	Very fine skewed
R1_ENV_079	Bimodal	302	174	Fine sand	3.20	Very poorly sorted	0.40	Very fine skewed
R1_ENV_080	Trimodal	132	113	Fine sand	3.32	Very poorly sorted	0.20	Fine skewed
R1_ENV_081	Unimodal	481	482	Medium sand	0.75	Moderately sorted	0.07	Symmetrical
R1_ENV_082	Unimodal	381	374	Medium sand	1.72	Poorly sorted	0.18	Fine skewed
R1_ENV_083	Unimodal	505	384	Medium sand	2.08	Very poorly sorted	0.45	Very fine skewed
R1_ENV_084	Unimodal	539	482	Medium sand	1.77	Poorly sorted	0.37	Very fine skewed
R1_ENV_086	Unimodal	498	434	Medium sand	1.84	Poorly sorted	0.38	Very fine skewed
R1_ENV_087	Unimodal	634	422	Medium sand	2.42	Very poorly sorted	0.45	Very fine skewed
R1_ENV_088	Unimodal	28.9	32.3	Coarse silt	3.24	Very poorly sorted	0.00	Symmetrical
R1_ENV_089	Bimodal	439	232	Fine sand	3.02	Very poorly sorted	0.45	Very fine skewed
R1_ENV_091	Unimodal	636	453	Medium sand	2.19	Very poorly sorted	0.48	Very fine skewed
R1_ENV_092	Bimodal	403	232	Fine sand	3.03	Very poorly sorted	0.39	Very fine skewed
R1_ENV_093	Unimodal	49.8	37.6	Coarse silt	2.62	Very poorly sorted	0.29	Fine skewed
R1_ENV_094	Unimodal	74.7	52.8	Coarse silt	2.33	Very poorly sorted	0.39	Very fine skewed
R1_ENV_095	Unimodal	97.7	71.9	Very fine sand	1.95	Poorly sorted	0.39	Very fine skewed
R1_ENV_096	Unimodal	289	279	Medium sand	0.78	Moderately sorted	0.01	Symmetrical

Station	Modality	Median [µm]	Mean Particle Size		Sorting Coefficient		Skewness	
			[µm]	Wentworth Description‡	[µm]	Description	[µm]	Description
R1_ENV_097	Unimodal	657	638	Coarse sand	1.15	Poorly sorted	-0.20	Coarse skewed
R1_ENV_099	Bimodal	617	585	Coarse sand	1.32	Poorly sorted	-0.23	Coarse skewed
R1_ENV_122	Unimodal	422	440	Medium sand	0.78	Moderately sorted	-0.02	Symmetrical
Minimum	-	**17.0**	**13.8**	-	**0.75**	-	**-0.23**	-
Maximum		**754**	**750**		**3.52**		**0.50**	
Mean		**332**	**263**		**2.21**		**0.28**	
Standard Deviation		**196**	**177**		**0.728**		**0.189**	
RSD [%]		**59**	**67**		**33**		**67**	

Notes
RSD = Relative standard deviation
* = Folk and Ward method (Gradistat statistics)
† = Sorting and skewness descriptions based on geometric Folk and Ward (1957) graphical measures (Gradistat statistics)

I. Sediment Hydrocarbons

I.1 Sediment United States Environmental Protection Agency 16 Polycyclic Aromatic Hydrocarbons Concentrations

Sediment United States Environmental Protection Agency 16 Polycyclic Aromatic Hydrocarbon Concentrations																	
Station	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[a]pyrene	Indeno[1,2,3-cd]pyrene	Benzo[ghi]perylene	Dibenzo[a,h]anthracene	Total US EPA 16 PAHs*
R1_ENV_001	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.1	0.1	< 0.1	0.1	0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.7
R1_ENV_002	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.1	0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R1_ENV_011	0.2	< 0.1	0.2	0.2	0.7	0.1	0.1	0.8	0.1	0.2	0.2	< 0.1	0.2	< 0.1	< 0.1	< 0.1	< 3.5
R1_ENV_014	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	0.1	< 0.1	0.1	0.2	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 1.7
R1_ENV_024	0.2	< 0.1	0.1	0.1	0.1	< 0.1	0.1	0.1	0.1	0.1	0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 1.7
R1_ENV_029	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R1_ENV_030	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R1_ENV_031	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R1_ENV_038	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R1_ENV_039	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.2	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.7
R1_ENV_040	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R1_ENV_041	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R1_ENV_042	0.1	< 0.1	0.3	< 0.1	0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.8
R1_ENV_043	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 1.6

Sediment United States Environmental Protection Agency 16 Polycyclic Aromatic Hydrocarbon Concentrations																	
Station	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[a]pyrene	Indeno[1,2,3-cd]pyrene	Benzo[ghi]perylene	Dibenzo[a,h]anthracene	Total US EPA 16 PAHs*
R1_ENV_044	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R1_ENV_045	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	0.1	< 0.1	0.1	0.1	< 0.1	0.1	0.1	< 0.1	< 0.1	< 1.6
R1_ENV_046	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	0.1	< 0.1	0.1	0.2	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 1.7
R1_ENV_047	0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R1_ENV_048	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	0.1	< 0.1	0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R1_ENV_049	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	0.1	< 0.1	0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R1_ENV_050	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 1.6
R1_ENV_051	0.1	< 0.1	1.5	0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 3.0
R1_ENV_052	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	0.1	< 0.1	0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R1_ENV_053	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.2	0.1	0.1	0.2	0.3	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 2.0
R1_ENV_054	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.1	0.1	0.1	0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R1_ENV_055	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.2	0.2	0.1	0.1	0.3	0.1	0.1	< 0.1	< 0.1	< 0.1	< 2.0
R1_ENV_056	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	0.1	0.1	0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R1_ENV_057	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.4	0.3	0.2	0.2	0.4	0.1	0.1	0.1	0.1	< 0.1	< 2.6

Sediment United States Environmental Protection Agency 16 Polycyclic Aromatic Hydrocarbon Concentrations																	
Station	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[a]pyrene	Indeno[1,2,3-cd]pyrene	Benzo[ghi]perylene	Dibenzo[a,h]anthracene	Total US EPA 16 PAHs*
R1_ENV_058	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.2	0.1	0.1	0.1	0.3	0.1	0.1	< 0.1	< 0.1	< 0.1	< 1.9
R1_ENV_059	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.3	0.2	0.2	0.2	0.4	0.1	0.1	< 0.1	< 0.1	< 0.1	< 2.4
R1_ENV_060	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.2	0.2	0.1	0.1	0.2	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.9
R1_ENV_061	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.2	0.1	0.1	0.1	0.2	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 1.8
R1_ENV_064	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.2	0.1	0.1	0.1	0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.8
R1_ENV_065	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.3	0.3	0.2	0.2	0.4	0.1	0.1	< 0.1	< 0.1	< 0.1	< 2.5
R1_ENV_066	0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.2	0.2	0.1	0.1	0.2	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 1.9
R1_ENV_067	0.1	< 0.1	< 0.1	< 0.1	0.2	< 0.1	1.7	1.5	1.0	1.1	1.8	0.5	0.5	0.2	0.2	< 0.1	< 9.3
R1_ENV_068	0.2	< 0.1	0.1	< 0.1	0.2	0.1	1.7	1.4	0.9	0.9	1.7	0.4	0.4	0.2	0.1	< 0.1	< 8.6
R1_ENV_069	0.1	< 0.1	< 0.1	< 0.1	0.3	0.1	2.6	2.1	1.4	1.3	2.4	0.7	0.7	0.3	0.2	0.1	< 12.6
R1_ENV_070	< 0.1	< 0.1	< 0.1	< 0.1	0.2	0.1	1.8	1.5	1.0	1.1	1.8	0.5	0.7	0.2	0.3	0.1	< 9.7
R1_ENV_071	< 0.1	< 0.1	< 0.1	< 0.1	0.4	0.1	2.6	2.1	1.5	1.4	4.0	0.6	1.1	0.3	0.2	< 0.1	< 14.8
R1_ENV_072	0.1	< 0.1	< 0.1	< 0.1	0.4	0.1	3.2	2.5	2.0	1.8	3.9	1.1	1.5	0.6	0.5	0.1	< 18.1
R1_ENV_073	< 0.1	< 0.1	< 0.1	< 0.1	0.2	0.1	1.2	0.9	0.7	0.7	1.5	0.5	0.6	0.3	0.3	0.1	< 7.5

Sediment United States Environmental Protection Agency 16 Polycyclic Aromatic Hydrocarbon Concentrations																	
Station	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[a]pyrene	Indeno[1,2,3-cd]pyrene	Benzo[ghi]perylene	Dibenzo[a,h]anthracene	Total US EPA 16 PAHs*
R1_ENV_074	< 0.1	< 0.1	< 0.1	< 0.1	0.2	0.1	1.4	1.1	0.8	0.8	2.1	0.6	0.6	0.3	0.2	< 0.1	< 8.7
R1_ENV_075	< 0.1	< 0.1	< 0.1	< 0.1	0.2	0.1	1.1	0.8	0.6	0.6	1.7	0.4	0.6	0.2	0.2	0.1	< 7.0
R1_ENV_076	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.4	0.2	0.2	0.2	0.4	0.1	0.1	0.1	0.1	< 0.1	< 2.5
R1_ENV_078	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.3	0.2	0.2	0.2	0.4	0.1	0.2	0.1	0.1	< 0.1	< 2.5
R1_ENV_079	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.5	0.3	0.2	0.3	0.6	0.2	0.3	0.2	0.2	< 0.1	< 3.5
R1_ENV_080	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	0.1	0.1	0.1	0.2	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 1.7
R1_ENV_081	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.7
R1_ENV_082	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	0.1	< 0.1	0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R1_ENV_083	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.2	0.1	< 0.1	0.1	0.3	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.9
R1_ENV_084	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	0.1	< 0.1	0.1	0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.7
R1_ENV_086	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	0.1	< 0.1	0.1	0.3	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.8
R1_ENV_087	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.2	0.2	0.1	0.1	0.5	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 2.2
R1_ENV_088	< 0.1	< 0.1	< 0.1	< 0.1	0.2	< 0.1	0.7	0.6	0.3	0.4	1.3	0.2	0.3	0.2	0.2	< 0.1	< 5.0
R1_ENV_089	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.4	0.3	0.1	0.2	0.5	0.1	0.1	< 0.1	0.1	< 0.1	< 2.6

Sediment United States Environmental Protection Agency 16 Polycyclic Aromatic Hydrocarbon Concentrations																	
Station	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[a]pyrene	Indeno[1,2,3-cd]pyrene	Benzo[ghi]perylene	Dibenzo[a,h]anthracene	Total US EPA 16 PAHs*
R1_ENV_091	< 0.1	< 0.1	< 0.1	< 0.1	0.2	< 0.1	0.7	0.5	0.3	0.3	1.1	0.2	0.2	0.1	0.1	< 0.1	< 4.3
R1_ENV_092	< 0.1	< 0.1	< 0.1	< 0.1	0.5	0.1	2.0	1.4	0.8	0.9	2.6	0.6	0.7	0.4	0.4	0.1	< 10.9
R1_ENV_093	0.1	< 0.1	0.1	0.1	0.8	0.3	3.8	2.7	2.2	2.2	6.4	1.7	1.6	0.9	0.7	0.2	< 23.9
R1_ENV_094	0.1	< 0.1	0.1	0.1	1.8	0.4	7.8	5.9	3.5	3.5	9.6	2.8	2.8	1.6	1.1	0.4	< 41.6
R1_ENV_095	0.1	< 0.1	0.1	0.1	1.8	0.4	7.1	5.4	2.7	2.8	6.6	1.8	1.7	0.9	0.7	0.2	< 32.5
R1_ENV_096	< 0.1	< 0.1	< 0.1	< 0.1	0.2	< 0.1	2.7	1.9	1.3	0.9	2.0	0.4	0.7	0.3	0.2	< 0.1	< 11.2
R1_ENV_097	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R1_ENV_099	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R1_ENV_104	0.1	< 0.1	0.2	< 0.1	0.6	< 0.1	1.9	1.2	0.9	0.9	1.8	0.6	0.8	0.5	0.5	0.1	< 10.4
R1_ENV_105	0.1	< 0.1	0.2	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.7
R1_ENV_108	0.2	< 0.1	0.4	0.2	0.5	0.1	0.1	0.1	0.2	0.2	0.5	0.1	0.2	0.2	0.2	< 0.1	< 3.4
R1_ENV_122	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R1_ENV_124	0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R1_ENV_125	0.1	< 0.1	< 0.1	0.1	0.2	< 0.1	0.1	0.1	0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.7

Sediment United States Environmental Protection Agency 16 Polycyclic Aromatic Hydrocarbon Concentrations																	
Station	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[a]pyrene	Indeno[1,2,3-cd]pyrene	Benzo[ghi]perylene	Dibenzo[a,h]anthracene	Total US EPA 16 PAHs*
R1_ENV_126	0.3	< 0.1	0.1	< 0.1	0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.8
Minimum	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
Maximum	0.3	< 0.1	1.5	0.2	1.8	0.4	7.8	5.9	3.5	3.5	9.6	2.8	2.8	1.6	1.1	0.4	< 41.6
Mean	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.78
Standard Deviation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.05
RSD [%]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	147
Sediment Standards (QCC, 2017)																	
General use areas	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1700†
Marine protected areas	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1700†
NOAA Assessment Criteria (Buchman, 2008)																	
ERL	160	44	16	19	240	85.3	600	665	261	384	-	-	430	-	-	63.4	-
ERM	2100	640	500	540	1500	1100	5100	2600	1600	2800	-	-	1600	-	-	260	-

Sediment United States Environmental Protection Agency 16 Polycyclic Aromatic Hydrocarbon Concentrations																
Station	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[a]pyrene	Indeno[1,2,3-cd]pyrene	Benzo[ghi]perylene	Dibenzo[a,h]anthracene	Total US EPA 16 PAHs*

Notes
Concentrations expressed as ng/g of dry sediment
US EPA 16 PAH = United States Environmental Protection Agency's 16 priority polycyclic aromatic hydrocarbons
RSD = Relative standard deviation
QCC = Quality and Conformity Council
NOAA = National Oceanic and Atmospheric Administration
ERL = Effects range low
ERM = Effects range median
MRV = Minimum reporting value
* = The total US EPA 16 PAH values were treated as absolute values when calculating summary statistics
† = Total PAH concentrations. Specific compounds not specified

Key:	Below Sediment Standards	Above Sediment Standard for General Use Areas	Above Sediment Standard for Marine Protected Areas

J. Sediment Polychlorinated Biphenyl (PCB) Congener Concentrations

J.1 Sediment Individual Polychlorinated Biphenyl (PCB) Congener Concentrations

Sediment Individual Polychlorinated Biphenyl (PCB) Congener Concentrations													
Station	PCB 77	PCB 81	PCB 105	PCB 114	PCB 118	PCB 123	PCB 126	PCB 156	PCB 157	PCB 167	PCB 169	PCB 189	PCB WHO12 Congeners
R1_ENV_001	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_002	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_014	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_029	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_030	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_031	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_038	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_039	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_040	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_041	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_043	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_044	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_045	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_046	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_048	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_049	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_050	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240

Sediment Individual Polychlorinated Biphenyl (PCB) Congener Concentrations

Station	PCB 77	PCB 81	PCB 105	PCB 114	PCB 118	PCB 123	PCB 126	PCB 156	PCB 157	PCB 167	PCB 169	PCB 189	PCB WHO12 Congeners
R1_ENV_052	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_053	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_054	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_055	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_056	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_057	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_058	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_059	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_060	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_061	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_064	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_065	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_066	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_067	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_068	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_069	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_070	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240

Sediment Individual Polychlorinated Biphenyl (PCB) Congener Concentrations

Station	PCB 77	PCB 81	PCB 105	PCB 114	PCB 118	PCB 123	PCB 126	PCB 156	PCB 157	PCB 167	PCB 169	PCB 189	PCB WHO12 Congeners
R1_ENV_071	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_072	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_073	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_074	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_075	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_076	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_078	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_079	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_080	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_081	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_082	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_083	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_084	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_086	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_087	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_088	0.021	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.241
R1_ENV_089	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240

Sediment Individual Polychlorinated Biphenyl (PCB) Congener Concentrations

Station	PCB 77	PCB 81	PCB 105	PCB 114	PCB 118	PCB 123	PCB 126	PCB 156	PCB 157	PCB 167	PCB 169	PCB 189	PCB WHO12 Congeners
R1_ENV_091	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_092	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_093	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_094	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_095	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_096	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_097	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_099	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_104	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R1_ENV_122	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
Minimum	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.240**
Maximum	**0.021**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.020**	**< 0.240**
Sediment Standards (QCC, 2017)													
General use areas	-	-	-	-	-	-	-	-	-	-	-	-	22.0*
Marine protected areas	-	-	-	-	-	-	-	-	-	-	-	-	22.0*

Notes
Concentrations expressed as ng/g dry sediment
PCB WHO 12 Congeners, as specified by the World Health Organisation (WHO)

Sediment Individual Polychlorinated Biphenyl (PCB) Congener Concentrations													
Station	PCB 77	PCB 81	PCB 105	PCB 114	PCB 118	PCB 123	PCB 126	PCB 156	PCB 157	PCB 167	PCB 169	PCB 189	PCB WHO12 Congeners

PCB = Polychlorinated biphenyls

PCB 77= 3,3′,4,4′-TetraCB
PCB 81 = 3,4,4′,5-TetraCB
PCB 105 = 2,3,3′,4,4′-PentaCB
PCB 114 = 2,3,4,4′,5-PentaCB
PCB 118 = 2,3′,4,4′,5-PentaCB
PCB 123 = 2′,3,4,4′,5-PentaCB
PCB 126 = 3,3′,4,4′,5-PentaCB
PCB 156 = 2,3,3′,4,4′,5-HexaCB
PCB 157 = 2,3,3′,4,4′,5′-HexaCB
PCB 167= 2,3′,4,4′,5,5′-HexaCB
PCB 169= 3,3′,4,4′,5,5′-HexaCB
PCB 189 = 2,3,3′,4,4′,5,5′-HeptaCB

RSD = Relative standard deviation
QCC = Abu Dhabi Quality and Conformity Council
* = Total PCB concentration. PCB congeners not specified

Key:	Below Sediment Standards	Above Sediment Standard for General Use Areas	Above Sediment Standard for Marine Protected Areas

K. Sediment Metals

K.1 Summary of Sediment Metals Analysis

Summary of Sediment Metals Analysis													
Station	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Ni	Pb	V	Zn
R1_ENV_001	4950	5.73	0.0279	28.2	< 0.0800	21.7	4.08	5780	< 0.0400	18.1	1.48	20.5	9.11
R1_ENV_002	5100	4.60	0.0201	21.7	< 0.0800	23.5	4.85	5570	< 0.0400	19.8	1.64	19.9	10.0
R1_ENV_011	2510	3.10	0.00853	23.0	< 0.0800	9.87	2.47	2500	< 0.0400	9.27	3.00	11.2	7.55
R1_ENV_014	2280	5.57	0.0139	15.2	< 0.0800	11.4	2.96	2090	< 0.0400	10.1	1.05	10.0	6.00
R1_ENV_024	1590	4.91	0.00758	16.6	< 0.0800	9.29	2.13	1560	< 0.0400	6.19	0.830	7.52	2.79
R1_ENV_029	853	4.63	< 0.00700	18.8	< 0.0800	6.94	0.736	1090	< 0.0400	3.38	0.788	8.32	1.52
R1_ENV_030	889	4.20	< 0.00700	18.0	< 0.0800	7.63	0.855	1140	< 0.0400	4.42	0.810	8.87	2.31
R1_ENV_031	1070	4.37	< 0.00700	13.4	< 0.0800	8.02	1.19	1360	< 0.0400	5.62	0.796	7.10	3.81
R1_ENV_038	128	0.810	< 0.00700	9.18	< 0.0800	1.08	< 0.800	142	< 0.0400	1.88	3.81	1.21	1.02
R1_ENV_039	906	4.08	< 0.00700	11.5	< 0.0800	6.05	1.10	1220	< 0.0400	7.28	1.54	6.44	2.00
R1_ENV_040	1050	5.49	< 0.00700	13.8	< 0.0800	6.62	1.15	1540	< 0.0400	7.73	0.774	6.68	2.12
R1_ENV_041	796	4.30	< 0.00700	11.5	< 0.0800	5.29	1.13	1120	< 0.0400	3.48	0.904	6.65	1.59
R1_ENV_042	789	3.99	< 0.00700	11.7	< 0.0800	4.79	1.07	1170	< 0.0400	2.49	0.853	7.90	1.43
R1_ENV_043	603	3.34	< 0.00700	11.9	< 0.0800	5.19	0.861	738	< 0.0400	2.50	1.35	5.02	1.71
R1_ENV_044	958	4.56	< 0.00700	13.9	< 0.0800	6.38	1.27	1160	< 0.0400	3.89	0.931	6.16	5.63
R1_ENV_045	816	4.14	< 0.00700	14.3	< 0.0800	5.73	0.980	1090	< 0.0400	3.24	0.888	5.67	2.86
R1_ENV_046	1510	4.88	0.00852	20.5	< 0.0800	7.98	1.60	1690	< 0.0400	5.47	1.24	6.79	4.24
R1_ENV_047	1020	3.84	< 0.00700	17.3	< 0.0800	5.41	2.76	1550	< 0.0400	5.59	0.927	8.00	1.91
R1_ENV_048	1130	3.34	< 0.00700	17.5	< 0.0800	6.60	1.23	1300	< 0.0400	4.01	1.04	6.42	4.06

Summary of Sediment Metals Analysis

Station	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Ni	Pb	V	Zn
R1_ENV_049	1250	4.63	< 0.00700	23.7	< 0.0800	7.61	1.48	1520	< 0.0400	4.80	1.31	6.53	3.63
R1_ENV_050	849	4.93	< 0.00700	15.0	< 0.0800	6.64	1.11	1190	< 0.0400	3.71	1.09	5.76	3.01
R1_ENV_051	376	2.25	0.00747	13.7	< 0.0800	1.99	1.20	414	< 0.0400	4.07	1.03	2.92	0.830
R1_ENV_052	1150	5.42	< 0.00700	28.9	< 0.0800	8.04	1.42	1430	< 0.0400	5.03	1.45	6.62	4.26
R1_ENV_053	1250	3.27	< 0.00700	44.5	< 0.0800	6.63	1.50	1300	< 0.0400	4.93	1.31	5.67	20.6
R1_ENV_054	1140	4.26	0.00701	29.2	< 0.0800	6.71	1.29	1310	< 0.0400	4.36	1.27	5.57	3.53
R1_ENV_055	1760	4.69	0.00886	73.2	< 0.0800	8.60	2.03	1900	< 0.0400	6.48	1.63	7.12	4.97
R1_ENV_056	1080	4.37	< 0.00700	28.4	< 0.0800	7.07	1.49	1400	< 0.0400	4.09	1.36	6.44	4.15
R1_ENV_057	873	3.70	< 0.00700	29.5	< 0.0800	5.78	1.08	1390	< 0.0400	3.00	1.21	6.76	2.96
R1_ENV_058	1450	4.23	< 0.00700	37.1	< 0.0800	8.16	1.55	1810	< 0.0400	4.62	1.46	7.53	2.82
R1_ENV_059	1350	4.92	< 0.00700	59.3	< 0.0800	7.77	1.88	1860	< 0.0400	4.36	1.45	6.68	2.42
R1_ENV_060	1570	5.49	< 0.00700	43.3	< 0.0800	8.92	1.69	2110	< 0.0400	5.70	1.40	6.60	2.98
R1_ENV_061	683	3.95	< 0.00700	15.5	< 0.0800	5.46	0.908	1380	< 0.0400	2.28	0.880	7.45	1.13
R1_ENV_064	1020	4.58	< 0.00700	26.2	< 0.0800	6.46	1.10	1620	< 0.0400	3.04	1.43	7.10	1.42
R1_ENV_065	1320	4.61	< 0.00700	53.1	< 0.0800	7.77	1.46	1810	< 0.0400	4.55	1.52	6.66	2.47
R1_ENV_066	1870	5.15	0.00810	92.1	< 0.0800	9.41	2.21	2300	< 0.0400	6.62	1.81	7.50	4.08
R1_ENV_067	1600	5.48	0.00730	123	< 0.0800	8.75	2.23	2050	< 0.0400	5.56	1.80	7.60	3.56
R1_ENV_068	3930	2.86	0.0141	211	< 0.0800	16.0	4.97	3520	< 0.0400	13.3	3.12	13.2	9.08
R1_ENV_069	1820	4.18	0.00766	101	< 0.0800	8.77	2.11	1990	< 0.0400	5.94	1.75	7.66	3.76

Summary of Sediment Metals Analysis													
Station	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Ni	Pb	V	Zn
R1_ENV_070	3830	3.20	0.0110	183	< 0.0800	15.8	4.38	3500	< 0.0400	13.2	3.18	11.9	9.34
R1_ENV_071	3770	2.97	0.0166	159	< 0.0800	15.3	4.43	3360	< 0.0400	12.7	3.06	12.0	8.47
R1_ENV_072	3830	3.71	0.0182	159	< 0.0800	16.1	4.37	3700	< 0.0400	14.1	3.19	12.9	10.1
R1_ENV_073	3610	2.69	0.0157	142	< 0.0800	16.5	4.75	3280	< 0.0400	16.1	2.80	12.4	13.2
R1_ENV_074	4750	2.41	0.0173	153	< 0.0800	18.4	5.00	3820	< 0.0400	17.0	3.48	14.6	11.6
R1_ENV_075	4140	2.46	0.0154	148	< 0.0800	16.0	4.90	3680	< 0.0400	15.5	3.22	13.6	10.2
R1_ENV_076	3260	2.44	0.0149	105	< 0.0800	14.6	4.44	3070	< 0.0400	14.4	2.75	11.0	9.49
R1_ENV_078	1180	4.28	0.00747	47.6	< 0.0800	7.37	1.70	1480	< 0.0400	5.92	1.57	5.44	3.73
R1_ENV_079	1270	3.23	0.00850	53.2	< 0.0800	7.30	1.74	1460	< 0.0400	5.61	1.60	5.41	3.17
R1_ENV_080	2260	2.03	0.00838	110	< 0.0800	9.78	2.21	2200	< 0.0400	15.6	2.51	8.48	6.96
R1_ENV_081	336	1.86	< 0.00700	11.1	< 0.0800	4.04	0.448	514	< 0.0400	1.54	0.949	4.25	1.14
R1_ENV_082	777	1.84	< 0.00700	38.3	< 0.0800	6.04	0.976	861	< 0.0400	3.14	1.74	4.35	2.48
R1_ENV_083	1050	3.91	< 0.00700	66.3	< 0.0800	9.07	1.57	1420	< 0.0400	4.00	2.12	7.61	2.91
R1_ENV_084	779	5.22	< 0.00700	48.4	< 0.0800	9.89	1.18	1250	< 0.0400	3.81	2.24	6.87	2.52
R1_ENV_086	881	5.40	< 0.00700	66.2	< 0.0800	8.68	0.995	1830	< 0.0400	3.00	2.41	8.98	2.90
R1_ENV_087	1230	3.20	< 0.00700	124	< 0.0800	7.63	1.36	1720	< 0.0400	4.44	2.91	7.52	3.76
R1_ENV_088	3930	2.59	0.0164	564	< 0.0800	16.3	4.32	3400	< 0.0400	13.1	7.09	13.2	11.1
R1_ENV_089	1260	3.15	< 0.00700	216	< 0.0800	8.18	1.45	1450	< 0.0400	4.58	3.16	6.34	3.73
R1_ENV_091	1160	3.76	< 0.00700	273	< 0.0800	8.03	1.34	1570	< 0.0400	3.85	3.21	7.07	3.35

Summary of Sediment Metals Analysis													
Station	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Ni	Pb	V	Zn
R1_ENV_092	1860	3.08	0.0161	747	< 0.0800	9.55	2.62	1920	< 0.0400	6.94	4.86	6.98	7.15
R1_ENV_093	2800	2.40	0.0313	1410	< 0.0800	13.8	5.06	2620	< 0.0400	10.7	9.45	10.2	12.0
R1_ENV_094	2020	2.24	0.0283	1670	< 0.0800	10.3	3.48	2010	< 0.0400	7.51	9.25	7.99	9.76
R1_ENV_095	1580	1.86	0.0207	1700	< 0.0800	8.71	3.98	1580	< 0.0400	6.97	8.47	6.81	8.92
R1_ENV_096	183	2.01	< 0.00700	55.0	< 0.0800	3.48	< 0.800	206	< 0.0400	1.94	1.43	1.47	1.44
R1_ENV_097	299	1.18	< 0.00700	27.6	< 0.0800	3.37	< 0.800	306	< 0.0400	2.32	1.29	2.52	1.51
R1_ENV_099	424	1.04	< 0.00700	17.7	< 0.0800	3.83	< 0.800	352	< 0.0400	1.99	1.45	3.21	1.25
R1_ENV_104	363	1.70	< 0.00700	161	< 0.0800	2.67	0.999	385	< 0.0400	1.00	3.15	3.12	1.83
R1_ENV_105	290	1.21	0.00898	67.6	< 0.0800	2.31	< 0.800	317	< 0.0400	5.83	3.18	2.56	1.50
R1_ENV_108	434	1.44	< 0.00700	94.8	< 0.0800	3.23	0.865	510	< 0.0400	3.21	3.50	3.38	2.05
R1_ENV_122	468	5.64	< 0.00700	22.2	< 0.0800	11.2	0.845	1530	< 0.0400	2.70	2.39	10.9	1.47
R1_ENV_124	625	5.96	< 0.00700	58.5	< 0.0800	10.7	1.00	1680	< 0.0400	1.86	2.35	11.9	1.28
R1_ENV_125	513	3.12	< 0.00700	67.1	< 0.0800	7.35	0.906	935	< 0.0400	4.57	2.48	6.47	1.39
R1_ENV_126	583	4.67	< 0.00700	47.9	< 0.0800	7.67	0.927	1200	< 0.0400	1.64	2.51	8.11	1.36
Minimum	**128**	**0.810**	**< 0.00700**	**9.18**	**< 0.0800**	**1.08**	**< 0.800**	**142**	**< 0.0400**	**1.00**	**0.774**	**1.21**	**0.830**
Maximum	**5100**	**5.96**	**0.0313**	**1700**	**< 0.0800**	**23.5**	**5.06**	**5780**	**< 0.0400**	**19.8**	**9.45**	**20.5**	**20.6**
Mean	**1560**	**3.67**	**-**	**143**	**-**	**8.72**	**1.96**	**1760**	**-**	**6.36**	**2.28**	**7.76**	**4.60**
Standard Deviation	**1240**	**1.32**	**-**	**329**	**-**	**4.47**	**1.39**	**1110**	**-**	**4.54**	**1.81**	**3.60**	**3.80**
RSD [%]	**79**	**36**	**-**	**230**	**-**	**51**	**71**	**63**	**-**	**71**	**79**	**46**	**83**

Summary of Sediment Metals Analysis													
Station	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Ni	Pb	V	Zn
Sediment Standards (QCC, 2017)													
General use areas	-	7.0	-	-	0.7	52	20.0	-	0.2	16.0	30.0	-	125.0
Marine protected areas	-	7.0	-	-	0.2	11	20.0	-	0.2	7.0	5.0	-	70.0
NOAA Assessment Criteria (Buchman, 2008)													
ERL	-	8.20	1.00	-	1.20	81.0	34.0	-	0.150	20.9	46.7	-	150
ERM	-	70.0	3.70	-	9.60	370	270	-	0.710	51.6	218	-	410

Notes

For statistical evaluation, results < MRV were treated as absolute values determined by MRV/2

Al = Aluminium As = Arsenic Ag = Silver Ba = Barium Cd = Cadmium Cr = Chromium Cu = Copper Fe= Iron
Hg = Mercury Pb = Lead Ni=Nickel V = Vanadium Zn = Zinc
RSD = Relative standard deviation
QCC = Abu Dhabi Quality and Conformity Council
NOAA = National Oceanic and Atmospheric Administration
ERL = Effects range low
ERM = Effects range median
MRV = Minimum reporting value

Key:	Below Sediment Standards	Above Sediment Standard for General Use Areas	Above Sediment Standard for Marine Protected Areas

L. Seabed Photographs

TRANSECT TR01

Photograph: R1_TR01_001
Easting: 760 272.8 mE
Northing: 2 671 452.7 mN
Depth: 6.3 m BSL

Sediment Type:
Sand

Epibiota:
Seagrass (*Halodule uninervis*, possible *Halophila stipulacea* and *Halophila ovalis* complex)

Photograph: R1_TR01_002
Easting: 760 263.4 mE
Northing: 2 671 448.4 mN
Depth: 6.4 m BSL

Sediment Type:
Sand

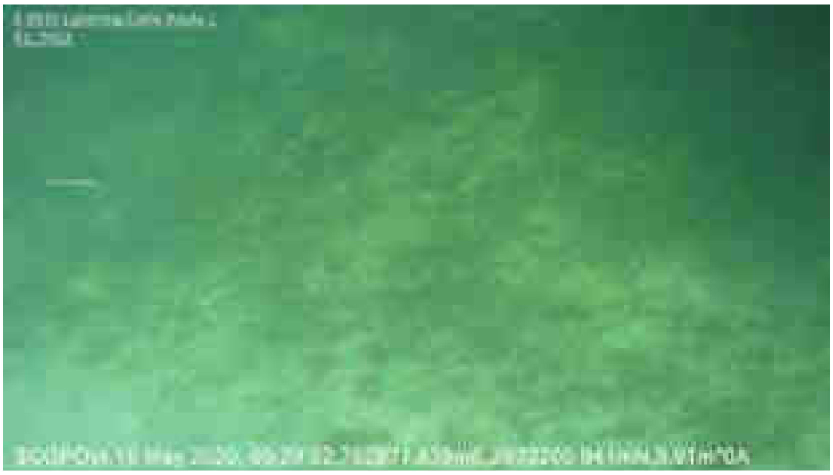
Epibiota:
Seagrass (*Halodule uninervis*, possible *Halophila stipulacea* and *Halophila ovalis* complex)

Photograph: R1_TR01_003
Easting: 760 242.6 mE
Northing: 2 671 438.3 mN
Depth: 6.7 m BSL

Sediment Type:
Sand

Epibiota:
Seagrass (*Halodule uninervis*, possible *Halophila stipulacea* and *Halophila ovalis* complex)

TRANSECT TR02



Photograph: R1_TR02_001
Easting: 762 871.8 mE
Northing: 2 672 205.9 mN
Depth: 3.9 m BSL

Sediment Type:
Sand

Epibiota:
Seagrass (*Halodule uninervis*, *Halophila stipulacea* and *Halophila ovalis* complex)

Photograph: R1_TR02_002
Easting: 762 866.9 mE
Northing: 2 672 204.2 mN
Depth: 3.8 m BSL

Sediment Type:
Sand

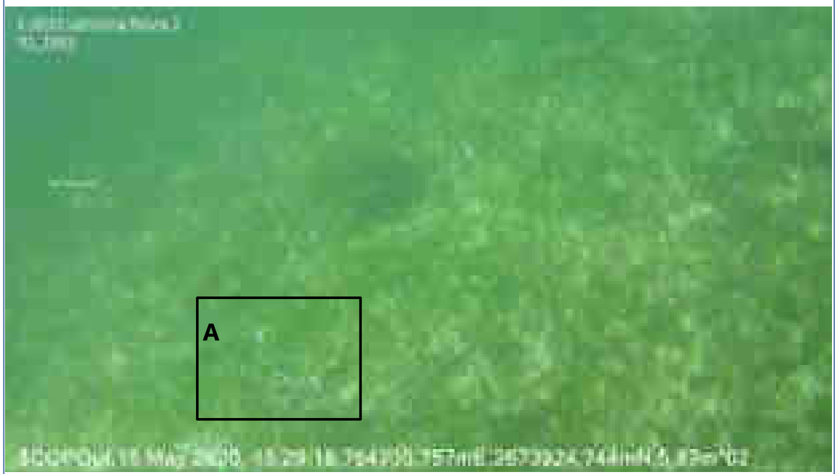
Epibiota:
Seagrass (*Halodule uninervis*, *Halophila stipulacea* and *Halophila ovalis* complex)

Photograph: R1_TR02_003
Easting: 762 858.1 mE
Northing: 2 672 199.5 mN
Depth: 3.8 m BSL

Sediment Type:
Sand

Epibiota:
Seagrass (*Halodule uninervis*, *Halophila stipulacea* and *Halophila ovalis* complex)

TRANSECT TR03



Photograph: R1_TR03_001

Easting: 764 735.8 mE
Northing: 2 673 924.7 mN
Depth: 5.9 m BSL

Sediment Type:
Sand

Epibiota:
A: Epiphytic branching sponges/ascidians (Porifera/Ascidiacea)

Seagrass (*Halodule uninervis*, *Halophila stipulacea* and *Halophila ovalis* complex)
Red algae (Rhodophyta)

Photograph: R1_TR03_002

Easting: 764 744.8 mE
Northing: 2 673 924.8 mN
Depth: 5.2 m BSL

Sediment Type:
Sand

Epibiota:
No visible epibiota

Photograph: R1_TR03_004
Easting: 764 756.6 mE
Northing: 2 673 927.0 mN
Depth: 5.2 m BSL

Sediment Type:
Sand

Epibiota:
Seagrass (*Halodule uninervis*, *Halophila stipulacea* and *Halophila ovalis* complex)
Red algae (Rhodophyta)

TRANSECT TR04B

Photograph: R1_R04B_003
Easting: 788 929.2 mE
Northing: 2 711 766.9 mN
Depth: 16.4 m BSL

Sediment Type:
Gravelly sand with shell fragments and coral rubble veneer overlying calcarenite

Epibiota:
A: Hammer oysters (*Malleus* sp.)

Photograph: R1_TR04B_005
Easting: 788 923.8 mE
Northing: 2 711 760.7 mN
Depth: 16.1 m BSL

Sediment Type:
Gravelly sand with shell fragments and coral rubble veneer overlying calcarenite

Epibiota:
A: Hammer oysters (*Malleus* sp.)

Photograph: R1_R04B_007
Easting: 788 918.8 mE
Northing: 2 711 749.4mN
Depth: 15.9 m BSL

Sediment Type:
Gravelly sand with shell fragments and coral rubble veneer overlying calcarenite

Epibiota:
A: Sea snails (Gastropoda)

TRANSECT TR05A

Photograph: R1_TR05A_001

Easting: 771 191.3 mE
Northing: 2 689 051.4 mN
Depth: 12.8 m BSL

Sediment Type:

Gravelly sand with shell fragment deposits

Epibiota:

A: Faunal turf (Hydrozoa/ Bryozoa)
Seagrass (possible *Halophila stipulacea* and *Halophila ovalis* complex)

Photograph: R1_TR05A_003

Easting: 771 194.0 mE
Northing: 2 689 062.9 mN
Depth: 12.8 m BSL

Sediment Type:

Gravelly sand with shell fragment deposits

Epibiota:

A: Faunal turf (Hydrozoa/ Bryozoa)
Seagrass (possible *Halophila stipulacea* and *Halophila ovalis* complex)

Photograph: R1_TR05A_007

Easting: 771 199.4 mE
Northing: 2 689 092.2 mN
Depth: 12.8 m BSL

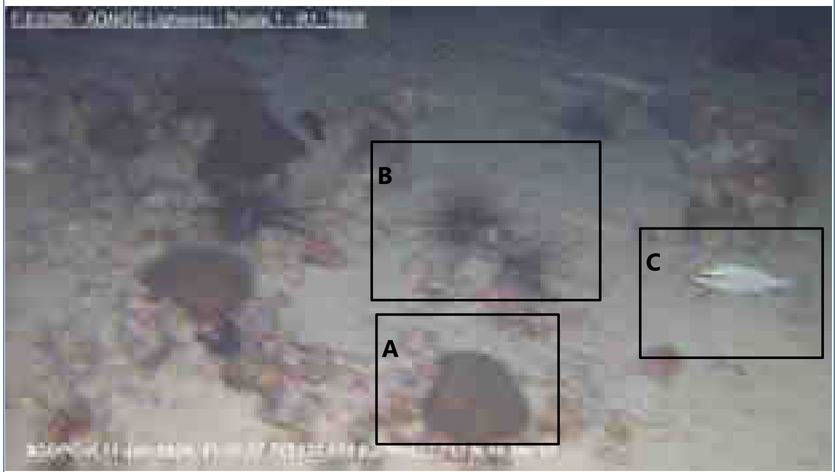
Sediment Type:

Gravelly sand with shell fragment deposits

Epibiota:

A: Faunal turf (Hydrozoa/ Bryozoa)
Seagrass (possible *Halophila stipulacea* and *Halophila ovalis* complex)

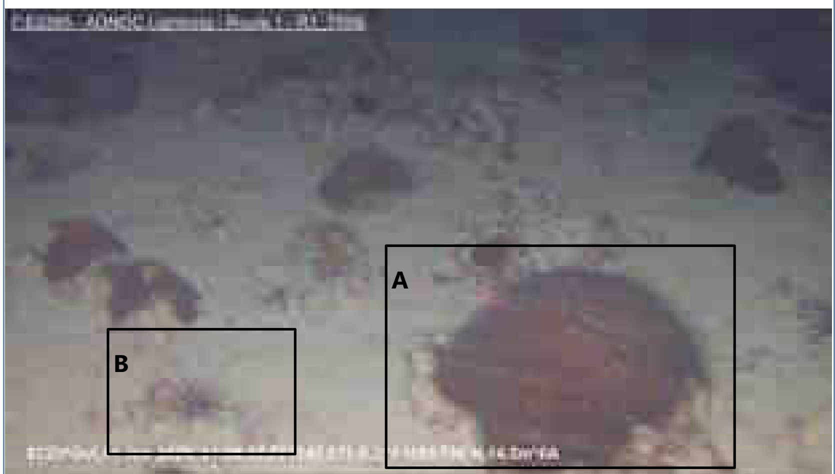
TRANSECT TR06



Photograph: R1_R06_001
Easting: 777 337.9 mE
Northing: 2 701 653.7 mN
Depth: 14.5 m BSL

Sediment Type:
Calcarenite with a veneer of sand, relict coral and coral rubble

Epibiota:
A: Encrusting plate corals (*Turbinaria* sp.)
B: Long spined sea urchins (*Diadema* sp.)
C: Arabian monocle bream (*Scolopsis ghanam*)



Photograph: R1_TR06_003
Easting: 777 342.9 mE
Northing: 2 701 663.85 mN
Depth: 14.5 m BSL

Sediment Type:
Calcarenite with a veneer of sand, relict coral and coral rubble

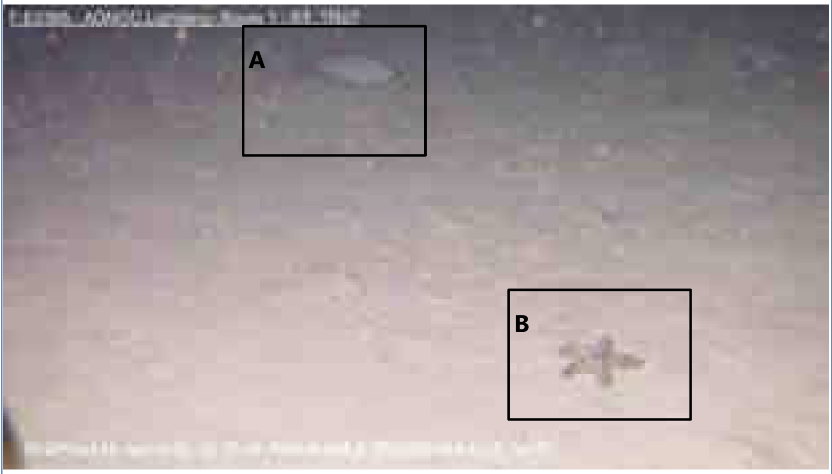
Epibiota:
A: Encrusting plate corals (*Turbinaria* sp.)
B: Long spined sea urchins (*Diadema* sp.)

Photograph: R1_R06_008
Easting: 777 363.0 mE
Northing: 2 701 704.4 mN
Depth: 16.2 m BSL

Sediment Type:
Calcarenite with gravelly sand veneer, relict coral and coral rubble

Epibiota:
A: Sea urchin (*Echinometra mathei*)

TRANSECT TR07



Photograph: R1_TR07_005
Easting: 793 46.8 mE
Northing: 2 722 055.7 mN
Depth: 22.7 m BSL

Sediment Type:
Sand, shell fragments and coral rubble veneer overlying possible calcarenite

Epibiota:
A: Mojarra fish (Gerreidae)
B: Starfish (*Pentaceraster mammillatus*)

Photograph: R1_TR07_011
Easting: 793 044.1 mE
Northing: 2 722 062.0 mN
Depth: 22.6 m BSL

Sediment Type:
Sand, shell fragments and coral rubble veneer overlying possible calcarenite

Epibiota:
A: Small scale terapon (*Terapon puta*)

Photograph: R1_TR07_014
Easting: 793 033.1 mE
Northing: 2 722 089.0 mN
Depth: 23.1 m BSL

Sediment Type:
Sand, shell fragments and coral rubble veneer overlying possible calcarenite

Epibiota:
A: Gorgonian (?*Subergorgia suberosa*) with brittlestar (Ophiuroidea possible *Ophiotela* sp.)

TRANSECT TR08A

Photograph: R1_TR08A_006
Easting: 791 666.4 mE
Northing: 2 713 400.0 mN
Depth: 19.8 m BSL

Sediment Type:
Muddy, gravelly sand with shell fragments and coral rubble veneer overlying calcarenite

Epibiota:
A: Ascidian (*Phallusia nigra*)
B: Hydroid (Hydrozoa)

Photograph: R1_TR08A_007
Easting: 791 668.9 mE
Northing: 2 713 395.9 mN
Depth: 19.7 m BSL

Sediment Type:
Muddy, gravelly sand with shell fragments and coral rubble veneer overlying calcarenite

Epibiota:
A: Sponge (Porifera)

Photograph: R1_TR08A_008
Easting: 791 672.7 mE
Northing: 2 713 392.4 mN
Depth: 19.8 m BSL

Sediment Type:
Muddy, gravelly sand with shell fragments and coral rubble veneer overlying calcarenite

Epibiota:
A: Hermit crab (Paguroidea)

TRANSECT TR09

Photograph: R1_TR09_001
Easting: 786 711.7 mE
Northing: 2 744 251.7 mN
Depth: 12.6 m BSL

Sediment Type:
Sand

Epibiota:
A: Hermit crabs (Paguroidea)

Photograph: R1_TR09_005
Easting: 786 725.4 mE
Northing: 2 744 258.1 mN
Depth: 12.6 m BSL

Sediment Type:
Sand

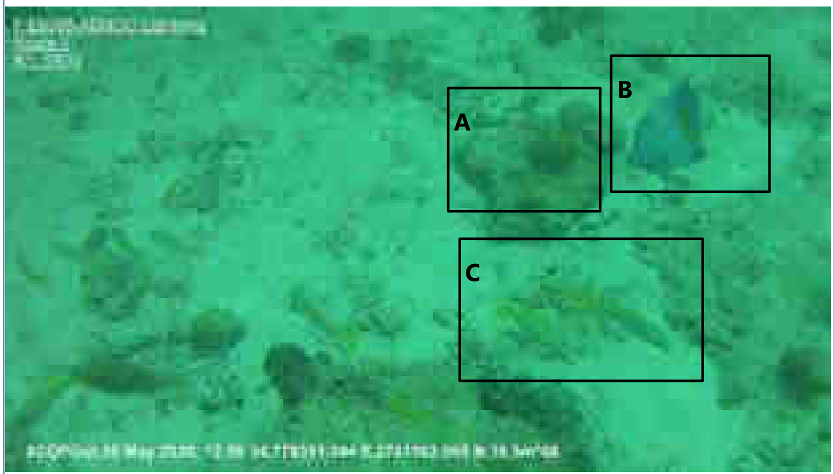
Epibiota:
No visible fauna
Seagrass (*Halophila stipulacea* and *Halophila ovalis* complex)

Photograph: R1_TR09_008
Easting: 786 7350.7 mE
Northing: 2 744 263.4 mN
Depth: 12.6 m BSL

Sediment Type:
Sand

Epibiota:
No visible fauna
Seagrass (*Halophila stipulacea* and *Halophila ovalis* complex)

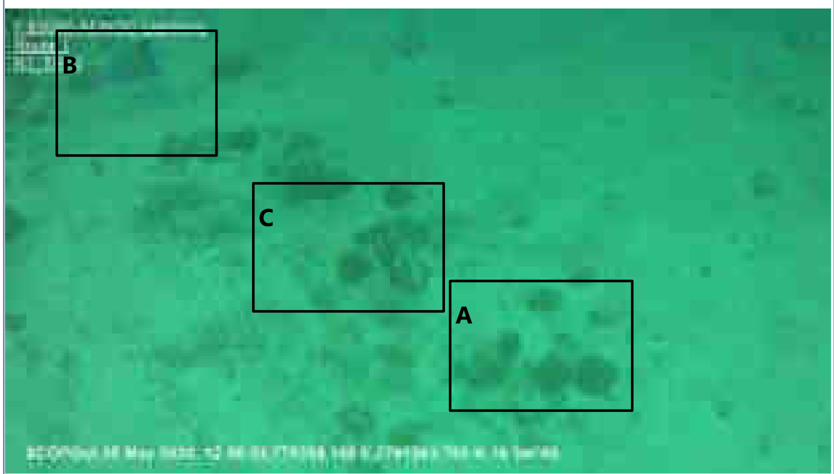
TRANSECT TR10



Photograph: R1_R10_003
Easting: 760 351.3 mE
Northing: 2 671 562.1 mN
Depth: 16.5 m BSL

Sediment Type:
Gravelly sand and shell fragments veneer overlying calcarenite, coral rubble

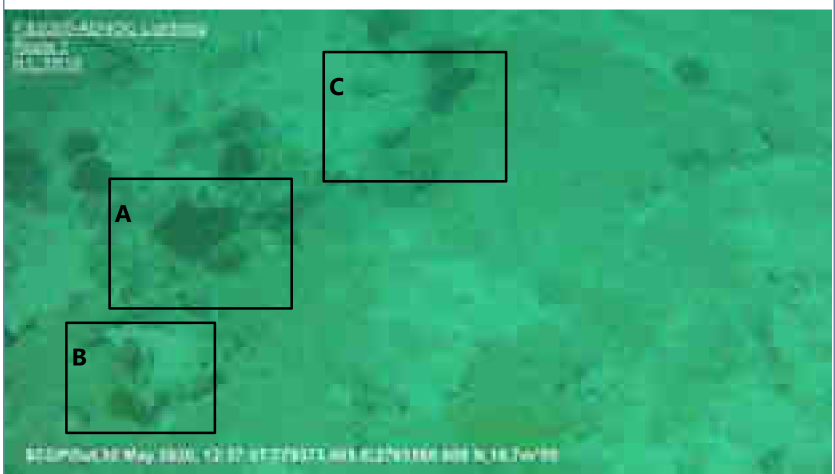
Epibiota:
A: Boulder corals (Faviidae)
B: Yellowband angel fish (*Pomacanthus maculosus*)
C: Black spot snapper (*Lutjanus* sp.)



Photograph: R1_TR10_004
Easting: 779 358.2 mE
Northing: 2 761 563.8 mN
Depth: 16.3 m BSL

Sediment Type:
Gravelly sand and shell fragments veneer overlying calcarenite, coral rubble

Epibiota:
A: Boulder corals (Faviidae)
B: Yellowband angel fish (*Pomacanthus maculosus*)
C: Black spot snapper (*Lutjanus* sp.)



Photograph: R1_TR10_005
Easting: 779 373.4 mE
Northing: 2 761 560.7 mN
Depth: 16.7 m BSL

Sediment Type:
Gravelly sand and shell fragments veneer overlying calcarenite, coral rubble

Epibiota:
A: Finger corals (*Porites* sp.)
B: Doublebar bream (*Acanthopagrus bifasciatus*)
C: Long spined urchins (*Diadema setosum*)

Appendix 2.3.2 – Environmental Baseline Survey Results Report – Route 2

Anthesis

E-0395 - LIGHTNING PROJECT

PROVISION OF GEOPHYSICAL, GEOTECHNICAL & ENVIRONMENTAL BASELINE SURVEYS FOR SUBSEA CABLE ROUTES

ENVIRONMENTAL BASELINE SURVEY RESULTS REPORT - ROUTE 2

ADNOC OFFSHORE PROJECT NO.	E-0395
CONTRACTOR DOC TITLE	ENVIRONMENTAL BASELINE SURVEY RESULTS REPORT - ROUTE 2
CONTRACTOR	FUGRO
FUGRO PROJECT NO.	OEU021

CONTRACTOR DOC NO: OEU021-V02-Route-2

Rev.	Date	Status	Status Description	Prepared	Reviewed	Approved	Company Approval
02	16/09/2020	Final	Issued as Final	T. Sidiropoulos A. Sutherland C. Vercoe-Robins L. Hankinson L.A. Baker J. Greig	S. Brittain A. Rawlins G. Harris-Bryant H. George	M. Ramm	DJ. Bouremel
01	30/08/2020	IFR	Issued for Review	S. Whyte	H. George	M. Ramn	DJ. Bouremel

SUMMARY OF DOCUMENT REVISIONS

Rev. No.	Date Revised	Section Revised	Revision Description
01	30/08/2020	IFR	EBS Report, Issued for Review
02	16/09/2020	Final	EBS Report, Issued as Final

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PROJECT DEFINITIONS AND REFERENCES

PROJECT DEFINITIONS

PROJECT:	LIGHTNING PROJECT - OFFSHORE GEOPHYSICAL, GEOTECHNICAL & ENVIRONMENTAL BASELINE SURVEYS FOR SUBSEA CABLE ROUTES
COMPANY:	Abu Dhabi National Oil Company Offshore (ADNOC Offshore)
CLIENT:	Abu Dhabi National Oil Company Offshore (ADNOC Offshore)
CONTRACTOR:	FUGRO
ADNOC JOB NO:	E-0395
SCOPE OF WORK:	AD41-G-450-023796 and Drawing AD102-450-PLG-80432

ABBREVIATIONS	
ADNOC	Abu Dhabi National Oil Company
ADS	Abu Dhabi Specification
BGS	British Geological Survey
BOD	Biochemical Oxygen Demand
BOT	Near Seabed Water Sample
BSL	Below Sea Level
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CBD	Convention on Biological Diversity
CCC	Criterion Continuous Concentration
CCME	Canadian Council of Ministers of the Environment
CD	Chart Datum
CFU	Coliform Forming Unit
CH	Critical Habitats
CITES	Convention on International Trade in Endangered Species
CM	Central Meridian
CMC	Criterion Maximum Concentration
COD	Chemical Oxygen Demand
CTD	Conductivity, Temperature, Depth
DNV	Det Norsk Veritas
DO	Dissolved Oxygen
DP	Dynamic Positioning
DTI	Department of Trade and Industry
EAD	Environment Agency–Abu Dhabi
EBS	Environmental Baseline Survey
EOL	End of Line
EPH	Extractable Petroleum Hydrocarbons
ERL	Effects Range Low
ERM	Effects Range Median
ESH	Environmentally Sensitive Habitats
FGBML	Fugro GB Marine Limited
GC	Gas Chromatography
GC-μECD	Gas Chromatography with micro-Electron Capture Detection

GC-FID	Gas Chromatography–Flame Ionisation Detection
GC-MS	Gas Chromatography-Mass Spectrometry
HC	Hydrocarbon Sample
HM	Heavy Metal Sample
GC-FID-HS	Headspace Gas Chromatography with Flame Ionisation Detection
HVDC	High Voltage Direct Current
ICP–MS	Inductively Coupled Plasma–Mass Spectrometry
ICP-OES	Inductively Coupled Plasma Optical Emission Spectrometry
IUCN	International Union of Conservation of Nature
KP	Kilometre Point
LTDP	Long term development plan
MAC	Maximum Allowable Concentration
MID	Mid Water Depth Water Sample
MLEAD	Marine Life of the Emirate of Abu Dhabi
MOCCAE	Ministry of Climate Change and Environment
MRV	Minimum Reporting Value
MV	Motor Vessel
NBSAP	National Biodiversity Strategy and Action Plan
ND	Not Detected
NDIR	Non-Dispersive Infrared Detection
NMBAQC	National Marine Biological Association Quality Control
NOAA	National Oceanographic and Atmospheric Administration
NPCC	National Petroleum Construction Company
NS	No Sample
NTU	Nephelometric Turbidity Units
PAH	Polycyclic Aromatic Hydrocarbon
PC	Physico-chemical Sample
PCB	Polychlorinated Biphenyl
PSA	Particle Size Analysis
PSD	Particle Size Distribution

ppt	Parts Per Thousand
PSU	Practical Salinity Unit
QCC	Abu Dhabi Quality and Conformity Council
RSD	Relative Standard Deviation
SLMXD	Sublittoral Mixed Deposit
SLSED	Sublittoral Sand and Gravel
SOL	Start of Line
SoW	Scope of Work
SSS	Side Scan Sonar
TDS	Total Dissolved Solids
THC	Total Hydrocarbon Content
TOC	Total Organic Carbon
TOP	Surface water sample
TR	Transect
TSS	Total Suspended Solids
UAE	United Arab Emirates
US EPA	United States Environmental Protection Agency
UTC	Coordinated Universal Time
UTM	Universal Transverse Mercator
UV	Ultra Violet
VPH	Volatile Petroleum Hydrocarbons
VV	Single Van Veen Grab
WGS84	World Geodetic System 1984
WHO	World Health Organisation
WP	Water Profile
WS	Water Sample

Document Control

Document Information

ADNOC Offshore Project No.	E-0395
Project Title	Lightning Project - Provision of Geophysical, Geotechnical, and Environmental Baseline Surveys for Subsea Cable Routes
Document Title	EBS Survey Results Report Route 2
Fugro Project No.	OEU021OEU021
Fugro Document No.	OEU21-Vol 2-Route 2
Issue Number	02
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Client Information

Client	Abu Dhabi National Oil Company for Offshore Oil Operations (ADNOC Offshore)
Client Address	PO Box 303, Abu Dhabi, U.A.E.
Client Contact	Mr. Djaafar Bouremel
Client Document No.	AD41-457-G-24203AD41-457-G-24203

Revision History

Issue	Date	Status	Comments on Content	Prepared By	Checked By	Approved By
01	30 August 2020	Draft	For Review	TXS/CVR/LMH/LAB/JSG	SRB/AJR/GHB/HG	SW/MR
02	16 Sept. 2020	Final	Issued as Final	TXS/AS/CVR/LMH/LAB/JSG	SRB/AJR/GHB/AHG	MR

GENERAL LOCATION MAP

Summary of Survey Results

Introduction

Fugro was contracted by ADNOC Offshore (Client) for the conduct of bathymetric, geotechnical and geophysical investigations and environmental baseline surveys (EBS) along two proposed cable routes. The proposed Route 1 will connect Lower Zakum Island G to Mirfa and Route 2 will connect Umm Shaif LTDP Island to Shuweihat, within the Zakum Field and the Umm Shaif field, respectively.

Survey Strategy

The EBS was designed to characterise the water column and seabed sediments at 135 stations along the vicinity of Route 2. Water column profiles were taken to characterise water column physical parameters. Water column samples were taken for physico-chemical analysis. Seabed and soil sediment samples were taken for physico-chemical analysis, whereas seabed photographic data were obtained to characterise benthic habitats and epifauna.

Water column profiles were successfully acquired at all 135 stations. Water samples were acquired from all proposed stations. A complete suite of physico-chemical sub-samples was acquired at 100 stations, a partial suite of samples was acquired at 11 stations and the remaining 24 stations could not be sampled due to hard substrate. Photographic still and video data were successfully acquired along all proposed camera transects. A complete set of soil samples was acquired at 12 out of the 17 proposed stations, with a partial suite being acquired from 1 further station.

Water Column Profiles

Water temperatures within the survey area differed between shallow and deeper waters. In contrast, salinity values were generally observed to be consistent throughout the water column for most stations. Turbidity increased with water depth at numerous water profiles, reaching values double those of the remaining profiles. Dissolved oxygen (DO) levels slightly decreased with increasing depth at most of the water profiles sampled, with a sharp decrease of 10 % observed in 3 samples at around 12 m depth. The pH values reported in the current survey were consistent across all samples taken. Overall, due to minimal differences observed across the samples obtained, the conditions encountered were considered typical for the region and season.

Inorganic Water Quality Parameters

The majority of inorganic water quality parameters (total suspended solids, nitrogen (ammonia), ammonium, sulphide, total nitrogen, total cyanide, orthophosphate, silicon, chemical oxygen demand (COD), biochemical oxygen demand (BOD) and total coliform) were below their respective minimum reporting values (MRVs) at all stations across the survey area. Parameters with values greater than the MRV (pH, total dissolved solids (TDS), nitrate, nitrite, sulphate, chloride and total organic carbon (TOC)) displayed low variability and were considered to be of no environmental concern.

Water Column Hydrocarbons

Concentrations of volatile petroleum hydrocarbons (VPHs), polycyclic aromatic hydrocarbons (PAHs), benzene, toluene, ethylbenzene and xylene (BTEX) and phenols were below their respective minimum reporting values in all samples apart from extractable petroleum hydrocarbons (EPHs), fluoranthene, phenanthrene and pyrene. However, the concentrations recorded are unlikely to be of environmental concern. Benzene, toluene and ethylbenzene were below the Canadian Council of Ministers of the Environment (CCME) guideline values and considered to be representative of background conditions.

Water Column Major and Trace Elements

With the exception of cadmium, chromium, copper and zinc, concentrations of major and trace elements were below their respective Abu Dhabi Specification (ADS) 18/2017 Ambient Marine Water Standards Maximum Allowable Concentration (MAC) for both general use areas and marine protected areas (QCC, 2017), where available, as well as the United States Environmental Protection Agency (US EPA) criterion continuous concentration (CCC) and criterion maximum concentration (CMC) (US EPA, 2020) and considered to be of no environmental concern. Zinc concentrations exceeded the US EPA CCC and the US EPA CMC thresholds, in sample R2_ENV_095-Middle. Copper concentrations exceeded the US EPA CCC threshold in four samples and the US EPA CMC threshold in two samples. The ADS 18/2017 MAC thresholds for both general use areas and marine protected areas were exceeded for zinc concentrations in 29 samples, for cadmium in 1 sample, for chromium in 162 samples and for copper in 4 samples.

Sediment Characterisation

Using the Wentworth (1922) sediment description, stations across the Route 2 survey area comprised mainly sand and were classified as coarse sand to medium silt. High interstation variability was demonstrated for all fractional composition parameters, except for sand which showed low variability.

Sediment Nutrients

Apart from silicon, all sediment nutrient concentrations, demonstrated low to moderate variation. No spatial patterns were observed indicating broadly homogenous sediments within the region. Phosphorus concentrations reported in Route 2 were higher than those carried out previously in the Zakum oil field (Blue Sea Environmental Consultants, 2011).

Sediment Hydrocarbons

Concentrations of total hydrocarbon content were considered as typical for the region as they were comparable to concentrations previously recorded around non-industrialised coastal environments distant from hydrocarbon inputs. The concentrations of BTEX compounds were below their respective MRVs at all stations, and the concentrations of individual PAHs were below their respective MRVs at most stations across the Route 2 survey area. Total sediment PAH concentrations were below the ADS 18/2017 MAC and are therefore unlikely to harm the sediment macrofauna.

Sediment Polychlorinated Biphenyls

The concentrations of individual polychlorinated biphenyls (PCBs) were below the MRV (0.020 ng/g) at most stations across the Route 2 survey area. All total PCB concentrations were below the ADS 18/2017 MAC.

Sediment Metals

The majority of the sediment metals concentrations across the survey area were below their respective US National Oceanographic and Atmospheric Administration (NOAA) effects range low (ERL) and effects range median (ERM) threshold values. Arsenic concentrations at three stations exceeded their ERL threshold value, as well as the ADS 18/2017 MAC threshold (7.0 µg/g) for both general use and marine protected areas at 9 stations. Concentrations of chromium and nickel exceeded the ADS 18/2017 MAC (QCC, 2017) for marine protected areas at numerous stations, and concentrations of lead exceeded the ADS 18/2017 MAC (QCC, 2017) for marine protected areas at one station. Nickel concentrations exceeded the ADS 18/2017 MAC (QCC, 2017) for general use areas at station R2_ENV_018. There was no clear spatial distribution pattern that would indicate a point source related to possible anthropogenic activities within the survey area, and the differences recorded are therefore most likely to be associated with natural sediment variations.

Seabed Habitats and Epifauna

Within the survey area, three distinct seabed habitats were identified under Marine Life of the Emirate of Abu Dhabi (MLEAD; John & George, 2001) and Environment Agency – Abu Dhabi (EAD; Al Dhaheri et al., 2017) habitat classifications.

The habitats observed across the survey area were classified under either ‘Sublittoral mixed deposit’ (SLMXD)/"13,000 - Hard Bottom", ‘Sublittoral sand deposit’ (SLSED)/"14,000 - Unconsolidated Bottom” or ‘Seagrass bed’ (SLSED)/"‘12,000 seagrass bed".

‘Sublittoral mixed deposit’ (SLMXD)/"13,000 - Hard Bottom" comprised mainly flat substratum of calcarenite (cemented sand) with occasional coral outcrops including finger corals (*Porites sp.*) boulder corals (Coscinaraeidae and Faviidae) plate corals (*Turbinaria* sp.) dead boulder corals and shell beds of pearl oysters (*Pinctada sp.*). The calcarenite was generally covered by a veneer of sand sediment.

‘Sublittoral sand deposit’ (SLSED)/"14,000 - Unconsolidated Bottom” comprised a mainly flat substratum of sand and gravelly sand with occasional shell deposits and coral rubble fragments.

‘Seagrass bed’/"‘12,000 seagrass bed" comprised a mainly flat substratum of sand and gravelly sand with occasional shell deposits and coral rubble fragments. Seagrasses (*Halophila ovalis* and *Halophila stipulacea*) were present in moderate abundance.

Survey Deliverables

Document Description	ADNOC Document No.	Fugro Document No.
EBS Results Report Route 1	AD41-457-G-24202	OEU021-V01-Route 1
EBS Results Report – Route 2	**AD41-457-G-24203**	**OEU021-V02-Route 2 (This Report)**

Contents

Appendices

Tables in the Main Text

Figures in the Main Text

1. Introduction

1.1 General

Fugro was contracted by ADNOC Offshore (Client) to provide bathymetric, geotechnical and geophysical investigations and environmental baseline surveys (EBS) along two proposed cable routes. This project consists of the development of two independent sub-sea high voltage direct current (HVDC) transmission links complete with onshore and offshore HVDC converter stations in the Emirate of Abu Dhabi. Cable Route 1 will connect Lower Zakum Island G to Mirfa and Route 2 will connect Umm Shaif Long Term Development Plan (LTDP) Island to Shuweihat, within the Zakum field and the Umm Shaif field, respectively.

Offshore survey operations were carried out by the MV DMS Challenger, a non-Dynamic Positioning (DP) vessel on a 24-hour basis, and the Fugro owned and operated survey launch small boat 'Thea' on a daylight only basis. The MV DMS Challenger acted as the mother vessel for the survey launch. Nearshore field operations were carried out onboard the Fugro owned and operated 'Fugro Porter 2' on a daylight only basis.

This document, AD41-457-G-24203, details the results of the EBS undertaken at the proposed Route 2 location. Survey operations along Route 2 were undertaken between 3 April and 30 June 2020.

All survey-related works were carried out in accordance with client requirements and Fugro's standing Survey Work Practices.

1.2 Scope of Work

The scope of work (SoW) for the EBS surveys are detailed in Fugro document P158874 Lightning EBS SoW, Rev.2, 7 May 2020, which covers the methods to be employed to conduct the environmental surveys for Project Lightning.

The EBS was designed to characterise the water column and seabed sediments at 135 stations, including a reference station, along the vicinity of Route 2. This was proposed to be achieved through collection of the following samples and data:

- Water column profiles to characterise water column physical parameters;
- Water column samples for physico-chemical and biological analysis;
- Seabed sediment samples for physico-chemical analysis;
- Seabed photographic data to characterise benthic habitats and epifauna.

1.3 Geodetic and Projection Parameters

1.3.1 Units

- Coordinates are expressed in metres [m];

- Linear measurements are expressed in metres [m];
- Angular units are expressed in degrees [º].

1.3.2 Geodetic Parameters

All coordinates detailed in this report are referenced to the Nahrwan (1967) datum, Universal Transverse Mercator (UTM) projection Zone 39 N, central meridian 51° east (CM 51° E). Table 1.1 provides the detailed geodetic and projection parameters.

Table 1.1: Geodetic parameters (Fugro Starfix NG Navigation Format)

Global Positioning Geodetic Coordinate Reference System Parameters*					
Datum:		WGS84 (ITRF 2000)		Epoch 2000.0	
Ellipsoid:		WGS84		EPSG Code 6326	
Semi-major Axis:		a = 6 378 137.000 0 m			
Semi-minor Axis:		b = 6 356 752.314 2 m			
Inverse Flattening:		1/f = 298.257 223 6			
Local Datum Geodetic Coordinate Reference System Parameters†					
Datum:		Nahrwan 1967		EPSG: 6270	
Ellipsoid:		Clarke 1880 (Mod)		EPSG: 7012	
Semi-major Axis:		a = 6 378 249.145 m			
Semi-minor Axis:		b = 6 356 514.870 m			
Inverse Flattening:		1/f = 293.465 000 0			
Datum Transformation Parameters from WGS84 to Nahrwan 1967‡					
X-axis Translation	+ 233.4 m	X-axis Rotation	0.00 arcsec	Scale Difference:	0.2263 ppm
Y-axis Translation	+ 160.7 m	Y-axis Rotation	0.00 arcsec		
Z-axis Translation	381.5 m	Z-axis Rotation	0.554 arcsec	Fugro Code:	41231
Local Projection Parameters					
Map Projection:		Universal Transverse Mercator		EPSG Code 16039	
Grid System:		UTM Zone 39 N			
Central Meridian:					
Latitude of Origin:					
False Easting:		500 000 m			
False Northing:		0 m			
Scale Factor on Central Meridian:		0.9996			
Units:		Metre			

Notes
* = Fugro Starfix navigation software always uses WGS84 as the primary datum for any geodetic calculations
† = ADNOC Offshore Technical Standard A0-ENG-Y-SP-001 (Rev.0)
‡ = Right-handed coordinate frame rotation convention used by Fugro Starfix navigation software

1.3.3 Vertical Datum

All water depths on charts are reduced to Chart Datum (CD) using predicted tides. Water depths measured while using sampling equipment, such as the drop-down camera and in situ water profiler, are depths below sea level (BSL).

1.3.4 Time

All survey data were logged in UTC. United Arab Emirates local time is UTC + 4 hours.

1.4 Background Information

The Arabian Gulf is a semi-enclosed marginal sea, connected to the Gulf of Oman through the 56 km Strait of Hormuz (Chao et al., 1992). Several biotopes of potential ecological importance are known to occur in the Arabian Gulf, within the region of the Hail and Mubarraz Islands.

Coral communities of the Arabian Gulf occur in two main forms: patch or platform reefs in shallow water, and as fringing reefs around offshore islands and bathymetric highs. Coral reefs support high abundances of a diverse array of fauna. They act as nurseries for commercial fish species and provide shoreline protection from erosion and inundation during storms (EAD, 2008).

Coral reefs in the Arabian Gulf are often patchy in nature, which is reported to be attributed to high rates of sedimentation, and a lack of suitable substrate. The corals of the Arabian Gulf are also species poor when compared to communities in other areas of the world (John & George, 2001). John & George (1998) observed that extremely high sea water temperatures, recorded during El Niño events in 1996 and 1998, were primarily responsible for the coral bleaching and subsequent mass mortality of coral in this part of the world. Coral reefs in the Arabian Gulf are also subject to very high salinity levels, typically 40 parts per thousand (ppt), to 50 ppt, but sometimes up to 60 ppt (John & George, 2001), which add to the rigors of this habitat.

Approximately 540 species of coral are reported to exist in the Arabian Gulf (Basson et al., 1977). The shallow water reefs contain large areas of Acropora with under stories of *Porites, Platygyra* and *Favia* spp. at depths of 1 m to 4 m. Deeper waters are dominated by large Porites colonies, with an under story of Acropora (John & George, 2001; Riegl, 2001; Rezai et al., 2004).

Sheppard et al. (2010) reported changes to the extent of natural marine habitats in the Arabian Gulf and general deterioration of their condition. The authors report this is due to a combination of natural stressors (high temperatures and salinity), the rapid development of the region and lack of cross border collaboration to mitigate environmental impacts.

In the Arabian Gulf only three species of seagrass can tolerate the seasonal variations of water temperature and salinity (*Halodule uninervis, Halophila stipulacea* and *Halophila ovalis*). These seagrasses are important as they support the world's second largest population of dugongs (Erftemeijer & Shuail., 2012). These seagrasses develop in deep soft sediment and encourage sedimentation, leading to the stabilisation of an area for other species to colonise the fine sediment (John & George, 2001).

Macroalgae communities are unable to grow on living corals and are found in shallow areas where corals reef coverage is lower. Where coral reefs dominate an area the brown algae *Lobophora variegata*, hard red coralline algae (Corallinales) and turf algae are found on surrounding rock or damaged/dead corals (John & George, 2001). These areas of macroalgae, coralline algae and turf algae have increased with the demise of the corals (John & George, 2001).

1.5 Environmental Legislation

Several Federal laws and policies regarding the protection of the marine and coastal environment are in place in the UAE. The primary legislation for environmental protection in the UAE is Federal Law No. 24 of 1999 for the environment protection and development of the environment which relates to environmental protection and development, pollution control, conservation of biodiversity, sustainable exploitation and compliance with international and regional conventions.

Other laws relevant to environmental issues are:

- Federal Law 9 was introduced in 1983 in response to a marked decline in desert and marine species in the UAE and regulates the hunting and gathering of various species including the dugong and several seabirds;
- Federal law 23 on the exploitation, protection and development of marine biological resources was introduced in 1999 to regulate fisheries and mitigate overfishing;
- Federal Laws 11 of 2002 and 16 of 2007 respectively regard the regulation and control of international trade in endangered species of wild flora and fauna animal protection. In addition to the latter, an executive order was issued by the Council of Ministers Decree No. 22 of 2003.

A number of international conventions involving the environment also apply in the UAE. Among these, the Convention on Biological Diversity (CBD) is the single most important multi-lateral framework for the conservation of biodiversity. To ensure its implementation, the National Biodiversity Strategy and Action Plan (NBSAP) has been developed to implement global commitment through local actions. The objectives and targets of the Biodiversity Strategy are aligned to the National Biodiversity Strategy and Action Plan 2014 to 2021, which was developed by the Ministry of Climate Change and Environment (MOCCAE) (Al Dhaheri et al., 2017).

In the 1990, the Convention on International Trade in Endangered Species of Fauna and Flora (CITES), which prevents the trade of listed threatened species such as the dugong (CITES website), was also applied in UAE.

In line with the Emirate's commitment to sustainable development and to implementing an ecosystem approach to biodiversity conservation, the Environment Agency – Abu Dhabi (EAD) has identified 12 critical habitats (CH) and 8 environmentally sensitive habitats (ESH) within Abu Dhabi emirate (EAD, 2017). The classification of these habitats as 'critical' or 'environmentally sensitive' is based on the importance of the habitat and its threat status as outlined in the International Union of Conservation of Nature (IUCN) Red List of Ecosystems Criteria for assessing the risk of ecosystem collapse (IUCN, 2020).

Table 1.2 provides a list of sensitive habitats that may occur within the current survey area, along with their designation. Figure 1.1 spatially displays the marine protected areas of Abu Dhabi in relation to the Route 2 survey area.

Table 1.2: Potential sensitive species/habitats, Route 2

Species/Habitat	Habitat Classification Manual Code (2015)	Description	Designation/Status
Coral reef	11,000	Areas characterized by a substrate or environmental setting largely constructed by the reef-building activities of corals and associated organisms	Critical habitat
Seagrass	12,000	Subtidal benthic substrates, generally composed of unconsolidated sediments, and characterised by greater than 10 % cover of rooted vascular seagrass species	Critical habitat
Algae communities	13,010	Seaweeds (macro algae) that are found either in combination with seagrass and reef communities or in a separate community aggregation	Environmentally sensitive

Figure 1.1: Protected areas relevant to the survey area, Route 2

1.6 Regional Standards and Comparable Studies

Sediments and water sample data were compared to the Abu Dhabi Specification ADS 18/2017 Ambient Marine Water and Sediments Maximum Allowable Concentrations (MAC) (QCC, 2017).

Additionally, water sample data were also compared to the internationally recognised United States Environmental Protection Agency (US EPA) criterion continuous concentration (CCC) and criterion maximum concentration (CMC) values (US EPA, 2020), where available. Benzene, toluene, ethylbenzene and xylene (BTEX) concentrations were compared to the Canadian Council of Ministers of the Environment (CCME) Marine Long Term Water Quality Guidelines for the Protection of Aquatic Life values (CCME, 2020).

Sediment sample data were compared to US National Oceanographic and Atmospheric Administration (NOAA) effects range low (ERL) values (Buchman, 2008). Detrimental effects are rarely observed in biota when concentrations are below these values.

2. Environmental Survey Methods

2.1 Survey Strategy

The survey strategy comprised the acquisition of seabed video data to assess the benthic habitats and communities present in the survey area. Sediment sampling (including soil samples taken every 8 km along the proposed route) was to be undertaken to determine the physico-chemical properties of the marine sediments. Water column sampling and water profiling was undertaken to assess water column physico-chemistry at the time of sampling.

Eleven transects were proposed along Route 2. Acquisition of seabed video data was required to assess the benthic habitats and communities.

Tables 2.1 to 2.3 provide the coordinates, data to be acquired and rationale for each location, Figure 2.1 a and b provide a spatial display of the proposed survey positions.

Table 2.1: Proposed camera transects, Route 2

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East					
Station	Point on Line	Easting [m]	Northing [m]	Rationale	Data Acquisition
R2_TR01	SOL	651 764.8	2 680 273.5	Shelly/gravel area with height and higher reflectivity	Video and stills
	EOL	651 886.5	2 680 253.9		
R2_TR02	SOL	651 352.6	2 688 488.8	Sediment boundary between higher/lower reflectivity sediments with some rippling	Video and stills
	EOL	651 267.7	2 688 579.6		
R2_TR03	SOL	639 750.9	2 704 945.1	Areas of varied height with higher reflectivity and mottled areas, as well as possible rocky outcrops	Video and stills
	EOL	639 609.2	2 704 961.4		
R2_TR04	SOL	645 620.6	2 716 711.8	Chosen for spatial distribution an area of higher reflectivity sediments	Video and stills
	EOL	645 685.7	2 716 601.2		
R2_TR05	SOL	664 316.0	2 732 013.8	Sediment boundary between higher/lower reflectivity sediments	Video and stills
	EOL	664 444.8	2 732 098.7		
R2_TR06	SOL	668 628.8	2 742 740.8	Chosen for spatial distribution an area of higher reflectivity sediments	Video and stills
	EOL	668 734.8	2 742 770.2		
R2_TR07	SOL	680 832.6	2 763 383.5	Sediment boundary between higher/lower reflectivity sediments	Video and stills
	EOL	681 004.1	2 763 482.2		

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East					
Station	Point on Line	Easting [m]	Northing [m]	Rationale	Data Acquisition
R2_TR08	SOL	685 068.9	2 771 164.7	Sediment boundary between higher/lower reflectivity sediments with some rippling, also chosen due variation of sediment types at edge and rippling as well as spatial distribution	Video and stills
	EOL	685 130.7	2 771 275.9		
R2_TR08A	SOL	672 151.2	2 750 099.8	Selected as a low turbidity option to TR08 based on bathymetry change and possible sediment boundary	Video and stills
	EOL	672 239.4	2 750 185.3		
R2_TR09	SOL	687 704.6	2 778 984.0	Feature with height and shadow	Video and stills
	EOL	687 816.8	2 779 037.0		
R2_TR10	SOL	670 986.9	2 743 394.1	Reference station selected by ADNOC	Video and stills
	EOL	671 070.4	2 743 322.5		
Notes SOL = Start of line EOL = End of line					

Table 2.2: Proposed environmental sampling stations, Route 2

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East				
Station	Easting [m]	Northing [m]	Rationale	Data/Sample Acquisition
R2_ENV_001	657 091.2	2 671 535.0	Approx. KP 1.000	PC, WP, WS
R2_ENV_002	656 226.7	2 672 037.6	Approx. KP 2.000	PC, WP, WS
R2_ENV_003	655 362.2	2 672 540.3	Approx. KP 3.000	PC, WP, WS
R2_ENV_004	654 498.0	2 673 043.3	Approx. KP 4.000	PC, WP, WS
R2_ENV_005	653 633.7	2 673 546.4	Approx. KP 5.000	PC, WP, WS
R2_ENV_006	652 769.8	2 674 048.1	Approx. KP 6.000	PC, WP, WS
R2_ENV_007	652 203.2	2 674 866.3	Approx. KP 7.000	PC, WP, WS
R2_ENV_008	651 683.2	2 675 716.6	Approx. KP 8.000	PC, WP, WS
R2_ENV_009	651 356.4	2 676 661.7	Approx. KP 9.000	PC, WP, WS
R2_ENV_010	651 602.0	2 677 804.5	Approx. KP 10.000	PC, WP, WS
R2_ENV_011	650 187.6	2 678 676.5	Approx. KP 11.000	PC, WP, WS
R2_ENV_012	651 726.6	2 679 445.7	Approx. KP 12.000	PC, WP, WS

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East				
Station	Easting [m]	Northing [m]	Rationale	Data/Sample Acquisition
R2_ENV_013	651 202.0	2 680 611.0	Approx. KP 13.000	PC, WP, WS
R2_ENV_014	650 655.9	2 681 639.7	Approx. KP 14.000	PC, WP, WS
R2_ENV_015	652 194.8	2 682 409.0	Approx. KP 15.000	PC, WP, WS
R2_ENV_016	651 659.4	2 683 506.0	Approx. KP 16.000	PC, WP, WS
R2_ENV_017	651 124.1	2 684 603.0	Approx. KP 17.000	PC, WP, WS
R2_ENV_018	652 663.0	2 685 372.2	Approx. KP 18.000	PC, WP, WS
R2_ENV_019	652 127.7	2 686 469.2	Approx. KP 19.000	PC, WP, WS
R2_ENV_020	651 524.8	2 687 139.0	Approx. KP 20.000	PC, WP, WS
R2_ENV_021	652 102.5	2 688 649.1	Approx. KP 21.000	PC, WP, WS
R2_ENV_022	650 928.9	2 688 984.7	Approx. KP 22.000	PC, WP, WS
R2_ENV_023	649 755.3	2 689 320.3	Approx. KP 23.000	PC, WP, WS
R2_ENV_024	650 212.5	2 690 978.9	Approx. KP 24.000	PC, WP, WS
R2_ENV_025	649 038.9	2 691 314.5	Approx. KP 25.000	PC, WP, WS
R2_ENV_026	647 865.3	2 691 650.1	Approx. KP 26.000	PC, WP, WS
R2_ENV_027	648 322.6	2 693 308.7	Approx. KP 27.000	PC, WP, WS
R2_ENV_028	647 149.0	2 693 644.3	Approx. KP 28.000	PC, WP, WS
R2_ENV_029	645 975.3	2 693 979.9	Approx. KP 29.000	PC, WP, WS
R2_ENV_030	646 432.6	2 695 638.5	Approx. KP 30.000	PC, WP, WS
R2_ENV_031	645 259.0	2 695 974.1	Approx. KP 31.000	PC, WP, WS
R2_ENV_032	644 085.4	2 696 309.7	Approx. KP 32.000	PC, WP, WS
R2_ENV_033	644 542.6	2 697 968.3	Approx. KP 33.000	PC, WP, WS
R2_ENV_034	643 386.7	2 698 313.9	Approx. KP 34.000	PC, WP, WS
R2_ENV_035	642 195.4	2 698 639.5	Approx. KP 35.000	PC, WP, WS
R2_ENV_036	642 109.0	2 699 857.1	Approx. KP 36.000	PC, WP, WS
R2_ENV_037	640 935.4	2 700 192.7	Approx. KP 37.000	PC, WP, WS
R2_ENV_038	641 392.7	2 701 851.3	Approx. KP 38.000	PC, WP, WS
R2_ENV_039	639 675.4	2 701 745.9	Approx. KP 39.000	PC, WP, WS
R2_ENV_040	640 038.6	2 703 076.4	Approx. KP 40.000	PC, WP, WS
R2_ENV_041	640 914.5	2 703 926.6	Approx. KP 41.000	PC, WP, WS
R2_ENV_042	639 728.0	2 705 172.5	Approx. KP 42.000	PC, WP, WS
R2_ENV_043	640 603.9	2 706 022.6	Approx. KP 43.000	PC, WP, WS
R2_ENV_044	641 479.8	2 706 872.8	Approx. KP 44.000	PC, WP, WS

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East				
Station	Easting [m]	Northing [m]	Rationale	Data/Sample Acquisition
R2_ENV_045	640 293.4	2 708 118.7	Approx. KP 45.000	PC, WP, WS
R2_ENV_046	641 169.3	2 708 968.9	Approx. KP 46.000	PC, WP, WS
R2_ENV_047	642 045.2	2 709 819.1	Approx. KP 47.000	PC, WP, WS
R2_ENV_048	640 858.7	2 711 065.0	Approx. KP 48.000	PC, WP, WS
R2_ENV_049	641 734.6	2 711 915.1	Approx. KP 49.000	PC, WP, WS
R2_ENV_050	642 610.5	2 712 765.3	Approx. KP 50.000	PC, WP, WS
R2_ENV_051	641 951.5	2 714 179.9	Approx. KP 51.000	PC, WP, WS
R2_ENV_052	642 996.5	2 714 354.6	Approx. KP 52.000	PC, WP, WS
R2_ENV_053	644 210.0	2 714 222.5	Approx. KP 53.000	PC, WP, WS
R2_ENV_054	644 412.4	2 715 931.0	Approx. KP 54.000	PC, WP, WS
R2_ENV_055	645 625.9	2 715 798.9	Approx. KP 55.000	PC, WP, WS
R2_ENV_056	646 839.4	2 715 666.8	Approx. KP 56.000	PC, WP, WS
R2_ENV_057	647 041.9	2 717 375.3	Approx. KP 57.000	PC, WP, WS
R2_ENV_058	648 255.3	2 717 243.2	Approx. KP 58.000	PC, WP, WS
R2_ENV_059	649 468.8	2 717 111.2	Approx. KP 59.000	PC, WP, WS
R2_ENV_060	649 671.3	2 718 819.7	Approx. KP 60.000	PC, WP, WS
R2_ENV_061	650 884.8	2 718 687.6	Approx. KP 61.000	PC, WP, WS
R2_ENV_062	652 098.3	2 718 555.5	Approx. KP 62.000	PC, WP, WS
R2_ENV_063	652 300.7	2 720 264.0	Approx. KP 63.000	PC, WP, WS
R2_ENV_064	653 514.2	2 720 131.9	Approx. KP 64.000	PC, WP, WS
R2_ENV_065	654 727.7	2 719 999.8	Approx. KP 65.000	PC, WP, WS
R2_ENV_066	654 930.1	2 721 708.3	Approx. KP 66.000	PC, WP, WS
R2_ENV_067	656 480.6	2 720 962.7	Approx. KP 67.000	PC, WP, WS
R2_ENV_068	657 020.1	2 722 057.7	Approx. KP 68.000	PC, WP, WS
R2_ENV_069	657 559.6	2 723 152.7	Approx. KP 69.000	PC, WP, WS
R2_ENV_070	658 773.1	2 723 020.6	Approx. KP 70.000	PC, WP, WS
R2_ENV_071	659 986.5	2 722 888.5	Approx. KP 71.000	PC, WP, WS
R2_ENV_072	660 189.0	2 724 597.0	Approx. KP 72.000	PC, WP, WS
R2_ENV_073	661 402.5	2 724 464.9	Approx. KP 73.000	PC, WP, WS
R2_ENV_074	662 778.9	2 724 866.1	Approx. KP 74.000	PC, WP, WS
R2_ENV_075	661 758.7	2 726 251.5	Approx. KP 75.000	PC, WP, WS
R2_ENV_076	662 734.6	2 726 984.6	Approx. KP 76.000	PC, WP, WS

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East				
Station	Easting [m]	Northing [m]	Rationale	Data/Sample Acquisition
R2_ENV_077	663 710.6	2 727 717.8	Approx. KP 77.000	PC, WP, WS
R2_ENV_078	662 690.3	2 729 103.1	Approx. KP 78.000	PC, WP, WS
R2_ENV_079	663 666.3	2 729 836.3	Approx. KP 79.000	PC, WP, WS
R2_ENV_080	664 642.2	2 730 569.5	Approx. KP 80.000	PC, WP, WS
R2_ENV_081	663 622.0	2 731 954.8	Approx. KP 81.000	PC, WP, WS
R2_ENV_082	664 597.9	2 732 688.0	Approx. KP 82.000	PC, WP, WS
R2_ENV_083	665 573.9	2 733 421.1	Approx. KP 83.000	PC, WP, WS
R2_ENV_084	664 553.6	2 734 806.5	Approx. KP 84.000	PC, WP, WS
R2_ENV_085	665 529.6	2 735 539.6	Approx. KP 85.000	PC, WP, WS
R2_ENV_086	666 505.5	2 736 272.8	Approx. KP 86.000	PC, WP, WS
R2_ENV_087	665 485.3	2 737 658.1	Approx. KP 87.000	PC, WP, WS
R2_ENV_088	666 461.2	2 738 391.3	Approx. KP 88.000	PC, WP, WS
R2_ENV_089	667 391.1	2 738 983.6	Approx. KP 89.000	PC, WP, WS
R2_ENV_090	666 669.0	2 740 557.1	Approx. KP 90.000	PC, WP, WS
R2_ENV_091	667 775.8	2 741 071.9	Approx. KP 91.000	PC, WP, WS
R2_ENV_092	668 882.5	2 741 586.7	Approx. KP 92.000	PC, WP, WS
R2_ENV_093	668 171.9	2 743 153.5	Approx. KP 93.000	PC, WP, WS
R2_ENV_094	669 278.7	2 743 668.3	Approx. KP 94.000	PC, WP, WS
R2_ENV_095	670 385.5	2 744 183.1	Approx. KP 95.000	PC, WP, WS
R2_ENV_096	669 674.8	2 745 749.9	Approx. KP 96.000	PC, WP, WS
R2_ENV_097	670 781.6	2 746 264.7	Approx. KP 97.000	PC, WP, WS
R2_ENV_098	671 888.4	2 746 779.5	Approx. KP 98.000	PC, WP, WS
R2_ENV_099	671 177.7	2 748 346.3	Approx. KP 99.000	PC, WP, WS
R2_ENV_100	672 284.5	2 748 861.1	Approx. KP 100.000	PC, WP, WS
R2_ENV_101	673 391.3	2 749 375.9	Approx. KP 101.000	PC, WP, WS
R2_ENV_102	672 680.6	2 750 942.7	Approx. KP 102.000	PC, WP, WS
R2_ENV_103	673 787.4	2 751 457.5	Approx. KP 103.000	PC, WP, WS
R2_ENV_104	674 894.2	2 751 972.3	Approx. KP 104.000	PC, WP, WS
R2_ENV_105	674 183.5	2 753 539.1	Approx. KP 105.000	PC, WP, WS
R2_ENV_106	675 290.3	2 754 053.9	Approx. KP 106.000	PC, WP, WS
R2_ENV_107	676 397.1	2 754 568.7	Approx. KP 107.000	PC, WP, WS
R2_ENV_108	675 686.4	2 756 135.5	Approx. KP 108.000	PC, WP, WS

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East				
Station	Easting [m]	Northing [m]	Rationale	Data/Sample Acquisition
R2_ENV_109	676 793.2	2 756 650.3	Approx. KP 109.000	PC, WP, WS
R2_ENV_110	677 900.0	2 757 165.0	Approx. KP 110.000	PC, WP, WS
R2_ENV_111	677 189.3	2 758 731.9	Approx. KP 111.000	PC, WP, WS
R2_ENV_112	678 296.1	2 759 246.7	Approx. KP 112.000	PC, WP, WS
R2_ENV_113	679 402.9	2 759 761.4	Approx. KP 113.000	PC, WP, WS
R2_ENV_114	678 730.4	2 761 334.7	Approx. KP 114.000	PC, WP, WS
R2_ENV_115	679 855.0	2 761 809.3	Approx. KP 115.000	PC, WP, WS
R2_ENV_116	680 979.7	2 762 283.8	Approx. KP 116.000	PC, WP, WS
R2_ENV_117	680 326.0	2 763 875.2	Approx. KP 117.000	PC, WP, WS
R2_ENV_118	681 450.7	2 764 349.7	Approx. KP 118.000	PC, WP, WS
R2_ENV_119	682 575.3	2 764 824.2	Approx. KP 119.000	PC, WP, WS
R2_ENV_120	681 921.6	2 766 415.7	Approx. KP 120.000	PC, WP, WS
R2_ENV_121	683 046.3	2 766 890.2	Approx. KP 121.000	PC, WP, WS
R2_ENV_122	684 170.9	2 767 364.7	Approx. KP 122.000	PC, WP, WS
R2_ENV_123	683 517.3	2 768 956.2	Approx. KP 123.000	PC, WP, WS
R2_ENV_124	684 641.9	2 769 430.7	Approx. KP 124.000	PC, WP, WS
R2_ENV_125	685 766.6	2 769 905.2	Approx. KP 125.000	PC, WP, WS
R2_ENV_126	685 112.9	2 771 496.6	Approx. KP 126.000	PC, WP, WS
R2_ENV_127	686 237.5	2 771 971.1	Approx. KP 127.000	PC, WP, WS
R2_ENV_128	686 176.6	2 773 190.3	Approx. KP 128.000	PC, WP, WS
R2_ENV_129	687 872.7	2 773 258.4	Approx. KP 129.000	PC, WP, WS
R2_ENV_130	687 431.6	2 774 644.7	Approx. KP 130.000	PC, WP, WS
R2_ENV_131	687 072.3	2 775 676.5	Approx. KP 131.000	PC, WP, WS
R2_ENV_132	688 311.9	2 776 581.0	Approx. KP 132.000	PC, WP, WS
R2_ENV_133	687 669.7	2 777 635.3	Approx. KP 133.000	PC, WP, WS
R2_ENV_134	687 599.0	2 778 893.5	Approx. KP 134.000	PC, WP, WS
R2_ENV_REF	671 026.3	2 743 362.9	Reference Station	PC, WP, WS

Notes
PC = Physico-chemical sample
WP = Water profile
WS = Water samples
KP = Kilometre point along the cable route

Table 2.3: Proposed soil sampling stations, Route 2

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East				
Station	Easting [m]	Northing [m]	Rationale	Data/Sample Acquisition
SO_R2_001	651 683.2	2675 716.6	Approx. KP 8.000	Soil sample
SO_R2_002	651 726.6	2 679 445.7	Approx. KP 12.000	Soil sample
SO_R2_003	651 524.8	2 687 139.0	Approx. KP 20.000	Soil sample
SO_R2_004	647 149.0	2 693 644.3	Approx. KP 28.000	Soil sample
SO_R2_005	642 109.0	2 699 857.1	Approx. KP 36.000	Soil sample
SO_R2_006	641 479.8	2 706 872.8	Approx. KP 44.000	Soil sample
SO_R2_007	642 996.5	2 714 354.6	Approx. KP 52.000	Soil sample
SO_R2_008	649 671.3	2 718 819.7	Approx. KP 60.000	Soil sample
SO_R2_009	657 020.1	2 722 057.7	Approx. KP 68.000	Soil sample
SO_R2_010	662 734.6	2 726 984.6	Approx. KP 76.000	Soil sample
SO_R2_011	664 553.6	2 734 806.5	Approx. KP 84.000	Soil sample
SO_R2_012	668 882.5	2 741 586.7	Approx. KP 92.000	Soil sample
SO_R2_013	672 284.5	2 748 861.1	Approx. KP 100.000	Soil sample
SO_R2_014	675 686.4	2 756 135.5	Approx. KP 108.000	Soil sample
SO_R2_015	680 979.7	2 762 283.8	Approx. KP 116.000	Soil sample
SO_R2_016	684 641.9	2 769 430.7	Approx. KP 124.000	Soil sample
SO_R2_017	688 311.9	2 776 581.0	Approx. KP 132.000	Soil sample
SO_R2_REF	671 026.3	2 743 362.9	Reference station	Soil sample
Notes KP = Kilometre point along the cable route				

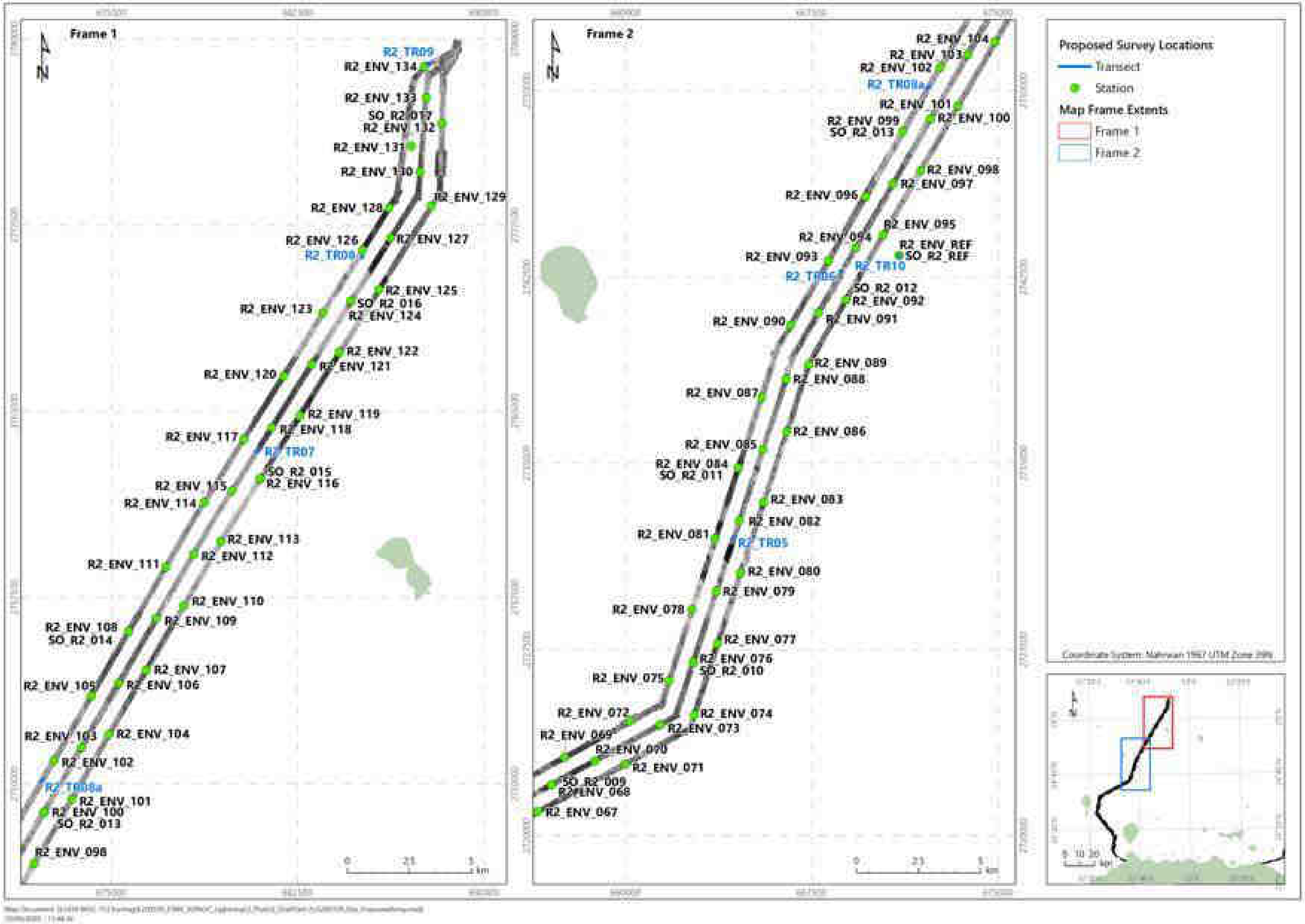


Figure 2.1a: Proposed environmental survey locations overlain on survey area side scan sonar (SSS) mosaic, Route 2

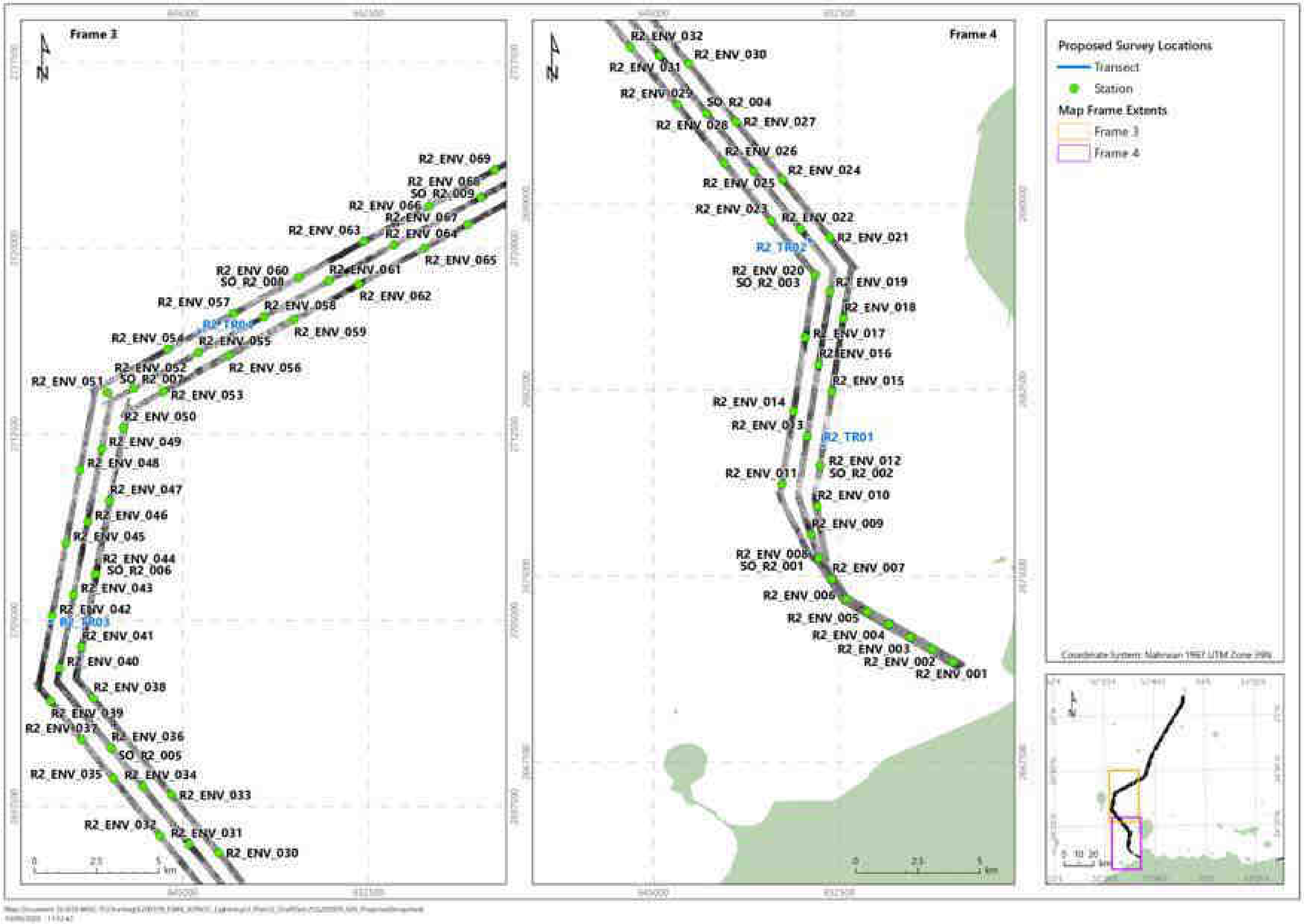


Figure 2.1b: Proposed environmental survey locations overlain on survey area side scan sonar (SSS) mosaic, Route 2

2.2 Survey Methods

2.2.1 Water Column Profiling

Water profiles were to be acquired from sea surface to near seabed during deployment and recovery of a YSI EXO2 conductivity, temperature and depth (CTD) profiler. The water column profiler was set up to record depth, dissolved oxygen (DO), pH, salinity, turbidity and temperature. At each station, the instrument was stabilised in the water column for five minutes before being slowly lowered to the bottom, where a fix was taken. The instrument was then recovered to the surface, resulting in the acquisition of data on both the down-cast and the up-cast.

2.2.2 Water Column Sampling

Water samples were to be collected using a 5 L Niskin water sampler at three water depths for each station. At each station, one water sample was collected approximately 1 m below the surface (‘top’), one approximately halfway (middle) and one from approximately 1 m above the seabed (‘bottom’). Due to water depth limitations in shallow coastal areas, the following criteria was established to determine where the samples would be recovered from:

Where the water depth was:

- < 5 m, a mid-depth sample was taken;
- Between 5 m to 10 m, a bottom and top sample were taken;
- > 10 m, a bottom, mid-depth and top sample were taken.

The water at each depth/station was recovered and decanted into labelled sample bottles provided by the laboratories with subsamples for water quality, hydrocarbons and metals parameters.

2.2.3 Sediment Grab Sampling

Seabed samples were to be acquired using a 0.1 m^2 single van Veen grab with a KC Denmark Day grab as a back-up. At each station, grab samples were to be acquired for physico-chemical analysis (particle size distribution (PSD), metals and hydrocarbons, sediment nutrients and polychlorinated biphenyls (PCBs)).

2.2.4 Seabed Video/Photography

Seabed video and photography were acquired using a Subsea Technology and Rentals SeaSpyder Nano underwater camera.

Seabed video footage was displayed on a computer monitor, and viewed in real time, assisting in the control of the camera in the water. A video overlay was used to overlay a navigation string including the time, date, depth (below sea level) and location (easting and northing). The survey location and station number were also displayed (manually updated).

Video footage and video frame captures (stills) were taken during all deployments. Manual positional fixes were taken for all stills.

The standard height of the camera above the seabed was ~ 0.5 m, which provided an approximate field of view of 1 m of seabed. Two lasers were set up at 6.8 cm apart to provide a scale.

2.3 Analytical Sampling

The following list briefly describes the suites of analyses carried out. Further details of the methods used for the analyses are in Appendix B

- Water column physical parameters were measured using a multiparameter sonde; data are presented in Section 4.
- Water quality was assessed by analysis of a suite of analytes, presented in Section 5;
- Water total hydrocarbon content (THC) by gas chromatography–flame ionisation detection (GC–FID; Section 6.2.1);
- Water 2 to 6 ring aromatic hydrocarbons, by gas chromatography-mass spectrometry (GC-MS; Section 6.2.2);
- Benzene, toluene, ethylbenzene and xylene (BTEX) by headspace gas chromatography with flame ionisation detection (GC–FID–HS) and phenols by GC–MS, Sections 6.2.3 and 6.2.4;
- Water trace and major elements, by inductively coupled plasma-mass spectrometry (ICP-MS; Section 7);
- The results of the sediment characterisation (PSD, total organic carbon, carbonate and nutrient content) are presented in Section 8 and 9;
- Sediment THC by GC-FID is presented in Section 10.2.1;
- Sediment polycyclic aromatic hydrocarbons (PAHs) by GC-MS are presented in Section 10.2.2;
- BTEX by GC-MS are presented in Section 10.2.3;
- PCBs were analysed by gas chromatography with micro-electron capture detection (GC-μECD) (Section 0);
- Sediment trace and major elements, by inductively coupled plasma-optical emission spectrometry (ICP-OES) and ICP-MS are presented in Section 12;
- Habitats were classified in accordance with the Marine Life of the Emirate of Abu Dhabi (MLEAD) and EAD classifications (Section 13).

The results from the soil samples are detailed within Sections 8.3, 0, 0 and 12.3.

3. Field Operations

3.1 Seabed Video/Photography

Digital photographic still and video data were successfully acquired along all proposed camera transects.

Table 3.1 lists the completed environmental camera transects surveyed and details the data acquired from each transect.

Table 3.1: Completed camera transects, Route 2

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East						
Transect		Easting [m]	Northing [m]	Depth [m BSL]	Length [m]	Data Acquisition
R2_TR01	SOL	651 889.9	2 680 252.0	13.4	130	9 min 51 sec 15 stills
	EOL	651 762.1	2 680 274.5	14.0		
R2_TR02	SOL	651 353.8	2 688 485.4	15.9	131	9 min 57 sec 20 stills
	EOL	651 264.3	2 688 581.1	18.8		
R2_TR03	SOL	639 755.2	2 704 942.7	36.0	149	12 min 29 sec 29 stills
	EOL	639 606.8	2 704 960.0	37.1		
R2_TR04	SOL	645 620.5	2 716 713.8	15.3	132	8 min 33 sec 26 stills
	EOL	645 687.9	2 716 600.3	22.5		
R2_TR05	SOL	664 454.5	2 732 103.4	15.1	173	16 min 36 sec 22 stills
	EOL	664 309.3	2 732 009.7	20.7		
R2_TR06	SOL	668 619.8	2 742 737.6	19.0	123	9 min 13 sec 23 stills
	EOL	668 737.7	2 742 772.3	19.8		
R2_TR07	SOL	681 009.5	2 763 485.4	22.6	207	19 min 29 sec 42 stills
	EOL	680 830.5	2 763 381.0	20.7		
R2_TR08A	SOL	672 247.8	2 750 193.8	16.2	129	9 min 52 sec 24 stills
	EOL	672 334.0	2 750 289.3	14.7		
R2_TR09	SOL	687 821.2	2 779 037.7	22.6	131	10 min 26 sec 19 stills
	EOL	687 702.7	2 778 981.4	25.2		
R2_TR10	SOL	671 072.0	2 743 317.1	10.9	120	8 min 55 sec 24 stills
	EOL	670 981.8	2 743 395.9	10.8		
Notes: BSL = Below sea level			SOL = Start of line		EOL = End of line	

3.2 Seabed Sampling

Due to the presence of hard substrate, suitable seabed samples were not obtained from 24 of the 135 proposed sampling stations. At least three grab attempts were made at each station. At 11 stations, limited sediment recovery enabled a partial suite of samples to be obtained. At the remaining 100 stations, a complete suite of physico-chemical subsamples was acquired.

Table 3.2 details the samples acquired and Appendix C presents detailed sampling logs.

Table 3.2: Completed sampling stations, Route 2

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East				
Station	Easting [m]	Northing [m]	Depth [m BSL]	Data/Sample Acquisition
R2_ENV_009	651 354.5	2 676 652.4	13.1	PC
R2_ENV_010	651 600.1	2 677 804.0	12.6	PC
R2_ENV_011	650 186.0	2 678 674.9	13.5	PC
R2_ENV_012	651 726.3	2 679 446.0	12.9	PC
R2_ENV_013	651 210.6	2 680 608.5	16.7	PC
R2_ENV_014	650 654.4	2 681 637.6	18.7	PC
R2_ENV_015	652 195.1	2 682 410.4	19.3	PC
R2_ENV_016	651 660.5	2 683 505.0	21.2	PC
R2_ENV_017	651 122.3	2 684 600.6	23.0	PC
R2_ENV_018	652 661.5	2 685 372.5	25.3	PC
R2_ENV_019	652 127.0	2 686 470.0	19.5	PC
R2_ENV_020	651 524.9	2 687 140.9	17.7	PC
R2_ENV_021	652 095.4	2 688 641.8	19.6	PC
R2_ENV_022	650 929.7	2 688 984.4	23.9	PC
R2_ENV_023	649 755.2	2 689 321.4	17.3	PC
R2_ENV_024	650 211.2	2 690 980.3	16.7	PC
R2_ENV_025	649 038.8	2 691 314.8	21.1	PC
R2_ENV_026	647 872.9	2 691 642.5	27.0	Partial sample
R2_ENV_027	648 327.6	2 693 298.6	30.3	PC
R2_ENV_028	647 148.9	2 693 645.4	31.0	PC
R2_ENV_029	645 974.2	2 693 976.9	25.9	PC
R2_ENV_030	646 431.7	2 695 635.1	27.5	PC
R2_ENV_031	645 258.2	2 695 972.8	33.2	PC
R2_ENV_032	644 087.9	2 696 299.6	20.4	Partial sample

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East				
Station	Easting [m]	Northing [m]	Depth [m BSL]	Data/Sample Acquisition
R2_ENV_033	644 547.9	2 697 960.5	21.1	PC
R2_ENV_034	643 394.0	2 698 308.1	20.6	PC
R2_ENV_035	642 194.0	2 698 647.9	29.7	PC
R2_ENV_036	642 108.5	2 699 856.8	31.4	PC
R2_ENV_037	640 936.9	2 700 192.2	33.0	PC
R2_ENV_038	641 386.3	2 701 857.2	37.5	PC
R2_ENV_039	639 678.1	2 701 735.8	38.5	PC
R2_ENV_040	640 031.8	2 703 067.9	39.7	PC
R2_ENV_041	640 912.7	2 703 925.8	36.5	PC
R2_ENV_042	639 727.7	2 705 173.1	38.1	PC
R2_ENV_043	640 605.4	2 706 022.1	28.6	PC
R2_ENV_044	641 477.6	2 706 873.6	36.5	PC
R2_ENV_045	640 277.3	2 708 040.0	32.0	PC
R2_ENV_046	641 168.4	2 708 968.4	36.9	PC
R2_ENV_047	642 045.2	2 709 817.9	23.0	PC
R2_ENV_048	640 861.5	2 711 056.5	28.9	PC
R2_ENV_049	641 733.9	2 711 916.9	27.7	PC
R2_ENV_050	642 611.1	2 712 767.3	25.2	PC
R2_ENV_051	641 696.6	2 714 454.3	31.5	PC
R2_ENV_052	642 914.7	2 714 298.4	27.8	PC
R2_ENV_053	644 651.6	2 714 463.5	28.9	PC
R2_ENV_055	645 624.1	2 715 788.2	23.3	PC
R2_ENV_056	646 835.1	2 715 665.8	25.0	PC
R2_ENV_057	647 045.7	2 717 382.0	33.8	PC
R2_ENV_058	648 254.4	2 717 242.5	18.5	PC
R2_ENV_060	649 668.0	2 718 811.4	19.6	Partial sample
R2_ENV_062	652 097.0	2 718 545.8	33.8	PC
R2_ENV_063	652 299.6	2 720 264.3	28.7	PC
R2_ENV_064	653 514.4	2 720 140.3	19.9	PC
R2_ENV_066	654 929.4	2 721 707.2	21.7	PC
R2_ENV_067	656 472.0	2 720 968.1	18.8	PC

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East				
Station	Easting [m]	Northing [m]	Depth [m BSL]	Data/Sample Acquisition
R2_ENV_068	657 027.6	2 722 052.0	21.2	PC
R2_ENV_069	657 560.5	2 723 154.6	20.8	PC
R2_ENV_070	658 773.0	2 723 021.7	19.5	Partial sample
R2_ENV_071	659 985.4	2 722 889.3	15.4	PC
R2_ENV_072	660 191.4	2 724 600.2	16.4	PC
R2_ENV_073	661 393.3	2 724 464.9	16.3	PC
R2_ENV_074	662 769.4	2 724 868.5	16.0	PC
R2_ENV_075	661 758.5	2 726 252.5	16.4	PC
R2_ENV_076	662 735.3	2 726 974.4	16.4	PC
R2_ENV_077	663 710.0	2 727 716.0	17.3	PC
R2_ENV_078	662 690.9	2 729 103.7	16.2	PC
R2_ENV_079	663 664.0	2 729 836.9	18.3	PC
R2_ENV_080	664 643.9	2 730 570.7	17.6	PC
R2_ENV_081	663 622.3	2 731 955.7	22.3	PC
R2_ENV_082	664 596.2	2 732 687.7	16.1	PC
R2_ENV_083	665 573.0	2 733 421.2	22.9	PC
R2_ENV_084	664 552.8	2 734 807.0	27.6	PC
R2_ENV_085	665 531.0	2 735 548.0	18.3	PC
R2_ENV_086	666 502.7	2 736 271.9	18.1	PC
R2_ENV_087	665 485.1	2 737 658.4	18.0	PC
R2_ENV_093	668 162.6	2 743 153.2	15.7	Partial sample
R2_ENV_096	670 771.3	2 746 266.3	17.1	PC
R2_ENV_097	673 390.2	2 749 375.9	17.3	Partial sample
R2_ENV_101	673 967.8	2 751 925.3	14.6	Partial sample
R2_ENV_103	674 892.7	2 751 973.9	17.3	PC
R2_ENV_104	674 181.4	2 753 538.2	16.4	Partial sample
R2_ENV_105	675 290.1	2 754 054.0	16.8	Partial sample
R2_ENV_106	676 396.2	2 754 568.0	17.3	PC
R2_ENV_107	675 688.1	2 756 134.0	17.3	PC
R2_ENV_108	676 791.1	2 756 646.5	17.1	Partial sample
R2_ENV_109	677 899.7	2 757 154.8	17.3	PC

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East				
Station	Easting [m]	Northing [m]	Depth [m BSL]	Data/Sample Acquisition
R2_ENV_110	677 187.5	2 758 720.3	17.4	PC
R2_ENV_111	678 295.5	2 759 246.4	18.2	PC
R2_ENV_112	679 401.1	2 759 758.9	18.2	PC
R2_ENV_113	678 731.1	2 761 334.9	18.2	PC
R2_ENV_114	679 854.4	2 761 809.4	17.9	Partial sample
R2_ENV_115	680 979.9	2 762 283.5	19.7	PC
R2_ENV_116	680 324.8	2 763 875.8	22.0	PC
R2_ENV_117	681 451.5	2 764 349.8	21.0	PC
R2_ENV_118	682 575.4	2 764 823.9	24.1	PC
R2_ENV_119	681 921.3	2 766 415.2	25.1	PC
R2_ENV_120	683 056.5	2 766 891.7	23.7	PC
R2_ENV_121	684 170.6	2 767 366.4	24.2	PC
R2_ENV_122	683 516.5	2 768 957.4	23.2	PC
R2_ENV_123	684 640.2	2 769 430.4	21.1	PC
R2_ENV_124	685 766.6	2 769 905.4	24.5	PC
R2_ENV_125	685 111.3	2 771 497.1	26.1	PC
R2_ENV_126	686 236.0	2 771 970.6	25.0	PC
R2_ENV_127	686 175.6	2 773 189.5	25.2	PC
R2_ENV_128	687 872.1	2 773 257.9	26.0	PC
R2_ENV_129	687 431.2	2 774 645.6	25.9	PC
R2_ENV_130	687 011.2	2 777 324.3	26.9	PC
R2_ENV_131	688 311.2	2 776 581.6	26.5	PC
R2_ENV_132	687 667.8	2 777 634.7	23.8	PC
R2_ENV_133	687 602.1	2 778 902.0	28.1	PC
R2_ENV_134	651 354.5	2 676 652.4	26.4	PC

Notes
BSL = Below sea level
PC = Physico-chemical sample

3.3 Water Sampling and Profiling

Water profiles were successfully acquired at all the proposed stations, of which, eight stations water profiles were re-run for data quality purposes.

Water samples were acquired from all proposed stations. Due to water depth limitations, top and bottom samples were acquired at stations R2_ENV_002 to R2_ENV_007.

Table 3.3 provides coordinates of water profiles and water samples acquired within the Route 2 survey area.

Table 3.3: Completed water sampling stations, Route 2

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East				
Station	Easting [m]	Northing [m]	Depth [m BSL]	Data/Sample Acquisition
R2_ENV_001	657 102.0	2 671 511.0	6.5	WS (Bottom, Middle, Top), WP
R2_ENV_002	656 227.5	2 672 038.5	8.0	WS (Bottom, Top), WP
R2_ENV_003	655 359.4	2 672 540.6	8.0	WS (Bottom, Top), WP
R2_ENV_004	654 496.3	2 673 048.4	7.0	WS (Bottom, Top), WP
R2_ENV_005	653 628.7	2 673 541.7	8.0	WS (Bottom, Top), WP
R2_ENV_006	652 765.4	2 674 049.8	8.0	WS (Bottom, Top), WP
R2_ENV_007	652 201.5	2 674 867.6	9.0	WS (Bottom, Top), WP
R2_ENV_008	651 686.0	2 675 693.0	11.0	WS (Bottom, Middle, Top), WP
R2_ENV_009	651 356.3	2 676 660.5	13.1	WS (Bottom, Middle, Top), WP
R2_ENV_010	651 601.6	2 677 805.2	12.6	WS (Bottom, Middle, Top), WP
R2_ENV_011	650 188.1	2 678 678.6	13.6	WS (Bottom, Middle, Top), WP
R2_ENV_012	651 726.9	2 679 446.0	12.9	WS (Bottom, Middle, Top), WP
R2_ENV_013	651 204.3	2 680 611.8	16.8	WS (Bottom, Middle, Top), WP
R2_ENV_014	650 656.4	2 681 639.9	18.7	WS (Bottom, Middle, Top), WP
R2_ENV_015	652 194.8	2 682 412.6	19.4	WS (Bottom, Middle, Top), WP
R2_ENV_016	651 659.6	2 683 505.5	21.2	WS (Bottom, Middle, Top), WP
R2_ENV_017	651 123.5	2 684 601.1	23.0	WS (Bottom, Middle, Top), WP
R2_ENV_018	652 662.5	2 685 371.9	25.2	WS (Bottom, Middle, Top), WP
R2_ENV_019	652 126.5	2 686 468.6	19.6	WS (Bottom, Middle, Top), WP
R2_ENV_020	651 526.2	2 687 139.1	20.1	WS (Bottom, Middle, Top), WP
R2_ENV_021	652 102.2	2 688 650.9	23.9	WS (Bottom, Middle, Top), WP
R2_ENV_022	649 755.2	2 689 319.9	17.4	WS (Bottom, Middle, Top), WP
R2_ENV_023	650 928.4	2 688 984.3	16.6	WS (Bottom, Middle, Top), WP

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East				
Station	Easting [m]	Northing [m]	Depth [m BSL]	Data/Sample Acquisition
R2_ENV_024	650 211.5	2 690 980.0	20.9	WS (Bottom, Middle, Top), WP
R2_ENV_025	647 867.3	2 691 650.3	27.1	WS (Bottom, Middle, Top), WP
R2_ENV_026	649 039.5	2 691 314.0	30.2	WS (Bottom, Middle, Top), WP
R2_ENV_027	648 323.0	2 693 308.4	31.0	WS (Bottom, Middle, Top), WP
R2_ENV_028	647 149.9	2 693 645.0	25.9	WS (Bottom, Middle, Top), WP
R2_ENV_029	645 974.5	2 693 977.3	27.8	WS (Bottom, Middle, Top), WP
R2_ENV_030	646 430.5	2 695 635.1	33.2	WS (Bottom, Middle, Top), WP
R2_ENV_031	644 085.2	2 696 309.8	20.1	WS (Bottom, Middle, Top), WP
R2_ENV_032	644 541.8	2 697 968.3	20.7	WS (Bottom, Middle, Top), WP
R2_ENV_033	645 258.8	2 695 973.6	20.8	WS (Bottom, Middle, Top), WP
R2_ENV_034	643 386.3	2 698 312.8	29.7	WS (Bottom, Middle, Top), WP
R2_ENV_035	642 196.4	2 698 640.1	31.3	WS (Bottom, Middle, Top), WP
R2_ENV_036	642 109.7	2 699 855.7	33.0	WS (Bottom, Middle, Top), WP
R2_ENV_037	640 935.2	2 700 192.8	37.4	WS (Bottom, Middle, Top), WP
R2_ENV_038	641 394.5	2 701 850.4	38.5	WS (Bottom, Middle, Top), WP
R2_ENV_039	639 675.4	2 701 745.5	39.4	WS (Bottom, Middle, Top), WP
R2_ENV_040	640 038.0	2 703 075.5	36.8	WS (Bottom, Middle, Top), WP
R2_ENV_041	640 913.7	2 703 926.2	38.0	WS (Bottom, Middle, Top), WP
R2_ENV_042	639 728.2	2 705 172.5	28.2	WS (Bottom, Middle, Top), WP
R2_ENV_043	640 604.4	2 706 024.1	36.5	WS (Bottom, Middle, Top), WP
R2_ENV_044	641 480.0	2 706 873.3	31.7	WS (Bottom, Middle, Top), WP
R2_ENV_045	640 278.7	2 708 040.0	36.9	WS (Bottom, Middle, Top), WP
R2_ENV_046	641 171.5	2 708 968.7	22.8	WS (Bottom, Middle, Top), WP
R2_ENV_047	640 858.3	2 711 063.8	28.7	WS (Bottom, Middle, Top), WP
R2_ENV_048	642 044.3	2 709 819.7	27.7	WS (Bottom, Middle, Top), WP
R2_ENV_049	641 734.8	2 711 916.1	25.2	WS (Bottom, Middle, Top), WP
R2_ENV_050	642 611.4	2 712 766.1	31.6	WS (Bottom, Middle, Top), WP
R2_ENV_051	641 699.3	2 714 445.9	27.7	WS (Bottom, Middle, Top), WP
R2_ENV_052	642 915.9	2 714 299.6	28.9	WS (Bottom, Middle, Top), WP
R2_ENV_053	644 756.4	2 716 123.1	21.7	WS (Bottom, Middle, Top), WP
R2_ENV_054	644 651.6	2 714 464.3	23.0	WS (Bottom, Middle, Top), WP

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East				
Station	Easting [m]	Northing [m]	Depth [m BSL]	Data/Sample Acquisition
R2_ENV_055	645 623.5	2 715 797.1	24.8	WS (Bottom, Middle, Top), WP
R2_ENV_056	646 837.3	2 715 664.8	33.7	WS (Bottom, Middle, Top), WP
R2_ENV_057	647 040.6	2 717 375.2	26.3	WS (Bottom, Middle, Top), WP
R2_ENV_058	649 468.3	2 717 110.7	19.0	WS (Bottom, Middle, Top), WP
R2_ENV_059	649 671.5	2 718 818.4	19.7	WS (Bottom, Middle, Top), WP
R2_ENV_060	650 884.7	2 718 687.2	21.3	WS (Bottom, Middle, Top), WP
R2_ENV_061	648 255.2	2 717 242.7	33.8	WS (Bottom, Middle, Top), WP
R2_ENV_062	652 300.2	2 720 265.0	28.7	WS (Bottom, Middle, Top), WP
R2_ENV_063	652 097.3	2 718 555.3	19.6	WS (Bottom, Middle, Top), WP
R2_ENV_064	654 727.4	2 719 999.6	18.2	WS (Bottom, Middle, Top), WP
R2_ENV_065	653 513.2	2 720 131.6	21.6	WS (Bottom, Middle, Top), WP
R2_ENV_066	654 929.3	2 721 708.1	18.9	WS (Bottom, Middle, Top), WP
R2_ENV_067	656 479.8	2 720 963.5	21.3	WS (Bottom, Middle, Top), WP
R2_ENV_068	657 020.7	2 722 057.0	21.0	WS (Bottom, Middle, Top), WP
R2_ENV_069	658 773.0	2 723 020.3	18.9	WS (Bottom, Middle, Top), WP
R2_ENV_070	657 559.2	2 723 153.4	15.3	WS (Bottom, Middle, Top), WP
R2_ENV_071	659 985.6	2 722 888.4	16.8	WS (Bottom, Middle, Top), WP
R2_ENV_072	660 190.3	2 724 597.2	16.3	WS (Bottom, Middle, Top), WP
R2_ENV_073	661 403.2	2 724 464.6	16.0	WS (Bottom, Middle, Top), WP
R2_ENV_074	662 781.2	2 724 868.8	16.4	WS (Bottom, Middle, Top), WP
R2_ENV_075	661 758.4	2 726 252.7	16.4	WS (Bottom, Middle, Top), WP
R2_ENV_076	662 734.9	2 726 984.4	17.2	WS (Bottom, Middle, Top), WP
R2_ENV_077	663 710.9	2 727 715.4	16.1	WS (Bottom, Middle, Top), WP
R2_ENV_078	662 689.8	2 729 103.9	18.3	WS (Bottom, Middle, Top), WP
R2_ENV_079	663 665.5	2 729 835.9	17.6	WS (Bottom, Middle, Top), WP
R2_ENV_080	664 641.9	2 730 572.9	22.1	WS (Bottom, Middle, Top), WP
R2_ENV_081	663 622.9	2 731 956.7	16.1	WS (Bottom, Middle, Top), WP
R2_ENV_082	664 597.9	2 732 684.0	22.9	WS (Bottom, Middle, Top), WP
R2_ENV_083	665 573.3	2 733 421.5	27.6	WS (Bottom, Middle, Top), WP
R2_ENV_084	664 553.5	2 734 806.2	18.1	WS (Bottom, Middle, Top), WP
R2_ENV_085	665 528.9	2 735 540.7	17.7	WS (Bottom, Middle, Top), WP

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East				
Station	Easting [m]	Northing [m]	Depth [m BSL]	Data/Sample Acquisition
R2_ENV_086	666 505.5	2 736 274.6	18.7	WS (Bottom, Middle, Top), WP
R2_ENV_087	666 460.6	2 738 391.1	18.8	WS (Bottom, Middle, Top), WP
R2_ENV_088	667 390.8	2 738 984.4	14.8	WS (Bottom, Middle, Top), WP
R2_ENV_089	666 669.8	2 740 557.3	14.1	WS (Bottom, Middle, Top), WP
R2_ENV_090	667 777.0	2 741 073.3	14.7	WS (Bottom, Middle, Top), WP
R2_ENV_091	668 882.3	2 741 587.5	13.2	WS (Bottom, Middle, Top), WP
R2_ENV_092	668 172.4	2 743 153.9	15.7	WS (Bottom, Middle, Top), WP
R2_ENV_093	669 279.0	2 743 667.3	18.1	WS (Bottom, Middle, Top), WP
R2_ENV_094	670 341.4	2 744 094.9	15.4	WS (Bottom, Middle, Top), WP
R2_ENV_095	665 484.4	2 737 657.3	17.0	WS (Bottom, Middle, Top), WP
R2_ENV_096	670 778.7	2 746 264.0	17.2	WS (Bottom, Middle, Top), WP
R2_ENV_097	671 888.4	2 746 778.8	17.1	WS (Bottom, Middle, Top), WP
R2_ENV_098	671 178.1	2 748 346.9	16.1	WS (Bottom, Middle, Top), WP
R2_ENV_099	672 284.4	2 748 861.2	15.8	WS (Bottom, Middle, Top), WP
R2_ENV_100	669 672.2	2 745 752.4	17.7	WS (Bottom, Middle, Top), WP
R2_ENV_101	673 391.6	2 749 375.7	14.8	WS (Bottom, Middle, Top), WP
R2_ENV_102	672 681.3	2 750 942.8	15.4	WS (Bottom, Middle, Top), WP
R2_ENV_103	673 965.4	2 751 924.6	17.3	WS (Bottom, Middle, Top), WP
R2_ENV_104	674 892.4	2 751 973.7	16.5	WS (Bottom, Middle, Top), WP
R2_ENV_105	674 180.9	2 753 536.7	16.8	WS (Bottom, Middle, Top), WP
R2_ENV_106	675 290.5	2 754 053.4	17.1	WS (Bottom, Middle, Top), WP
R2_ENV_107	676 396.9	2 754 568.2	17.4	WS (Bottom, Middle, Top), WP
R2_ENV_108	675 686.1	2 756 135.3	17.0	WS (Bottom, Middle, Top), WP
R2_ENV_109	676 793.1	2 756 649.3	17.3	WS (Bottom, Middle, Top), WP
R2_ENV_110	677 899.5	2 757 166.4	17.5	WS (Bottom, Middle, Top), WP
R2_ENV_111	677 188.7	2 758 730.0	18.3	WS (Bottom, Middle, Top), WP
R2_ENV_112	678 295.1	2 759 245.1	18.1	WS (Bottom, Middle, Top), WP
R2_ENV_113	679 401.0	2 759 761.8	18.1	WS (Bottom, Middle, Top), WP
R2_ENV_114	678 730.7	2 761 335.8	17.8	WS (Bottom, Middle, Top), WP
R2_ENV_115	679 854.5	2 761 809.7	19.7	WS (Bottom, Middle, Top), WP
R2_ENV_116	680 979.6	2 762 284.7	22.0	WS (Bottom, Middle, Top), WP

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East				
Station	Easting [m]	Northing [m]	Depth [m BSL]	Data/Sample Acquisition
R2_ENV_117	680 324.9	2 763 876.4	20.9	WS (Bottom, Middle, Top), WP
R2_ENV_118	681 450.9	2 764 350.2	24.1	WS (Bottom, Middle, Top), WP
R2_ENV_119	682 576.0	2 764 823.4	25.0	WS (Bottom, Middle, Top), WP
R2_ENV_120	681 922.6	2 766 415.8	23.8	WS (Bottom, Middle, Top), WP
R2_ENV_121	683 046.0	2 766 890.3	24.2	WS (Bottom, Middle, Top), WP
R2_ENV_122	684 170.9	2 767 365.3	23.3	WS (Bottom, Middle, Top), WP
R2_ENV_123	683 516.2	2 768 957.0	21.1	WS (Bottom, Middle, Top), WP
R2_ENV_124	684 638.6	2 769 433.1	24.6	WS (Bottom, Middle, Top), WP
R2_ENV_125	685 766.4	2 769 905.2	26.2	WS (Bottom, Middle, Top), WP
R2_ENV_126	685 110.1	2 771 499.7	25.0	WS (Bottom, Middle, Top), WP
R2_ENV_127	686 236.7	2 771 970.8	25.1	WS (Bottom, Middle, Top), WP
R2_ENV_128	686 175.6	2 773 190.5	25.9	WS (Bottom, Middle, Top), WP
R2_ENV_129	687 872.1	2 773 256.1	25.9	WS (Bottom, Middle, Top), WP
R2_ENV_130	687 431.0	2 774 644.7	26.9	WS (Bottom, Middle, Top), WP
R2_ENV_131	687 010.1	2 777 324.3	26.6	WS (Bottom, Middle, Top), WP
R2_ENV_132	688 310.4	2 776 579.0	23.9	WS (Bottom, Middle, Top), WP
R2_ENV_133	687 668.6	2 777 635.0	28.1	WS (Bottom, Middle, Top), WP
R2_ENV_134	687 598.1	2 778 895.3	26.5	WS (Bottom, Middle, Top), WP
R2_ENV_REF	671 026.4	2 743 361.1	11.1	WS (Bottom, Middle, Top), WP

Notes
Coordinates provided for bottom water sample
BSL = Below sea level
WS = Water sample
WP = Water profile

3.4 Soil Sampling

Soil samples were acquired at 13 out of the 17 proposed stations.

Table 3.4 provides the details of soil samples acquired.

Table 3.4: Completed soil sampling, Route 2

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East				
Station	Easting [m]	Northing [m]	Depth [m BSL]	Data/Sample Acquisition
SO_R2_002	651 727.0	2 679 448.3	12.9	Soil sample
SO_R2_003	651 526.6	2 687 141.9	17.8	Soil sample
SO_R2_004	647 148.6	2 693 644.4	30.9	Soil sample
SO_R2_005	642 107.0	2 699 855.5	31.3	Soil sample
SO_R2_006	641 478.6	2 706 875.0	36.6	Soil sample
SO_R2_007	642 915.0	2 714 298.2	27.8	Soil sample
SO_R2_009	657 021.9	2 722 059.5	21.5	Soil sample
SO_R2_010	662 735.0	2 726 973.9	16.4	Soil sample
SO_R2_011	664 554.2	2 734 806.5	27.6	Soil sample
SO_R2_014	675 685.5	2 756 134.8	17.0	Partial soil sample
SO_R2_015	680 979.8	2 762 283.9	22.0	Soil sample
SO_R2_016	684 639.9	2 769 431.4	24.6	Soil sample
SO_R2_017	688 310.7	2 776 581.0	23.8	Soil sample
Notes BSL = Below sea level				

3.5 Bathymetry and Seabed Features

The water depth along Route 2 survey area ranged from 0.0 m to 39.9 m CD.

The seabed features consisted of pockmarks, seabed depressions, seabed scars, ridges, mounds and pinnacles as well as areas of boulders, pitted seabed and areas of sand ripple marks.

Further details can be found in the geophysical report (Fugro, 2020a, b and c).

Figure 3.1a and b displays the actual sampling stations, overlain on side scan sonar (SSS).

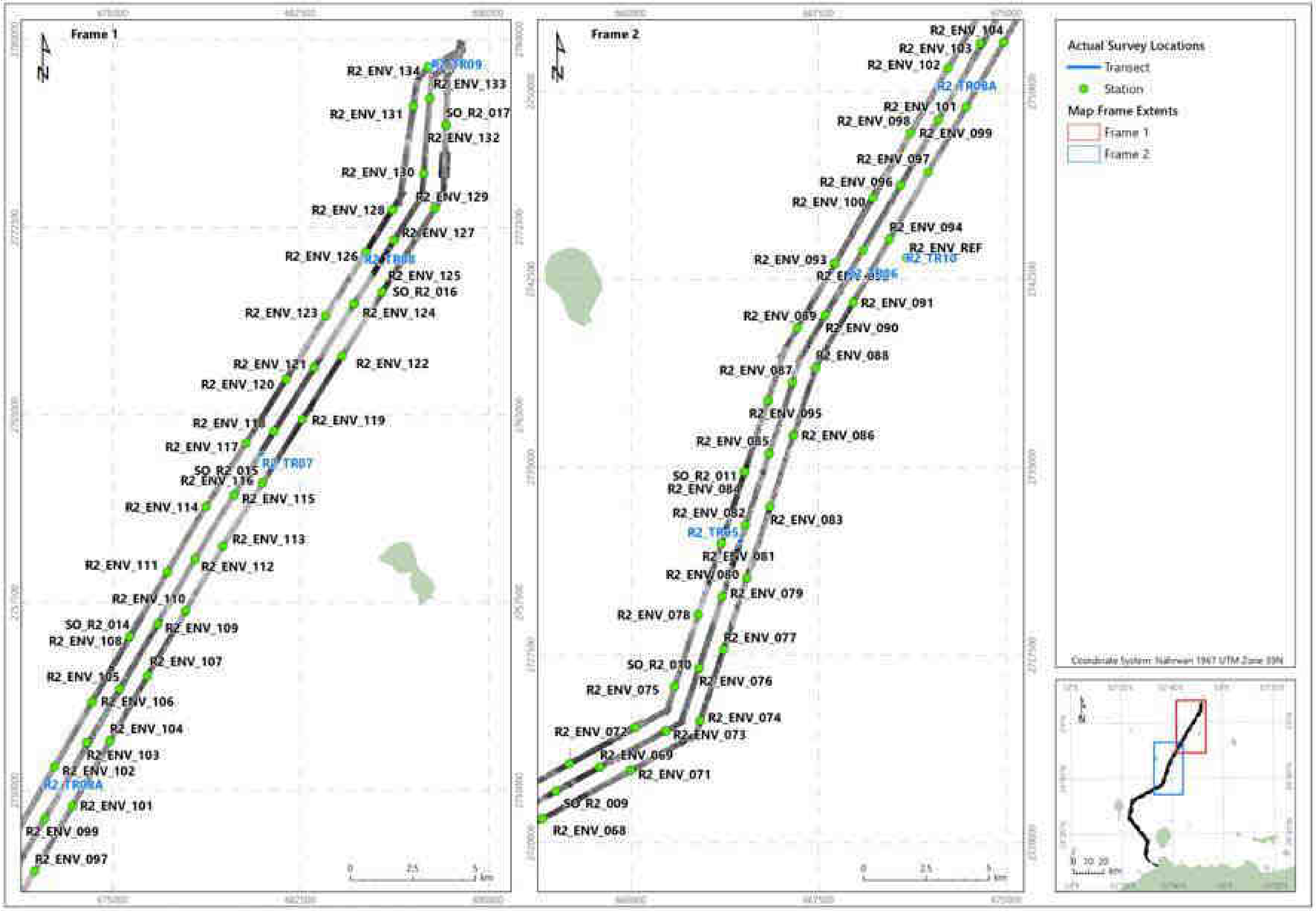


Figure 3.1a: Completed environmental sampling locations overlain on survey area side scan sonar (SSS) mosaic, Route 2

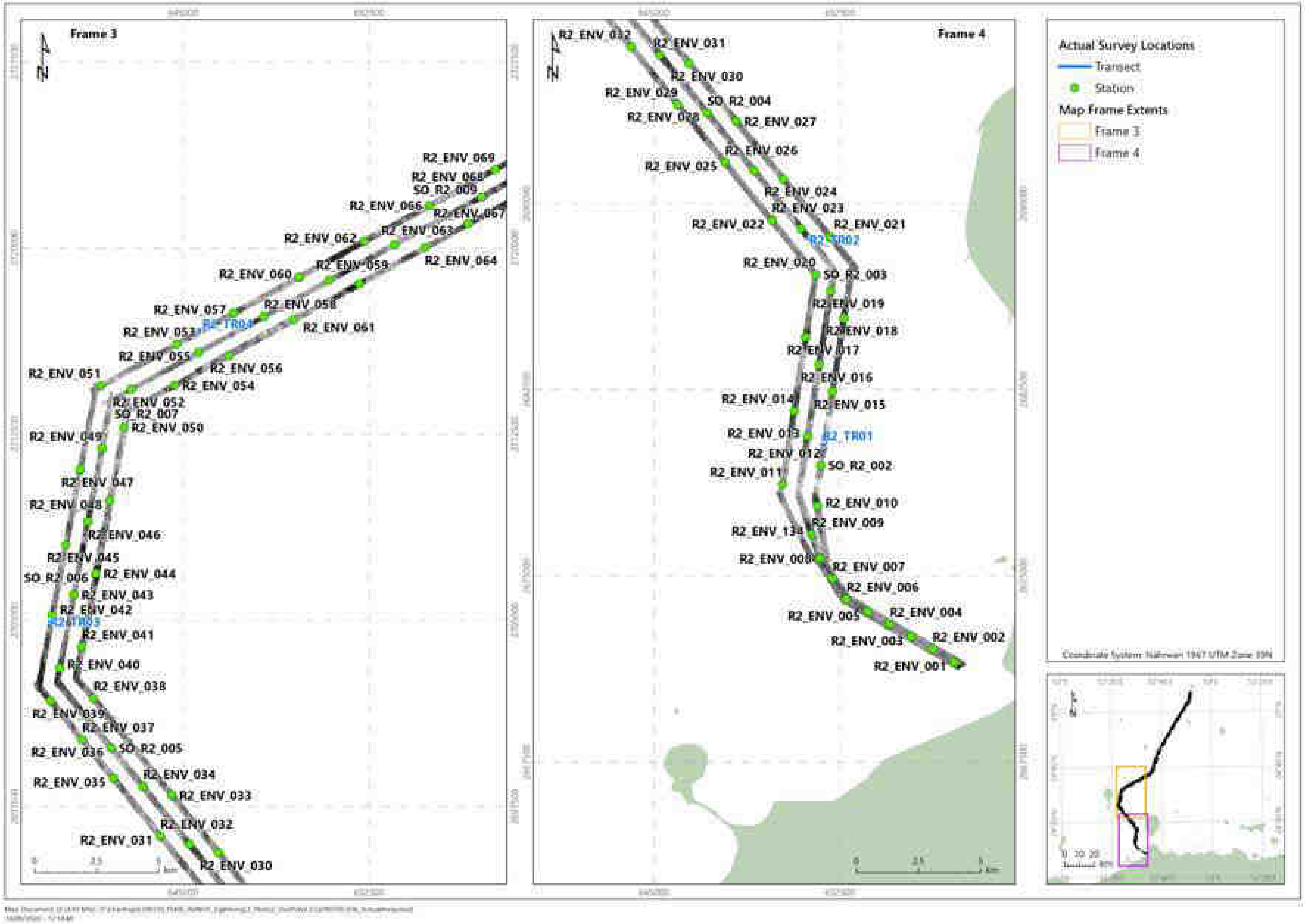


Figure 3.1b: Completed environmental sampling locations overlain on survey area side scan sonar (SSS) mosaic, Route 2

4. Water Column Profiles

4.1 Introduction

Water column profiles were successfully acquired at all 135 stations within the survey area. Profiles were collected using a YSI EXO2 CTD instrument, which was setup to continuously log (0.5s intervals) temperature, salinity, depth, turbidity, DO saturation and pH.

An example water profile has been presented in Figure 4.1 with all water profiles acquired during the survey presented in Appendix D.

4.2 Results

4.2.1 Temperature

Water temperatures within the survey area appeared more consistent at stations with shallower waters (ranged from ca. 23 °C to ca. 25 °C), compared to those in deeper waters (ranged from ca. 23.8 °C to ca. 33.0 °C). No vertical stratification was present, with temperatures remaining broadly constant from sea-surface to seabed.

4.2.2 Salinity

Salinity values ranged from ca. 40 practical salinity unit (PSU) to ca. 46 PSU. Values were generally observed to be consistent throughout the water column for most stations. A slight increase in salinity values was noted in water profiles R2_ENV_076 and R2_ENV_077 from 4 m to 8 m depth.

Salinities in the Gulf typically reach between 40 ppt and 50 ppt (Carpenter et al., 1997), with ranges between 35.2 to 44.0 previously demonstrated in the wider region (Shriadah & Al Ghais, 1999). Whilst units are not clarified; these are likely to be ppt or PSU, with these two units of measurement approximately equivalent to each other. With this assumption, the salinity recorded in the survey area were considered to be within these ranges.

4.2.3 Turbidity

Turbidity values ranged from ca. 0.2 nephelometric turbidity units (NTU) to ca. 2.5 NTU. Some anomalous readings were recorded when the sensor contacted the seabed and these were removed from the dataset. A limited number of readings within the water profiles for R2_ENV_036 (from 15 m to 20 m of depth) and R2_ENV_090 (from 6 m to 14 m of depth), were considered anomalous, as no patterns emerged in the rest of the parameters sampled within these profiles. A clear trend of increasing turbidity with water depth was observed at water profiles R2_ENV_15, R2_ENV_16, R2_ENV_17, R2_ENV_118 to R2_ENV_120, R2_ENV_121, R2_ENV_123, R2-ENV_124, R2_ENV_125 to R2_ENV_129, R2_ENV_131 and R2_ENV_134. The turbidity for these stations increased over the course of the profiles by a factor of two.

4.2.4 Dissolved Oxygen (DO) Saturation

The DO measurements obtained during the profiling operations ranged between ca. 87 % saturation (% sat.) and ca. 110 % sat. Overall, there was a slight reduction in DO with increasing depth at most of the water profiles sampled. A sharp decrease of 10 % in DO was observed at profiles R2_ENV_118 to R2_ENV_120 at around 12 m depth.

4.2.5 pH

pH values ranged from ca. 8.0 to 8.1 with no clear depth-related trends in pH values at any of the stations profiled. The pH values reported in the current survey were within the range of values reported previously in the Arabian Gulf (7.91 to 8.60; Shriadah & Al-Ghais, 1999).

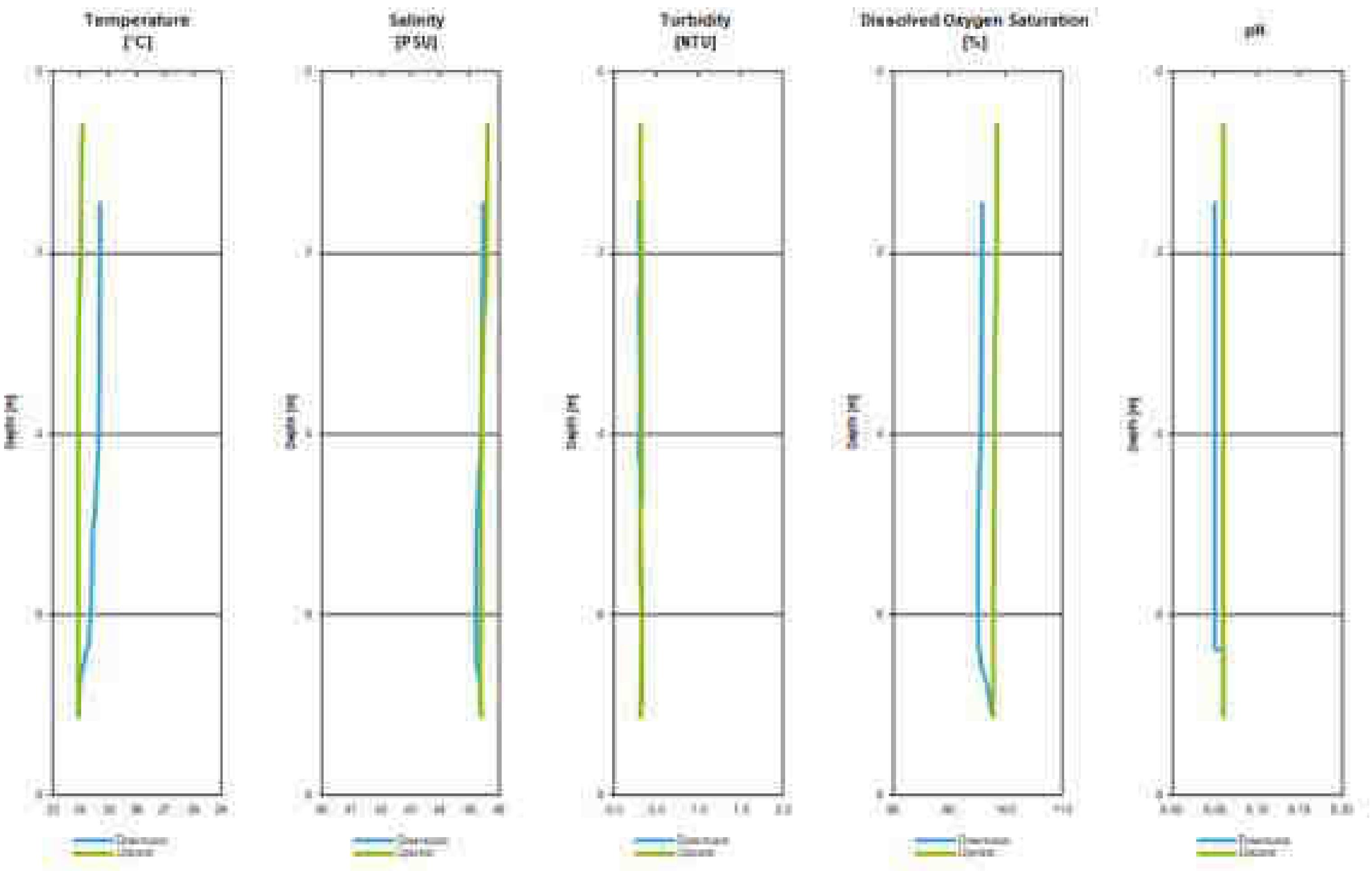


Figure 4.1: Example water profile showing temperature, salinity, turbidity, dissolved oxygen and pH at station R2_ENV_004

5. Inorganic Water Quality Parameters

5.1 Introduction

Water samples were analysed for a suite of inorganic indicators of water quality, presented in Appendix E.1.

Inorganic water quality parameters were compared to their respective ADS 18/2017 MACs (QCC, 2017), US EPA CCC and CMC values (US EPA, 2020). Concentrations below the CCC and CMC values are considered concentrations at which detrimental effects are rarely observed in biota.

Relative standard deviation (RSD) indicates the extent of variability in a dataset in relation to the mean value. The RSD value expresses the standard deviation as a percentage of the mean. For the purpose of this report, RSD of less than 30 % will be considered low variability, 30 % to 70 % will be considered moderate variability and more than 70 % will be considered high variability.

5.2 Results

The pH ranged from 7.8 to 8.2 in all water samples acquired. These values fall within the US EPA CCC range of 6.5 to 8.5.

Total dissolved solid (TDS) concentrations ranged from 45600 mg/L in sample R2_ENV_126-Top to 53800 mg/L in samples R2_ENV_001-Top and R2_ENV_001-Bottom, with a mean of 48800 mg/L and low variability (RSD 4 %).

Turbidity concentrations ranged from below the MRV value (0.1 NTU) in 106 samples to 0.9 NTU in samples R2_ENV_125-Bottom and R2_ENV_128-Bottom, with a mean of 0.2 NTU and high variability (RSD 79 %).

Nitrate concentrations ranged from below the MRV value (0.04 mg/L) in 298 samples to 0.33 mg/L in sample R2_ENV_028-Bottom.

Nitrite concentrations ranged from below the MRV value (0.016 mg/L) all samples except R2_ENV_083-Middle which recorded a concentration of 0.017 mg/L.

Sulphate concentrations ranged from 2940 mg/L in sample R2_ENV_115-Top to 3740 mg/L in samples R2_ENV_056-Bottom, R2_ENV_57-Middle and R2_ENV_072-Middle. The mean concentration was 3300 mg/L and variability was low (RSD 5 %).

Chloride concentrations ranged from 22700 mg/L in seven samples to 27700 mg/L in two samples, with a mean of 25000 mg/L and low variability (RSD 5 %).

Total organic carbon (TOC) concentrations ranged from 1.2 mg/L at six samples to 1.8 mg/L in six samples, with a mean of 1.5 mg/L and low variability (RSD 8 %)

Total suspended solids, nitrogen (ammonia), ammonium, sulphide, total nitrogen, total cyanide, total phosphorus, orthophosphate, silicon, chemical oxygen demand (COD), biochemical oxygen demand (BOD) and total coliforms were all below their respective MRVs for all samples as presented in Appendix E.1.

6. Water Column Hydrocarbons

6.1 Introduction

Seawater samples were analysed for their hydrocarbon content, including volatile petroleum hydrocarbons (VPH), extractable petroleum hydrocarbons (EPH), polycyclic aromatic hydrocarbons (PAHs), BTEX and phenols.

Concentrations of extractable petroleum hydrocarbons were compared to their ADS 18/2017 MACs (QCC, 2017). In the absence of local guideline values, BTEX concentrations were compared to the CCME Marine Long-Term Water Quality Guidelines for the Protection of Aquatic Life values (CCME, 2020).

Appendix F displays the concentrations of volatile petroleum hydrocarbons, extractable petroleum hydrocarbons, dissolved and emulsified oil and free oil.

6.2 Results

6.2.1 Hydrocarbons

Concentrations of VPH (C_5 to C_{10}), dissolved and emulsified oil and free oil were below their respective MRVs in all samples along the Route 2 survey area. Concentrations of EPH (C_{10} to C_{40}) were below the MRV (10 µg/L) in the majority of samples however, in samples R2_ENV_035-Top (230 µg/L), R2_ENV_035-Bottom (17 µg/L), R2_ENV_074-Bottom (85 µg/L) and R2_ENV_103-Top (39 µg/L) these MRV values were exceeded. The MRV values were above the ADS 18/2017 MAC for both general use areas (7.0 µg/L) and marine protected areas (7.0 µg/L) and therefore no meaningful comparison of most of the current data can be made to the reference values. Where the values exceeded the MRV values, they exceeded the ADS 18/2017 MAC for both general use areas and marine protected areas. However, it is possible that these high values are anomalous.

6.2.2 Polycyclic Aromatic Hydrocarbons (PAHs)

Fluoranthene concentrations were below the MRV (0.01 µg/L) in all samples except R2_ENV_008-Top which recorded a concentration of 0.02 µg/L.

Phenanthrene concentrations were below the MRV (0.01 µg/L) in all samples except R2_ENV_009-Bottom, R2_ENV_058-Middle and R2_ENV_112-Top which all recorded concentrations of 0.01 µg/L.

Pyrene concentrations were below the MRV (0.01 µg/L) in all samples except for R2_ENV_008-Top (0.14 µg/L) and R2_ENV_006-Bottom (0.02 µg/L).

The remaining PAH parameters presented in Appendix F.2 were below their respective MRVs for all samples.

6.2.3 Benzene, Toulene, Ethylbenzene and Xylene (BTEX)

Concentrations of BTEX were below their respective MRVs in all samples across the Route 2 survey area (Appendix F.3). Benzene, toluene and ethylbenzene concentrations were below their respective CCME guideline values for the protection of aquatic life (CCME, 2020).

6.2.4 Phenols

Concentrations of phenol and phenolic compounds were below their respective MRVs in all samples across the Route 2 survey area (Appendix F.4).

7. Water Column Major and Trace Elements

7.1 Introduction

Water samples collected from the survey area were analysed for selected elements: aluminium, arsenic, barium, cadmium, chromium, copper, iron, lead, mercury, silver, vanadium and zinc using ICP-MS.

Concentrations of metals in the water samples were compared to their respective ADS 18/2017 MACs (QCC, 2017), US EPA CCC and CMC values (US EPA, 2020).

Appendix G.1 summarises the concentrations of major and trace elements in the water samples from the Route 2 survey area.

7.2 Results

Appendix G.1 summarises the concentrations of major and trace elements in the water samples from the Route 2 survey area.

Aluminium concentrations ranged from below the MRV (0.005 mg/L) in 355 samples to 0.090 mg/L in sample R2_ENV_083-Top.

Arsenic concentrations ranged from below the MRV (0.0005 mg/L) in 70 samples to 0.0048 mg/L in sample R2_ENV_052-Bottom, with a mean of 0.0018 mg/L and moderate variability (RSD 57 %). Concentrations of arsenic were below the US EPA CCC threshold of 0.036 mg/L in at all samples.

Barium concentrations ranged from below the MRV (0.0005 mg/L) in 16 samples to 0.183 mg/L (sample R2_ENV_009-Middle), with a mean of 0.0046 mg/L and high variability (RSD 202 %).

Cadmium concentrations were below the MRV (0.0001 mg/L) in all samples except 3 samples with a concentration of 0.0001 mg/L, 2 samples with a concentration of 0.0002 mg/L, one sample with a concentration of 0.0004 mg/L (sample R2_ENV_088-Top) and one sample with a concentration of 0.0008 mg/L (sample R2_ENV_129-Bottom). The cadmium concentration was above the ADS 18/2017 MAC for both general use areas (0.0003 mg/L) in both samples R2_ENV_088-Top and R2_ENV_129-Bottom, and marine protected areas (0.0007 mg/L) in sample R2_ENV_129-Bottom, however, both the concentrations were below the US EPA CCC threshold of 0.0079 mg/L and US EPA CMC threshold of 0.033 mg/L.

Chromium concentrations ranged from below the MRV (0.0001 mg/L) in 217 samples to 0.0284 mg/L (sample R2_ENV_098-Bottom). Concentrations of chromium were above the ADS 18/2017 MAC for both general use areas (0.0002 mg/L) and marine protected areas (0.0002 mg/L) in 162 samples but below the US EPA CCC threshold of 0.050 mg/L and US EPA CMC threshold of 1.100 mg/L.

Copper concentrations ranged from below the MRV (0.0003 mg/L) in 390 samples to 0.0210 mg/L (sample R2_ENV_004-Bottom). Concentrations of copper were above the ADS 18/2017 MACs for both general use areas (0.0030 mg/L) and marine protected areas (0.0030 mg/L) and the US EPA CCC threshold of 0.0031 mg/L in 4 samples (samples R2_ENV_004-Bottom, R2_ENV_079-Top, R2_ENV_083-Top and R2_ENV_084-Bottom), and above the US EPA CMC threshold of 0.0048 mg/L in two samples (samples R2_ENV_004-Bottom and R2_ENV_079-Top).

Iron concentrations were below the MRV (0.02 mg/L) in all samples, except for 45 samples where the concentrations ranged from 0.01 mg/L to 0.21 mg/L.

Lead concentrations were below the MRV (0.0002 mg/L) in all but 11 samples, with the highest concentration reported in sample R2_ENV_100-Middle (0.0017 mg/L). The lead concentrations were below US EPA CCC threshold of 0.0081 mg/L in all samples.

Vanadium concentrations ranged from 0.0002 mg/L in sample R2_ENV_088-Top to 0.0039 mg/L in samples R2_ENV_001-Middle and R2_ENV_001-Bottom, with a mean concentration of 0.0020 mg/L and moderate variability (RSD 30 %).

Zinc concentrations ranged from below the MRV (0.002 mg/L) in 187 samples to 0.130 mg/L in sample R2_ENV_095-Middle, with a mean concentration of 0.006 mg/L and high variability (RSD 176 %). Zinc concentrations in five samples were reported as < 0.010 mg/L. Concentrations of zinc were above the ADS 18/2017 MAC for general use areas (0.0150 mg/L) and for marine protected areas (0.0150 mg/L) in 29 samples. The zinc concentration in sample R2_ENV_095-Middle (0.130 mg/L) exceeded the US EPA CCC threshold of 0.081 mg/L and the US EPA CMC threshold of 0.090 mg/L.

Concentrations of mercury and silver were all below their respective MRVs (presented in Appendix G.1) at all stations across the survey area and were below their respective ADS 18/2017 MAC for both general use and marine protected areas, as well as the US EPA CCC and CMC thresholds (US EPA, 2020).

8. Sediment Characterisation

8.1 Introduction

Sediment samples were analysed for their PSD using a combination of two techniques; sieve analysis for all material retained by a 1 mm sieve followed by laser diffraction analysis of the finer material. The results of the particle size analysis were treated statistically to characterise the sediment type (Wentworth Scale and Folk) and particle size homogeneity (sorting index).

Carbonate content was analysed with the following method. A pre-dried aliquot of the sediment was weighed and then treated with hydrochloric acid to remove inorganic carbon in the form of carbonate. Fresh acid was added until all effervescence ceased; the sediment was then washed over a glass-fibre filter and the residue dried to a constant weight.

The TOC content was determined by combustion with Non-Dispersive Infrared Detection (NDIR).

Appendix B provides full details of the analytical techniques employed and Appendix H.1 displays the histograms of particle size class summary for each station.

8.2 Sediment Sample Results

Appendix H.2 presents the sediment characteristics, including granulometry, TOC and carbonate content across the Route 2 survey area.

Figure 8.1 presents the granulometry of the sediments at each station, whilst Figure 8.2a and b presents the fractional composition of the sediments spatially across the Route 2 survey area.

The TOC content across Route 2 ranged from 0.09 % at station R2_ENV_115 to 0.70 % at station R2_ENV_018 (mean 0.25 %) with moderate interstation variability (RSD 43 %).

The carbonate content across Route 2 ranged from 84.0 % at station R2_ENV_022 to 99.7 % at station R2_ENV_112 (mean 95.9 %), with low interstation variability (RSD 3 %).

When fractional composition (Appendix H.2 and Figure 8.1) was considered, the sand fraction dominated the sediment at most stations and ranged from 25.18 % at station R2_ENV_018 to 96.38 % at station R2_ENV_071 (mean 77.02 %) with low variability (RSD 18 %). The highest percentage of the gravel fraction recorded within a station sampled across the survey area was 33 %, whereas the fines fraction dominated 3 stations (stations R2_ENV_017, R2_ENV_018 and R2_ENV_040). The Folk descriptions classify sediment by the relative proportion of sediment fractions (gravel, sand and fines). The Folk description (British Geological Survey (BGS) modified) classified 33 stations as slightly gravelly muddy sand, 30 stations as gravelly muddy sand, 22 stations as slightly gravelly sand, 13 stations as gravelly sand, 1 station as muddy sandy gravel and 3 stations as slightly gravelly sandy mud.

The fractional composition of the Route 2 survey area was comparable to previously reported data from the Zakum area, which recorded sand as the dominant sediment type (mean 82 %; Blue Sea Environmental Consultants, 2011).

Appendix H.3 presents the physical composition of the sediments (Folk and Ward) at each station across the Route 2 survey area. The mode (or modal distribution) represents the peak of the particle size frequency distribution. Within the Route 2 survey area, distributions were mixed, with 60 stations displaying a unimodal distribution, 33 stations had a bimodal distribution and 9 stations displayed a trimodal distribution.

The mean particle size (µm) (Appendix H.3) across the Route 2 survey area ranged from 23 µm at station R2_ENV_018 to 1004 µm at station R2_ENV_ 110 (mean 318 µm), with moderate interstation variability (RSD 56 %).

The Wentworth description, assigned from mean particle size, categorised sediments across the Route 2 survey area as medium sand (45 stations), fine sand (26 stations), coarse sand (14 stations), very fine sand (12 stations), coarse silt (3 stations), very coarse sand (1 station) and medium silt (1 station).

The sorting coefficient of particle size indicates the degree of spread of individual size classes about the mean and provides the basis of a sorting index, in which low values indicate sediments to be fairly homogeneous (well sorted) while high values suggest a relatively large scatter of particle sizes about the mean (poorly sorted). Across the Route 2 survey area 63 stations were described as very poorly sorted, 33 stations were described as poorly sorted and 6 stations were described as moderately sorted.

Skewness indicates the tendency of particle size classes to be skewed about the mean, either towards coarser sediment (negative skewness) or finer sediment (positive skewness). Across the Route 2 survey area skewness ranged from -0.57 µm at station R2_ENV_ 110 to 0.50 µm at station R2_ENV_052 (mean 0.20 µm). Thirty-eight stations were described as fine skewed, thirty-seven as very fine skewed, twenty-two as symmetrical, three as coarse skewed and two as very coarse skewed.

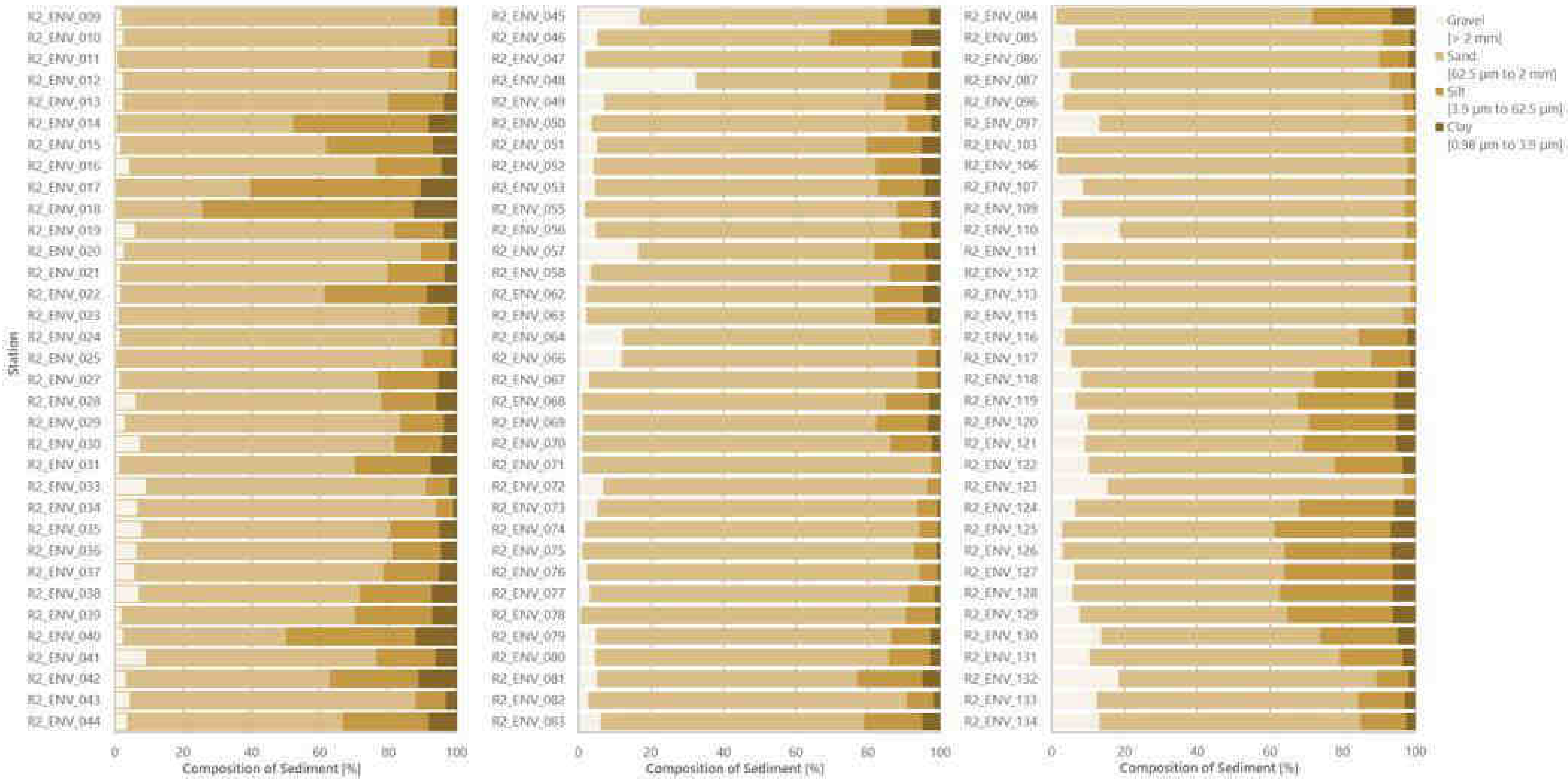


Figure 8.1: Sediment Composition, Route 2

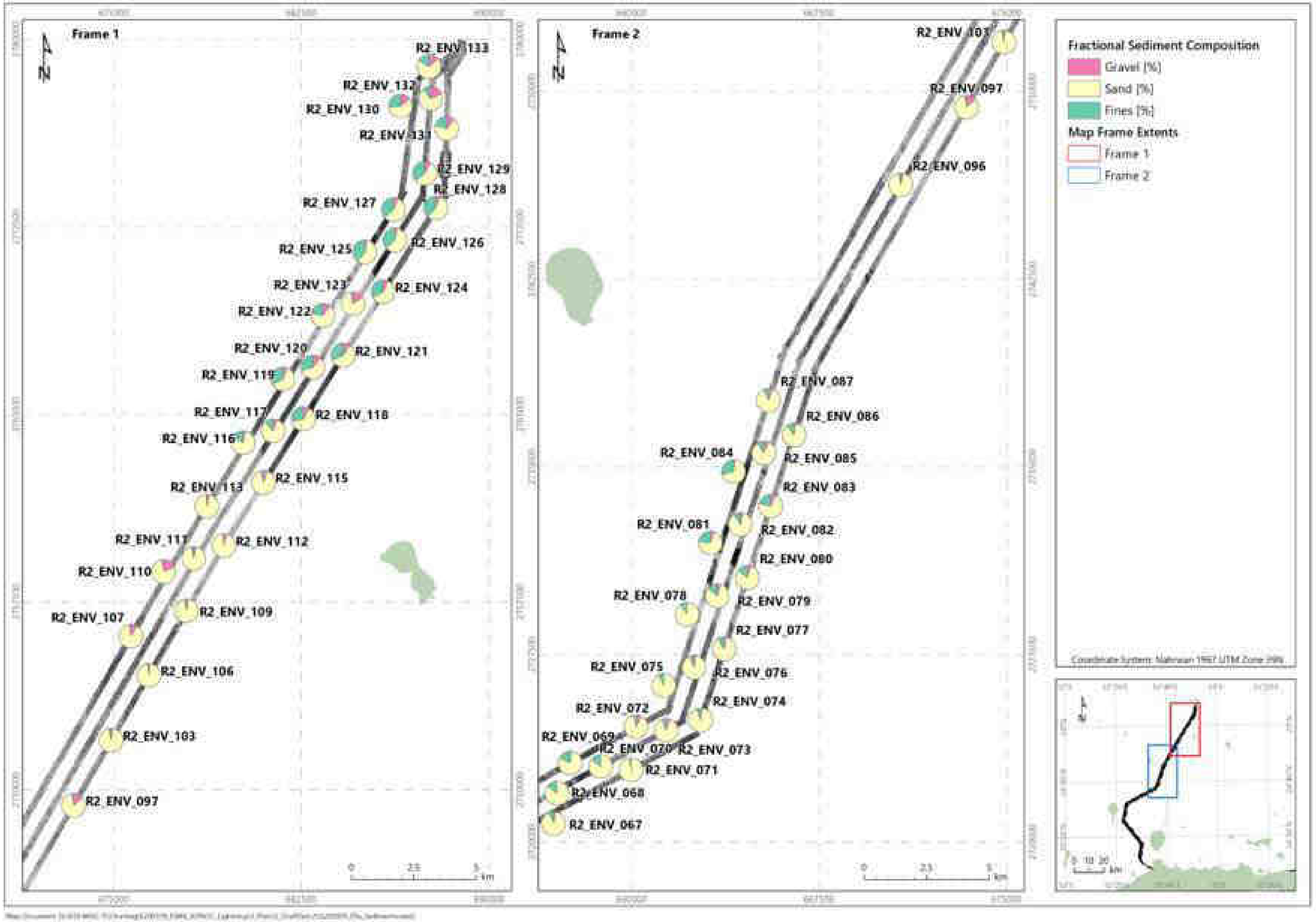


Figure 8.2a: Sediment fractional composition overlain on side scan sonar (SSS), Route 2

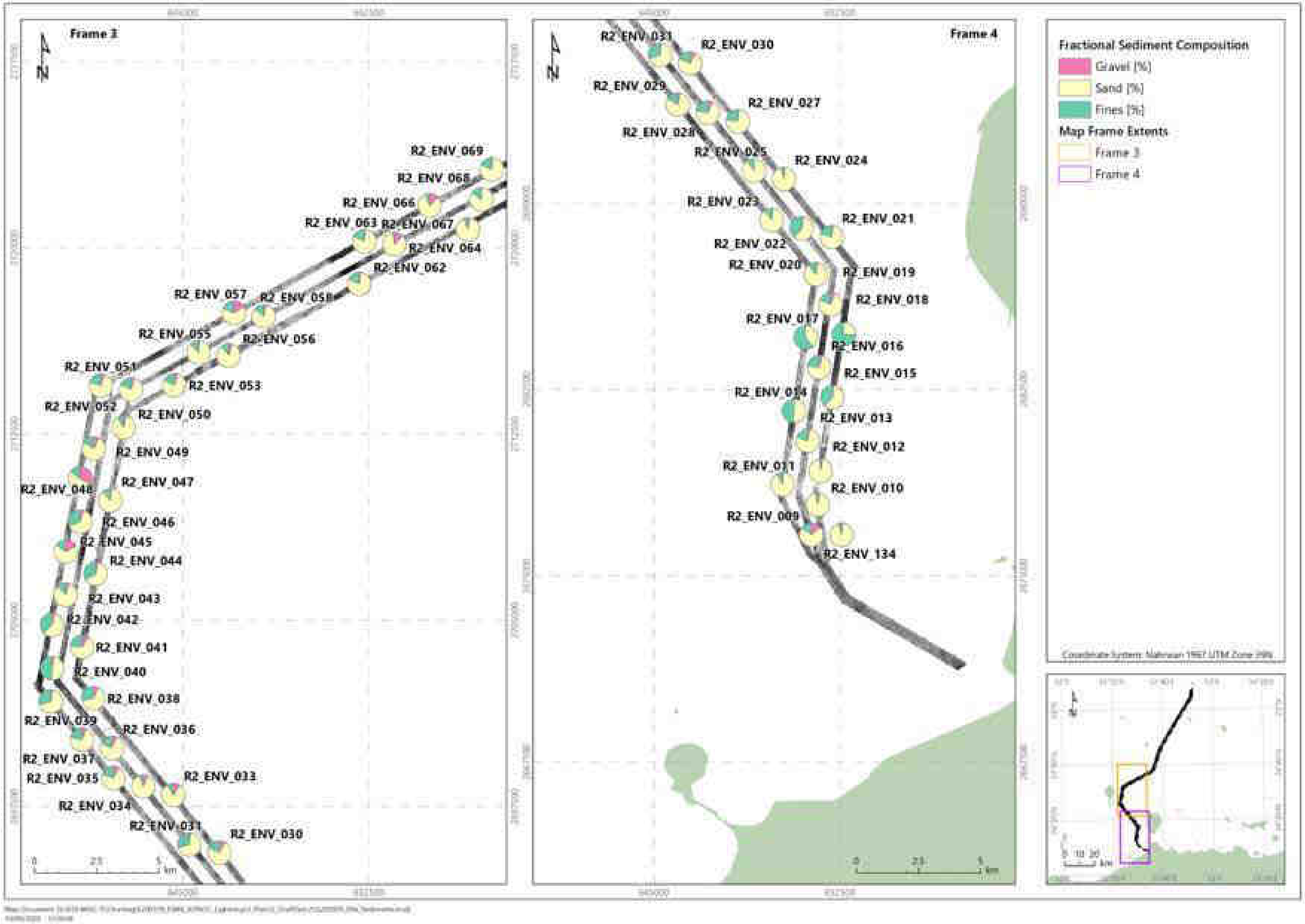


Figure 8.2b: Sediment fractional composition overlain on side scan sonar (SSS), Route 2

8.3 Soil Sample Results

The proportion of TOC within the soil samples across the Route 2 survey area ranged from 0.14 % at station SO_R2_002 to 0.37 % at station SO_R2_016 (mean 0.23 %) with moderate interstation variability (RSD 35 %).

Table 8.1: Soil sample TOC content Route 2

Station	TOC [%]
SO_R2_002	0.14
SO_R2_003	0.16
SO_R2_004	0.23
SO_R2_005	0.20
SO_R2_006	0.31
SO_R2_007	0.16
SO_R2_009	0.25
SO_R2_010	0.18
SO_R2_011	0.36
SO_R2_015	0.27
SO_R2_016	0.37
SO_R2_017	0.16
Minimum	**0.14**
Maximum	**0.37**
Mean	**0.23**
Standard Deviation	**0.080**
RSD [%]	**35**
Upper Zakum Pipelines Replacement Project EBS (NPCC, 2019)*	
Mean	**0.4692**

Notes
Concentrations expressed as percentage (%) of dry sediment
TOC = Total organic carbon
RSD = Relative standard deviation
* = Mean taken from Environmental Baseline Survey Upper Zakum Replacement Project Phase 1 (NPCC, 2019)

9. Sediment Nutrients

9.1 Introduction

Seabed sediments were analysed for silicon, phosphorus, total cyanide and total nitrogen.

Silicon and phosphorus were determined on an air dried and ground sample following an aqua regia digest with analysis by ICP-OES. Total cyanide was determined on wet sediment by segmented flow analysis with colorimetric detection. Total nitrogen was determined on an air dried and ground sediment sample by an elemental analyser.

9.2 Sediment Sample Results

Table 9.1 presents the concentration of nutrients in the surface sediment samples across the Route 2 survey area.

Silicon concentrations ranged from 13 mg/kg at station R2_ENV_011 to 869 mg/kg at station R2_ENV_040, with a mean of 209 mg/kg and high variability (RSD 71 %).

Phosphorus concentrations ranged from 16 mg/kg at station R2_ENV_121 to 634 mg/kg at station R2_ENV_042, with a mean of 365 mg/kg and low variability (RSD 27 %).

Total cyanide concentrations were below the MRV (0.5 mg/kg) at all stations sampled.

Total nitrogen concentrations ranged from below the MRV (0.04 %, 0.05 % and 0.06 %) at 33 stations to 0.11 % at stations R2_ENV_018 and R2_ENV_126, with a mean of 0.05 % and moderate variability (RSD 48 %).

Table 9.1: Sediment nutrient concentrations, Route 2

Station	Silicon*	Phosphorus*	Total Cyanide*	Total Nitrogen†
R2_ENV_009	107	170	< 0.5	< 0.04
R2_ENV_010	128	201	< 0.5	< 0.04
R2_ENV_011	72	220	< 0.5	0.05
R2_ENV_012	312	245	< 0.5	< 0.04
R2_ENV_013	72	220	< 0.5	0.05
R2_ENV_014	92	292	< 0.5	0.09
R2_ENV_015	70	256	< 0.5	0.07
R2_ENV_016	66	290	< 0.5	0.08
R2_ENV_017	97	311	< 0.5	0.10
R2_ENV_018	91	306	< 0.5	0.11
R2_ENV_019	83	281	< 0.5	0.06
R2_ENV_020	255	278	< 0.5	0.04
R2_ENV_021	78	298	< 0.5	0.06

Station	Silicon*	Phosphorus*	Total Cyanide*	Total Nitrogen†
R2_ENV_022	102	300	< 0.5	0.10
R2_ENV_023	104	297	< 0.5	0.06
R2_ENV_024	91	245	< 0.5	0.05
R2_ENV_025	99	270	< 0.5	0.05
R2_ENV_026	59	347	< 0.5	0.06
R2_ENV_027	808	385	< 0.5	0.05
R2_ENV_028	329	399	< 0.5	0.05
R2_ENV_029	478	314	< 0.5	0.04
R2_ENV_030	334	342	< 0.5	< 0.04
R2_ENV_031	264	407	< 0.5	0.07
R2_ENV_033	584	328	< 0.5	0.05
R2_ENV_034	387	326	< 0.5	0.05
R2_ENV_035	350	401	< 0.5	0.05
R2_ENV_036	160	441	< 0.5	0.04
R2_ENV_037	357	437	< 0.5	0.04
R2_ENV_038	368	360	< 0.5	0.05
R2_ENV_039	399	483	< 0.5	0.05
R2_ENV_040	869	570	< 0.5	0.08
R2_ENV_041	562	563	< 0.5	0.04
R2_ENV_042	118	634	< 0.5	0.06
R2_ENV_043	150	430	< 0.5	< 0.04
R2_ENV_044	183	477	< 0.5	0.06
R2_ENV_045	169	476	< 0.5	< 0.04
R2_ENV_046	162	479	< 0.5	0.05
R2_ENV_047	163	347	< 0.5	< 0.04
R2_ENV_048	357	337	< 0.5	0.05
R2_ENV_049	297	351	< 0.5	< 0.04
R2_ENV_050	348	423	< 0.5	< 0.04
R2_ENV_051	246	467	< 0.5	0.04
R2_ENV_052	301	414	< 0.5	< 0.04
R2_ENV_053	289	404	< 0.5	< 0.04
R2_ENV_055	196	456	< 0.5	< 0.04
R2_ENV_056	194	455	< 0.5	0.05
R2_ENV_057	150	380	< 0.5	0.05
R2_ENV_058	227	445	< 0.5	0.05
R2_ENV_062	128	455	< 0.5	0.05
R2_ENV_063	154	440	< 0.5	0.05
R2_ENV_064	145	159	< 0.5	0.05

Station	Silicon*	Phosphorus*	Total Cyanide*	Total Nitrogen†
R2_ENV_066	132	374	< 0.5	< 0.04
R2_ENV_067	138	341	< 0.5	< 0.05
R2_ENV_068	201	371	< 0.5	0.06
R2_ENV_069	180	408	< 0.5	0.06
R2_ENV_070	112	364	< 0.5	0.05
R2_ENV_071	141	208	< 0.5	< 0.05
R2_ENV_072	218	296	< 0.5	< 0.04
R2_ENV_073	220	275	< 0.5	< 0.05
R2_ENV_074	168	286	< 0.5	< 0.05
R2_ENV_075	149	325	< 0.5	< 0.05
R2_ENV_076	365	335	< 0.5	0.04
R2_ENV_077	167	289	< 0.5	< 0.05
R2_ENV_078	200	347	< 0.5	0.06
R2_ENV_079	172	314	< 0.5	0.05
R2_ENV_080	117	242	Insufficient sample	< 0.05
R2_ENV_081	127	350	< 0.5	0.06
R2_ENV_082	108	328	< 0.5	< 0.05
R2_ENV_083	156	385	< 0.5	0.06
R2_ENV_084	330	410	< 0.5	0.07
R2_ENV_085	166	328	< 0.5	< 0.06
R2_ENV_086	149	317	< 0.5	< 0.05
R2_ENV_087	160	375	< 0.5	< 0.05
R2_ENV_096	218	352	< 0.5	< 0.05
R2_ENV_097	99	356	< 0.5	0.05
R2_ENV_103	209	290	< 0.5	0.05
R2_ENV_106	240	316	< 0.5	0.04
R2_ENV_107	496	390	< 0.5	0.10
R2_ENV_109	44	437	< 0.5	0.08
R2_ENV_110	16	389	< 0.5	0.07
R2_ENV_111	13	344	< 0.5	0.06
R2_ENV_112	111	435	< 0.5	0.05
R2_ENV_113	96	392	< 0.5	< 0.05
R2_ENV_115	118	391	< 0.5	< 0.05
R2_ENV_116	211	334	< 0.5	0.06
R2_ENV_117	65	408	< 0.5	< 0.05
R2_ENV_118	106	366	< 0.5	0.07
R2_ENV_119	58	379	< 0.5	0.09
R2_ENV_120	475	349	< 0.5	0.08

Station	Silicon*	Phosphorus*	Total Cyanide*	Total Nitrogen†
R2_ENV_121	142	16	< 0.5	0.09
R2_ENV_122	422	314	< 0.5	0.09
R2_ENV_123	287	343	< 0.5	< 0.05
R2_ENV_124	305	452	< 0.5	0.08
R2_ENV_125	170	578	< 0.5	0.09
R2_ENV_126	153	584	< 0.5	0.11
R2_ENV_127	155	554	< 0.5	0.09
R2_ENV_128	261	311	< 0.5	0.08
R2_ENV_129	269	346	< 0.5	0.08
R2_ENV_130	199	467	< 0.5	0.07
R2_ENV_131	82	515	< 0.5	0.06
R2_ENV_132	303	361	< 0.5	< 0.04
R2_ENV_133	87	465	< 0.5	< 0.05
R2_ENV_134	88	501	< 0.5	< 0.05
Minimum	13	16	< 0.5	< 0.04
Maximum	869	634	< 0.5	0.11
Mean	209	365	-	0.05
Standard Deviation	149	97.2	-	0.024
RSD [%]	71	27	-	48
Zakum Oil Field (Blue Sea Environmental Consultants, 2011)*				
Mean	-	127.87	-	-

Notes
For statistical evaluation, results less than minimum reporting values (MRV) were treated as absolute values determined by MRV/2
* = Concentrations expressed as mg/kg of dry sediment
† = Concentrations expressed as a percentage [%] of dry sediment
‡ = Mean taken from Environmental Baseline Survey of ADMA OPCO'S Existing Oil Facilities, Zakum Oil Field, (Blue Sea Consultants, 2011)
RSD = Relative standard deviation

9.3 Soil Sample Results

Fluoride concentrations across Route 2 ranged from < 4.0 mg/kg at station SO_R2_015 to 8.1 mg/kg at station SO_R2_016, with a mean of 4.7 mg/kg and moderate variability observed (RSD 30 %).

Total cyanide concentrations across Route 2 were below the MRV (0.5 mg/kg) at all stations.

Total nitrogen concentrations across Route 2 ranged from below the MRV (0.04 %) at station SO_R2_002, SO_R2_007 and SO_R2_017) to 0.08 % at station SO_R2_016, with a mean of 0.05 % and moderate variability observed (RSD 43 %).

Phosphate concentrations across Route 2 ranged from 53.9 mg/l at station SO_R2_002 to 144 mg/l at station SO_R2_015, with a mean of 102 mg/l and low variability observed (RSD 24 %).

The acid soluble sulphate concentrations ranged from 5230 mg/kg at station SO_R2_002 to 8110 mg/kg at station SO_R2_006, with a mean of 6400 mg/kg and low variability (RSD 14 %).

The water soluble sulphate concentrations ranged from 544 mg/l at station SO_R2_002 to 1050 mg/l at station SO_R2_011, with a mean of 778 mg/l and low variability (RSD 18%).

Table 9.2: Soil sample nutrient concentrations, Route 2

Station	Fluoride Water Soluble*	Total Cyanide*	Total Nitrogen†	Phosphates‡	Sulphates	
					Acid Soluble*	Acid Soluble‡
SO_R2_002	5.7	< 0.5	< 0.04	53.9	5230	544
SO_R2_003	5.8	< 0.5	0.04	80.9	5310	721
SO_R2_004	4.6	< 0.5	0.05	87.6	6270	687
SO_R2_005	5.1	< 0.5	0.04	93.5	6460	733
SO_R2_006	4.2	< 0.5	0.06	88.4	8110	942
SO_R2_007	4.5	< 0.5	< 0.04	96.0	6650	729
SO_R2_009	4.1	< 0.5	0.06	111	7260	904
SO_R2_010	4.4	< 0.5	0.04	119	5310	692
SO_R2_011	4.1	< 0.5	0.07	113	7290	1050
SO_R2_015	< 4.0	< 0.5	0.06	144	6650	801
SO_R2_016	8.1	< 0.5	0.08	134	6700	857
SO_R2_017	4.0	< 0.5	< 0.04	105	5600	676
Minimum	**< 4.0**	**< 0.5**	**< 0.04**	**53.9**	**5230**	**544**
Maximum	**8.1**	**< 0.5**	**0.08**	**144**	**8110**	**1050**
Mean	**4.7**	**-**	**0.05**	**102**	**6400**	**778**
Standard Deviation	**1.44**	**-**	**0.020**	**24.4**	**908**	**139**
RSD [%]	**30**	**-**	**43**	**24**	**14**	**18**

Notes
For statistical evaluation, results less than minimum reporting values (MRV) were treated as absolute values determined by MRV/2
* = Concentrations expressed as mg/kg of dry sediment
† = Concentrations expressed as % of dry sediment
‡ = Concentrations expressed as mg/l of dry sediment
RSD = Relative standard deviation

10. Sediment Hydrocarbons

10.1 Introduction

Seabed sediments were analysed for hydrocarbon concentrations including THC (C_{10} to C_{40}), BTEX and the US EPA 16 PAHs.

Samples were extracted by ultrasonication of wet sediments with mixed solvents. The sample extracts were then cleaned up using absorption column chromatography with the resulting extracts analysed for THC and US EPA 16 PAHs.

The total hydrocarbon material present was quantified using response factors calculated from the analysis of mixed oil standard solutions over an appropriate range and analysed by GC-FID.

Calibration was undertaken using a range of PAH standard solutions, a number of alkylated PAH, dibenzothiophene and a range of suitable internal standards. Individual response factors were calculated for each of the compounds present in the calibration solution. Response factors for the non-calibrated alkylated PAH were taken to be equivalent to closely related compounds. The MRV of individual and alkylated PAHs is 0.1 ng/g. PAHs were analysed by GC-MS.

BTEX were determined using static headspace sampling and analysed by GC-MS.

Full details of all the analytical techniques employed are included in Appendix B.

Reference criteria are available for some sediment hydrocarbons, including ADS 18/2017 MACs (QCC, 2017) and internationally recognised environmental effect threshold values, specifically ERL and effects range median (ERM), have been established for several US EPA 16 PAHs (Buchman, 2008).

10.2 Sediment Sample Results

10.2.1 Total Hydrocarbon Content

Table 10.1 presents the THC concentrations in the surface sediment samples across the Route 2 survey area. Concentrations of THC ranged from 0.7 µg/g at station R2_ENV_012 to 9.0 µg/g at station R2_ENV_133, with a mean of 2.45 µg/g and moderate variability (RSD 56 %).

Table 10.1: Summary of sediment total hydrocarbon content analysis, Route 2

Station	THC (C_{10}-C_{40})
R2_ENV_009	2.3
R2_ENV_010	1.3
R2_ENV_011	1.5
R2_ENV_012	0.7
R2_ENV_013	2.3
R2_ENV_014	4.2
R2_ENV_015	3.5
R2_ENV_016	1.8
R2_ENV_017	1.7
R2_ENV_018	2.7
R2_ENV_019	2.7
R2_ENV_020	1.8
R2_ENV_021	2.6
R2_ENV_022	1.3
R2_ENV_023	2.5
R2_ENV_024	1.8
R2_ENV_025	2.6
R2_ENV_026	1.9
R2_ENV_027	1.7
R2_ENV_028	1.5
R2_ENV_029	1.5
R2_ENV_030	1.6
R2_ENV_031	2.1
R2_ENV_032	1.8
R2_ENV_033	2.3
R2_ENV_034	1.5
R2_ENV_035	1.4
R2_ENV_036	1.4
R2_ENV_037	1.5
R2_ENV_038	1.8
R2_ENV_039	1.7
R2_ENV_040	2.8
R2_ENV_041	2.4
R2_ENV_042	2.2
R2_ENV_043	1.3

Station	THC (C_{10}-C_{40})
R2_ENV_044	1.1
R2_ENV_045	1.5
R2_ENV_046	2.6
R2_ENV_047	2.3
R2_ENV_048	1.5
R2_ENV_049	1.3
R2_ENV_050	2.0
R2_ENV_051	1.3
R2_ENV_052	1.3
R2_ENV_053	1.7
R2_ENV_055	2.3
R2_ENV_056	3.2
R2_ENV_057	2.3
R2_ENV_058	2.3
R2_ENV_060	3.6
R2_ENV_062	2.1
R2_ENV_063	2.4
R2_ENV_064	1.3
R2_ENV_066	1.4
R2_ENV_067	1.3
R2_ENV_068	3.0
R2_ENV_069	2.2
R2_ENV_070	2.6
R2_ENV_071	1.1
R2_ENV_072	1.4
R2_ENV_073	1.1
R2_ENV_074	1.0
R2_ENV_075	1.6
R2_ENV_076	1.5
R2_ENV_077	1.5
R2_ENV_078	3.9
R2_ENV_079	1.6
R2_ENV_080	1.7
R2_ENV_081	1.4
R2_ENV_082	1.7
R2_ENV_083	1.4

Station	THC (C_{10}-C_{40})
R2_ENV_084	2.1
R2_ENV_085	1.7
R2_ENV_086	2.3
R2_ENV_087	2.2
R2_ENV_093	2.4
R2_ENV_096	2.5
R2_ENV_097	2.1
R2_ENV_101	4.2
R2_ENV_103	1.8
R2_ENV_104	4.1
R2_ENV_105	3.4
R2_ENV_106	1.8
R2_ENV_107	2.7
R2_ENV_108	4.0
R2_ENV_109	3.2
R2_ENV_110	3.8
R2_ENV_111	3.1
R2_ENV_112	1.6
R2_ENV_113	1.3
R2_ENV_114	1.8
R2_ENV_115	1.6
R2_ENV_116	3.2
R2_ENV_117	2.3
R2_ENV_118	2.9
R2_ENV_119	4.3
R2_ENV_120	4.8
R2_ENV_121	3.8
R2_ENV_122	3.3
R2_ENV_123	2.8
R2_ENV_124	5.8
R2_ENV_125	6.2
R2_ENV_126	5.0
R2_ENV_127	2.1
R2_ENV_128	3.7
R2_ENV_129	2.6
R2_ENV_130	2.7

Station	THC (C_{10}-C_{40})
R2_ENV_131	3.1
R2_ENV_132	4.0
R2_ENV_133	9.0
R2_ENV_134	8.9
Minimum	**0.7**
Maximum	**9.0**
Mean	**2.44**
Standard Deviation	**1.36**
RSD [%]	**56**

Notes
Concentrations expressed as µg/g of dry sediment
THC = Total hydrocarbon content
RSD = Relative standard deviation

10.2.2 Aromatic Hydrocarbon Content

Appendix I.1 summarises the individual concentrations of the US EPA 16 PAHs across the Route 2 survey area. Comparison of total US EPA 16 concentrations was made to the ADS 18/2017 MAC values for total PAHs (QCC, 2017), although this document does not state which individual PAHs constitute the total PAH value.

Individual US EPA 16 PAH concentrations were below the MRV (0.1 ng/g) at most stations across Route 2. Benzo(b)fluoranthene ranged from less than MRV (0.1 ng/g) at 40 stations to 4.2 ng/g at station R2_ENV_134. The total US EPA 16 PAH values were treated as absolute values to enable comparison with the ADS 18/2017 MAC dataset, ranging from < 1.6 ng/g at 89 stations to < 21.8 ng/g at station R2_ENV_134, with a mean of 2.1 ng/g and high variability (RSD 120 %). All values were reported as lower than their respective ADS 18/2017 MAC value for total PAHs (1700 ng/g; QCC, 2017) for both general use and marine protected areas.

10.2.3 Benzene, Toluene, Ethylbenzene, Xylenes (BTEX)

Table 10.2 presents the concentrations of BTEX compounds in sediment samples within across the Route 2 survey area.

The concentrations of BTEX compounds were below the MRV (5.0 ng/g) at all stations.

Table 10.2: Sediment benzene, toluene, ethylbenzene, xylenes (BTEX) compound concentrations, Route 2

Station	Benzene	Toluene	Ethylbenzene	m, p-Xylene	o-Xylene
R2_ENV_009	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_010	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_011	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

Station	Benzene	Toluene	Ethylbenzene	m, p-Xylene	o-Xylene
R2_ENV_012	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_013	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_014	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_015	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_016	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_017	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_018	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_019	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_020	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_021	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_022	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_023	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_024	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_026	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_027	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_028	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_029	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_030	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_031	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_032	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_033	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_034	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_035	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_036	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_037	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_038	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_039	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_040	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_041	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_042	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_043	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_044	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_045	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_046	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_047	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_048	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_049	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_050	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

Station	Benzene	Toluene	Ethylbenzene	m, p-Xylene	o-Xylene
R2_ENV_051	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_052	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_053	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_055	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_056	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_057	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_058	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_060	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_062	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_063	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_064	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_066	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_067	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_068	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_069	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_070	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_071	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_072	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_073	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_074	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_075	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_076	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_077	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_078	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_079	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_080	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_081	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_082	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_083	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_084	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_085	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_086	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_087	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_093	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_096	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_097	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_101	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_103	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_104	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

Station	Benzene	Toluene	Ethylbenzene	m, p-Xylene	o-Xylene
R2_ENV_105	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_106	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_107	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_108	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_109	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_110	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_111	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_112	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_113	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_114	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_115	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_116	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_117	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_118	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_119	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_120	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_121	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_122	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_123	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_124	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_125	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_126	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_127	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_128	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_129	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_130	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_131	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_132	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_133	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
R2_ENV_134	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Minimum	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Maximum	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

Notes
Concentrations expressed as ng/g of dry sediment
BTEX = benzene, toluene, ethylbenzene, m’ and p’-xylene and o’-xylene. Note that m-xylene and p-xylene are not separated by the method. The result is reported as the sum of both isomers

10.3 Soil Sample Results

Table 10.3 presents the concentrations of THC and oil and grease concentrations in the soil samples. Concentrations of THC in the soil samples ranged from 0.7 µg/g at station SO_R2_002 to 5.8 µg/g at station SO_R2_016, with a mean of 2.42 µg/g and moderate variability (RSD 62 %). The concentrations of oil and grease will be consistently lower than the THC results. The MRV for oil and grease in sediment was determined to be 50 µg/g, therefore there was no requirement to carry out the analysis.

Table 10.3 : Soil sample total hydrocarbons content and oil and grease concentrations, Route 2

Station	THC (C_{10}-C_{40})	Oil and Grease
SO_R2_002	0.7	< 50.0
SO_R2_003	1.8	< 50.0
SO_R2_004	1.5	< 50.0
SO_R2_005	1.4	< 50.0
SO_R2_006	1.1	< 50.0
SO_R2_007	1.3	< 50.0
SO_R2_009	3.0	< 50.0
SO_R2_010	1.5	< 50.0
SO_R2_011	2.1	< 50.0
SO_R2_014	4.0	< 50.0
SO_R2_015	3.2	< 50.0
SO_R2_016	5.8	< 50.0
SO_R2_017	4.0	< 50.0
Minimum	**0.7**	**< 50.0**
Maximum	**5.8**	**< 50.0**
Mean	**2.42**	-
Standard Deviation	**1.49**	-
RSD [%]	**62**	-

Notes
Concentrations expressed as µg/g of dry sediment
THC = Total hydrocarbon content
RSD = Relative standard deviation

Table 10.4 presents the concentrations of BTEX compounds in soil samples across Route 2. The concentrations of BTEX compounds within the Route 2 soil samples were below the MRV (5.0 ng/g) at all stations.

Table 10.4: Soil sample volatile organic compound concentrations, Route 2

Station	Benzene	Toluene	Ethylbenzene	m, p-Xylene	o-Xylene
SO_R2_002	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
SO_R2_003	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
SO_R2_004	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
SO_R2_006	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
SO_R2_007	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
SO_R2_009	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
SO_R2_010	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
SO_R2_011	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
SO_R2_014	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
SO_R2_015	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
SO_R2_016	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
SO_R2_017	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Minimum	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Maximum	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

Notes
Concentrations expressed as ng/g of dry sediment
BTEX = Benzene, toluene, ethylbenzene, m' and p'-xylene and o'-xylene. Note that m-xylene and p-xylene are not separated by the method. The result is reported as the sum of both isomers

Table 10.5 presents the concentrations of VOCs in the soil samples across Route 2. Concentrations of VOCs in the soil samples across Route 2 were all below their respective MRVs, apart from tetrachloroethene at stations SO_R2_007, SO_R2_010 and SO_R2_016, the 1,2,4-trichlorobenzene and hexachlorobutadiene concentrations at station SO_R2_010.

Table 10.5: Soil sample volatile organic compound concentrations, Route 2

VOC	Station												Minimum	Maximum
	SO_R2_002	SO_R2_003	SO_R2_004	SO_R2_005	SO_R2_006	SO_R2_007	SO_R2_009	SO_R2_010	SO_R2_011	SO_R2_015	SO_R2_016	SO_R2_017		
1,1,1,2-Tetrachloroethane	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

VOC	Station												Minimum	Maximum
	SO_R2_002	SO_R2_003	SO_R2_004	SO_R2_005	SO_R2_006	SO_R2_007	SO_R2_009	SO_R2_010	SO_R2_011	SO_R2_015	SO_R2_016	SO_R2_017		
1,1-Dichloroethene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	< 3.0	< 3.0	< 3.0	< 3.0	< 2.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 2.0	< 3.0
1,2,3-Trichloropropane	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trichlorobenzene	< 3.0	< 3.0	< 3.0	< 3.0	< 2.0	< 3.0	< 3.0	4.0	< 3.0	< 3.0	< 3.0	< 3.0	< 2.0	4.0
1,2,4-Trimethylbenzene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-chloropropane	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromoethane	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,2-Dichloropropane	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromochloromethane	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromodichloromethane	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Carbon Tetrachloride	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Chloroform	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane	< 3.0	< 3.0	< 3.0	< 3.0	< 2.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 2.0	< 3.0
cis 1,2-Dichloroethene	< 5.0	< 5.0	< 5.0	< 5.0	< 4.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 4.0	< 5.0
cis 1,3-Dichloropropene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromochloromethane	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

VOC	Station												Minimum	Maximum
	SO_R2_002	SO_R2_003	SO_R2_004	SO_R2_005	SO_R2_006	SO_R2_007	SO_R2_009	SO_R2_010	SO_R2_011	SO_R2_015	SO_R2_016	SO_R2_017		
Dibromomethane	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dichlorodifluoromethane	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Hexachlorobutadiene	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	2.0
iso-Propylbenzene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m and p-Xylene	< 4.0	< 4.0	< 4.0	< 4.0	< 3.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 3.0	< 4.0
MTBE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Naphthalene	< 5.0	< 5.0	< 5.0	< 5.0	< 4.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 4.0	< 5.0
n-Butylbenzene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
p-Isopropyltoluene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Propylbenzene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
sec-Butylbenzene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
tert-Butylbenzene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	< 3.0	< 3.0	< 3.0	< 3.0	< 2.0	4.0	< 3.0	3.0	< 3.0	< 3.0	9.0	< 3.0	< 2.0	9.0
Toluene	< 5.0	< 5.0	< 5.0	< 5.0	< 4.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 4.0	< 5.0
trans 1,2-Dichloroethene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans 1,3-Dichloropropene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichlorofluoromethane	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Notes
Concentrations expressed as µg/kg of dry sediment
VOCs = Volatile organic compounds

11. Sediment Polychlorinated Biphenyls

11.1 Introduction

Seabed sediments were analysed for a group of 12 PCBs compiled by the World Health Organisation (WHO) by GC-µECD.

Full details of these methodologies are provided in Appendix B.

11.2 Results

Appendix J.1 presents the concentrations of individual PCB congeners and total WHO12 concentrations across the Route 2 survey area. Concentrations of all 12 individual PCBs were reported below the MRV (0.020 ng/g) at all stations across Route 2 except for PCB 167 at stations R2_ENV_012, R2_ENV_093, R2_ENV_096, R2_ENV_097 and R2_ENV_105, where the concentrations ranged from 0.026 ng/g to 0.097 ng/g. The total WHO12 concentrations are below the ADS 18/2017 MAC (22.0 ng/g) for general use areas and MPAs. However, this comparison should be treated with caution as PCB congeners were not specified in the QCC (2017) document.

12. Sediment Metals

12.1 Introduction

Sediments collected from the Route 2 survey area were analysed for selected elements: aluminium, arsenic, barium, cadmium, chromium, copper, iron, mercury, nickel, lead, silver, vanadium and zinc.

Metals were extracted from the sediment matrix using an aqua regia digest technique. This provides a partial digest and the results obtained from this method are typically considered indicative of the concentration of metals available for biological interactions. The resulting digests were then analysed for aluminium, barium, iron and vanadium using ICP-OES and analysed for arsenic, cadmium, lead, copper, chromium, nickel, mercury, silver and zinc using ICP-MS. Appendix B provides full details of all analytical techniques employed.

Concentrations of metals in the sediment samples were compared to their respective ADS 18/2017 MACs (QCC, 2017) and the US National Oceanographic and Atmospheric Administration (NOAA) effects range low (ERL) and effects range median (ERM) values (Buchman, 2008).

12.2 Sediment Sample Results

Appendix K.1 summarises the concentrations of the aqua regia extractable metals in the sediment samples across the Route 2 survey area.

Aluminium concentrations ranged from 281 µg/g at station R2_ENV_114 to 4890 µg/g at station R2_ENV_018, with a mean of 1530 µg/g and moderate variability (RSD 64 %).

Arsenic concentrations ranged from 0.959 µg/g at station R2_ENV_106 to 11.5 µg/g at station R2_ENV_043, with a mean of 3.70 µg/g and moderate variability (RSD 56 %). Concentrations of arsenic exceeded the ADS 18/2017 MAC threshold (7.0 µg/g) for both general use and marine protected areas at 9 stations. Arsenic concentrations also exceeded the NOAA ERL value of 8.2 µg/g (Buchman, 2008) at 3 stations (stations R2_ENV_043, R2_ENV_045 and R2_ENV_052).

Silver concentrations ranged from below the MRV (0.00700 µg/g) at 65 stations to 0.115 µg/g at station R2_ENV_068.

Barium concentrations ranged from 8.29 µg/g at station R2_ENV_034 to 487 µg/g at station R2_ENV_053, with a mean of 45.7 µg/g and high variability (RSD 136 %).

Chromium concentrations ranged from 2.79 µg/g at station R2_ENV_064 to 21.7 µg/g at station R2_ENV_018, with a mean of 7.54 µg/g and moderate variability (RSD 45 %). Concentrations of chromium were above the ADS 18/2017 MAC for marine protected areas (11 µg/g; QCC, 2017) at 17 stations, but below the ERL (81 µg/g) and ERM (370 µg/g) thresholds (Buchman, 2008).

Copper concentrations ranged from below the MRV (0.800 µg/g) at 9 stations including R2_ENV_064, R2_ENV_071, R2_ENV_073, R2_ENV_076, R2_ENV_096, R2_ENV_097, R2_ENV_105, R2_ENV_108 and R2_ENV_114, to 9.93 µg/g at station R2_ENV_018, with a mean of 2.32 µg/g and moderate variability (RSD 61 %).

Iron concentrations ranged from 375 µg/g at station R2_ENV_106 to 5900 µg/g at station R2_ENV_042, with a mean of 1890 µg/g and moderate variability (RSD 60 %).

Nickel concentrations ranged from 1.11 µg/g at station R2_ENV_114 to 16.7 µg/g at station R2_ENV_018, with a mean of 5.90 µg/g and moderate variability (RSD 53 %). Concentrations of nickel were above the ADS 18/2017 MAC for general use areas (16 µg/g; QCC, 2017) at station R2_ENV_018 and marine protected areas (7 µg/g; QCC, 2017) in 40 stations but below the ERL (20.9 µg/g) and ERM (51.6 µg/g) thresholds (Buchman, 2008).

Lead concentrations ranged from 0.592 µg/g at station R2_ENV_071 to 10.5 µg/g at station R2_ENV_057, with a mean of 1.60 µg/g and high variability (RSD 70 %). The lead concentration reported from station R2_ENV_057 exceeded the ADS 18/2017 MAC for marine protected areas (5 µg/g).

Vanadium concentrations ranged from 2.47 µg/g at station R2_ENV_096 to 17.7 µg/g at station R2_ENV_018, with a mean of 7.10 µg/g and moderate variability (RSD 42 %).

Zinc concentrations ranged from below the MRV (0.800 µg/g) at station R2_ENV_114 to 13.9 µg/g at station R2_ENV_018, with a mean of 4.22 µg/g and moderate variability (RSD 60 %).

Concentrations of cadmium and mercury were all below their respective MRVs (presented in Appendix K.1) at all stations across the survey area and were below their respective ADS 18/2017 MAC for both general use and marine protected areas, as well as their respective ERL and ERM thresholds (Buchman, 2008).

Figure 12.1 presents the overall trend in individual metals concentrations, assessed by comparing the relative (maximum normalised) concentrations. By maximum normalising the elemental data for the sediment samples to the highest concentration for each element, it can be seen that the highest concentrations for most metals were recorded at station R2_ENV_018.

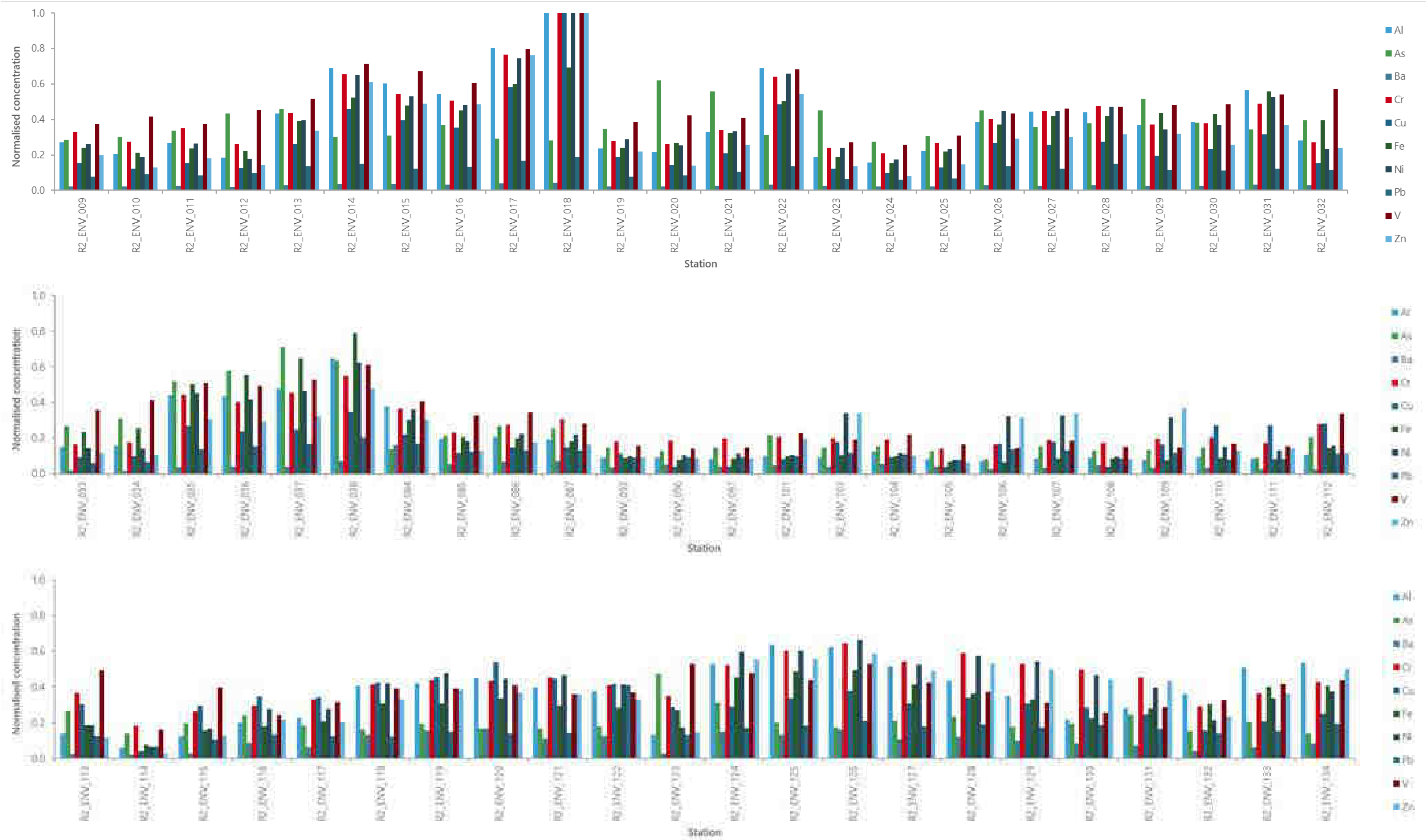


Figure 12.1: Relative (maximum normalised) elemental concentrations in sediments, Route 2

12.3 Soil Sample Results

Table 12.1 presents the concentrations of the aqua regia extractable metals in the 13 soil samples across the Route 2 survey area, including antimony, arsenic, barium, cadmium, chromium, cobalt, copper, iron, mercury, molybdenum, nickel, lead, selenium and zinc.

Arsenic concentrations across the survey area ranged from 1.50 µg/g at station SO_R2_014 to 9.77 µg/g at station SO_R2_007, with a mean of 4.19 µg/g and moderate variability (RSD 58 %). Arsenic concentrations in stations SO_R2_003 and SO_R2_007 exceeded the ADS18/2017 MAC for both general use and marine protected areas (7.0 µg/g). The arsenic concentration recorded in station SO_R2_007 also exceeded the NOAA ERL value of 8.20 µg/g (Buchman, 2008).

Barium concentrations ranged from 9.74 µg/g at station SO_R2_002 to 135 µg/g at station SO_R2_007, with a mean of 44.6 µg/g and high variability (RSD 91 %).

Cobalt concentrations ranged from 0.173 µg/g at station SO_R2_014 to 2.06 µg/g at station SO_R2_006, with a mean of 0.804 µg/g and moderate variability (RSD 66 %).

Chromium concentrations ranged from 3.72 µg/g at station SO_R2_014 to 13.3 µg/g at station SO_R2_006, with a mean of 7.44 µg/g and moderate variability (RSD 38 %). Chromium concentrations at stations SO_R2_006 and SO_R2_016 exceeded the ADS18/2017 MAC (11 µg/g) for marine protected areas. However, these values were below the NOAA ERL value (81.0 µg/g), so deemed not to be of environmental concern.

Copper concentrations ranged from below the MRV (0.800 µg/g) at stations SO_R2_010 and SO_R2_014 to 3.78 µg/g at station SO_R2_006, with a mean of 2.06 µg/g and moderate variability (RSD 51 %).

Iron concentrations ranged from 502 µg/g at station SO_R2_014 to 4250 µg/g at station SO_R2_006, with a mean of 2030 µg/g and moderate variability (RSD 54 %).

Molybdenum concentrations ranged from 0.162 µg/g at station SO_R2_010 to 0.877 µg/g at station SO_R2_003, with a mean of 0.435 µg/g and moderate variability (RSD 55 %).

Nickel concentrations ranged from 1.60 µg/g at station SO_R2_014 to 11.4 µg/g at station SO_R2_006, with a mean of 5.75 µg/g and moderate variability (RSD 52 %). Nickel concentrations at stations SO_R2_004, SO_R2_006, SO_R2_009 and SO_R2_016 were above the ADS 18/2017 MAC (7.0 µg/g) for marine protected areas. However, these values were below the NOAA ERL value (20.9 µg/g).

Lead concentrations ranged from 0.643 µg/g at station SO_R2_010 to 3.55 µg/g at station SO_R2_007, with a mean of 1.59 µg/g and moderate variability (RSD 48%).

Antimony concentrations ranged from below the MRV (0.0400 µg/g) at 5 stations (stations SO_R2_010, SO_R2_011, SO_R2_014, SO_R2_015 and SO_R2_017) to 0.376 µg/g at station SO_R2_007, with a mean of 0.085 µg/g and high variability (RSD 113 %).

Selenium concentrations ranged from 0.133 µg/g at station SO_R2_014 to 0.389 µg/g at station SO_R2_006, with a mean of 0.250 µg/g and moderate variability (RSD 31 %).

Zinc concentrations ranged from 1.08 µg/g at station SO_R2_010 to 8.42 µg/g at station SO_R2_006, with a mean of 4.03 µg/g and moderate variability (RSD 60 %).

All cadmium and mercury concentrations recorded across the survey area were below their respective MRVs at all stations sampled.

Table 12.1: Summary of soil sample metals analysis, Route 2

Station	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mo	Ni	Pb	Sb	Se	Zn
SO_R2_002	4.97	9.74	< 0.0800	0.444	5.68	1.24	1320	< 0.0400	0.208	2.96	1.04	0.0975	0.207	1.99
SO_R2_003	7.13	11.0	< 0.0800	0.598	5.68	1.42	1570	< 0.0400	0.877	4.24	0.899	0.108	0.213	1.95
SO_R2_004	4.35	14.3	< 0.0800	1.33	10.3	2.72	2480	< 0.0400	0.642	7.87	1.58	0.088	0.325	4.37
SO_R2_005	6.66	19.7	< 0.0800	1.35	8.78	2.34	3280	< 0.0400	0.661	6.96	1.63	0.130	0.276	4.12
SO_R2_006	4.37	108	< 0.0800	2.06	13.3	3.78	4250	< 0.0400	0.576	11.4	2.59	0.100	0.389	8.42
SO_R2_007	9.77	135	< 0.0800	0.979	7.00	1.72	3330	< 0.0400	0.202	4.77	3.55	0.376	0.248	3.96
SO_R2_009	3.26	26.7	< 0.0800	0.634	6.60	2.81	1450	< 0.0400	0.416	8.47	1.48	0.0639	0.275	7.21
SO_R2_010	2.77	20.0	< 0.0800	0.274	3.77	< 0.800	859	< 0.0400	0.162	2.31	0.643	< 0.0400	0.153	1.08
SO_R2_011	1.56	77.8	< 0.0800	0.701	7.95	2.17	1780	< 0.0400	0.420	6.02	1.77	< 0.0400	0.220	4.23
SO_R2_014	1.50	22.3	< 0.0800	0.173	3.72	< 0.800	502	< 0.0400	0.199	1.60	0.907	< 0.0400	0.133	1.15
SO_R2_015	2.78	42.6	< 0.0800	0.511	6.38	3.42	1060	< 0.0400	0.405	4.59	1.38	< 0.0400	0.274	3.00
SO_R2_016	3.56	72.3	< 0.0800	0.979	11.3	2.87	2670	< 0.0400	0.711	9.96	1.79	0.0402	0.366	7.68
SO_R2_017	1.75	20.3	< 0.0800	0.418	6.31	1.53	1800	< 0.0400	0.173	3.59	1.45	< 0.0400	0.173	3.25
Minimum	1.50	9.74	< 0.0800	0.173	3.72	< 0.800	502	< 0.0400	0.162	1.60	0.643	< 0.0400	0.133	1.08
Maximum	9.77	135	< 0.0800	2.06	13.3	3.78	4250	< 0.0400	0.877	11.4	3.55	0.376	0.389	8.42
Mean	4.19	44.6	-	0.804	7.44	2.06	2030	-	0.435	5.75	1.59	0.0849	0.250	4.03
Standard Deviation	2.45	40.8	-	0.527	2.83	1.06	1100	-	0.240	3.02	0.77	0.096	0.0782	2.42
RSD [%]	58	91	-	66	38	51	54	-	55	52	48	113	31	60
Sediment Standards (QCC, 2017)														
General use areas	7.0	-	0.7	-	52	20.0	-	0.2	-	16.0	30.0	-	-	125.0
Marine protected areas	7.0	-	0.2	-	11	20.0	-	0.2	-	7.0	5.0	-	-	70.0

Station	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mo	Ni	Pb	Sb	Se	Zn
NOAA Assessment Criteria (Buchman, 2008)														
ERL	8.20	-	1.20	-	81.0	34.0	-	0.150	-	20.9	46.7	-	-	150
ERM	70.0	-	9.60	-	370	270	-	0.710	-	51.6	218	-	-	410

Notes

For statistical evaluation, results less than minimum reporting values (MRV) were treated as absolute values determined by MRV/2

As = Arsenic, Cd = Cadmium, Co = Cobalt, Cr = Chromium, Cu = Copper, Fe= Iron, Mo = Molybdenum, Ni=Nickel

Pb = Lead, Sb = Antimony, Se = Selenium, Zn = Zinc

RSD = Relative standard deviation

QCC = Abu Dhabi Quality and Conformity Council

NOAA = National Oceanic and Atmospheric Administration

ERL = Effects range low

ERL = Effects range medium

Key:	Below Sediment Standards	Above Sediment Standard for General Use Areas	Above Sediment Standard for Marine Protected Areas

13. Seabed Habitats and Epifauna

13.1 Introduction

Video data from the 11 transects surveyed were analysed by experienced Fugro marine/biologists/taxonomists. Habitats were classified in accordance with the MLEAD (John & George, 2001) and EAD (Al Dhaheri et al., 2017) habitat classifications. Epifauna were identified to the lowest practicable taxonomic level and the presence of sensitive species (hard corals) assessed.

13.2 Results

The seabed observed was heterogeneous across the survey area and encompassed gravelly sand and shell veneer overlying calcarenite, with occasional coral outcrops and boulder corals or. gravelly sand with shell fragments deposits.

Three distinct seabed habitats were identified within the survey area.

'Sublittoral mixed deposit' (SLMXD) was identified from five transects (TR03, TR04, TR05, TR08a and TR10). This habitat was restricted to relatively deeper water depths of between ~11.0 m and ~37.0 m BSL.

'Sublittoral sand and gravel' (SLSED) habitat was identified from six transects (TR02, TR05, TR06, TRO7, TR08 and TR09) interspersed with seagrass beds. This habitat was restricted to relatively shallower water depths of between ~16.0 m and ~25.0 m BSL.

'Low density beds of *H. ovalis* and *H. stipulacea* colonising bare sediment' (SLSED.Hoval.Hstip) was identified from four transects (TR01.TR02, TR05 and TR06). This habitat variant consisted of lower density understorey seagrass *H. ovalis* and *H. stipulacea*, colonising bare sediment at deeper depths of between ~13.0 m and ~19.0 m BSL. Table 13.1 presents the habitat classification hierarchy for the habitats observed within the survey area.

Table 13.1: Habitat classifications, Route 2

MLEAD (2001) Habitat Classification		MLEAD Classification (John & George, 2001)	EAD Habitat Classification and Protection Guideline (Al Dhaheri et al., 2017)
Depth Zone Level 1	Substratum Level 2		
SL Sublittoral zone	MXD Mixed deposit	SLMXD	"13,000 - hard bottom"
	SED Sediment (Gravels/ Sands Deposit)	SLSED	"14,000 - unconsolidated bottom"
		SLSED.Huni.Hoval.Hstip	"12,000 - seagrass bed"
		SLSED.Hoval.Hstip*	

Notes
MLEAD = The Marine Life of the Emirate of Abu Dhabi
EAD = Emirate Abu Dhabi
* = This habitat was adapted from MLEAD habitat classification to better describe the habitat observed within the survey area

13.2.1 Seabed Habitats and Fauna

13.2.1.1 'Sublittoral Mixed Deposit' (SLMXD)/'13,000 – Hard Bottom'

The mixed substratum habitats identified along Route 2 were classified as the 'Sublittoral mixed deposit' (SLMXD) habitat defined by John & George (2001) and under the "13,000 - Hard Bottom" habitat defined by Al Dhaheri et al. (2017). This habitat comprised a mainly flat substratum of calcarenite (cemented sand) with occasional coral outcrops including finger corals (*Porites* sp.) boulder corals (Coscinaraeidae and Faviidae) plate corals (*Turbinaria* sp.) dead boulder corals and shell beds of pearl oysters (*Pinctada* sp.). The calcarenite was generally covered by a veneer of sand sediment.

This habitat displayed generally a low diversity and abundance of corals within the nearshore survey area; with exception of transect TR04 where a moderate abundance of corals was recorded. This is detailed in the hard coral assessments presented in Section 13.2.2.1 . The most frequently recorded corals across the survey area were finger corals of the genus *Porites* sp., boulder corals of the families Faviidae and Coscinaraeidae which included the taxa *Favia* sp., *Favites* sp., and possible *Siderastrea* sp. Branching coral (possibly *Pocillopora* sp) and the disk coral (*Turbinaria* sp.) were also occasionally observed.

This habitat also had a low diversity and abundance of soft corals and sea whips. This is detailed in the soft coral assessment presented in Section 13.2.2.1. The most frequently recorded corals across the survey area were gorgonian corals (Pleuxaridae, Alcyonacea (including possible *Euplexaura* sp., and *Menella* sp.) and sea whips (*Junceella juncea*).

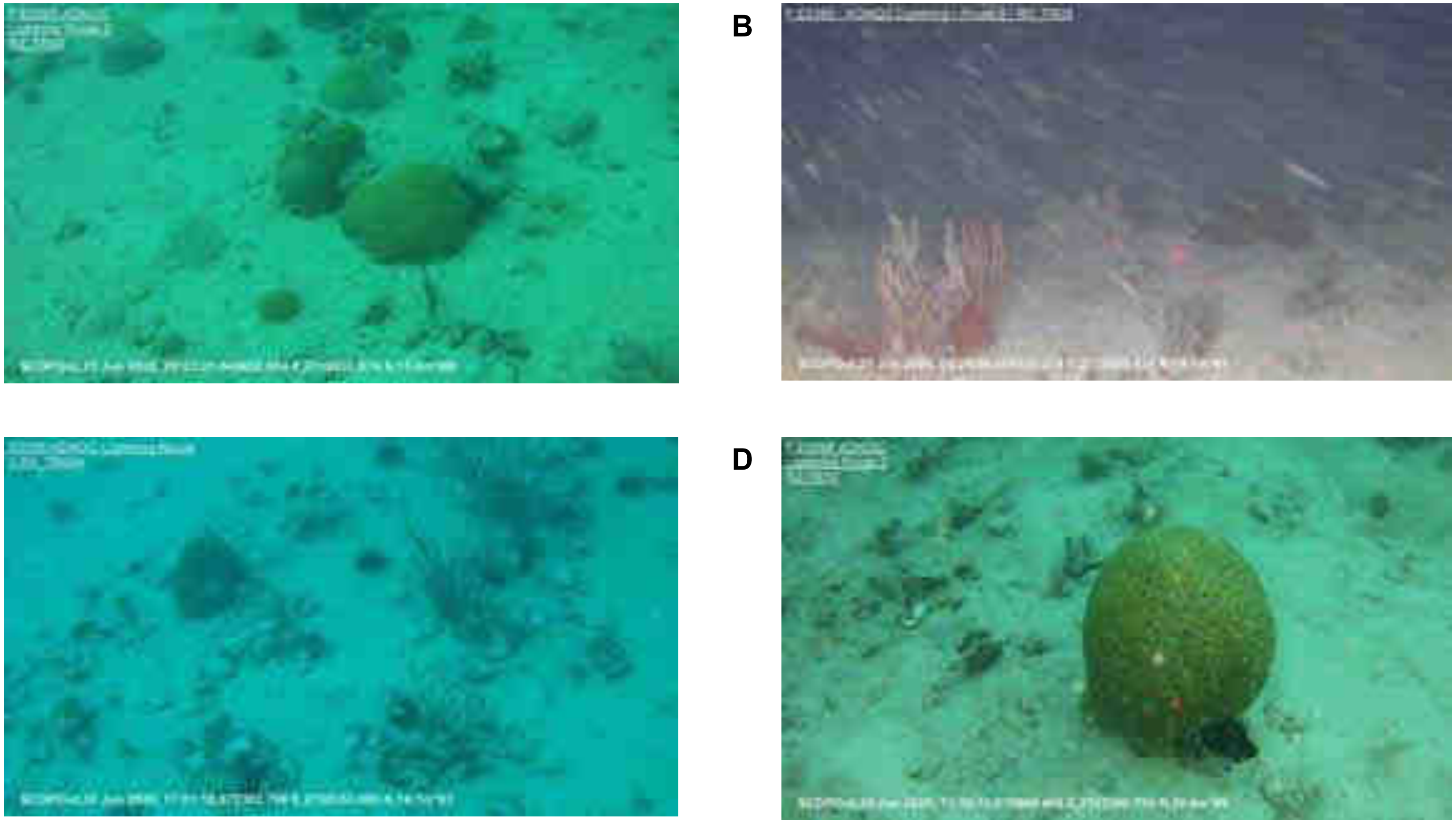
Associated to corals within this habitat there was a sessile epifauna of encrusting and branching sponges (Porifera) and ascidians (Tunicata including *Phallusia nigra* and possibly *Didemnum* sp.). Shell beds (Bivalvia) included largely pearl oysters (*Pinctada* sp.), but hammer oysters (*Malleus* sp.) were also occasionally observed. Hydroids (Hydrozoa), coralline algae (Corallinales), peacock weed (*Padina boergesenil*), macroalgae, algal turf (Chlorophyta) were also present.

Errant invertebrates included brittlestars (*Ophiotela* sp.), sea urchins (*Echinometra mathei*), long-spined sea urchins (*Diadema* sp.), conid shells (Conidae) and dorid nudibranchs (Nudibranchia).

Fish including yellowstripe scad (*Selaroides leptolepis*) sordid rubberlip (?*Plectorhinchus sordidus*), yellow spotted trevally (*Carangoides fulvoguttatus*), Arabian monocle bream (*Scolopsis ghanam*), yellow fin hind (*Cephalopholis hemistiktos*), cardinal fish (Apogonidae), yellowbar angelfish (*Pomacanthus* sp.), pearly goatfish (*Parupeneus margaritatus*) and gobies (Gobiidae including *Cryptocentrus* sp and *Valenciennea* sp.) were sporadically observed in this habitat.

Figure 13.1 presents example seabed photographs of this habitat.

A B C D



A: Photograph R2_TR04_07
Calcarenite with veneer of sand, shell fragments and coral outcrops. Boulder coral (Faviidae), long spined sea urchins (*Diadema* sp.)

B: Photograph R2_TR05_20
Gravelly sand with shell fragments and coral rubble veneer overlying calcarenite. Occasional calcarenite outcrops. Gorgonians (Alcyonacea including *Euplexaura sp.,* ?*Menella* sp.), hard coral (?*Siderastrea* sp.)

C: Photograph R2_TR08a_16
Gravelly sand with shell fragments and coral rubble veneer over calcarenite. Occasional calcarenite outcrops. Boulder corals (Faviidae), gorgonians (Alcyonacea including Pleuxaridae), sea urchins (*Echinometra mathei*), pearl oysters (*Pinctada* sp.)

D: Photograph R2_TR10_24
Gravelly sand with shell fragments and coral rubble veneer overlying calcarenite. Occasional calcarenite outcrops. Boulder coral (Faviidae), ascidian (*Phallusia nigra*), pearl oysters (*Pinctada* sp.)

Figure 13.1: Example seabed photographs of 'Sublittoral Mixed Deposit' (SLMXD)/'13,000 - Hard Bottom', Route 2

13.2.1.2 'Sublittoral Gravels/Sands' (Sublittoral Sediment; SLSED)/'14,000 Unconsolidated Bottom'

'Sublittoral sand and gravel' was classified within the 'Sublittoral sediment' (SLSED) habitat of John & George (2001) and "14,000 – Unconsolidated Bottom" habitat of Al Dhaheri et al. (2017).

This habitat comprised a mainly flat substratum of sand and gravelly sand with occasional shell deposits and coral rubble fragments.

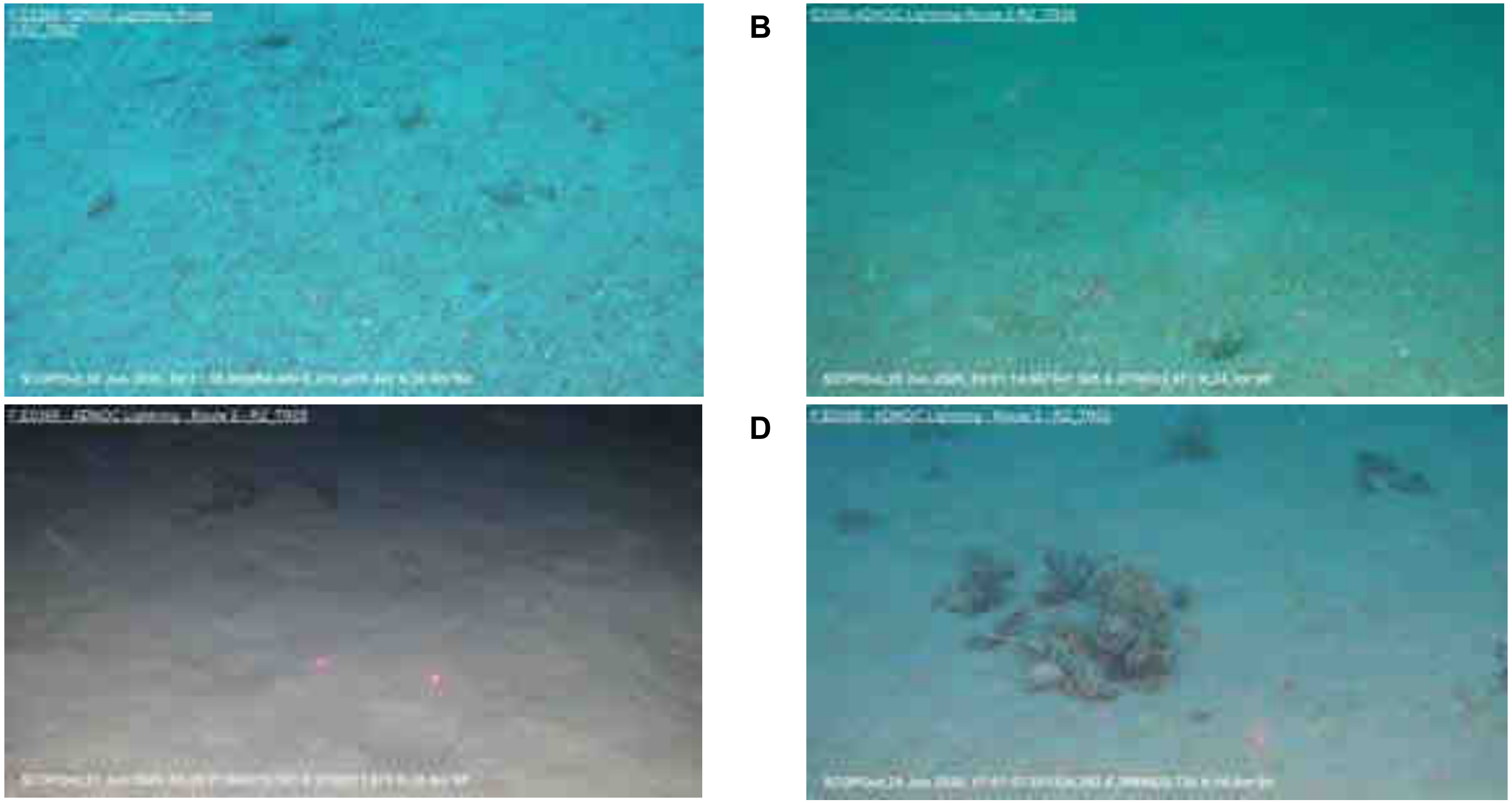
This habitat also had rare observations of singular coral outcrops (Scleractinia), low diversity and abundance sea whips (Alcyonacea), and low density patches of seagrass (*Halophila ovalis*). Associated to this habitat there was a sessile epifauna of shell beds (Bivalvia) including fanshells (*Pinna muricata*) and peal oyster (*Pinctada* sp.) hydroids (Hydrozoa), green seaweed (*Avrainvillea amadelpha*), coralline algae (Corallinales), starfish (Asteroidea) and ascidians (*P nigra*).

Errant invertebrates included sand dollar (Clypeasteroidea), sea urchins (*Echinometra mathei),* worm tubes (Polychaeta), dorid nudibranchs (Nudibranchia) and hermit crabs (Paguridoidea).

Fish including cardinal fish (Apogonidae), gobies (Gobiidae including *Valenciennea* sp. and *Cryptocentrus* sp.), yellowstripe scad (*Selaroides leptolepis*) were sporadically observed in this habitat.

Figure 13.2 presents example seabed photographs of this habitat.

A B C D



A: Photograph R2_TR07_32
Slightly gravelly sand with shell fragments. Hermit crabs (Paguroidea)

B: Photograph R2_TR09_16
Gravelly sand with shell deposits Faunal burrows

C: Photograph R2_TR05_22
Gravelly sand with shell fragments and occasional coral rubble. Low density patch of seagrass (*Halophila ovalis*)

D: Photograph R2_TR02_09
Sand with shell fragments. Fanshells (*Pinna muricata*), peal oyster (*Pinctada* sp.), algal turf

Figure 13.2: Example seabed photographs of 'Sublittoral Sand and Gravel' (SLSED)/'14,000 Unconsolidated Bottom', Route 2

13.2.1.3 'Seagrass beds'/'12,000 Seagrass Bed'

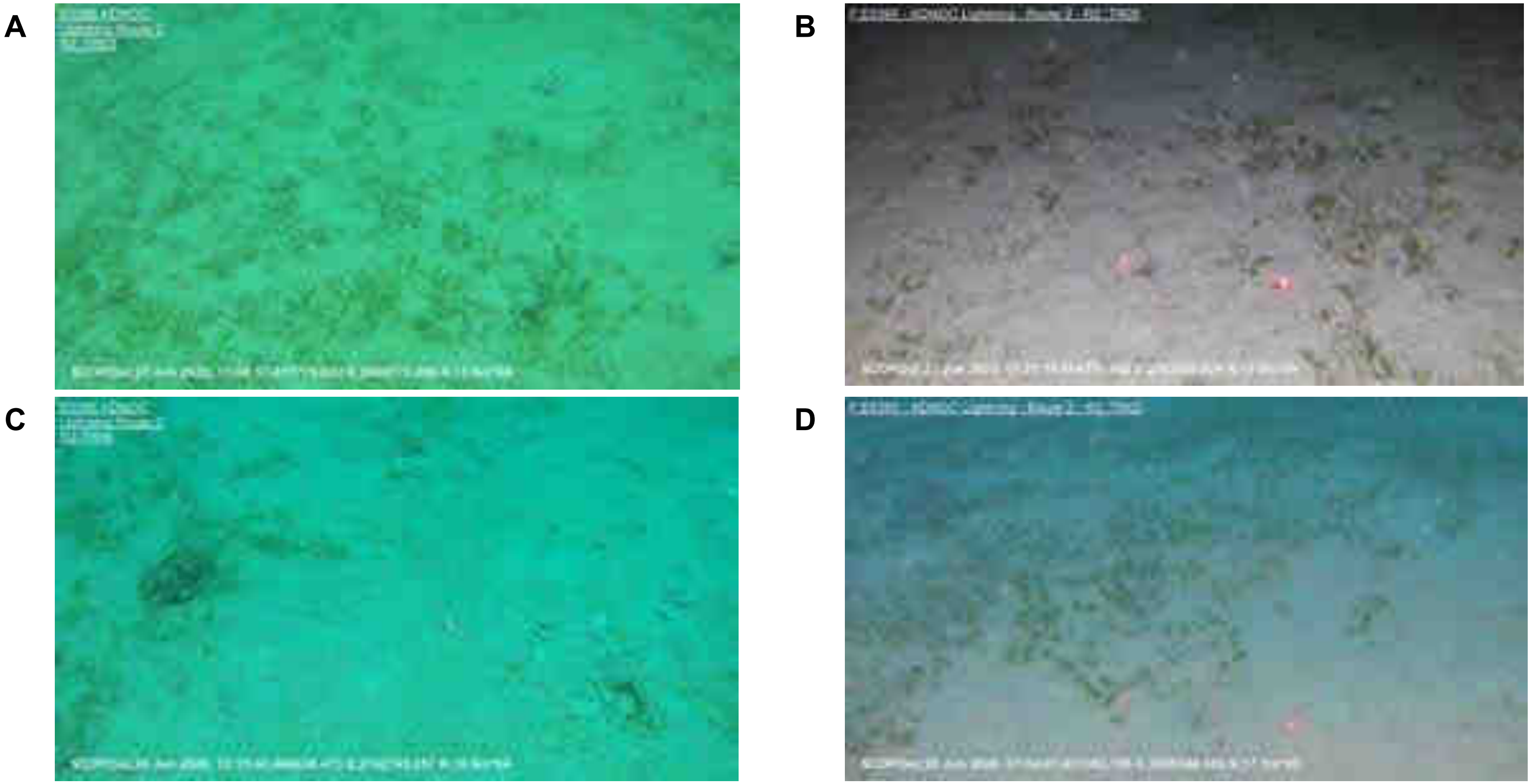
'Seagrass bed' was classified within 'Sublittoral sediment' (SLSED) habitat of John & George (2001) and the "'12,000 seagrass bed" habitat of Al Dhaheri et al. (2017).

This habitat comprised a mainly flat substratum of sand and gravelly sand with occasional shell deposits and coral rubble fragments. Seagrass (*H. ovalis* and *H. stipulacea*) was observed on transects TR01, TR02, TR05, TR06, in moderate abundance. This is detailed in the seagrass assessment presented in Section 13.2.2.2.

Associated to seagrass within this habitat there was sessile epifauna of encrusting and branching sponges (Porifera) and ascidians (Tunicata including *Phallusia nigra*). Shell beds (Bivalvia) including fanshells (*Pinna muricata*), peal oyster (*Pinctada* sp.), were also occasionally observed. Hydroids (Hydrozoa), brown algae (*Canistrocarpus* sp.) red algae (Rhodophyta), coralline algae (Corallinales) and algal turf (Chlorophyta) were also present. Errant invertebrates included starfish (Asteroidea), sand dollars (Clypeasteroidea), conid shells (Conidae) and hermit crabs (Paguroidea).

Fish including yellowstripe scad (*Selaroides leptolepis*), goatfish (Mullidae), goby (Gobiidae including *Cryptocentrus* sp. and *Amblygobius* sp.), file fish (Monacanthidae) were sporadically observed in this habitat.

Figure 13.3 presents example seabed photographs of this habitat.



A: Photograph R2_TR01_14
Sand with shell fragment deposits
Seagrass (*Halophila stipulacea* and *Halophila ovalis* complex), faunal burrows

B: Photograph TR05_10
Gravelly sand with shell deposits
Seagrass (*Halophila ovalis* and *Halophila stipulacea*), hydroids (Hydrozoa)

C: Photograph R2_TR06_10
Gravelly sand with shell deposits.
Seagrass (*Halophila stipulacea* and ?*Halophila ovalis*), fanshell (*Pinna muricata*), faunal burrows

D: Photograph R2_TR02_13
Sand with shell and coral rubble fragments. Seagrass (*Halophila ovalis* and *Halophila stipulacea*)

Figure 13.3: Example seabed photographs of 'Sublittoral Gravel/Sands (SLSED.Hoval. Hstip)/'14,000 – Seagrass Beds, Route 2

13.2.2 Potentially Sensitive Habitats

13.2.2.1 Coral Assessments

Hard Corals

Table 13.2 summarises the hard coral assessment with proportions of transects and this is displayed spatially in Figure 13.4. Appendix C.3 provides the detailed assessment for the individual transects.

Within the survey area, the majority of the transects displayed ‘No coral cover’. Transects that supported live hard corals that were classified as ‘Low live coral cover’, were observed on transects TR04 and TR10. The density of live corals reached ‘Moderate live coral cover’ (~ 10 to 40 %) on a section of transect TR04. Live hard coral observations were also recorded on TR05 and TR08a but were at average densities of < 1 % and were therefore classed as containing ‘No coral’.

Hard corals diversity was generally low within the survey area and included finger corals of the genus *Porites* sp., boulder corals of the families Faviidae and Coscinaraeidae which included the taxa *Favia* sp., *Favites* sp., and possible *Siderastrea* sp. Branching coral, (possibly *Pocillopora* sp.) and disk coral (*Turbinaria* sp.) were also occasionally recorded.

In general, living corals outcrops were in a good state of health. However, occasional evidence of coral death was observed throughout the transects across the survey area. Dead boulder corals were also occasionally observed.

Table 13.2: Hard coral assessment, Route 2

Transect	Hard Coral Assessment [%]		
TR01	N (100 %)		
TR02	N (100 %)		
TR03	N (100 %)		
TR04	N (40.3 %)	L (53.4 %)	M (16.3 %)
TR05	N (100 %)		
TR06	N (100 %)		
TR07	N (100 %)		
TR08	N (100 %)		
TR08a	N (100 %)		
TR09	N (100 %)		
TR10	L (100 %)		

Notes
N = No coral (< 1 %)
L = Low Coral Cover (1 % to 10 %)
M = Moderate Coral Cover (10 % to 50 %)

Key:	No coral	Coral rubble	Dead coral framework	Low live coral cover	Moderate live coral cover	High live coral cover

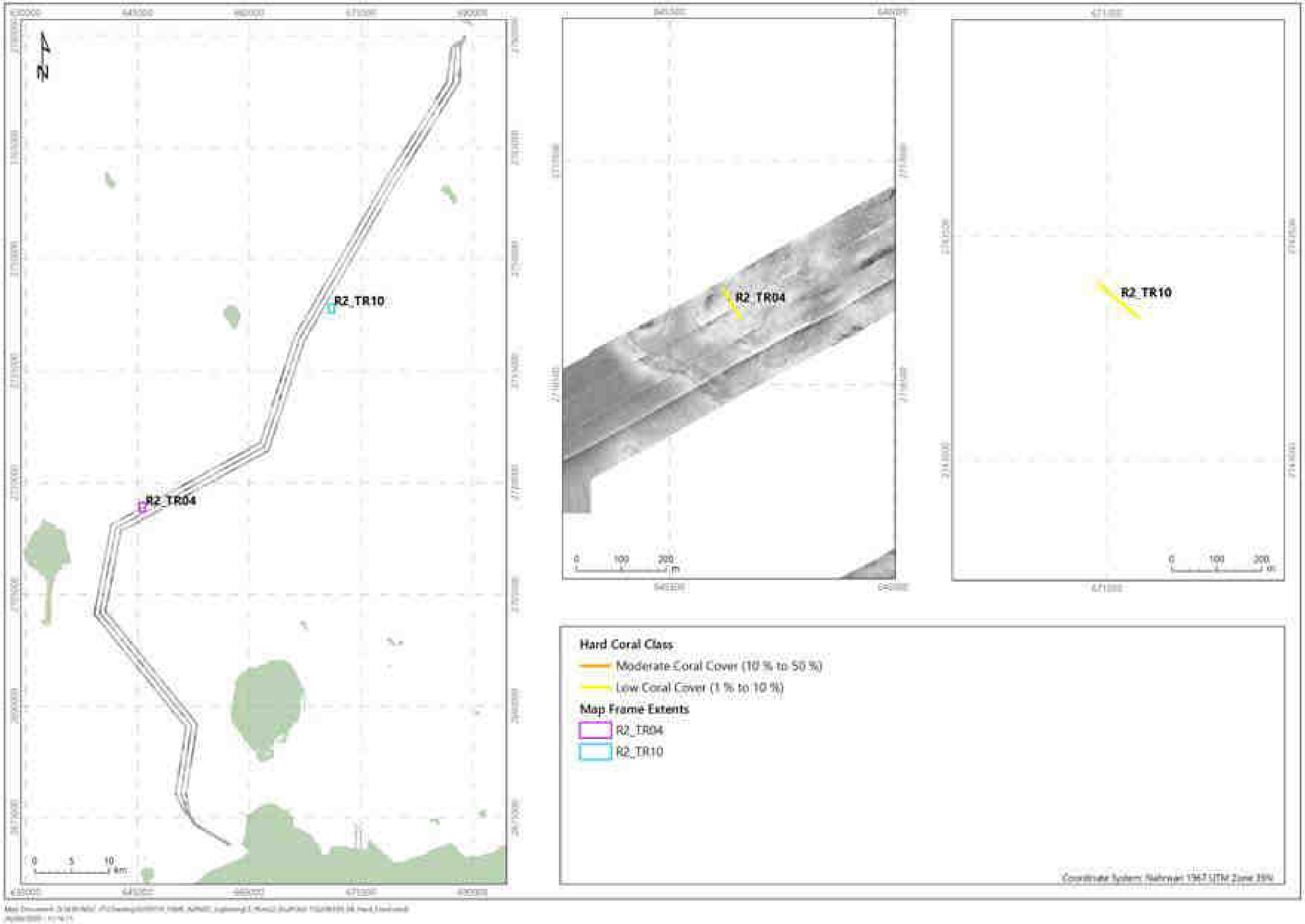


Figure 13.4: Completed environmental transects, showing hard coral assessment results, Route 2

Soft Corals

Table 13.3 summarises the soft coral assessment and this is displayed spatially in Figure 13.5. Appendix C.3 provides the detailed assessment for the individual transects.

Within the survey area, sections of transects that supported live soft corals that were classified as 'Low live coral cover' (1 % to 10 % cover), were observed on transects TR03 and TR08a, although the majority of these transects displayed an average density of live soft corals of < 1 %. Live soft coral observations were recorded on TR03, TR04, TR05, TR07 and TR10 but were at average densities of < 1 % throughout and were therefore classified as having 'No coral'.

Soft corals diversity was generally low within the survey area and included gorgonian corals (Pleuxaridae and Alcyonacea, including possible *Euplexaura* sp., and *Menella* sp.) and sea whips (*Junceella juncea*). In general, soft corals appeared in a good state of health. However, occasional evidence of coral death were observed throughout the transects across the survey area.

Table 13.3: Soft coral assessment, Route 2

Transect	Soft Coral Assessment [%]	
TR01	N (100 %)	
TR02	N (100 %)	
TR03	N (90.2 %)	L (9.8 %)
TR04	N (100 %)	
TR05	N (100 %)	
TR06	N (100 %)	
TR07	N (100 %)	
TR08	N (100 %)	
TR08a	L (100 %)	
TR09	N (100 %)	
TR10	N (100 %)	

Notes
N = No coral (< 1 %) L = Low Coral Cover (1 % to 10 %)

Key:	No coral	Coral rubble	Dead coral framework	Low live coral cover	Moderate live coral cover	High live coral cover

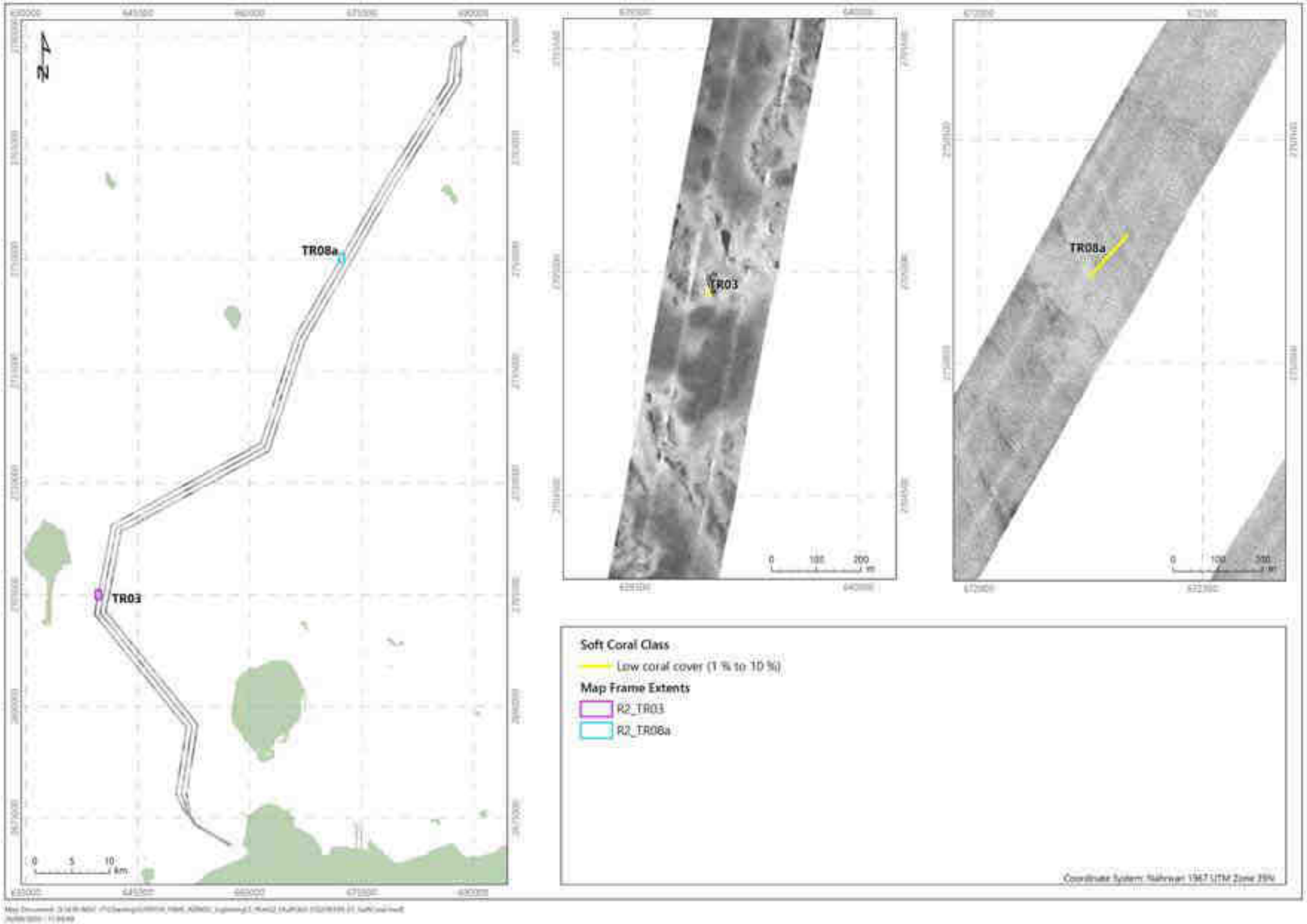


Figure 13.5: Completed environmental transects, showing soft coral assessment results, Route 2

13.2.2.2 Seagrass Assessment

Table 13.4 summarises the seagrass assessment and this is displayed spatially in Figure 13.6. Appendix C.3 provides the detailed assessment for the individual transects.

For the purpose of this survey, the lower limit of what constitutes a seagrass bed is approximately 10 % cover. Within the survey area, transects that supported seagrass that were classified as '≥10 % coverage were observed on transects TR01, TR02, TR05 and TR06. Live seagrass observations were also recorded on transects TR03, TR04, TR05, TR07 and TR10, but were at densities of < 10 %.

In general, seagrass habitats were observed as moderate density beds of *H. stipulacea* and *H. ovalis* colonising bare sediment. Only these two species were reported, and they were present as widely spaced individuals found in small patches.

Table 13.4: Seagrass Assessment, Route 2

Transect	Seagrass Assessment [%]		
TR01	S (100 %)		
TR02	N (56.3 %)	S (43.7 %)	
TR03	N (100 %)		
TR04	N (100 %)		
TR05	N (1.1 %)	L (54.8 %)	S (44.0 %)
TR06	N (47.3 %)	S (52.7%)	
TR07	N (100 %)		
TR08	N (100 %)		
TR08A	N (100 %)		
TR09	N (100 %)		
TR10	N (100 %)		

Notes
N = No Seagrass Cover (< 1 %) L = Low Seagrass Cover (1 % to 10 %) S = Seagrass bed (≥ beds (≥10 %)

Key:	No Seagrass < 1 % cover	Low Seagrass (1 % to 10 %) cover	Seagrass Beds ≥ 10 %

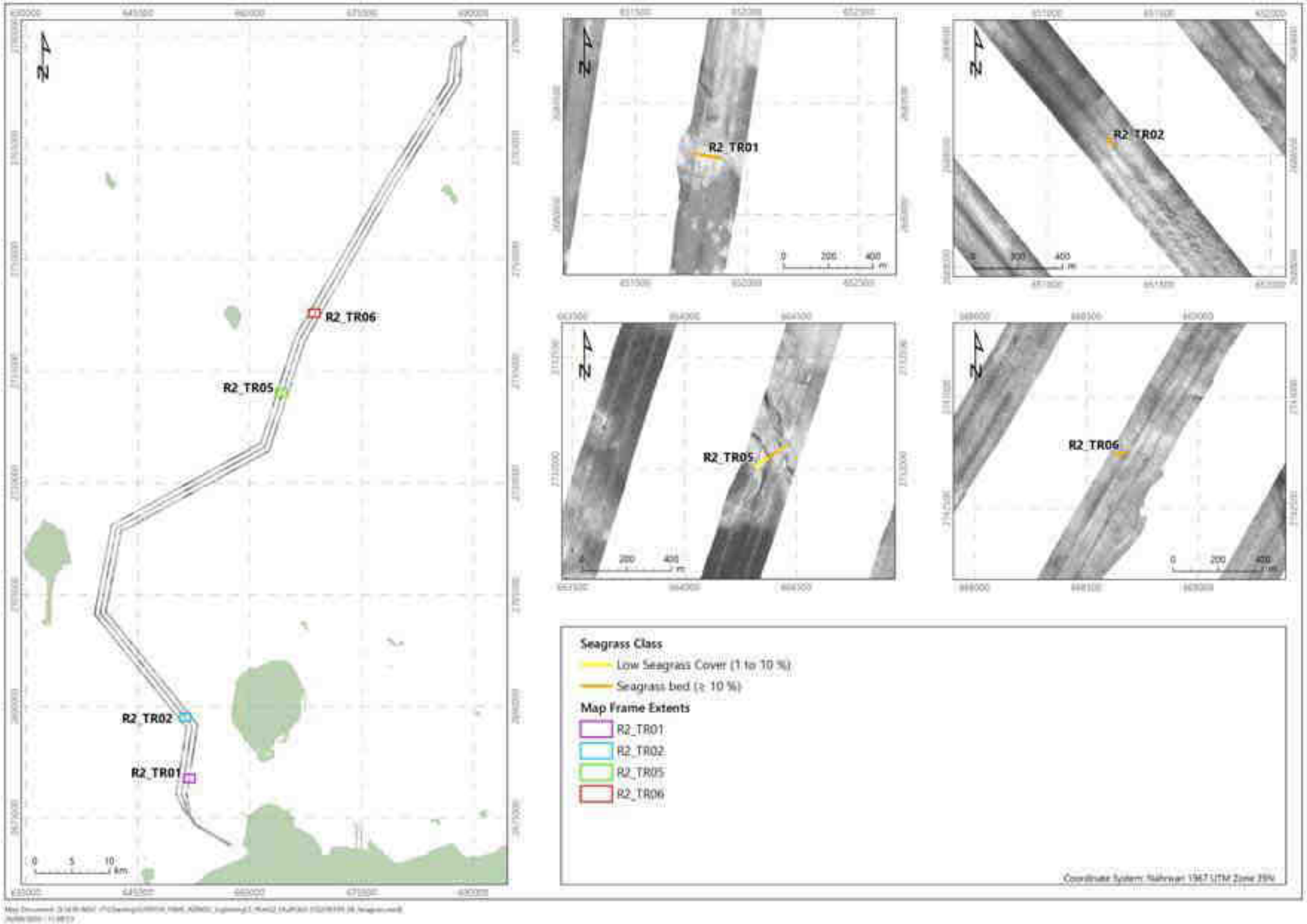


Figure 13.6: Completed environmental transects, showing sea grass assessment results, Route 2

14. Discussion

This survey was undertaken to establish the current biological and physico-chemical conditions of the seabed sediments and water column along the proposed Lightning Cable Route 2 that will connect Umm Shaif LTDP Island to Shuweihat and the Umm Shaif Field, Offshore Abu Dhabi. The survey and analytical strategies were designed to provide a comprehensive baseline dataset of the physico-chemical characteristics within the survey area. An assessment of likely habitats and biotopes, with particular attention to environmentally sensitive habitats and species was also conducted. The sampling plan included the collection of water profiles, water samples and surface sediments at 135 pre-selected stations in the vicinity of Route 2. Photographic data was acquired from ten transects approximately 120 m to 207 m in length.

Water profiles were collected to record in situ parameters throughout the water column, including temperature, turbidity, salinity, DO saturation and pH. Water samples (from top, middle and bottom depths) were analysed for inorganic parameters (ammonium, ammoniacal nitrogen, COD, chloride, nitrate, nitrite, sulphide, total nitrogen, total cyanide, TSS, total coliforms, BOD, chloride, pH, phosphate, sulphate, TDS, TOC, orthophosphate, silicon, turbidity, total phosphorus), hydrocarbons and heavy and trace metals.

The surface (0 cm to 2 cm) sediment samples were analysed for nutrients, TOC, carbonate content, hydrocarbons (including THC, PAHs and BTEX), PCBs and heavy metal content. The surface (0 cm to 5 cm) sediment samples were analysed for selected physical characteristics (e.g. PSD).

The previous sections of this report have presented the data generated from the analysis programme stated above with the aid of data tables and graphics. This discussion section will review the data with respect to cited background levels. Background concentrations have been utilised to support interpretation such as the Abu Dhabi Specification Ambient Marine Water and Sediments Specifications MACs (ADS 18/2017; QCC, 2017). These set maximum allowable limits for general use areas and MPAs whilst the NOAA screening quick reference tables provide assessment criteria for contaminants in sediments in the form of ERL and ERM threshold values (Buchman, 2008). Adverse effects on organisms are rarely observed when concentrations are present below the ERL value but are generally observed when above the ERM value (NOAA, 1999).

14.1 Water Profiles

The Arabian Gulf is a semi-enclosed body marine body of water that connects to open waters via the Strait of Hormuz. In that area, ecosystems are under high environmental pressures with high temperatures causing high evaporation rates and high salinity, poor flushing causing limited dilution, slow dispersion and high resident time, atmospheric fallout from dust storms and high ultra violet (UV) exposure.

A monthly hydrographical survey carried out in the Arabian Gulf between October 1993 and September 1994 (Shriadah & Al-Ghais, 1999) demonstrated water temperatures ranged from 16.90 °C to 34.60 °C, suggesting the temperature values from this survey fall within normal ranges for the wider area.

The arid climate influences the sea salinity, which together with shallow water and a limited circulation pattern, as well as inconsequential freshwater runoff due to the low annual rainfall means that salinities in the Gulf normally reach between 40 ppt and 50 ppt (Carpenter et al., 1997) with ranges between 35.2 to 44.0 (units are not clarified; however, they are likely to be parts per thousand (ppt) or PSU) previously demonstrated in the wider region (Shriadah & Al-Ghais, 1999).

All profiles sampled across the survey area displayed a single well mixed water layer. Water temperature and salinity profiles were broadly similar, and no vertical stratification was observed within the water column. Based on the existing literature presented above, both temperature and salinity values sampled were considered to be typical of that region.

Turbidity can be an indicator of suspended solids within the water column, often related to factors including erosion, seasonal inputs from rivers and resuspension of sediments. High turbidity may also be indicative of phytoplankton or algal growth. In particular, prevailing north-westerly ‘shamal’ winds occur between November and April. These drive seasonal eddies in the central Gulf and influence coastal storms surges and currents in the south (Sheppard, 1993). Not only does this cause fluctuations in seawater temperature, but the resulting wave-driven sediment resuspension across the shallow (< 10 m) coastal areas can cause periods of elevated turbidity (> 20 NTU; Paparella et al., 2019).

Water turbidity profiles across the survey area were generally constant, with low values (0.2 NTU to 2.5 NTU) at all stations; however, at 16 stations, a slight trend of increasing turbidity with water depth was observed at depths > 10 m, where turbidity increased approximately by a factor of 2. Overall, turbidity profiles suggest clear waters with low levels of suspended material in the water, despite the slight increase in turbidity towards the seabed at select stations. Anomalous readings recorded at two stations were attributed to the sensor contacting the seabed.

The oxygen content of natural waters varies with temperature, salinity, turbulence, the photosynthetic activity of algae and plants, and atmospheric pressure. Biological respiration, including that related to decomposition processes, reduces DO concentrations. The solubility of oxygen decreases as temperature and salinity increase. Dissolved oxygen saturation across the survey area was greater than ca. 87 % throughout the water column, exhibiting a slight reduction in DO with increasing depth at most of the water profiles sampled. The observed pattern typically reflects greater photosynthesis (from increased light levels) in surface waters, as well as greater gas exchange with the atmosphere, compared to deeper waters. Overall, the water profiles demonstrate that marine waters within the survey area were at, or near, oxygen saturation at the time of survey, with little indication of oxygen depletion.

The mean pH values of the water profiles acquired during water profiling were approximately 8.1 and relatively constant throughout the water column. High pH in water samples can occur during algae blooms due to chemical processes associated with photosynthesis but moderate to high salinities usually ‘buffer’ pH in the range 7 to 8 range. A typical pH range for seawater is 6.5 to 8.5 (US EPA, 2020); the pH in all survey areas were within these criteria indicating little evidence of algal blooms. The pH values reported in the current survey, were within the range of values reported previously in the Arabian Gulf (7.91 to 8.60; Shriadah & Al-Ghais, 1999), hence considered to be typical of that region.

14.2 Water Quality

Most of the inorganic water quality parameters (total suspended solids, nitrogen (ammonia), ammonium, sulphide, total nitrogen, total cyanide, total phosphorus, orthophosphate, silicon, COD, BOD and total coliforms) were below their respective MRVs at all stations across the survey area. Values for nitrite were below their respective MRVs for the majority of stations across the survey area. Reference values were available for some parameters (pH, total cyanide and total coliforms).

Total suspended solids (TSS) are related to turbidity and linked to factors including erosion, seasonal inputs from rivers and resuspension of sediments. TSS have a deleterious effect on water quality due to a reduction in light transmission and the transport of nutrients and bacteria in the water column (Bilotta & Brazier, 2008). Across the survey area TSS values were < 5.0 mg/L and turbidity ranged from below the MRV (0.1 mg/L) to 0.9 mg/L. According to the EPA (Klemas, 2012), TSS concentrations of < 10 mg/L are classified as clear waters, therefore the results from the survey area are indicative of clear water.

In water the forms of nitrogen that are of greatest interest are nitrate, nitrite, ammonia and organic nitrogen. Nitrate is the final oxidation product of nitrogen compounds in seawater and is considered the most thermodynamically stable oxidation level under aerobic conditions; it is one of the most important nutrients controlling primary production. Nitrite forms the intermediate between the reduction of nitrate and the oxidation of ammonia in sea and estuarine water. The concentrations of nitrite are typically low except in transition zones between oxic and anoxic conditions (Mordy et al., 2010). In oxygenated natural water systems, nitrite is rapidly oxidised to nitrate and consequently, concentrations of nitrite would be expected to be low. Throughout sediments where oxygen is depleted, nitrite is reduced by anaerobic bacteria to ammonia (Koike & Sorensen, 1988). Nitrite levels across the survey area were below or just above the MRV (0.016 mg/L), and nitrate ranged from below the MRV of 0.04 mg/L in 298 samples to 0.33 mg/L.

Phosphorus in waters occurs mostly as dissolved orthophosphate, polyphosphates and organically bound phosphates. Changes between these forms occur continuously due to decomposition and synthesis of organically bound forms and oxidised inorganic forms. Natural sources of phosphorus are mainly the weathering of phosphorus-bearing rocks and the decomposition of organic matter. Domestic waste waters (particularly those containing detergents), industrial effluents and fertilisers' run-off contribute to elevated levels in surface waters. Phosphorus associated with organic and mineral constituents in water bodies can also be mobilised by bacteria and released to the water column. Because phosphorus is actively taken up by algae and marine plants, there can be considerable seasonal fluctuations in concentrations in surface waters, and elevated phosphorus levels may lead to the eutrophication of water. The orthophosphate concentrations were below the MRV (0.060 mg/L), indicating no evidence of eutrophication.

TOC consists of both dissolved and particulate organic carbon and can be an approximate indicator of productivity in marine waters where anthropogenic inputs are not present. The mean TOC values observed across the Route 2 survey area were comparable at different depths suggesting no evidence of stratification.

Sulphate concentrations (2940 mg/L to 3740 mg/L) did not show clear spatial or depth-driven trends within the dataset and were lower than the sulphate concentrations recorded for the wider Arabian Gulf region (3750 mg/L to 4490 mg/L, Taher et al., 2012).

Chemical oxygen demand (COD) is a measurement of the oxygen required to oxidise soluble and particulate organic matter in water. Biochemical oxygen demand (BOD) is a measurement of the amount of dissolved oxygen that is used by aerobic microorganisms when decomposing organic matter in water. High BOD and COD values can be indicative of nutrient enrichment in marine waters. BOD and COD levels were < MRV (2 mg/L and 5 mg/L receptively), indicating low levels of primary productivity and reflective of the low levels of nutrients present in the water column.

Microbiological analysis of coliforms showed that bacterial colonies were not present within the water samples, suggesting no influence of human or animal wastes.

Generally, the water samples from the Route 2 survey area demonstrated no evidence of anthropogenic pollution and are likely to be representative of background conditions for the local area.

14.3 Water Column Hydrocarbons

Hydrocarbon content can be used as an indicator of petrogenic inputs into water columns. This is because soluble fractions of hydrocarbons can partition between dissolved and particulate bound phases in the water column (Latimer & Zheng, 2003; Thibodeaux et al., 2011).

Concentrations of volatile petroleum hydrocarbons (VPH), dissolved and emulsified oil and free oil were below their respective MRVs in all samples.

The concentrations of extractable petroleum hydrocarbons (EPH) were below the MRV (10.0 µg/L) in the majority of samples. The MRV values were above the ADS 18/2017 MAC for both general use areas (7.0 µg/L) and marine protected areas (7.0 µg/L) and therefore no meaningful comparison of most of the current data can be made to the reference values. Samples R2_ENV_035-Top, R2_ENV_035-Bottom, R2_ENV_074-Top and R2_ENV_103-Top contained EPH concentrations greater than the MRV. These values were also above the ADS 18/2017 MAC for both general use areas (7.0 µg/L) and marine protected areas (7.0 µg/L), however it should be noted that is likely these values are anomalous.

Polycyclic aromatic hydrocarbons and their alkyl homologues have been recorded in a wide range of marine matrices (Laflamme & Hites, 1978; Neff, 1979; Youngblood & Blumer, 1975). These compounds consist of two or more fused benzene rings in linear, angular or cluster arrangements. By definition, PAHs only contain carbon and hydrogen atoms. However, other atoms (e.g. nitrogen, sulphur and oxygen) may be readily substituted into the benzene ring to form heterocyclic compounds that are present in significant levels in petroleum and refined products.

Monitoring of aromatic hydrocarbon type and content is important due to the particularly toxic nature (mutagenic/carcinogenic) of several PAHs even at very low concentrations. The EPA has identified sixteen priority PAHs to be monitored that primarily reflect inputs from man-made combustion sources (further alkylated and parent compounds are normally studied because of the information they provide on PAH origin and fate). Many PAHs have long been recognised as universal environmental pollutants with the heavier molecular weight PAHs (mainly 4 to 6 ring PAH) generally being regarded as carcinogens and mutagens. Indeed, 11 of 40 PAHs ranging from 3 to 6 ring structures have been listed as being strongly carcinogenic or mutagenic with a further ten listed as weakly carcinogenic or mutagenic (Edwards, 1983).

By far the greatest concentrations of PAHs released into the environment are formed during fossil fuel combustion and man-made forest and agricultural fires (Sims & Overcash, 1983; Edwards, 1983). Once released into the atmosphere PAHs may be carried long distances adsorbed to particulate material (e.g. soot and fly-ash; Windsor & Hites, 1979). Similarly, when deposited within the water environment PAHs may undergo further transport (e.g. by rivers or ocean currents) before final deposition in the sediments. Due to the low solubility and hydrophobic nature of PAHs, when deposited within the water column they tend to be adsorbed to suspended inorganic and organic particulate matter, which gradually settles out. Once deposited in the sediment PAHs are less susceptible to photochemical and biological degradation and may accumulate to relatively high concentrations.

Concentrations of PAHs were below their respective MRVs in all samples across the Route 2 survey area, apart from fluoranthene, phenanthrene and pyrene. Concentrations of fluoranthene exceeded the MRV (0.01 µg/L) for sample R2_ENV_008-Top (0.02 µg/L). Concentrations of phenanthrene (slightly) exceeded the MRV of < 0.01 µg/L in three samples, R2_ENV_009-Bottom, R2_ENV_058-Middle and R2_ENV_112-Top, where the recorded concentration was 0.01 µg/L. Pyrene concentrations were below the MRV of (0.01 µg/L) in the majority of samples with the exception of R2_ENV_008-Top (0.14 µg/L) and R2_ENV_112-Top (0.02 µg/L). However, the concentrations of PAHs recorded across the Lightning Route 2 survey area are unlikely to be of environmental concern.

BTEX is the term used to describe a group of compounds related to benzene: toluene (methylbenzene), ethylbenzene, xylenes and benzene itself. BTEX are volatile and present in light crude oils and gasoline and sources are primarily from oil and gas industries, chemical industries and other combustion processes. BTEX compounds are volatile in nature and can be lost through evaporation processes, however they are toxic to organisms when in the marine environment if contact time is sufficient (Alpar & Unlu, 2010).

BTEX concentrations were all below their respective MRVs. The concentrations of benzene, toluene and ethylbenzene were all below their respective CCME values, and therefore unlikely to be of environmental concern.

Phenol and its derivatives are common by-products of industrial processes such refining or treatment of fossil fuels and the production of coke, steel, paint, fiberglass etc (Krastanov et al., 2013). Phenol and phenolic compounds are water-soluble substances and toxic to marine organisms (Duan et al., 2017; Duan et al., 2018). The concentrations of phenol and phenolic compounds were below their respective MRVs in all samples across the Route 2 survey area.

14.4 Water Column Major and Trace Elements

Metals and metalloids occur naturally in the marine environment and are widely distributed in both dissolved and sedimentary forms. Some are essential to marine life while others have no biological function and therefore are toxic to numerous organisms at certain levels (Paez-Osuna & Ruiz-Fernandez, 1995; Boening, 1999). Metals can enter the environment via natural methods such as riverine transport, coastal discharges, geological weathering and atmospheric fallout (Brady et al., 2015). Other routes into marine waters are from anthropogenic activities such as direct discharges from industrial activities.

Except for cadmium, chromium, copper and zinc, concentrations of all major and trace elements were below their respective ADS 18/2017 MAC for both general use areas and marine protected areas, as well as the US EPA CCC and CMC thresholds (US EPA, 2020) and considered to be of no environmental concern. Concentrations of cadmium exceeded the ADS 18/2017 MAC for both general use areas and marine protected areas in one sample (sample R2_ENV_129-Bottom), whereas for chromium exceeded the ADS 18/2017 MAC thresholds in almost half of the samples obtained across the survey area. Copper concentrations exceeded the ADS 18/2017 MAC thresholds in 4 samples. From these, two samples (samples R2_ENV_004-Bottom and R2_ENV_079-Top) exceeded the US EPA CMC threshold of 0.0048 mg/L. Sample R2_ENV_095-Middle was the only sample were zinc concentrations exceeded the US EPA CCC and the US EPA CMC thresholds, whereas concentrations in a total of 29 samples exceeded their respective ADS 18/2017 MAC for both general use areas and marine protected areas.

It should be noted that the chromium concentrations determined across the Lightning Route 2 survey area were total chromium concentrations including hexavalent chromium (Cr VI), whereas the ADS 18/2017 standard is for hexavalent chromium only. As such, the analysis results are not directly comparable to the MACs.

It is not clear if the ADS 18/2017 MACs are for total or dissolved metals, whereas the major and trace element concentrations analysed across the Lightning Route 2 survey area are total concentrations, consisting of both dissolved and particulate forms. Consequently, the cadmium, chromium, copper and zinc concentrations in the particulate fraction could influence total concentrations resulting in an exceedance of the MACs across the Lightning Route 2 survey area.

There were no spatial patterns in the dataset, or any relationships with depth, suggesting no influence on water column concentrations from the underlying sediment.

14.5 Sediment Characterisation

The general physical and chemical characteristics of sediment particles have a significant effect on how other chemical components and biological species interact with seabed sediments. For example, the silt/clay fraction is known to adsorb petroleum hydrocarbons/heavy metals from seawater and through this pathway, these chemicals become incorporated into the sediment system (Meyers & Quinn, 1973). Granulometry data can therefore be critical when interpreting chemical and biological data obtained in this type of benthic study.

With regard to macrofaunal communities, the species distributions and community structure can be greatly influenced by the nature of the sediment, which represents the effects of a complex set of hydrological factors, such as water movement, turbulence and suspended load, at one particular point in time. Some animals have a behavioural preference for sediment of a particular grain size (Meadows, 1964; Gray, 1981), while this factor and organic matter content are closely associated with other properties of the sediment such as density, porosity, permeability, oxygenation and bacterial count (Buchanan, 1984), all of which affect animal functions such as locomotion, attachment, tube construction and feeding. Specifically, the proportion of fine (silt/clay) material often influences the distribution of macrofaunal communities.

The sediments within the Route 2 survey areas demonstrated moderate interstation variability in mean diameter (µm) and low variability in sand content (Appendix H.2). Sediment descriptions using the BGS modified Folk description categorised the seabed across Route 2 as slightly gravelly muddy sand, gravelly muddy sand, slightly gravelly sand, gravelly sand, muddy sandy gravel and slightly gravelly sandy mud. This was classified further within the laboratory to Wentworth (1922) sediment descriptions of ‘coarse sand’ to ‘medium silt’, with sand as the dominant fraction at most stations (mean 77.02 %). No clear spatial patterns in sediment type were apparent across the survey area.

Carbonate content within sediments in the Arabian Gulf have been well documented to be high and closely correlated with grain size, with an average of 85 % in coarser sediment (Basaham & El Sayed, 1998). Carbonate content across the Route 2 survey area was higher than this (mean 95.9 %). Elevated carbonate percentages have been associated with high temperature and high salinity, as observed in the water column profiles (Section 4), in addition to low dilution from land derived inputs and low precipitation, which increases the carbonate production of benthic organisms (Fugro, 2016).

Sediment TOC content within the Route 2 survey area was lower (mean 0.25 %) than data presented by the National Petroleum Construction Company (2019) for the Zakum Field (0.47 %).

14.6 Sediment Nutrients

Sediment nutrient concentrations are important indicators of primary production and the health of an ecosystem. Apart from silicon, all sediment nutrient concentrations recorded across the survey area demonstrated low to moderate variation. Silicon concentrations demonstrated high variability (RSD 71 %).

Phosphorus concentrations reported in the current survey (mean 365 µg/g) were higher than those carried out previously in the Zakum oil field (mean 127.87 µg/g; Blue Sea Environmental Consultants, 2011).

No spatial patterns were observed or any association with depth, hence the concentrations recorded were considered as background for the region.

14.7 Sediment Hydrocarbons

Marine sediments contain hydrocarbons derived from many sources that enter the marine environment via three general processes: biosynthesis (marine and land organisms biosynthesise hydrocarbons), geochemical processes (submarine and coastal/terrestrial oil-seeps) and anthropogenic sources (from accidental or intentional discharge of fossil fuel) (Farrington & Meyer, 1975; Myers & Gunnerson, 1976).

Biosynthesised hydrocarbons are ubiquitous in the marine environment (Harada et al., 1995; Parinos et al., 2013). Odd carbon number, long chain n-alkanes are widely distributed in the plant kingdom (Eglinton et al., 1962; Douglas & Eglinton, 1966; Bush & McInerney, 2013) as components of cuticle waxes. These are common on the surfaces of leaves, stems, flowers and pollen and their presence in sediment is indicative of terrestrial inputs from adjacent land masses. Relatively high concentrations of nC_{29}, nC_{31} and nC_{33} are therefore a common feature of many marine sediments (Farrington et al., 1977), particularly inshore marine sediments (Bouloubassi et al., 1997).

Anthropogenic hydrocarbon inputs enter the marine environment from a number of sources: for example, marine transportation, offshore oil production, coastal oil refineries, accidental shipping losses, industrial and municipal waste (including sewage and dredged spoils) with a significant contribution to the global budget entering via urban and river run-off, atmospheric deposition (i.e. from combustion sources, including PAHs) and natural seepages (Johnston, 1980; Dicks et al., 1987).

The total hydrocarbon content concentrations measured in sediment samples collected along the cable route displayed moderate variability (RSD 56 %). Stations R2_ENV_133 and R2_ENV_134 demonstrated the highest THC concentrations. Overall, concentrations were low (ranging from 0.7 µg/g to 9.0 µg/g) with values that are typical of concentrations recorded around non-industrialised coastal environments distant from hydrocarbon inputs (de Mora et al., 2010).

Most of the sediment individual PAH concentrations were below the MRV (0.1 ng/g). Total PAH concentrations did not exceed the ADS 18/2017 MAC value (1700 ng/g) at any station. Although comparison of total US EPA 16 PAH concentrations was made to the MAC values for total PAHs (QCC, 2017), they should be treated with caution as this document does not state which PAHs constitute the total PAH value. The concentrations of individual PAHs were also lower than the available estimated environmental effect threshold values (ERL values, listed in Appendix I.1). Total PAH concentrations were broadly comparable to the range (0 ng/g to 31.5 ng/g) reported previously in offshore UAE waters (Al Katheeri, 2004).

The concentrations of BTEX measured in the sediment samples collected throughout the survey area were all below the MRV (5.0 ng/g). Previous site-specific studies in UAE offshore waters (Fugro, 2016) reported BTEX sediment concentrations below the MRV (range from < 0.05 mg/kg to < 0.1 mg/kg), which were higher than the current survey.

14.8 Sediment Polychlorinated Biphenyls

PCBs are a group of industrial chemicals that were widely used in electrical equipment. They are manufactured by reacting chlorine with biphenyl resulting in the formation of a complex mixture of compounds (known as congeners). The properties of the final product are modified by varying the proportion of chlorine to biphenyl present. PCBs in environmental samples are therefore present as technical mixtures not as individual compounds. PCBs have been identified as being potentially harmful to the environment and are no longer commercially produced but may still be present on offshore installations in sealed units (such as power transformers). Releases of PCBs to the environment would therefore not be expected to be widespread with the most likely source of contamination being related to historic use of coatings/paint containing PCBs or spillages from damaged equipment.

PCB concentrations along Route 2 were below the MRV at most stations and all total WHO12 PCB concentrations were below the ADS 18/2017 MAC (22.0 ng/g) for general use areas and MPAs. Although comparison to the MAC values have been made, the ADS 18/2017 (QCC, 2017) document does not specify which PCBs constitute the PCB total. Previous studies in UAE offshore waters demonstrated higher PCB sediment concentrations (< 0.01 mg/kg; Fugro, 2016) than those from the current survey.

14.9 Sediment Metals

The analysis of samples for heavy metal content can provide further corroboration in conjunction with the physical characteristics and hydrocarbon content of marine sediments in assessing either the background levels or the dispersion of discharged material around offshore installations.

Trace metal contaminants in the marine environment tend to form associations with the non-residual phases of mineral matter, such as iron and manganese oxides and hydroxides, metal sulphides, clays, organics and carbonates (Warren & Zimmerman, 1993; Dang et al., 2015; Wang et al., 2015). Non-residual trace metals are associated with more reactive and available sediment components through processes such as adsorption onto mineral surfaces and organic complexation. Metals associated with these more reactive phases are prone to various environmental interactions and transformations (physical, chemical and biological) potentially increasing their mobility and biological availability (Tessier et al., 1979; Warren & Zimmerman, 1993; Du Laing et al., 2009). Residual trace metals are defined as those that are part of the crystal structure of the component minerals and are generally unavailable to organisms (de Orte et al., 2018). Therefore, in monitoring trace metal contamination of the marine environment, it is important to distinguish the more mobile non-residual trace metals from the residual metals held tightly in the sediment lattice (Chester & Voutsinou, 1981), which are of comparatively lesser environmental significance because of their low reactivity and availability.

In this study, an analytical procedure involving the digestion of sediment using aqua regia was employed to analyse the elemental content of the sediments. The aqua regia digest releases for analysis the non-residual heavy metals, which are not incorporated in the mineral matrix and are therefore potentially available for biological uptake.

Except for arsenic, chromium, lead and nickel, concentrations of all sediment metals were below their respective ADS 18/2017 MAC for both general use areas and marine protected areas where available, as well as the ERL and ERM threshold values (Buchman, 2008). Concentrations of chromium, lead and nickel exceeded the ADS 18/2017 MAC (QCC, 2017) for marine protected areas at 17, 1 and 40 stations respectively. Nickel concentrations exceeded the ADS 18/2017 MAC (QCC, 2017) for general use areas at station R2_ENV_018. Arsenic concentrations exceeded their respective ADS 18/2017 MAC threshold (7.0 µg/g) for both general use and marine protected areas at 9 stations. The NOAA ERL value for arsenic (8.20 µg/g; Buchman, 2008) was also exceeded at 3 stations, however the concentrations at these stations were below the ERM threshold (70.0 µg/g; the level at which environmental effects start to be observed). Therefore, the background levels of these elements measured in the survey area would not be expected to be environmentally important.

There were no spatial patterns in the sediment metal concentrations across the survey area, or any relationships with depth.

14.10 Seabed Habitats

Seabed across the survey area encompasses three distinct habitats in accordance with the MLEAD (John & George, 2001) and EAD (Al Dhaheri et al., 2017) habitat classifications.

'Sublittoral mixed deposit' (SLMXD) habitat was identified from five transects TR03, TR04, TR05, TR08a and TR10. This habitat was restricted to relatively deeper water depths of between ~11.0 m and ~37.0 m BSL. This habitat consisted of a hard, calcarenite substratum, overlaid with a veneer of sand, shell sediment and coral rubble. Calcarenite substrata comprise cemented calcareous sand grains and can be formed in marine or terrestrial settings. Calcarenite is widespread throughout shallower waters and coastal areas of the

UAE (Macklin et al., 2012). The findings of the seabed photography analysis aligned with those of the geophysical survey (Fugro, 2020b) which reported calcarenite surficial sediments throughout the Route 2 survey area. The authors of this classification describe shallower water variants of this habitat, in which macroalgae are the dominant biota, as being widespread throughout Abu Dhabi waters. Previous surveys offshore Abu Dhabi (e.g. Fugro, 2016) and across the wider region have also reported habitats more akin to that recorded from Route 2 survey area; these appear to be deeper variants of the mixed sediment habitat reported by John & George (2001), with boulder corals and other attached invertebrates found to be the dominant taxa.

Overall, the survey area comprised a low diversity and abundance of corals within the nearshore survey area; with exception of transects TR04 where a moderate abundance of corals was recorded. The most frequently recorded corals across the survey area were finger corals of the genus *Porites* sp., boulder corals of the families Faviidae and Coscinaraeidae which included the taxa *Favia* sp., *Favites* sp., and possible *Siderastrea* sp. Branching coral, possibly *Pocillopora* sp. and the disk coral (*Turbinaria* sp.) were also occasionally observed. The majority of coral colonies identified were small (less than 20 cm diameter), with the largest colony reported (*Porites* sp.) reaching approximately 50 cm diameter.

This habitat also had a low diversity and abundance of soft corals and sea whips. The most frequently recorded corals across the survey area were gorgonian corals (Pleuxaridae, Alcyonacea including possibly *Euplexaura* sp., and *Menella* sp.) and sea whips (*Junceella juncea*).

Hard coral and soft coral assessments were undertaken in line with internationally recognised assessment criteria (DNV, 2019; Santavy et al., 2012) Within the survey area, transects that supported live hard corals that were classified as ‘Low live coral cover’, were observed on transects TR04 and TR10. Where the density of live corals reached ~ 10 to 40 % and was classified as ‘Moderate live coral cover’ was observed on TR04. The majority of the transects displayed an average density of live hard corals of < 1 %). Live hard coral observations were also recorded on TR05 and TR08a but were at densities of < 1 %).

Transects that supported live soft corals that were classified as ‘Low live coral cover’, were observed on transects TR03 and TR08a. More in detail, the majority of the transects displayed an average density of live soft corals of < 1 %). Live soft coral observations were recorded on TR03, TR04, TR05, TR07 and TR10 but were at densities of < 1 %).

‘Sublittoral sand and gravel’ (SLSED) habitat was identified from six transects (TR02, TR05, TR06, TRO7, TR08 and TR09) where bare soft sediment was interspersed with seagrass beds or singular coral outcrops or sea whips. Compared to the other two habitats observed across the survey area, the ‘Sublittoral sand and gravel’ displayed the lowest diversity and abundance in terms of epifauna and epiflora. The biological assemblages usually associated to this habitat are largely represented by infauna, including a range of polychaetes and crustaceans. Large burrows in stable sediment are often occupied by shrimp gobies

(*Cryptocentrus lutheri*) and their attendant bulldozer alpheid shrimps (John & George, 2004). This habitat was restricted to water depths of between ~16.0 m and ~25.0 m BSL.

'Seagrass bed' were identified from five transects across the survey area. Seagrass beds are common in the vast shallow subtidal areas (< 15 m) that dominate much of the south and southwestern Gulf, with the most extensive beds occurring off of the coast of the UAE and Qatar (Jones, 1985). Three main seagrass species occur regionally, *Halodule uninervis* (most widely distributed), *Halophila stipulacea* (less common, but forming dense meadows in some areas) and *Halophila ovalis* (rarely forming dense monospecific meadows), with > 90 % of seagrass being *H. uninervis* alone (Erftemeijer and Shuail, 2012).

Within the survey area 'Seagrass bed' consisted of the two species *H. stipulacea* and *H. ovalis.* At deeper depths, ranging between ~13.0 m and ~19.0 m BSL, *H. ovalis* and *H stipulacea* was identified from four transects (TR01, TR02, TR05 and TR06). This habitat variant also consisted of lower densities colonising bare sediment on five transects (TR03, TR04, TR05, TR07 and TR10). The habitat consisted of relatively deeper soft sediment at lower depths, where it can form more stable and dense seagrass meadows.

The type of substratum plays a major role in the distribution of seagrasses. For the rhizomes to grow and for the anchoring of roots, seagrasses typically require a soft substrate of gravel, sand or mud (Greve and Binzer, 2004). In the Arabian Gulf, seagrasses are subject to extreme natural variations in water temperature which plays a major stressor in the seagrass productivity. Seagrasses have significant ecological and economic importance in the Gulf. They are a direct food source for many herbivores, they provide indirect energy to the detrital food web (Coles & McCain, 1990), and provide nursery habitats for a variety of commercially important fishes (Jones et al., 2002; Sheppard et al., 2010).

15. Conclusions

The aim of this report is to establish the current biological and physico-chemical conditions of the seabed sediments and water column along the proposed Lightning Cable Route 2 that will connect Umm Shaif LTDP Island to Shuweihat, within the Umm Shaif field, Offshore Abu Dhabi. A review of the environmental data in context with other cited studies from the region and estimated water and sediment effects threshold values (QCC, 2017; US EPA 2018, Buchman, 2008 and CCME, 2014) was also undertaken. Based on the overall assessment of the survey area, the following key conclusions can be stated:

Water temperatures within the survey area appeared more consistent in shallow waters, rather than deeper ones. In contrast, salinity values were generally observed to be consistent throughout the water column for most stations. A clear trend of increasing turbidity with water depth was observed at numerous water profiles, where the turbidity levels almost doubled compared to the rest of profiles obtained. A slight reduction in dissolved oxygen (DO) with increasing depth was observed at most of the water profiles sampled, with a sharp decrease of 10 % observed in 3 profiles at around 12 m depth. The pH values reported in the current survey were consistent across all profiles taken. Overall, minimal differences were observed at a few stations, hence the conditions encountered were considered typical for the region and season.

The water samples collected across the Route 2 survey area demonstrated no evidence of anthropogenic pollution with most parameters were below their respective MRVs.

Most water hydrocarbons recorded across the survey area were either comparable to, or below their respective MRV values. The concentrations of EPH in 4 samples exceeded the ADS 18/2017 MAC for both general use areas (7.0 µg/L) and marine protected areas (7.0 µg/L), however these values are considered to be potentially anomalous.

Except for cadmium, chromium, copper and zinc, concentrations of all major and trace elements for waters were below their respective ADS 18/2017 MACs, as well as the US EPA CCC and CMC values and considered to be of no environmental concern. The ADS 18/2017 MAC thresholds for both general use areas and marine protected areas were exceeded for zinc in 29 samples, for cadmium in 1 sample, for chromium in 162 samples and for copper in 4 samples. Zinc concentrations exceeded the US EPA CCC and the US EPA CMC thresholds, in sample R2_ENV_095-Middle. Copper concentrations exceeded the US EPA CCC threshold in four samples and the US EPA CMC threshold of 0.0048 mg/L in two samples.

Using the Wentworth (1922) sediment description, most stations along the Route 2 survey area comprised mainly sand and were classified as coarse sand to medium silt. No clear spatial patterns between depth and sediment type were apparent along Route 2. Total organic carbon content was low across the survey area, with a high carbonate content.

All sediment nutrient concentrations, except silicon, demonstrated low to moderate variation across the survey area with no spatial patterns, demonstrating broadly homogenous sediments. Phosphorus concentrations reported in the current survey were higher than those recorded previously in the Zakum oil field (Blue Sea Environmental Consultants, 2011).

Concentrations of THC were low and typical of concentrations recorded around non-industrialised coastal environments distant from hydrocarbon inputs. Total PAH concentrations were below the ADS 18/2017 MAC. The concentrations of BTEX in the current survey were below the MRV at all stations along the Route 2 survey area and lower than the values reported previously in the region.

The concentrations of individual PCBs were below the MRV at most stations along the Route 2 survey area. Total WHO12 PCB concentrations were below the ADS 18/2017 MAC.

The majority of the sediment metals concentrations were below their respective ERL values, except for arsenic at 3 stations. Arsenic concentrations also exceeded the ADS 18/2017 MAC threshold (7.0 µg/g) for both general use and marine protected areas at 9 stations. Concentrations of chromium and nickel exceeded the ADS 18/2017 MAC (QCC, 2017) for marine protected areas in numerous stations. Lead concentrations exceeded the ADS 18/2017 MAC for marine protected areas at one station. Nickel concentrations also exceeded the ADS 18/2017 MAC (QCC, 2017) for general use areas at station R2_ENV_018. There was no clear spatial distribution pattern that would indicate a point source related to possible anthropogenic activities within the survey area, and the differences recorded are therefore most likely to be associated with natural sediment variations.

The seabed was heterogeneous across the survey area and encompassed three distinct habitats: ‘Sublittoral mixed deposit’, ‘Sublittoral sediment’ and ‘Seagrass beds’. ‘Sublittoral mixed deposit’ comprised a mainly flat substratum of calcarenite (cemented sand) with a veneer of sand sediment and occasional coral outcrops, mainly including finger corals (*Porites* sp.), plate corals (*Turbinaria* sp.) and boulder corals (Faviidae). ‘Sublittoral sediment’ encompasses predominantly sand sediment, with varying proportions of gravel, shell and coral fragments. ‘Seagrass bed’ comprised predominantly sand sediment with moderate density beds of *H. ovalis* and *H. stipulacea*. All habitats reported, and the taxa resident therein, were typical of areas of similar sediment and water depth in the southern Arabian Gulf.

16. References

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Appendices

A. Guidelines on Use of Report

This report (the "Report") was prepared as part of the services (the "Services") provided by Fugro Survey (Middle East) Limited ("Fugro") for its client (the "Client") under terms of the relevant contract between the two parties (the "Contract"). The Services were performed by Fugro based on requirements of the Client set out in the Contract or otherwise made known by the Client to Fugro at the time.

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B. Methodologies

B.1 Laboratory Analysis of Water Samples

B.1.1 Water Quality

pH was determined using the method APHA 4500 H + B: pH Value in Water by Potentiometry Using a Standard Hydrogen Electrode.

Total suspended solids (TSS) were determined by method APHA 2540 D: D: Total Suspended Solids Dried at 103 °C to 105 °C.

Total dissolved solids (TDS) were determined by the method APHA 2540 C: Total Dissolved Solids Dried at 180 °C.

Turbidity was analysed using method APHA 2130 B: Nephelometric Method.

Nitrogen (ammonia) and ammonium were analysed using method HACH 8155: Salicylate Method. Ammonia compounds combined with chlorine to form monochloramine. Monochloramine reacted with salicylate to form 5-aminosalicylate. The 5-aminosalicylate was oxidised in the presence of a sodium nitroprusside catalyst to form a blue coloured compound. The blue colour was masked by the yellow colour from the excess reagent present to give a final green-coloured solution which was measured colorimetrically.

Sulphide was determined by method APHA 4500 S2- F: Sulphide by Iodometry.

Total nitrogen was analysed using method ASTM D5176: Standard Test Method for Total Chemically Bound Nitrogen in Water by Pyrolysis and Chemiluminescence Detection. The sample of water was introduced into a stream of oxygen or inert gas/oxygen mix flowing through a quartz pyrolysis tube. Oxidative pyrolysis converted chemically bound nitrogen to nitric oxide (NO). The gas stream was dried and the NO was contacted with ozone (O_3) producing metastable nitrogen dioxide (NO_2*). As the NO_2* decayed, light was emitted and detected by a photomultiplier tube. The resulting signal was a measure of the total chemically bound nitrogen in the sample.

Total cyanide was analysed by a modified version of method US EPA method OIA-1667: Available Cyanide by Flow Injection, Ligand Exchange and Amperometry.

Nitrate was analysed by method HACH 8039: Cadmium Reduction Method. Cadmium metal reduced nitrates in the sample to nitrite. The nitrite ion reacted in an acidic medium with sulfanilic acid to form an intermediate diazonium salt. The salt coupled with gentisic acid to form an amber coloured solution. The measurement wavelength was 500 nm for spectrophotometers or 520 nm for colorimeters.

Nitrite was determined using method HACH 8507: Nitrite method. Nitrite in the sample reacted with sulfanilic acid to form an intermediate diazonium salt. This coupled with chromotropic acid to produce a pink coloured complex directly proportional to the amount of nitrite present. Test results were measured at 507 nm.

Phosphorus was analysed using the method APHA 3125: Metals by Inductively Coupled Plasma Mass Spectrometry (2017).

Orthophosphate was analysed using method HACH 8048: Phosphorus, Reactive (Orthophosphate). Orthophosphate reacted with molybdate in an acid medium to produce a mixed phosphate/molybdate complex. Ascorbic acid then reduced the complex, which gave an intense molybdenum blue colour. The measurement wavelength was 880 nm (DR 1900:710 nm) for spectrophotometers or 610 nm for colorimeters.

Sulphate was determined by method APHA 4500 SO42- C: Gravimetric Analysis with Ignition of Residue. Sulphate was precipitated in an HCl solution as barium sulphate by the addition of barium chloride. The precipitation was carried out near the boiling temperature, and after a period of digestion, the precipitate was filtered, washed with water until free of chloride, ignited or dried, and weighed as barium sulphate.

Chloride was determined by method APHA 4500 Cl- B: Iodometric Method I. Chlorine liberates free iodine from potassium iodide (KI) solutions at pH 8 or less. The liberated iodine was titrated with a standard solution of sodium thiosulfate ($Na_2S_2O_3$) with starch as the indicator. Titrate at pH 3 to 4 because the reaction is not stoichiometric at neutral pH due to partial oxidation of thiosulphate to sulphate.

Silicon was determined by method APHA 3125: inductively coupled plasma-mass spectrometry (ICP-MS).

Chemical oxygen demand (COD) was determined by method APHA 5220 B: Closed Reflux, Colorimetric Method. The sample was digested, resulting in the dichromate ion oxidising COD material in the sample. This resulted in the change of chromium from the hexavalent (VI) state to the trivalent (III) state. Both the chromium species were coloured and absorb in the visible region of the spectrum.

Total organic carbon (TOC) was determined by method APHA 5310 B: High-Temperature Combustion Method. The sample was homogenised and diluted as necessary and a micro portion was injected into a heated reaction chamber packed with an oxidative catalyst such as cobalt oxide, platinum group metals or barium chromate. The water was vaporised, and the organic carbon and inorganic carbon was oxidised to CO_2 and H_2O. The CO_2 was transported in the carrier-gas stream and was measured by means of a nondispersive infrared analyser or titrated colormetrically.

Biochemical oxygen demand (BOD) was analysed using method APHA 5210 B: 5-Day BOD Test. The method consisted of filling an airtight bottle of the specified size with sample to overflowing and incubating it at the specified temperature for 5 days. Dissolved oxygen was measured initially and after incubation and the BOD was computed from the difference between the initial and final dissolved oxygen (DO) value.

Total coliforms were determined using method APHA 9222 B: Membrane Filter Technique for Members of the Coliform Group 9222B. The sample was filtered through a membrane filter in the field immediately after collection. The filter was placed in the transport medium and shipped to the laboratory in a sealed container. The membrane was transferred to les-ENDO or m-ENDO agar containing basic Fuchsin as the indicator. This was incubated at 35 °C +/- 0.5 °C for 20 h to 22 h. Red colonies with a metallic (golden) sheen were coliform positive.

B.1.2 Hydrocarbon Content

Volatile petroleum hydrocarbons (C_5-C_{10}) were analysed using the method EPA 8015B: Nonhalogenated Organics Using GC-FID.

Extractable petroleum hydrocarbons were analysed for the n-alkane range nC_{10} to nC_{40}, using the method EPA 8015B: Nonhalogenated Organics Using GC-FID.

Dissolved and emulsified oil and free oil were analysed using the method: APHA 5520B: Oil and Grease by Partition-Gravimetric Method.

B.1.3 Polycyclic Aromatic Hydrocarbons (PAHs)

Concentrations of US EPA 16 PAHs in water were analysed using US EPA method 8270D: Semivolatile Organic Compounds by GC-MS.

B.1.4 Benzene, Toluene, Ethylbenzene and Xylene (BTEX)

Concentrations of BTEX were analysed using the method EPA 8015B: Nonhalogenated Organics Using GC-FID.

B.1.5 Phenols

Phenol concentrations were analysed using the US EPA method 528: Determination of Phenols in Drinking Water.

Analytes and surrogates were extracted by passing a 1 L water sample through a solid phase extraction cartridge containing 0.5 g of a modified polystyrene divinyl benzene copolymer.

The organic compounds were eluted from the solid phase with a small quantity of methylene chloride. The sample components were separated, identified, and measured by injecting an aliquot of the concentrated extract into a high resolution fused silica capillary column of a GC-MS system. Compounds eluting from the GC column were identified by comparing their measured mass spectra and retention times to reference spectra and retention times in a data base.

B.1.6 Major and Trace Elements

Water samples were analysed using the method APHA 3125: Metals by Inductively Coupled Plasma-Mass Spectrometry (2017).

Water samples collected from the survey area were analysed for selected elements: aluminium, arsenic, barium, cadmium, chromium, copper, iron, lead, mercury, silver, silicon, vanadium and zinc using ICP-MS.

B.2 Laboratory Analysis for Sediment Samples

B.2.1 Sediment Characterisation

B.2.1.1 Particle Size Distribution

Dry Sieve Analysis

Particle size distribution (PSD) analysis was undertaken in accordance with Fugro GB Marine Limited (FGBML) in house methods based on the National Marine Biological Association Quality Control (NMBAQC) scheme's best practice guidance document – Particle Size Analysis (PSA) for Supporting Biological Analysis, and BS1377: Parts 1: 2016 and 2: 1990.

Representative material > 1 mm was split from the bulk subsample and oven dried before sieving through a series of sieves with apertures corresponding to 0.5 phi intervals between 63 mm and 1 mm as described by the Wentworth scale (Wentworth, 1922). The weight of the sediment fraction retained on each mesh was subsequently measured and recorded.

Laser Diffraction

Particle size distribution (PSD) analysis was undertaken in accordance with FGBML in house methods based on the National Marine Biological Association Quality Control (NMBAQC) scheme's best practice guidance document – Particle Size Analysis (PSA) for Supporting Biological Analysis, and BS ISO 13320: 2009.

Representative material < 1 mm was removed from the bulk subsample for laser analysis, a minimum of three triplicate analyses (mixed samples) or one triplicate analyses (sands) were analysed using the laser sizer at 0.5 phi intervals between < 1 mm to < 3.9 µm. Laser diffraction was carried out using a Malvern Mastersizer 2000 with a Hydro 2000G dispersion unit.

Outputs and Deliverables

Sieve and laser data are merged and entered into GRADISTAT to derive statistics including mass and percentage retained within each size fraction, mean and median grain size, bulk sediment classes (percentage gravel, sand and silt/clay), skewness, sorting coefficients and Folk classification.

B.2.1.2 Calcium Carbonate

A pre-dried aliquot of the sediment was weighed and then treated with hydrochloric acid to remove inorganic carbon in the form of carbonate. Fresh acid was added until all effervescence ceased; the sediment was then washed over a glass-fibre filter and the residue dried to a constant weight before being ignited in a muffle furnace at 600 °C for 2 hours. The organic content of the sediment is then calculated using the weight difference from the original dry weight to the ignited residue (taking into account the loss of carbonate).

B.2.1.3 Total Organic Content

Sediment samples were analysed for total organic carbon (TOC) by Element Materials Technology. The dry, homogenised sample was treated with hydrochloric acid, then rinsed with deionised water to remove mineral carbon. The sample was then combusted in an Eltra TOC furnace/analyser in the presence of oxygen. Organic carbon was oxidised to CO2 and measured by non-dispersive infrared analysis. This method does not quantify volatile organic carbon, which should be determined by another technique. The limit of detection for this method was < 0.02 % w/w.

B.2.1.4 Sediment Nutrients

Total cyanide was determined on wet sediment by segmented flow analysis with colormetric detection. Total nitrogen was determined on an air dried and ground sediment sample by an elemental analyser. Silicon, sulphates and phosphorus were determined on an air dried and ground sample following an aqua regia digest with analysis by ICP- OES. Fluoride was determined using an ion selective electrode. Phosphates were determined by ion selective spectrometry.

B.2.2 Sediment Hydrocarbons

B.2.2.1 Total Hydrocarbons by Gas Chromatography–Flame Ionisation Detection (GC-FID)

The total hydrocarbon material (C_{10}-C_{40}) present was quantified using response factors calculated from the analysis of mixed oil standard solutions over an appropriate range. The unresolved complex mixture was determined by subtracting the area of all the resolved peaks from the total hydrocarbon area and applying the total hydrocarbon response factor. The minimum reporting value (MRV) is 0.5 µg/g dry weight.

B.2.2.2 Oil and Grease

Samples would have been extracted using n-hexane then following EPA 9071B for n-hexane extractable material. The procedure below would have been followed if data had not been derived from the THC method. Samples were homogenised by mixing, and a representative sample (approximately 10 g) weighed and blended with approximately 10 g of anhydrous sodium sulphate. The sediments were then extracted in a glass wool thimble by Soxhlet extraction for 4 hours using 90 mL of n-hexane. The extract was transferred to a 250 mL round-bottom flask and evaporated to dryness using a rotary evaporator. The round bottom flask was then placed in a desiccator for 30 minutes and the weight recorded every 30 minutes until it remained constant. The water content of the sediment was determined by drying a subsample of the homogenised sediment to constant weight at 105 °C.

B.2.2.3 Polycyclic Aromatic Hydrocarbons (PAHs)

The US EPA range of 16 polycyclic aromatic hydrocarbon (PAH) quantified as specified by Department of Trade and Industry (DTI) regulations (DTI, 1993).

Calibration was undertaken using a range of PAH standard solutions, a number of alkylated PAH, dibenzothiophene and a range of suitable internal standards. Individual response factors were calculated for each of the compounds present in the calibration solution. Response factors for the non calibrated alkylated PAH were taken to be equivalent to closely related compounds. The MRV of individual and alkylated PAHs is 0.1 ng/g.

B.2.2.4 Benzene, Toluene, Ethylbenzene, Xylenes (BTEX)

BTEX analysis of sediments was carried out by FGBML.

General Precautions

To effectively eliminate all possible sources of BTEX contamination from the analysis the following precautionary measures were taken prior to sample work-up:

- All solvents were purchased as high purity grade. Each batch was checked for purity by concentrating approximately 400 mL down to a small volume (< 1 mL) and analysing by gas chromatography (GC);
- All water used was distilled through an all glass still;
- All glassware was cleaned using an acid/base machine wash. The glassware was rinsed with acetone then finally with dichloromethane prior to use.

BTEX Analysis in Sediment

The BTEX compounds are concentrated in the headspace above the sediment sample containing distilled water and internal standards in a sealed vial. A subsample of the headspace is then analysed by GC-MS.

Sediment samples were thawed, homogenised and accurately weighed into a 20 mL headspace vial. A solution containing an appropriate amount of the following internal standards was added to each sample using a microsyringe.

BTEX Standards
d_6 Benzene
d_8 Toluene
d_{10} Ethylbenzene
d_{10} P-xylene
d_{10} O-xylene

Distilled water (10 mL) was added to the headspace vial and the vial was sealed using a crimped cap.

Correction factors for wet/dry sediments were obtained by drying a subsample of the homogenised sediment to constant weight at 105 °C.

BTEX Analysis by Gas Chromatography–Mass Spectrometry Detection (GC-MS)

Calibration was undertaken using a range of BTEX standard solutions containing the BTEX compounds, and a range of suitable internal standards. Individual response factors were calculated for each of the BTEX present in the calibration solution. The minimum reporting value of individual BTEX is 0.5 ng/g dry weight.

Instrument Conditions for BTEX Analysis

GC Injector	Split
Injector Temperature	250 °C
Injection Volume	100 µL manual injection
Purge Valve	Off
Carrier Gas	Helium
Column Flow	0.4 mL/min
Split Flow	32 mL/min
Oven Temperature	40 °C 3 min; 40 °C to 200 °C at 20 °C/min
Transfer Line Temperature	325 °C
Tune File	ATUNE.U
Acquisition Mode	SIM
Source Temperature	300 °C
SIM Groups Dwell Time	0.03 sec
SIM Width	0.3
Resolution	Low
Group Ions	78, 84, 92, 100, 106, 116

B.2.2.5 Sediment Polychlorinated Biphenyls

Microwave Digestion Extraction Procedure

Sediment samples were thawed and added into a Teflon sample vessel. Sediment samples were accurately weighed into the cells and a known quantity of hexabromobiphenyl added as internal standard. The cells were extracted using hexane:acetone (1:1, v:v). as the extraction solvent at 120 °C and 1800 W.

Clean-up of Sediment Extracts by Column Chromatography

Sample extracts are cleaned up by column chromatography using 40 % (w/w) acid silica. The silica gel used was 70 to 230 mesh, muffled at 400 °C for at least 4 hours to remove impurities and activate it then stored at 200 °C. Prior to use, acid silica is prepared by the addition of sulphuric acid to silica. The sediment extract was added to the silica gel column, containing 5 g of adsorbent and eluted with 30 mL of hexane. The eluent was reduced in volume using the evaporator to approximately 2 mL before being further reduced under a gentle stream of nitrogen to an appropriate volume, approximately 1 g of activated copper powder (for removal of free sulphur) before being concentrated to 0.5 mL for analysis.

GC-µECD Analysis of WHO12 PCBs

Sample extracts were analysed by GC-µECD for the WHO12 Congeners (PCBs 77, 81, 105, 114, 118, 123, 126, 156, 157, 167, 169 and 189). The instrument parameters are shown on the following table.

	Gas Chromatography [GC]
Instrument	HP 6890N Series GC with 7683B autoinjector
Column	8 %-phenyl polysilphenylene-siloxane bonded fused silica, 50 m, 0.25 µm film thickness, 0.25 mm internal diameter
Carrier Gas	Hydrogen (constant flow 2.1 mL/min)
Injector	On column (1 µL injection)
Oven Temperature Programme	60 °C - 1 min 60 °C to 190 °C at 35 °C/min 190 °C to 300 °C at 3 °C/min 300 °C to 330 °C at 45 °C/min 330 °C - 8 min
Detector Temperature	340 °C (µECD)

B.2.2.6 VOC Analysis in Soil

VOCs were determined using static headspace sampling and analysis by GC-MS.

B.2.2.7 Sediment Metals

Sediment samples were dried at 40 °C and then sieved to the required size fraction (2000 µm). Samples were subjected to an aqua regia microwave digestion. This acid mixture allows a partial dissolution of metals, predominately releasing those associated with the sediment fines.

The resulting digests were then analysed for aluminium, barium, iron and vanadium by coupled plasma-optical emission spectrometry (ICP-OES) and analysed for antimony, arsenic, cadmium, chromium, cobalt, copper, lead, mercury, molybdenum, nickel, selenium, silver and zinc by using inductively coupled plasma-mass spectrometry (ICP-MS).

B.3 Habitat Assessment

B.3.1 Seabed Habitat Classification

To assess the habitats present within the survey area, acquired video footage was reviewed by experienced Fugro marine biologists/taxonomists. Changes in sediment type and/or morphology of the seabed in conjunction with the associated faunal community were logged. Interpretive logs for the stations surveyed during the survey are provided in Appendix C.

The habitat classification in the current study followed that outlined in ‘The Marine Life of the Emirate of Abu Dhabi’ (John & George, 2001). This document provides information on Abu Dhabi’s inshore environment that included the biodiversity and distribution of its marine flora and fauna and encompasses all of the principal habitat types known in the Arabian Gulf.

This system adopts a hierarchical approach, beginning with the major habitat type at the highest level and finishing with the sub-biotope (or variant) at the lowest. Major habitats (Levels 1 and 2) are defined on gross physical/chemical features, habitat complexes by major differences in species or community form (Level 3), biotope complexes by broad biological groups (Level 4) and biotopes by dominant taxa (Level 5).

An example hierarchy from the MLEAD classification system is provided in Table B 1.

Major habitats are defined on gross physical/chemical features, habitat complexes by major differences in species or community form, biotope complexes by broad biological or habitat species, biotopes by dominant species or taxa linked to distinctive habitat characteristics, and the sub-biotope (variant) by sub-species.

Biotope codes are defined for habitat complexes, biotopes and variants using the habitat complex code, a full stop and then the biotope code. As far as possible, the codes used within the Marine Life of the Emirate of Abu Dhabi, follow those adopted by the Marine Nature Conservation Review (MNCR) for the British Isles.

Table B 1: Example hierarchy from the MLEAD classification system

Level	Example Classification Name	Example Classification Code
1. Depth Zone	Sublittoral Zone	SL
2. Substratum	Mixed Deposit	MXD
3. Life Forms	Sponges Ascidians	SPAS
4. Functional Groups	Macroalgae	MACA
5. Taxa	Epibiota dominated by sponges, ascidians and seasonal flushes of macroalgae on small unstable sand embedded hard surfaces	SL.MXD.SP.AS.MACA

In addition to the classification defined by MLEAD, habitats were also classified in accordance with the 'Abu Dhabi Emirate Habitat Classification and Protection Guideline' (Al Dhaheri et al., 2017).

Although, theoretically a biotope can be assigned to any sized area of seabed, for the purposes of this assessment, the commonly accepted minimum habitat size of 25 m2 (Parry, 2019) was adopted for the designation of the biotopes encountered within the survey area.

B.3.2 Seabed Habitat Assessment

B.3.2.1 Coral Assessment

A hard-coral habitat assessment was undertaken based on the guidance outlined in the United States Environmental Protection Agency (US EPA) Field Manual for Coral Reef Assessment (Santavy et al., 2012) and the Det Norsk Veritas (DNV) visual benthic mapping guidelines (DNV, 2019). To assess the quality of coral habitats found within the survey area a classification scheme that classifies data based on the presence of live coral and dead reef structures was derived. This system was loosely based on that used by DNV (2019), but the classification and ranges for live coral cover have been adapted to make them appropriate for the coral communities of the Arabian Gulf. Habitats with percentage cover of live coral greater than 50 have the potential to be classified as reef.

The assessment criteria followed in the current study are summarised in Table B 2.

Video data have been utilised to estimate the percentage cover of living coral colonies. The occurrence and extent of any adverse health conditions, such as bleaching, disease or overgrowth by boring sponges have also been recorded to assess the relative health of living coral colonies.

Table B 2: Hard coral assessment criteria

Classification	Live Coral Cover [%]	Description
No Coral	< 1	Areas with no living coral or very sporadic small corals. No evidence of dead reef structures
Coral Rubble	< 1	Fragments of coral, detached from reef structures or other hard substrates. Little or no living coral
Dead Coral Framework	< 1	Reef structure, clearly of coralline origin and attached to hard substrata. Little or no living coral
Low Live Coral Cover	< 10	Sparse (< 10 % cover) live corals on dead coral framework or other hard substrata
Moderate Live Coral Cover		Abundant (10 % to 50 % cover) live corals on dead coral framework or other hard substrata
High Live Coral Cover	> 50	Reef structure comprising predominantly live corals (e.g. healthy *Acropora* or *Porites* reef)

A similar classification system was used to assess soft coral abundance within the survey area, which is summarised in Table B 3.

Table B 3: Soft coral assessment criteria

Classification	Live Coral Cover [%]	Description
No Coral	< 1	Areas with no living soft coral (or sea whips) or very sporadic small soft corals
Low Live Coral Cover	< 10	Sparse (< 10 % cover) live soft corals (or sea whips)
Moderate Live Coral Cover		Common (10 % to 50 % cover) live soft corals (or sea whips)
High Live Coral Cover	> 50	Abundant (> 50 % cover) live soft corals (or sea whips)

B.3.2.2 Seagrass Assessment

A seagrass assessment, based on the method described in the EAD's 'Abu Dhabi Emirate Habitat Classification and Protection Guideline' (Al Dhaheri et al., 2017), has been performed on the habitats that contained seagrasses. The video data were analysed to estimate if the cover of rooted vascular seagrass taxa was greater than 10 %.

Video data have been utilised to estimate the percentage cover of seagrass. The assessment criteria followed in the current study are summarised in Table B 4.

Table B 4: Seagrass assessment criteria

Classification	Seagrass [%]	Description
No Seagrass	< 1 %	Areas with no living seagrass or very sporadic small patches of seagrass
Low Seagrass Cover	< 10	Sparse (< 10 % cover) live seagrass
Seagrass Bed	10 %	10 % cover) live seagrass forming

C. Logs

C.1 Survey Log

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
27/03/2020	10:42:50	R2_ENV_001	WP	Valeport	-	6.5	657 091.2	2 671 535.0	657 074.3	2 671 519.7	Water profile rerun using YSI EXo2 for continuity
03/04/2020	08:20:24	R2_ENV_002	WP	NS	1	8.7	656 226.7	2 672 037.6	656 118.0	2 671 892.0	
03/04/2020	08:39:43	R2_ENV_002	WP	YSI Exo2	2	8.7	656 226.7	2 672 037.6	656 119.0	2 671 895.0	
03/04/2020	08:55:10	R2_ENV_003	WP	YSI Exo2	3	8.8	655 362.2	2 672 540.3	655 346.0	2 672 519.0	
03/04/2020	09:14:16	R2_ENV_004	WP	YSI Exo2	4	8.1	654 498.0	2 673 043.3	654 502.0	2 673 011.0	
03/04/2020	09:29:00	R2_ENV_005	WP	YSI Exo2	5	8.9	653 633.7	2 673 546.4	653 613.0	2 673 535.0	
03/04/2020	09:45:48	R2_ENV_006	WP	YSI Exo2	6	9.1	652 769.8	2 674 048.1	652 750.0	2 674 029.0	
04/04/2020	06:22:00	R2_ENV_001	VV	PC	11	6.5	657 091.2	2 671 535.0	657 086.0	2 671 538.0	
03/04/2020	13:21:00	R2_ENV_002	VV	NS	7	8.7	656 226.7	2 672 037.6	656 176.0	2 671 941.0	
03/04/2020	13:27:00	R2_ENV_002	VV	NS	8	8.7	656 226.7	2 672 037.6	656 103.0	2 671 778.0	
04/04/2020	04:48:00	R2_ENV_008	WP	YSI Exo2	33	11.5	651 683.2	2 675 716.6	651 714.0	2 675 597.0	
04/04/2020	05:01:00	R2_ENV_007	WP	YSI Exo2	34	10.1	652 203.2	2 674 866.3	652 209.0	2 674 775.0	
04/04/2020	06:07:37	R2_ENV_001	WP	YSI Exo2	10	6.5	657 091.2	2 671 535.0	657 086.0	2 671 536.0	
03/04/2020	13:32:00	R2_ENV_002	VV	NS	9	8.7	656 226.7	2 672 037.6	656 047.0	2 671 672.0	
04/04/2020	07:02:00	R2_ENV_003	VV	NS	12	8.8	655 362.2	2 672 540.3	655 343.0	2 672 549.0	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
04/04/2020	07:05:00	R2_ENV_003	VV	NS	13	8.8	655 362.2	2 672 540.3	655 346.0	2 672 538.0	
04/04/2020	07:14:00	R2_ENV_003	VV	NS	14	8.8	655 362.2	2 672 540.3	655 347.0	2 672 538.0	
04/04/2020	07:23:00	R2_ENV_004	VV	NS	15	8.1	654 498.0	2 673 043.3	654 500.0	2 673 039.0	
04/04/2020	07:27:00	R2_ENV_004	VV	NS	16	8.1	654 498.0	2 673 043.3	654 497.0	2 673 036.0	
04/04/2020	07:29:00	R2_ENV_004	VV	NS	17	8.1	654 498.0	2 673 043.3	654 494.0	2 673 032.0	
04/04/2020	07:39:00	R2_ENV_005	VV	NS	18	8.9	653 633.7	2 673 546.4	653 611.0	2 673 546.0	
04/04/2020	07:42:00	R2_ENV_005	VV	NS	19	8.9	653 633.7	2 673 546.4	653 613.0	2 673 536.0	
04/04/2020	07:44:00	R2_ENV_005	VV	NS	20	8.9	653 633.7	2 673 546.4	653 615.0	2 673 535.0	
04/04/2020	07:53:00	R2_ENV_006	VV	NS	21	9.1	652 769.8	2 674 048.1	652 749.0	2 674 037.0	
04/04/2020	07:55:00	R2_ENV_006	VV	NS	22	9.1	652 769.8	2 674 048.1	652 751.0	2 674 028.0	
04/04/2020	07:58:00	R2_ENV_006	VV	NS	23	9.1	652 769.8	2 674 048.1	652 752.0	2 674 028.0	
04/04/2020	08:14:00	R2_ENV_007	VV	NS	24	10.1	652 203.2	2 674 866.3	652 196.0	2 674 848.0	
04/04/2020	08:15:00	R2_ENV_007	VV	NS	25	10.1	652 203.2	2 674 866.3	652 198.0	2 674 832.0	
04/04/2020	08:18:00	R2_ENV_007	VV	NS	26	10.1	652 203.2	2 674 866.3	652 207.0	2 674 820.0	
04/04/2020	08:30:00	R2_ENV_008	VV	NS	27	11.5	651 683.2	2 675 716.6	651 666.0	2 675 699.0	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
04/04/2020	08:30:00	SO_R2_001	VV	NS	28	11.5	651 683.2	2 675 716.6	651 666.0	2 675 699.0	
04/04/2020	08:33:00	R2_ENV_008	VV	NS	29	11.5	651 683.2	2 675 716.6	651 691.0	2 675 604.0	
04/04/2020	08:33:00	SO_R2_001	VV	NS	30	11.5	651 683.2	2 675 716.6	651 691.0	2 675 604.0	Positional error
04/04/2020	08:36:00	R2_ENV_008	VV	NS	31	11.5	651 683.2	2 675 716.6	651 700.0	2 675 539.0	
04/04/2020	08:36:00	SO_R2_001	VV	NS	32	11.5	651 683.2	2 675 716.6	651 700.0	2 675 539.0	
04/04/2020	11:12:00	R2_ENV_008	WS	BOT	35	11.0	651 683.2	2 675 716.6	651 686.0	2 675 693.0	
04/04/2020	11:36:00	R2_ENV_008	WS	MID	36	5.0	651 683.2	2 675 716.6	651 680.0	2 675 710.0	
04/04/2020	11:53:00	R2_ENV_008	WS	TOP	37	1.0	651 683.2	2 675 716.6	651 682.0	2 675 704.0	
04/04/2020	13:03:00	R2_ENV_001	WS	BOT	38	6.5	657 091.2	2 671 535.0	657 102.0	2 671 511.0	
04/04/2020	13:20:00	R2_ENV_001	WS	MID	39	3.0	657 091.2	2 671 535.0	657 097.0	2 671 510.0	
04/04/2020	13:32:00	R2_ENV_001	WS	TOP	40	1.0	657 091.2	2 671 535.0	657 099.0	2 671 509.0	
08/04/2020	03:24:00	R2_ENV_002	WS	BOT	41	8.0	656 226.7	2 672 037.6	656 227.5	2 672 038.5	
08/04/2020	03:38:00	R2_ENV_002	WS	TOP	42	1.0	656 226.7	2 672 037.6	656 222.8	2 672 032.9	
08/04/2020	04:09:00	R2_ENV_003	WS	BOT	43	8.0	655 362.2	2 672 540.3	655 359.4	2 672 540.6	
08/04/2020	04:20:00	R2_ENV_003	WS	TOP	44	1.0	655 362.2	2 672 540.3	655 362.8	2 672 539.4	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
08/04/2020	05:22:00	R2_ENV_004	WS	TOP	45	1.0	654 498.0	2 673 043.3	654 493.3	2 673 040.6	
08/04/2020	05:36:00	R2_ENV_005	WS	TOP	46	1.0	653 633.7	2 673 546.4	653 631.1	2 673 546.0	
08/04/2020	05:55:00	R2_ENV_006	WS	TOP	47	1.0	652 769.8	2 674 048.1	652 772.5	2 674 046.8	
08/04/2020	06:10:00	R2_ENV_007	WS	TOP	48	1.0	652 203.2	2 674 866.3	652 203.4	2 674 869.5	
08/04/2020	08:22:00	R2_ENV_004	WS	BOT	49	7.0	654 498.0	2 673 043.3	654 496.3	2 673 048.4	
08/04/2020	08:46:00	R2_ENV_005	WS	BOT	50	8.0	653 633.7	2 673 546.4	653 628.7	2 673 541.7	
08/04/2020	09:04:00	R2_ENV_006	WS	BOT	51	8.0	652 769.8	2 674 048.1	652 765.4	2 674 049.8	
08/04/2020	09:18:00	R2_ENV_007	WS	BOT	52	9.0	652 203.2	2 674 866.3	652 201.5	2 674 867.6	
16/06/2020	17:52:36	R2_ENV_076	WP	YSI Exo2	1760	16.3	662 734.6	2 726 984.6	662 731.1	2 726 985.7	
27/06/2020	11:35:52	R2_ENV_009	VV	Partial Sample	2438	13.1	651 356.4	2 676 661.7	651 354.7	2 676 660.6	
27/06/2020	11:44:45	R2_ENV_009	VV	PC	2439	13.1	651 356.4	2 676 661.7	651 354.5	2 676 652.4	
16/06/2020	18:37:02	SO_R2_010	VV	SOIL	1763	16.4	662 734.6	2 726 984.6	662 735.0	2 726 973.9	
16/06/2020	19:03:32	R2_ENV_076	WS	BOT	1764	16.4	662 734.6	2 726 984.6	662 734.9	2 726 984.4	
16/06/2020	19:11:24	R2_ENV_076	WS	MID	1765	16.3	662 734.6	2 726 984.6	662 735.0	2 726 984.1	
16/06/2020	19:17:55	R2_ENV_076	WS	TOP	1766	16.3	662 734.6	2 726 984.6	662 734.9	2 726 983.7	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East

Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
27/06/2020	10:55:19	R2_ENV_010	VV	PC	2437	12.6	651 602.0	2 677 804.5	651 600.1	2 677 804.0	
16/06/2020	20:13:31	R2_ENV_077	WS	BOT	1768	17.2	663 710.6	2 727 717.8	663 710.9	2 727 715.4	
16/06/2020	20:21:21	R2_ENV_077	WS	MID	1769	17.1	663 710.6	2 727 717.8	663 711.3	2 727 717.6	
16/06/2020	20:28:31	R2_ENV_077	WS	TOP	1770	17.3	663 710.6	2 727 717.8	663 711.2	2 727 717.0	
16/06/2020	20:40:39	R2_ENV_077	WP	YSI Exo2	1771	17.3	663 710.6	2 727 717.8	663 710.2	2 727 718.7	
16/06/2020	21:21:05	R2_ENV_078	WS	BOT	1772	16.1	662 690.3	2 729 103.1	662 689.8	2 729 103.8	
16/06/2020	21:33:27	R2_ENV_078	WS	MID	1773	16.2	662 690.3	2 729 103.1	662 688.7	2 729 102.5	
16/06/2020	21:42:03	R2_ENV_078	WS	TOP	1774	16.2	662 690.3	2 729 103.1	662 688.2	2 729 102.7	
27/06/2020	09:20:34	R2_ENV_011	VV	PC	2428	13.5	650 187.6	2 678 676.5	650 186.0	2 678 674.9	
16/06/2020	22:14:11	R2_ENV_078	WP	YSI Exo2	1776	16.2	662 690.3	2 729 103.1	662 686.7	2 729 103.8	
27/06/2020	08:33:30	R2_ENV_012	VV	PC	2426	12.9	651 726.6	2 679 445.7	651 726.3	2 679 446.0	
16/06/2020	23:23:47	R2_ENV_079	WS	BOT	1778	18.3	663 666.3	2 729 836.3	663 665.5	2 729 835.9	
16/06/2020	23:31:57	R2_ENV_079	WS	MID	1779	18.1	663 666.3	2 729 836.3	663 666.5	2 729 836.4	
16/06/2020	23:39:43	R2_ENV_079	WS	TOP	1780	18.1	663 666.3	2 729 836.3	663 667.4	2 729 839.1	
16/06/2020	23:55:30	R2_ENV_079	WP	YSI Exo2	1781	18.2	663 666.3	2 729 836.3	663 665.6	2 729 835.8	Data not accepted

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
17/06/2020	00:17:31	R2_ENV_079a	WP	YSI Exo2	1782	18.2	663 666.3	2 729 836.3	663 667.2	2 729 834.2	
17/06/2020	00:52:42	R2_ENV_080	WP	YSI Exo2	1783	17.8	664 642.2	2 730 569.5	664 639.9	2 730 568.8	
27/06/2020	06:00:31	R2_ENV_013	VV	NS	2402	16.7	651 202.0	2 680 611.0	651 201.3	2 680 611.8	
17/06/2020	03:14:56	R2_ENV_080	WS	BOT	1785	17.6	664 642.2	2 730 569.5	664 641.9	2 730 572.9	
17/06/2020	03:21:50	R2_ENV_080	WS	MID	1786	17.6	664 642.2	2 730 569.5	664 643.0	2 730 570.0	
17/06/2020	03:28:50	R2_ENV_080	WS	TOP	1787	17.5	664 642.2	2 730 569.5	664 644.0	2 730 572.5	
17/06/2020	04:15:33	R2_ENV_081	WS	BOT	1788	22.1	663 622.0	2 731 954.8	663 622.9	2 731 956.7	
17/06/2020	04:17:08	R2_ENV_081	WP	YSI Exo2	1789	22.3	663 622.0	2 731 954.8	663 622.1	2 731 953.5	
17/06/2020	04:25:46	R2_ENV_081	WS	MID	1790	22.3	663 622.0	2 731 954.8	663 623.1	2 731 955.1	
17/06/2020	04:34:50	R2_ENV_081	WS	TOP	1791	22.3	663 622.0	2 731 954.8	663 622.8	2 731 955.7	
27/06/2020	06:09:45	R2_ENV_013	VV	NS	2403	16.7	651 202.0	2 680 611.0	651 194.3	2 680 615.7	
27/06/2020	06:19:06	R2_ENV_013	VV	PC	2404	16.7	651 202.0	2 680 611.0	651 210.6	2 680 608.4	
19/06/2020	13:11:30	R2_ENV_082	WS	BOT	1794	16.1	664 597.9	2 732 688.0	664 597.9	2 732 684.0	
19/06/2020	13:13:19	R2_ENV_082	WP	YSI Exo2	1795	16.1	664 597.9	2 732 688.0	664 597.2	2 732 681.5	
19/06/2020	13:25:49	R2_ENV_082	WS	MID	1796	16.1	664 597.9	2 732 688.0	664 595.8	2 732 684.9	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
19/06/2020	13:34:07	R2_ENV_082	WS	TOP	1797	15.9	664 597.9	2 732 688.0	664 597.6	2 732 688.3	
27/06/2020	13:48:20	R2_ENV_014	VV	PC	2449	18.7	650 655.9	2 681 639.7	650 654.4	2 681 637.6	
19/06/2020	14:44:50	R2_ENV_083	WS	BOT	1799	22.9	665 573.9	2 733 421.1	665 573.3	2 733 421.5	
19/06/2020	14:52:09	R2_ENV_083	WS	MID	1800	22.9	665 573.9	2 733 421.1	665 572.7	2 733 421.1	
19/06/2020	15:01:33	R2_ENV_083	WS	TOP	1801	22.9	665 573.9	2 733 421.1	665 571.2	2 733 420.0	
19/06/2020	15:15:32	R2_ENV_083	WP	YSI Exo2	1802	22.9	665 573.9	2 733 421.1	665 574.6	2 733 419.1	
27/06/2020	04:20:59	R2_ENV_015	VV	PC	2393	19.3	652 194.8	2 682 409.0	652 195.1	2 682 410.4	
19/06/2020	16:03:28	SO_R2_011	VV	SOIL	1804	27.6	664 553.6	2 734 806.5	664 554.2	2 734 806.5	
19/06/2020	16:24:23	R2_ENV_084	WS	BOT	1805	27.6	664 553.6	2 734 806.5	664 553.5	2 734 806.2	
19/06/2020	16:33:21	R2_ENV_084	WS	MID	1806	27.6	664 553.6	2 734 806.5	664 554.2	2 734 805.7	
19/06/2020	16:41:54	R2_ENV_084	WS	TOP	1807	27.6	664 553.6	2 734 806.5	664 553.3	2 734 807.0	
19/06/2020	16:52:27	R2_ENV_084	WP	YSI Exo2	1808	27.6	664 553.6	2 734 806.5	664 555.1	2 734 804.7	
19/06/2020	17:29:07	R2_ENV_085	WS	BOT	1809	18.1	665 529.6	2 735 539.6	665 528.9	2 735 540.7	
19/06/2020	17:38:33	R2_ENV_085	WS	MID	1810	17.9	665 529.6	2 735 539.6	665 529.5	2 735 540.8	
19/06/2020	17:49:05	R2_ENV_085	WS	TOP	1811	17.9	665 529.6	2 735 539.6	665 529.6	2 735 539.8	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East

Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
27/06/2020	14:30:48	R2_ENV_016	VV	PC	2450	21.2	651 659.4	2 683 506.0	651 660.5	2 683 505.0	
27/06/2020	16:55:22	R2_ENV_017	VV	PC	2459	23.0	651 124.1	2 684 603.0	651 122.3	2 684 600.6	
19/06/2020	18:22:52	R2_ENV_085	WP	YSI Exo2	1814	18.2	665 529.6	2 735 539.6	665 528.8	2 735 538.0	
27/06/2020	17:53:58	R2_ENV_018	VV	PC	2461	25.3	652 663.0	2 685 372.2	652 661.5	2 685 372.5	
19/06/2020	19:31:20	R2_ENV_086	WS	BOT	1816	17.7	666 505.5	2 736 272.8	666 505.5	2 736 274.6	
19/06/2020	19:40:45	R2_ENV_086	WS	MID	1817	17.4	666 505.5	2 736 272.8	666 504.2	2 736 272.9	
19/06/2020	19:50:09	R2_ENV_086	WS	TOP	1818	17.6	666 505.5	2 736 272.8	666 505.6	2 736 272.8	
19/06/2020	20:02:46	R2_ENV_086	WP	YSI Exo2	1819	17.6	666 505.5	2 736 272.8	666 507.0	2 736 272.5	
19/06/2020	20:40:44	R2_ENV_087	WS	BOT	1820	18.7	665 485.3	2 737 658.1	665 484.4	2 737 657.3	
19/06/2020	20:49:18	R2_ENV_087	WS	MID	1821	18.7	665 485.3	2 737 658.1	665 484.7	2 737 657.2	
19/06/2020	20:57:21	R2_ENV_087	WS	TOP	1822	17.6	665 485.3	2 737 658.1	665 484.5	2 737 657.6	
27/06/2020	20:05:55	R2_ENV_019	VV	PC	2469	19.5	652 127.7	2 686 469.2	652 127.0	2 686 470.0	
27/06/2020	21:06:24	R2_ENV_020	VV	PC	2471	17.7	651 524.8	2 687 139.0	651 524.9	2 687 140.9	
19/06/2020	21:36:16	R2_ENV_087	WP	YSI Exo2	1825	17.7	665 485.3	2 737 658.1	665 483.4	2 737 658.1	
27/06/2020	23:06:28	R2_ENV_021	VV	NS	2481	20.0	652 102.5	2 688 649.1	652 102.6	2 688 650.2	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East

Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
27/06/2020	23:17:12	R2_ENV_021	VV	PC	2482	19.6	652 102.5	2 688 649.1	652 095.4	2 688 641.8	
28/06/2020	00:09:25	R2_ENV_022	VV	PC	2484	23.9	650 928.9	2 688 984.7	650 929.7	2 688 984.4	
19/06/2020	22:32:41	R2_ENV_088	WS	BOT	1829	18.8	666 461.2	2 738 391.3	666 460.6	2 738 391.1	
19/06/2020	22:41:12	R2_ENV_088	WS	MID	1830	18.8	666 461.2	2 738 391.3	666 460.6	2 738 391.7	
19/06/2020	22:50:24	R2_ENV_088	WS	TOP	1831	18.8	666 461.2	2 738 391.3	666 459.9	2 738 390.8	
19/06/2020	23:00:45	R2_ENV_088	WP	YSI Exo2	1832	18.8	666 461.2	2 738 391.3	666 462.8	2 738 391.5	
27/06/2020	03:11:01	R2_ENV_023	VV	Partial Sample	2390	17.3	649 755.3	2 689 320.3	649 755.2	2 689 321.4	HM and HC
27/06/2020	03:23:55	R2_ENV_023	VV	NS	2392	17.2	649 755.3	2 689 320.3	649 763.1	2 689 316.3	
27/06/2020	03:18:55	R2_ENV_023	VV	NS	2391	17.4	649 755.3	2 689 320.3	649 748.2	2 689 327.0	
20/06/2020	00:01:19	R2_ENV_089	WS	BOT	1836	14.8	667 391.1	2 738 983.6	667 390.7	2 738 984.4	
20/06/2020	00:09:54	R2_ENV_089	WS	MID	1837	14.8	667 391.1	2 738 983.6	667 390.8	2 738 983.9	
20/06/2020	00:17:27	R2_ENV_089	WS	TOP	1838	14.8	667 391.1	2 738 983.6	667 390.2	2 738 982.8	
20/06/2020	00:28:24	R2_ENV_089	WP	YSI Exo2	1839	14.8	667 391.1	2 738 983.6	667 393.0	2 738 983.6	
27/06/2020	00:54:51	R2_ENV_024	VV	PC	2381	16.7	650 212.5	2 690 978.9	650 211.2	2 690 980.3	
26/06/2020	23:35:29	R2_ENV_025	VV	PC	2376	21.1	649 038.9	2 691 314.5	649 038.8	2 691 314.8	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
26/06/2020	22:36:47	R2_ENV_026	VV	Partial Sample	2371	27.2	647 865.3	2 691 650.1	647 865.1	2 691 649.7	
20/06/2020	01:18:58	R2_ENV_090	WS	BOT	1843	14.1	666 669.0	2 740 557.1	666 669.8	2 740 557.3	
20/06/2020	01:26:01	R2_ENV_090	WS	MID	1844	14.1	666 669.0	2 740 557.1	666 669.6	2 740 556.6	
20/06/2020	01:34:50	R2_ENV_090	WS	TOP	1845	14.1	666 669.0	2 740 557.1	666 669.0	2 740 557.2	
20/06/2020	01:44:01	R2_ENV_090	WP	YSI Exo2	1846	14.1	666 669.0	2 740 557.1	666 666.2	2 740 557.4	
20/06/2020	02:44:28	R2_ENV_091	WS	BOT	1847	14.7	667 775.7	2 741 071.9	667 777.0	2 741 073.3	
20/06/2020	02:46:32	R2_ENV_091	WP	YSI Exo2	1848	14.7	667 775.7	2 741 071.9	667 775.9	2 741 072.2	
20/06/2020	02:55:38	R2_ENV_091	WS	MID	1849	14.6	667 775.7	2 741 071.9	667 776.5	2 741 073.1	
20/06/2020	03:02:47	R2_ENV_091	WS	TOP	1850	14.6	667 775.7	2 741 071.9	667 776.0	2 741 072.8	
26/06/2020	22:46:10	R2_ENV_026	VV	Partial Sample	2372	27.0	647 865.3	2 691 650.1	647 872.9	2 691 642.5	PSD
26/06/2020	22:52:21	R2_ENV_026	VV	NS	2373	27.1	647 865.3	2 691 650.1	647 859.3	2 691 658.8	
26/06/2020	22:57:02	R2_ENV_026	VV	NS	2374	27.0	647 865.3	2 691 650.1	647 873.4	2 691 640.2	
20/06/2020	03:54:07	SO_R2_012	VV	NS	1854	13.1	668 882.5	2 741 586.7	668 883.4	2 741 588.2	
26/06/2020	20:47:28	R2_ENV_027	VV	NS	2362	30.3	648 322.6	2 693 308.7	648 324.7	2 693 309.6	
26/06/2020	20:52:30	R2_ENV_027	VV	PC	2363	30.3	648 322.6	2 693 308.7	648 327.6	2 693 298.6	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
26/06/2020	18:48:41	R2_ENV_028	VV	NS	2352	31.0	647 149.0	2 693 644.3	647 149.3	2 693 644.8	
20/06/2020	04:10:25	R2_ENV_092	WS	BOT	1858	13.2	668 882.5	2 741 586.7	668 882.3	2 741 587.5	
20/06/2020	04:15:20	R2_ENV_092	WP	YSI Exo2	1859	13.1	668 882.5	2 741 586.7	668 883.5	2 741 585.7	
20/06/2020	04:26:59	R2_ENV_092	WS	MID	1860	13.3	668 882.5	2 741 586.7	668 882.5	2 741 587.7	
20/06/2020	04:33:46	R2_ENV_092	WS	TOP	1861	13.3	668 882.5	2 741 586.7	668 882.2	2 741 586.9	
20/06/2020	05:07:01	R2_ENV_093	WS	BOT	1862	15.7	668 171.9	2 743 153.5	668 172.4	2 743 153.9	
20/06/2020	05:07:36	R2_ENV_093	WP	YSI Exo2	1863	15.7	668 171.9	2 743 153.5	668 173.8	2 743 151.3	
20/06/2020	05:22:57	R2_ENV_093	WS	MID	1864	15.7	668 171.9	2 743 153.5	668 173.8	2 743 154.7	
20/06/2020	05:28:53	R2_ENV_093	WS	TOP	1865	15.6	668 171.9	2 743 153.5	668 171.0	2 743 154.5	
26/06/2020	18:58:37	R2_ENV_028	VV	NS	2353	30.9	647 149.0	2 693 644.3	647 152.0	2 693 634.5	
26/06/2020	19:03:45	R2_ENV_028	VV	NS	2354	30.9	647 149.0	2 693 644.3	647 144.7	2 693 653.6	
26/06/2020	19:23:19	R2_ENV_028	VV	NS	2356	30.9	647 149.0	2 693 644.3	647 149.5	2 693 642.0	
20/06/2020	08:14:11	R2_TR06	Video	SOL	1869	19.0	668 628.8	2 742 740.8	668 618.6	2 742 737.5	
20/06/2020	08:14:14	R2_TR06	Still	R2_TR06_001	-	19.1	-	-	668 620.5	2 742 737.5	
20/06/2020	08:14:19	R2_TR06	Still	R2_TR06_002	1870	19.1	-	-	668 620.5	2 742 737.5	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
20/06/2020	08:14:28	R2_TR06	Still	R2_TR06_003	1871	18.9	-	-	668 622.9	2 742 738.0	
20/06/2020	08:14:35	R2_TR06	Still	R2_TR06_004	1872	19.0	-	-	668 624.0	2 742 738.5	
20/06/2020	08:14:44	R2_TR06	Still	R2_TR06_005	1873	18.7	-	-	668 625.7	2 742 739.8	
20/06/2020	08:14:58	R2_TR06	Still	R2_TR06_006	1874	18.6	-	-	668 629.2	2 742 741.3	
20/06/2020	08:15:25	R2_TR06	Still	R2_TR06_007	1875	18.4	-	-	668 634.3	2 742 744.5	
20/06/2020	08:15:43	R2_TR06	Still	R2_TR06_008	1876	18.3	-	-	668 637.3	2 742 745.5	
20/06/2020	08:15:51	R2_TR06	Still	R2_TR06_009	1877	18.3	-	-	668 638.5	2 742 745.3	
20/06/2020	08:16:10	R2_TR06	Still	R2_TR06_010	1878	18.2	-	-	668 643.6	2 742 747.2	
20/06/2020	08:16:23	R2_TR06	Still	R2_TR06_011	1879	18.2	-	-	668 647.1	2 742 746.7	
20/06/2020	08:16:42	R2_TR06	Still	R2_TR06_012	1880	18.3	-	-	668 651.9	2 742 747.0	
20/06/2020	08:17:25	R2_TR06	Still	R2_TR06_013	1881	18.1	-	-	668 661.6	2 742 748.9	
20/06/2020	08:17:58	R2_TR06	Still	R2_TR06_014	1882	17.9	-	-	668 669.0	2 742 752.5	
20/06/2020	08:18:49	R2_TR06	Still	R2_TR06_015	1883	17.9	-	-	668 679.6	2 742 757.2	
20/06/2020	08:19:07	R2_TR06	Still	R2_TR06_016	1884	18.0	-	-	668 683.3	2 742 756.8	
20/06/2020	08:19:48	R2_TR06	Still	R2_TR06_017	1885	18.2	-	-	668 691.6	2 742 757.6	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
20/06/2020	08:20:17	R2_TR06	Still	R2_TR06_018	1886	18.3	-	-	668 699.0	2 742 760.5	
20/06/2020	08:20:56	R2_TR06	Still	R2_TR06_019	1887	18.5	-	-	668 707.7	2 742 763.0	
20/06/2020	08:21:21	R2_TR06	Still	R2_TR06_020	1888	18.5	-	-	668 712.0	2 742 763.3	
20/06/2020	08:21:36	R2_TR06	Still	R2_TR06_021	1889	18.6	-	-	668 713.8	2 742 764.5	
20/06/2020	08:22:22	R2_TR06	Still	R2_TR06_022	1890	18.9	-	-	668 722.2	2 742 768.7	
20/06/2020	08:22:34	R2_TR06	Still	R2_TR06_023	1891	18.9	-	-	668 724.5	2 742 769.1	
20/06/2020	08:23:24	R2_TR06	Video	EOL	1892	19.8	668 734.8	2 742 770.2	668 741.9	2 742 775.1	
20/06/2020	09:11:12	R2_TR10	Video	SOL	1893	10.9	671 070.4	2 743 322.5	671 071.8	2 743 317.7	
20/06/2020	09:11:40	R2_TR10	Still	R2_TR10_001	1894	10.8	-	-	671 068.6	2 743 322.6	
20/06/2020	09:11:49	R2_TR10	Still	R2_TR10_002	1895	10.8	-	-	671 067.1	2 743 323.8	
20/06/2020	09:12:23	R2_TR10	Still	R2_TR10_003	1896	10.8	-	-	671 062.4	2 743 329.1	
20/06/2020	09:12:48	R2_TR10	Still	R2_TR10_004	1897	10.9	-	-	671 058.1	2 743 331.4	
20/06/2020	09:12:59	R2_TR10	Still	R2_TR10_005	1898	10.9	-	-	671 056.9	2 743 332.9	
20/06/2020	09:13:25	R2_TR10	Still	R2_TR10_006	1899	10.9	-	-	671 052.4	2 743 335.7	
20/06/2020	09:13:38	R2_TR10	Still	R2_TR10_007	1900	10.9	-	-	671 050.8	2 743 337.6	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
20/06/2020	09:13:45	R2_TR10	Still	R2_TR10_008	1901	10.9	-	-	671 050.0	2 743 338.5	
20/06/2020	09:13:54	R2_TR10	Still	R2_TR10_009	1902	10.9	-	-	671 048.3	2 743 340.2	
20/06/2020	09:14:07	R2_TR10	Still	R2_TR10_010	1903	10.9	-	-	671 046.6	2 743 341.6	
20/06/2020	09:14:31	R2_TR10	Still	R2_TR10_011	1904	10.8	-	-	671 042.8	2 743 344.3	
20/06/2020	09:14:39	R2_TR10	Still	R2_TR10_012	1905	10.9	-	-	671 042.1	2 743 345.1	
20/06/2020	09:14:53	R2_TR10	Still	R2_TR10_013	1906	10.9	-	-	671 039.6	2 743 348.1	
20/06/2020	09:15:05	R2_TR10	Still	R2_TR10_014	1907	10.9	-	-	671 037.5	2 743 349.4	
20/06/2020	09:15:39	R2_TR10	Still	R2_TR10_015	1908	10.8	-	-	671 032.2	2 743 354.6	
20/06/2020	09:15:47	R2_TR10	Still	R2_TR10_016	1909	10.8	-	-	671 022.7	2 743 362.7	
20/06/2020	09:16:32	R2_TR10	Still	R2_TR10_017	1910	10.7	-	-	671 011.9	2 743 370.7	
20/06/2020	09:17:15	R2_TR10	Still	R2_TR10_018	1911	10.7	-	-	671 011.9	2 743 370.7	
20/06/2020	09:17:27	R2_TR10	Still	R2_TR10_019	1912	10.7	-	-	671 009.3	2 743 372.9	
20/06/2020	09:17:40	R2_TR10	Still	R2_TR10_020	1913	10.7	-	-	671 003.5	2 743 378.8	
20/06/2020	09:18:12	R2_TR10	Still	R2_TR10_021	1914	10.7	-	-	670 998.7	2 743 382.5	
20/06/2020	09:18:36	R2_TR10	Still	R2_TR10_022	1915	10.7	-	-	670 995.8	2 743 386.1	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
20/06/2020	09:18:55	R2_TR10	Still	R2_TR10_023	1916	10.8	-	-	670 988.5	2 743 390.8	
20/06/2020	09:19:33	R2_TR10	Still	R2_TR10_024	1917	10.7	-	-	670 988.5	2 743 390.8	
20/06/2020	09:20:07	R2_TR10	Vid	EOL	1918	10.8	670 986.9	2 743 394.1	670 978.1	2 743 397.8	
20/06/2020	09:44:10	SO_R2_REF	VV	NS	1919	10.9	671 026.3	2 743 362.9	671 024.5	2 743 362.6	
26/06/2020	19:27:57	R2_ENV_028	VV	PC	2357	31.0	647 149.0	2 693 644.3	647 148.9	2 693 645.4	
26/06/2020	17:36:45	R2_ENV_029	VV	PC	2349	25.9	645 975.3	2 693 979.9	645 974.2	2 693 976.9	
26/06/2020	14:44:19	R2_ENV_030	VV	PC	2341	27.5	646 432.6	2 695 638.5	646 431.7	2 695 635.1	
20/06/2020	10:07:53	R2_ENV_REF	WS	BOT	1923	11.1	671 026.3	2 743 362.9	671 026.4	2 743 361.1	
20/06/2020	10:09:51	R2_ENV_REF	WP	YSI Exo2	1924	11.1	671 026.3	2 743 362.9	671 027.3	2 743 359.1	
20/06/2020	10:18:15	R2_ENV_REF	WS	MID	1925	11.1	671 026.3	2 743 362.9	671 024.6	2 743 361.3	
20/06/2020	10:23:50	R2_ENV_REF	WS	TOP	1926	11.2	671 026.3	2 743 362.9	671 026.2	2 743 362.3	
20/06/2020	11:00:48	R2_ENV_094	WS	BOT	1927	18.1	669 278.7	2 743 668.3	669 279.0	2 743 667.3	
20/06/2020	11:03:05	R2_ENV_094	WP	YSI Exo2	1928	18.0	669 278.7	2 743 668.3	669 279.1	2 743 666.2	
20/06/2020	11:09:45	R2_ENV_094	WS	MID	1929	18.1	669 278.7	2 743 668.3	669 278.1	2 743 669.2	
20/06/2020	11:17:28	R2_ENV_094	WS	TOP	1930	18.1	669 278.7	2 743 668.3	669 278.9	2 743 669.0	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
26/06/2020	12:29:55	R2_ENV_031	VV	PC	2336	33.2	645 259.0	2 695 974.1	645 258.2	2 695 972.8	PSD
26/06/2020	11:55:56	R2_ENV_032	VV	Partial Sample	2334	20.4	644 085.4	2 696 309.7	644 087.9	2 696 299.6	HC
26/06/2020	11:50:30	R2_ENV_032	VV	Partial Sample	2333	20.2	644 085.4	2 696 309.7	644 086.0	2 696 310.0	
26/06/2020	12:02:34	R2_ENV_032	VV	NS	2335	20.5	644 085.4	2 696 309.7	644 081.2	2 696 318.6	
26/06/2020	09:43:11	R2_ENV_033	VV	Partial Sample	2322	21.1	644 542.6	2 697 968.3	644 547.9	2 697 960.5	PSD
26/06/2020	09:49:09	R2_ENV_033	VV	Partial Sample	2323	20.8	644 542.6	2 697 968.3	644 536.2	2 697 975.1	HC
20/06/2020	12:26:02	R2_ENV_095	WS	BOT	1937	15.4	670 385.5	2 744 183.1	670 341.4	2 744 094.9	Moved due to potential presence of shallow gass
20/06/2020	12:36:20	R2_ENV_095	WP	YSI Exo2	1938	15.7	670 385.5	2 744 183.1	670 343.7	2 744 092.1	
20/06/2020	12:43:12	R2_ENV_095	WS	MID	1939	15.8	670 385.5	2 744 183.1	670 342.5	2 744 093.5	
20/06/2020	12:50:23	R2_ENV_095	WS	TOP	1940	15.8	670 385.5	2 744 183.1	670 341.3	2 744 093.9	
20/06/2020	13:16:45	R2_ENV_096	WS	BOT	1941	17.0	669 674.8	2 745 749.9	669 672.2	2 745 752.4	
20/06/2020	13:19:44	R2_ENV_096	WP	YSI Exo2	1942	17.1	669 674.8	2 745 749.9	669 676.8	2 745 748.9	
20/06/2020	13:23:13	R2_ENV_096	WS	MID	1943	17.0	669 674.8	2 745 749.9	669 674.5	2 745 751.2	
20/06/2020	13:29:39	R2_ENV_096	WS	TOP	1944	17.0	669 674.8	2 745 749.9	669 672.7	2 745 751.3	
26/06/2020	09:38:49	R2_ENV_033	VV	Partial Sample	2321	20.9	644 542.6	2 697 968.3	644 543.0	2 697 967.2	HM

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
26/06/2020	09:07:51	R2_ENV_034	VV	NS	2319	20.8	643 386.7	2 698 313.9	643 386.6	2 698 314.2	
26/06/2020	09:11:14	R2_ENV_034	VV	PC	2320	20.6	643 386.7	2 698 313.9	643 394.0	2 698 308.1	
26/06/2020	00:51:47	R2_ENV_035	VV	Partial Sample	2262	29.4	642 195.4	2 698 639.5	642 199.1	2 698 630.5	
26/06/2020	00:42:50	R2_ENV_035	VV	NS	2261	29.7	642 195.4	2 698 639.5	642 196.3	2 698 638.5	
20/06/2020	14:56:10	R2_ENV_097	WS	BOT	1950	17.2	670 781.6	2 746 264.7	670 778.7	2 746 264.0	
20/06/2020	15:06:49	R2_ENV_097	WS	MID	1951	17.3	670 781.6	2 746 264.7	670 781.0	2 746 264.6	
20/06/2020	15:14:27	R2_ENV_097	WS	TOP	1952	17.3	670 781.6	2 746 264.7	670 780.3	2 746 263.8	
20/06/2020	15:27:46	R2_ENV_097	WP	YSI Exo2	1953	17.3	670 781.6	2 746 264.7	670 782.1	2 746 263.1	
20/06/2020	16:10:17	R2_ENV_098	WS	BOT	1954	17.1	671 888.4	2 746 779.5	671 888.4	2 746 778.8	
20/06/2020	16:19:08	R2_ENV_098	WS	MID	1955	17.1	671 888.4	2 746 779.5	671 888.3	2 746 779.7	
20/06/2020	16:28:34	R2_ENV_098	WS	TOP	1956	17.1	671 888.4	2 746 779.5	671 888.2	2 746 779.2	
26/06/2020	00:58:38	R2_ENV_035	VV	PC	2263	29.7	642 195.4	2 698 639.5	642 194.0	2 698 647.9	
25/06/2020	22:34:43	R2_ENV_036	VV	PC	2252	31.4	642 109.0	2 699 857.1	642 108.5	2 699 856.8	
25/06/2020	21:34:02	R2_ENV_037	VV	PC	2250	33.0	640 935.4	2 700 192.7	640 936.8	2 700 192.2	
20/06/2020	17:03:18	R2_ENV_098	WP	YSI Exo2	1960	17.0	671 888.4	2 746 779.5	671 887.3	2 746 781.6	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
25/06/2020	19:26:22	R2_ENV_038	VV	NS	2240	37.9	641 392.7	2 701 851.3	641 395.1	2 701 851.9	
25/06/2020	19:38:22	R2_ENV_038	VV	NS	2241	37.5	641 392.7	2 701 851.3	641 392.6	2 701 851.1	
25/06/2020	19:42:06	R2_ENV_038	VV	PC	2242	37.5	641 392.7	2 701 851.3	641 386.3	2 701 857.2	
20/06/2020	17:53:17	R2_ENV_099	WS	BOT	1964	16.1	671 177.7	2 748 346.3	671 178.1	2 748 346.9	
20/06/2020	18:01:00	R2_ENV_099	WS	MID	1965	16.1	671 177.7	2 748 346.3	671 178.9	2 748 348.6	
20/06/2020	18:07:51	R2_ENV_099	WS	TOP	1966	16.1	671 177.7	2 748 346.3	671 178.0	2 748 348.7	
20/06/2020	18:16:56	R2_ENV_099	WP	YSI Exo2	1967	16.1	671 177.7	2 748 346.3	671 175.5	2 748 346.8	
20/06/2020	19:11:15	R2_ENV_100	WS	BOT	1968	15.8	672 284.5	2 748 861.1	672 284.4	2 748 861.2	
20/06/2020	19:19:28	R2_ENV_100	WS	MID	1969	15.8	672 284.5	2 748 861.1	672 284.8	2 748 861.6	
20/06/2020	19:27:56	R2_ENV_100	WS	TOP	1970	15.7	672 284.5	2 748 861.1	672 284.8	2 748 860.3	
25/06/2020	17:43:42	R2_ENV_039	VV	NS	2234	38.5	639 675.4	2 701 745.9	639 676.3	2 701 745.2	
25/06/2020	17:47:46	R2_ENV_039	VV	PC	2235	38.5	639 675.4	2 701 745.9	639 678.1	2 701 735.8	
25/06/2020	16:30:46	R2_ENV_040	VV	NS	2231	39.5	640 038.6	2 703 076.4	640 036.5	2 703 075.8	
20/06/2020	19:50:10	SO_R2_013	VV	NS	1974	15.6	672 284.5	2 748 861.1	672 285.3	2 748 861.2	
20/06/2020	19:56:16	R2_ENV_100	WP	YSI Exo2	1975	15.7	672 284.5	2 748 861.1	672 287.7	2 748 863.8	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
25/06/2020	16:42:11	R2_ENV_040	VV	PC	2232	39.7	640 038.6	2 703 076.4	640 031.8	2 703 067.9	
25/06/2020	14:33:36	R2_ENV_041	VV	PC	2223	36.5	640 914.5	2 703 926.6	640 912.7	2 703 925.8	
26/06/2020	06:15:23	R2_ENV_042	VV	PC	2281	38.1	639 728.0	2 705 172.5	639 727.7	2 705 173.1	
20/06/2020	21:00:12	R2_ENV_102	WS	BOT	1979	15.4	672 680.6	2 750 942.7	672 681.3	2 750 942.8	
20/06/2020	21:08:51	R2_ENV_102	WS	MID	1980	15.4	672 680.6	2 750 942.7	672 680.4	2 750 943.3	
20/06/2020	21:15:31	R2_ENV_102	WS	TOP	1981	15.3	672 680.6	2 750 942.7	672 681.4	2 750 942.6	
20/06/2020	21:30:33	R2_ENV_102	WP	YSI Exo2	1982	15.3	672 680.6	2 750 942.7	672 678.3	2 750 943.0	
21/06/2020	01:12:12	R2_TR05	Video	SOL	1983	15.1	664 444.8	2 732 098.7	664 454.3	2 732 103.3	
21/06/2020	01:12:35	R2_TR05	Still	R2_TR05_001	1984	14.6	-	-	664 452.0	2 732 101.9	
21/06/2020	01:13:12	R2_TR05	Still	R2_TR05_002	1985	13.9	-	-	664 446.2	2 732 098.8	
21/06/2020	01:13:42	R2_TR05	Still	R2_TR05_003	1986	14.2	-	-	664 441.2	2 732 095.7	
21/06/2020	01:14:08	R2_TR05	Still	R2_TR05_004	1987	14.9	-	-	664 436.3	2 732 093.3	
21/06/2020	01:14:37	R2_TR05	Still	R2_TR05_005	1988	15.2	-	-	664 433.0	2 732 089.5	
21/06/2020	01:15:27	R2_TR05	Still	R2_TR05_006	1989	15.4	-	-	664 426.8	2 732 085.5	
21/06/2020	01:15:45	R2_TR05	Still	R2_TR05_007	1990	15.5	-	-	664 424.6	2 732 083.7	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
21/06/2020	01:16:48	R2_TR05	Still	R2_TR05_008	1991	15.7	-	-	664 414.3	2 732 078.1	
21/06/2020	01:17:22	R2_TR05	Still	R2_TR05_009	1992	15.8	-	-	664 409.3	2 732 074.3	
21/06/2020	01:18:11	R2_TR05	Still	R2_TR05_010	1993	15.9	-	-	664 404.0	2 732 070.1	
21/06/2020	01:18:35	R2_TR05	Still	R2_TR05_011	1994	16.0	-	-	664 400.6	2 732 067.7	
21/06/2020	01:19:53	R2_TR05	Still	R2_TR05_012	1995	15.5	-	-	664 387.8	2 732 061.5	
21/06/2020	01:20:38	R2_TR05	Still	R2_TR05_013	1996	14.7	-	-	664 382.8	2 732 057.1	
21/06/2020	01:21:22	R2_TR05	Still	R2_TR05_014	1997	15.5	-	-	664 376.9	2 732 051.5	
21/06/2020	01:22:02	R2_TR05	Still	R2_TR05_015	1998	16.4	-	-	664 369.4	2 732 049.0	
21/06/2020	01:23:47	R2_TR05	Still	R2_TR05_016	1999	17.2	-	-	664 354.6	2 732 039.0	
21/06/2020	01:24:08	R2_TR05	Still	R2_TR05_017	2000	17.3	-	-	664 352.5	2 732 036.2	
21/06/2020	01:25:03	R2_TR05	Still	R2_TR05_018	2001	17.6	-	-	664 345.4	2 732 031.4	
21/06/2020	01:26:00	R2_TR05	Still	R2_TR05_019	2002	19.0	-	-	664 336.7	2 732 026.3	
21/06/2020	01:26:09	R2_TR05	Still	R2_TR05_020	2003	19.1	-	-	664 335.3	2 732 025.4	
21/06/2020	01:27:46	R2_TR05	Still	R2_TR05_021	2004	20.3	-	-	664 320.0	2 732 015.6	
21/06/2020	01:28:31	R2_TR05	Still	R2_TR05_022	2005	20.7	-	-	664 312.5	2 732 011.9	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
21/06/2020	01:28:48	R2_TR05	Video	EOL	2006	20.7	664 316.0	2 732 013.8	664 310.2	2 732 010.3	
21/06/2020	01:58:36	R2_ENV_081	WS	TOP	2007	21.6	663 622.0	2 731 954.8	663 621.8	2 731 955.4	
26/06/2020	05:44:27	R2_ENV_043	VV	PC	2280	28.6	640 603.9	2 706 022.6	640 605.4	2 706 022.1	
21/06/2020	03:32:46	R2_ENV_075	WS	BOT	2009	16.4	661 758.7	2 726 251.4	661 758.3	2 726 252.7	
21/06/2020	03:33:45	R2_ENV_075	WP	YSI Exo2	2010	16.5	661 758.7	2 726 251.4	661 759.3	2 726 250.1	
21/06/2020	03:41:37	R2_ENV_075	WS	MID	2011	16.5	661 758.7	2 726 251.4	661 758.9	2 726 251.9	
21/06/2020	03:48:10	R2_ENV_075	WS	TOP	2012	16.4	661 758.7	2 726 251.4	661 758.2	2 726 251.8	
21/06/2020	04:29:27	R2_ENV_074	WS	BOT	2013	16.0	662 778.9	2 724 866.1	662 781.2	2 724 868.8	
21/06/2020	04:33:24	R2_ENV_074	WP	YSI Exo2	2014	16.0	662 778.9	2 724 866.1	662 782.3	2 724 867.4	
21/06/2020	04:48:31	R2_ENV_074	WS	MID	2015	16.0	662 778.9	2 724 866.1	662 779.1	2 724 866.9	
21/06/2020	04:59:14	R2_ENV_074	WS	TOP	2016	16.0	662 778.9	2 724 866.1	662 780.0	2 724 868.6	
26/06/2020	04:00:51	R2_ENV_044	VV	PC	2271	36.5	641 479.8	2 706 872.8	641 477.6	2 706 873.6	
26/06/2020	03:16:53	R2_ENV_045	VV	PC	2269	32.0	640 293.4	2 708 118.7	640 277.3	2 708 040.0	
25/06/2020	12:50:59	R2_ENV_046	VV	PC	2218	36.9	641 169.3	2 708 968.9	641 168.4	2 708 968.4	
25/06/2020	12:26:40	R2_ENV_047	VV	PC	2217	23.0	642 045.2	2 709 819.1	642 045.2	2 709 817.9	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
21/06/2020	06:27:01	R2_ENV_073	WS	BOT	2021	16.3	661 402.5	2 724 464.9	661 403.2	2 724 464.6	
21/06/2020	06:28:04	R2_ENV_073	WP	YSI Exo2	2022	16.3	661 402.5	2 724 464.9	661 402.3	2 724 463.4	
21/06/2020	06:46:09	R2_ENV_073	WS	MID	2023	16.2	661 402.5	2 724 464.9	661 402.1	2 724 465.9	
21/06/2020	06:52:05	R2_ENV_073	WS	TOP	2024	16.3	661 402.5	2 724 464.9	661 402.5	2 724 464.9	
21/06/2020	07:52:17	R2_ENV_071	WS	BOT	2025	15.3	659 986.5	2 722 888.5	659 985.6	2 722 888.4	
21/06/2020	07:56:12	R2_ENV_071	WP	YSI Exo2	2026	15.3	659 986.5	2 722 888.5	659 985.4	2 722 886.9	
21/06/2020	08:03:03	R2_ENV_071	WS	MID	2027	15.4	659 986.5	2 722 888.5	659 986.1	2 722 888.8	
21/06/2020	08:14:52	R2_ENV_071	WS	TOP	2028	15.4	659 986.5	2 722 888.5	659 986.0	2 722 888.7	
25/06/2020	10:58:27	R2_ENV_048	VV	Partial Sample	2208	28.9	640 858.7	2 711 065.0	640 861.5	2 711 056.5	PSD
25/06/2020	10:49:20	R2_ENV_048	VV	NS	2206	27.9	640 858.7	2 711 065.0	640 857.6	2 711 067.1	
25/06/2020	10:53:30	R2_ENV_048	VV	NS	2207	27.3	640 858.7	2 711 065.0	640 856.9	2 711 074.7	
21/06/2020	09:33:44	R2_ENV_067	WS	BOT	2032	18.9	656 480.6	2 720 962.7	656 479.8	2 720 963.5	
21/06/2020	09:50:13	R2_ENV_067	WS	MID	2034	18.9	656 480.6	2 720 962.7	656 480.2	2 720 962.4	
21/06/2020	09:56:24	R2_ENV_067	WS	TOP	2035	19.0	656 480.6	2 720 962.7	656 480.9	2 720 962.7	
21/06/2020	10:08:59	R2_ENV_067	WP	YSI Exo2	2036	19.1	656 480.6	2 720 962.7	656 478.8	2 720 962.7	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
21/06/2020	10:56:25	R2_ENV_065	WS	BOT	2037	18.2	654 727.7	2 719 999.8	654 727.4	2 719 999.6	
21/06/2020	11:01:15	R2_ENV_065	WP	YSI Exo2	2038	18.3	654 727.7	2 719 999.8	654 731.0	2 719 999.6	
21/06/2020	11:10:54	R2_ENV_065	WS	MID	2039	18.2	654 727.7	2 719 999.8	654 726.5	2 719 998.4	
21/06/2020	11:21:07	R2_ENV_065	WS	TOP	2040	18.2	654 727.7	2 719 999.8	654 726.9	2 719 999.0	
25/06/2020	10:15:57	R2_ENV_049	VV	PC	2205	27.7	641 734.6	2 711 915.1	641 733.9	2 711 916.9	
25/06/2020	08:52:48	R2_ENV_050	VV	PC	2196	25.2	642 610.5	2 712 765.3	642 611.1	2 712 767.3	
25/06/2020	08:17:15	R2_ENV_051	VV	NS	2194	31.6	641 951.5	2 714 179.9	641 699.6	2 714 446.0	
25/06/2020	08:20:40	R2_ENV_051	VV	PC	2195	31.5	641 951.5	2 714 179.9	641 696.6	2 714 454.3	
25/06/2020	06:44:02	R2_ENV_052	VV	PC	2185	27.8	642 996.5	2 714 354.6	642 914.7	2 714 298.4	
25/06/2020	06:00:42	R2_ENV_053	VV	PC	2183	28.9	644 210.0	2 714 222.5	644 651.6	2 714 463.4	
21/06/2020	13:17:20	R2_ENV_064	WS	BOT	2047	19.6	653 514.2	2 720 131.9	653 513.2	2 720 131.6	
21/06/2020	13:19:21	R2_ENV_064	WP	YSI Exo2	2048	19.6	653 514.2	2 720 131.9	653 516.4	2 720 133.8	
21/06/2020	13:25:56	R2_ENV_064	WS	MID	2049	19.7	653 514.2	2 720 131.9	653 514.3	2 720 132.0	
21/06/2020	13:34:23	R2_ENV_064	WS	TOP	2050	19.6	653 514.2	2 720 131.9	653 512.7	2 720 130.8	
24/06/2020	04:30:36	R2_ENV_072	WS	BOT	2052	16.8	660 189.0	2 724 597.0	660 190.3	2 724 597.2	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
24/06/2020	04:34:30	R2_ENV_072	WP	YSI Exo2	2053	16.7	660 189.0	2 724 597.0	660 187.6	2 724 597.7	
24/06/2020	04:42:04	R2_ENV_072	WS	MID	2054	16.3	660 189.0	2 724 597.0	660 190.4	2 724 597.5	
24/06/2020	04:49:54	R2_ENV_072	WS	TOP	2055	16.4	660 189.0	2 724 597.0	660 190.9	2 724 598.4	
25/06/2020	03:36:31	R2_ENV_054	VV	NS	2148	21.6	644 412.4	2 715 931.0	644 756.3	2 716 123.8	
25/06/2020	03:41:25	R2_ENV_054	VV	NS	2149	21.4	644 412.4	2 715 931.0	644 757.6	2 716 133.0	
25/06/2020	03:47:05	R2_ENV_054	VV	NS	2150	21.7	644 412.4	2 715 931.0	644 756.3	2 716 115.0	
24/06/2020	13:27:58	R2_ENV_055	VV	Partial Sample	2095	23.3	645 625.9	2 715 798.9	645 624.8	2 715 799.6	HM
24/06/2020	06:06:44	R2_ENV_070	WS	BOT	2060	18.9	658 773.0	2 723 020.6	658 773.0	2 723 020.3	
24/06/2020	06:12:44	R2_ENV_070	WP	YSI Exo2	2061	18.8	658 773.0	2 723 020.6	658 770.7	2 723 022.5	
24/06/2020	06:16:24	R2_ENV_070	WS	MID	2062	18.7	658 773.0	2 723 020.6	658 773.4	2 723 021.0	
24/06/2020	06:23:43	R2_ENV_070	WS	TOP	2063	18.7	658 773.0	2 723 020.6	658 773.8	2 723 021.2	
24/06/2020	06:57:40	R2_ENV_069	WS	BOT	2064	21.0	657 559.6	2 723 152.7	657 559.2	2 723 153.4	
24/06/2020	06:58:22	R2_ENV_069	WP	YSI Exo2	2065	21.1	657 559.6	2 723 152.7	657 558.0	2 723 152.8	
24/06/2020	07:09:32	R2_ENV_069	WS	MID	2066	20.9	657 559.6	2 723 152.7	657 559.3	2 723 153.9	
24/06/2020	07:16:01	R2_ENV_069	WS	TOP	2067	21.0	657 559.6	2 723 152.7	657 560.2	2 723 153.5	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
24/06/2020	14:40:13	R2_ENV_055	VV	Partial Sample	2096	23.3	645 625.9	2 715 798.9	645 624.1	2 715 788.2	HC and PSD
24/06/2020	08:15:19	SO_R2_009	VV	SOIL	2069	21.5	657 020.1	2 722 057.7	657 021.9	2 722 059.5	
24/06/2020	15:32:53	R2_ENV_056	VV	PC	2097	25.0	646 839.4	2 715 666.8	646 835.1	2 715 665.7	
24/06/2020	17:50:20	R2_ENV_057	VV	NS	2106	33.9	647 041.9	2 717 375.3	647 041.2	2 717 375.2	
24/06/2020	17:53:47	R2_ENV_057	VV	NS	2107	33.7	647 041.9	2 717 375.3	647 035.7	2 717 368.0	
24/06/2020	08:49:30	R2_ENV_068	WS	BOT	2073	21.3	657 020.1	2 722 057.7	657 020.7	2 722 057.0	
24/06/2020	08:57:18	R2_ENV_068	WS	MID	2074	21.3	657 020.1	2 722 057.7	657 020.0	2 722 057.3	
24/06/2020	09:03:22	R2_ENV_068	WP	YSI Exo2	2075	21.2	657 020.1	2 722 057.7	657 020.7	2 722 059.1	Data not accepted
24/06/2020	09:05:29	R2_ENV_068	WS	TOP	2076	21.2	657 020.1	2 722 057.7	657 019.7	2 722 057.6	
24/06/2020	09:20:19	R2_ENV_068	WP	YSI Exo2	2077	21.1	657 020.1	2 722 057.7	657 021.7	2 722 059.2	
24/06/2020	10:01:00	R2_ENV_066	WS	BOT	2078	21.6	654 930.1	2 721 708.3	654 929.3	2 721 708.1	
24/06/2020	10:05:04	R2_ENV_066	WP	NS	2079	21.6	654 930.1	2 721 708.3	654 933.2	2 721 709.3	
24/06/2020	10:07:06	R2_ENV_066	WS	MID	2080	21.6	654 930.1	2 721 708.3	654 928.7	2 721 709.0	
24/06/2020	10:13:46	R2_ENV_066	WS	TOP	2081	21.6	654 930.1	2 721 708.3	654 930.7	2 721 707.4	
24/06/2020	17:57:33	R2_ENV_057	VV	PC	2108	33.8	647 041.9	2 717 375.3	647 045.7	2 717 382.0	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
24/06/2020	10:41:34	R2_ENV_066	WP	YSI Exo2	2083	21.7	654 930.1	2 721 708.3	654 931.0	2 721 709.3	
24/06/2020	18:53:59	R2_ENV_058	VV	PC	2110	18.5	648 255.3	2 717 243.2	648 254.4	2 717 242.5	
24/06/2020	20:57:01	R2_ENV_059	VV	NS	2118	18.8	649 468.8	2 717 111.2	649 468.0	2 717 111.6	
24/06/2020	21:05:20	R2_ENV_059	VV	NS	2119	21.1	649 468.8	2 717 111.2	649 470.0	2 717 121.4	
24/06/2020	11:32:02	R2_ENV_063	WS	BOT	2087	28.7	652 300.7	2 720 264.0	652 300.2	2 720 265.0	
24/06/2020	11:38:39	R2_ENV_063	WP	YSI Exo2	2088	28.7	652 300.7	2 720 264.0	652 302.6	2 720 263.7	
24/06/2020	11:39:53	R2_ENV_063	WS	MID	2089	28.8	652 300.7	2 720 264.0	652 299.3	2 720 264.3	
24/06/2020	11:47:05	R2_ENV_063	WS	TOP	2090	28.8	652 300.7	2 720 264.0	652 301.6	2 720 262.9	
24/06/2020	12:47:44	R2_ENV_055	WS	BOT	2091	23.0	645 625.9	2 715 798.9	645 623.5	2 715 797.1	
24/06/2020	12:52:20	R2_ENV_055	WP	YSI Exo2	2092	23.0	645 625.9	2 715 798.9	645 628.5	2 715 797.9	
24/06/2020	12:55:31	R2_ENV_055	WS	MID	2093	23.6	645 625.9	2 715 798.9	645 623.5	2 715 799.5	
24/06/2020	13:04:01	R2_ENV_055	WS	TOP	2094	23.3	645 625.9	2 715 798.9	645 625.3	2 715 798.8	
24/06/2020	21:10:42	R2_ENV_059	VV	NS	2120	22.0	649 468.8	2 717 111.2	649 468.6	2 717 102.2	
24/06/2020	22:35:58	R2_ENV_060	VV	NS	2125	19.6	649 671.3	2 718 819.7	649 671.8	2 718 819.7	
24/06/2020	22:39:11	R2_ENV_060	VV	Partial Sample	2126	19.6	649 671.3	2 718 819.7	649 668.0	2 718 811.4	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
24/06/2020	15:45:49	R2_ENV_056	WS	BOT	2098	24.8	646 839.4	2 715 666.8	646 837.3	2 715 664.8	
24/06/2020	16:12:44	R2_ENV_056	WS	MID	2099	25.1	646 839.4	2 715 666.8	646 840.0	2 715 665.9	
24/06/2020	16:20:36	R2_ENV_056	WS	TOP	2100	25.1	646 839.4	2 715 666.8	646 839.5	2 715 666.6	
24/06/2020	16:31:00	R2_ENV_056	WP	YSI Exo2	2101	25.1	646 839.4	2 715 666.8	646 839.3	2 715 667.4	Data not accepted
24/06/2020	16:46:31	R2_ENV_056	WP	YSI Exo2	2102	25.3	646 839.4	2 715 666.8	646 840.8	2 715 666.0	
24/06/2020	17:26:26	R2_ENV_057	WS	BOT	2103	33.7	647 041.9	2 717 375.3	647 040.6	2 717 375.2	
24/06/2020	17:36:35	R2_ENV_057	WS	MID	2104	33.8	647 041.9	2 717 375.3	647 040.5	2 717 373.7	
24/06/2020	17:43:32	R2_ENV_057	WS	TOP	2105	33.8	647 041.9	2 717 375.3	647 040.9	2 717 373.9	
24/06/2020	22:43:33	R2_ENV_060	VV	Partial Sample	2127	19.6	649 671.3	2 718 819.7	649 678.0	2 718 828.4	
24/06/2020	23:34:53	R2_ENV_061	VV	NS	2130	21.8	650 884.8	2 718 687.6	650 885.6	2 718 687.2	
24/06/2020	23:38:10	R2_ENV_061	VV	NS	2131	21.7	650 884.8	2 718 687.6	650 881.9	2 718 678.7	
24/06/2020	18:15:08	R2_ENV_057	WP	YSI Exo2	2109	33.8	647 041.9	2 717 375.3	647 042.5	2 717 374.2	
24/06/2020	23:41:00	R2_ENV_061	VV	NS	2132	21.3	650 884.8	2 718 687.6	650 889.2	2 718 696.6	
24/06/2020	19:10:25	R2_ENV_058	WS	BOT	2111	26.3	648 255.3	2 717 243.2	648 255.2	2 717 242.7	
24/06/2020	19:18:17	R2_ENV_058	WS	MID	2112	26.4	648 255.3	2 717 243.2	648 255.5	2 717 243.2	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
24/06/2020	19:25:38	R2_ENV_058	WS	TOP	2113	26.3	648 255.3	2 717 243.2	648 255.3	2 717 242.9	
24/06/2020	19:37:18	R2_ENV_058	WP	YSI Exo2	2114	26.3	648 255.3	2 717 243.2	648 257.4	2 717 243.4	
24/06/2020	20:31:13	R2_ENV_059	WS	BOT	2115	19.0	649 468.8	2 717 111.2	649 468.3	2 717 110.7	
24/06/2020	20:41:25	R2_ENV_059	WS	MID	2116	19.0	649 468.8	2 717 111.2	649 469.2	2 717 111.1	
24/06/2020	20:49:17	R2_ENV_059	WS	TOP	2117	19.0	649 468.8	2 717 111.2	649 468.2	2 717 110.7	
25/06/2020	01:29:47	R2_ENV_062	VV	PC	2142	33.8	652 098.3	2 718 555.5	652 097.0	2 718 545.8	
25/06/2020	01:17:06	R2_ENV_062	VV	Partial Sample	2140	33.8	652 098.3	2 718 555.5	652 098.8	2 718 555.7	
25/06/2020	01:22:58	R2_ENV_062	VV	Partial Sample	2141	33.8	652 098.3	2 718 555.5	652 100.1	2 718 566.2	
24/06/2020	21:18:38	R2_ENV_059	WP	YSI Exo2	2121	21.8	649 468.8	2 717 111.2	649 466.7	2 717 112.8	
24/06/2020	22:00:50	R2_ENV_060	WS	BOT	2122	19.7	649 671.3	2 718 819.7	649 671.5	2 718 818.4	
24/06/2020	22:19:35	R2_ENV_060	WS	MID	2123	19.6	649 671.3	2 718 819.7	649 671.7	2 718 820.2	
24/06/2020	22:27:18	R2_ENV_060	WS	TOP	2124	19.6	649 671.3	2 718 819.7	649 672.5	2 718 818.6	
24/06/2020	11:27:24	R2_ENV_063	VV	NS	2086	28.6	652 300.7	2 720 264.0	652 300.5	2 720 273.7	
24/06/2020	11:11:57	R2_ENV_063	VV	Partial Sample	2084	28.7	652 300.7	2 720 264.0	652 299.6	2 720 264.3	HC
24/06/2020	11:20:35	R2_ENV_063	VV	Partial Sample	2085	28.7	652 300.7	2 720 264.0	652 299.6	2 720 254.3	HM and PSD

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
24/06/2020	22:49:13	SO_R2_008	VV	NS	2128	19.4	649 671.3	2 718 819.7	649 677.7	2 718 828.1	
24/06/2020	22:57:00	R2_ENV_060	WP	YSI Exo2	2129	19.4	649 671.3	2 718 819.7	649 670.0	2 718 820.9	
21/06/2020	12:45:38	R2_ENV_064	VV	NS	2044	19.5	653 514.2	2 720 131.9	653 511.8	2 720 132.1	
21/06/2020	12:57:12	R2_ENV_064	VV	PC	2046	19.9	653 514.2	2 720 131.9	653 514.4	2 720 140.3	
21/06/2020	12:49:21	R2_ENV_064	VV	Partial Sample	2045	19.6	653 514.2	2 720 131.9	653 514.3	2 720 122.1	
24/06/2020	23:49:15	R2_ENV_061	WS	BOT	2133	21.3	650 884.8	2 718 687.6	650 884.7	2 718 687.2	
24/06/2020	23:58:54	R2_ENV_061	WS	MID	2134	21.8	650 884.8	2 718 687.6	650 885.4	2 718 687.8	
25/06/2020	00:05:52	R2_ENV_061	WS	TOP	2135	21.7	650 884.8	2 718 687.6	650 885.9	2 718 688.0	
25/06/2020	00:16:28	R2_ENV_061	WP	YSI Exo2	2136	21.3	650 884.8	2 718 687.6	650 884.4	2 718 689.6	
25/06/2020	00:46:16	R2_ENV_062	WS	BOT	2137	33.8	652 098.3	2 718 555.5	652 097.3	2 718 555.3	
25/06/2020	00:59:08	R2_ENV_062	WS	MID	2138	33.8	652 098.3	2 718 555.5	652 098.8	2 718 555.2	
25/06/2020	01:08:52	R2_ENV_062	WS	TOP	2139	33.8	652 098.3	2 718 555.5	652 099.0	2 718 555.4	
21/06/2020	11:32:09	R2_ENV_065	VV	NS	2041	18.3	654 727.7	2 719 999.8	654 725.9	2 720 000.0	
21/06/2020	11:37:00	R2_ENV_065	VV	NS	2042	18.3	654 727.7	2 719 999.8	654 726.9	2 719 990.1	
21/06/2020	11:39:55	R2_ENV_065	VV	NS	2043	18.3	654 727.7	2 719 999.8	654 725.8	2 720 008.6	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East

Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
25/06/2020	01:50:25	R2_ENV_062	WP	YSI Exo2	2143	33.8	652 098.3	2 718 555.5	652 095.2	2 718 554.5	
25/06/2020	03:04:01	R2_ENV_054	WS	BOT	2144	21.7	644 412.4	2 715 931.0	644 756.4	2 716 123.1	
25/06/2020	03:08:23	R2_ENV_054	WP	YSI Exo2	2145	21.8	644 412.4	2 715 931.0	644 753.6	2 716 124.0	
25/06/2020	03:19:49	R2_ENV_054	WS	MID	2146	21.7	644 412.4	2 715 931.0	644 756.5	2 716 122.8	
25/06/2020	03:26:47	R2_ENV_054	WS	TOP	2147	21.6	644 412.4	2 715 931.0	644 756.1	2 716 123.3	
24/06/2020	10:23:50	R2_ENV_066	VV	PC	2082	21.7	654 930.1	2 721 708.3	654 929.4	2 721 707.2	
21/06/2020	09:11:43	R2_ENV_067	VV	NS	2030	18.8	656 480.6	2 720 962.7	656 480.0	2 720 963.9	
21/06/2020	09:15:24	R2_ENV_067	VV	PC	2031	18.8	656 480.6	2 720 962.7	656 471.9	2 720 968.0	
25/06/2020	05:01:48	R2_TR04	Video	SOL	2151	15.3	645 620.6	2 716 711.7	645 619.9	2 716 715.4	
25/06/2020	05:02:02	R2_TR04	Still	R2_TR04_001	2152	15.4	-	-	645 622.2	2 716 710.9	
25/06/2020	05:02:16	R2_TR04	Still	R2_TR04_002	2153	15.3	-	-	645 624.5	2 716 707.3	
25/06/2020	05:02:32	R2_TR04	Still	R2_TR04_003	2154	15.4	-	-	645 626.4	2 716 703.3	
25/06/2020	05:02:46	R2_TR04	Still	R2_TR04_004	2155	15.5	-	-	645 627.7	2 716 700.3	
25/06/2020	05:03:05	R2_TR04	Still	R2_TR04_005	2156	15.7	-	-	645 628.7	2 716 695.6	
25/06/2020	05:03:18	R2_TR04	Still	R2_TR04_006	2157	15.8	-	-	645 631.0	2 716 692.7	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
25/06/2020	05:03:27	R2_TR04	Still	R2_TR04_007	2158	15.9	-	-	645 632.0	2 716 692.7	
25/06/2020	05:03:41	R2_TR04	Still	R2_TR04_008	2159	16.0	-	-	645 634.0	2 716 689.0	
25/06/2020	05:04:10	R2_TR04	Still	R2_TR04_009	2160	16.6	-	-	645 637.8	2 716 683.0	
25/06/2020	05:04:33	R2_TR04	Still	R2_TR04_010	2161	16.8	-	-	645 641.5	2 716 678.2	
25/06/2020	05:04:46	R2_TR04	Still	R2_TR04_011	2162	17.0	-	-	645 643.5	2 716 675.2	
25/06/2020	05:05:14	R2_TR04	Still	R2_TR04_012	2163	17.5	-	-	645 646.6	2 716 670.1	
25/06/2020	05:05:51	R2_TR04	Still	R2_TR04_013	2164	18.0	-	-	645 652.4	2 716 662.2	
25/06/2020	05:06:24	R2_TR04	Still	R2_TR04_014	2165	18.6	-	-	645 656.5	2 716 654.8	
25/06/2020	05:06:37	R2_TR04	Still	R2_TR04_015	2166	18.8	-	-	645 657.9	2 716 652.0	
25/06/2020	05:06:58	R2_TR04	Still	R2_TR04_016	2167	19.4	-	-	645 660.4	2 716 646.9	
25/06/2020	05:07:21	R2_TR04	Still	R2_TR04_017	2168	19.6	-	-	645 663.6	2 716 641.7	
25/06/2020	05:07:35	R2_TR04	Still	R2_TR04_018	2169	19.9	-	-	645 665.5	2 716 638.5	
25/06/2020	05:07:43	R2_TR04	Still	R2_TR04_019	2170	20.0	-	-	645 666.1	2 716 637.3	
25/06/2020	05:08:01	R2_TR04	Still	R2_TR04_020	2171	20.5	-	-	645 669.3	2 716 632.3	
25/06/2020	05:08:26	R2_TR04	Still	R2_TR04_021	2172	20.7	-	-	645 672.6	2 716 625.9	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East

Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
25/06/2020	05:08:35	R2_TR04	Still	R2_TR04_022	2173	20.7	-	-	645 673.6	2 716 624.2	
25/06/2020	05:08:57	R2_TR04	Still	R2_TR04_023	2174	21.2	-	-	645 676.9	2 716 618.5	
25/06/2020	05:09:06	R2_TR04	Still	R2_TR04_024	2175	21.6	-	-	645 678.2	2 716 616.4	
25/06/2020	05:09:41	R2_TR04	Still	R2_TR04_025	2176	22.0	-	-	345 683.1	2 716 609.0	
25/06/2020	05:10:13	R2_TR04	Still	R2_TR04_026	2177	22.4	-	-	345 687.1	2 716 602.5	
25/06/2020	05:10:21	R2_TR04	Video	EOL	2178	22.5	645 685.7	2 716 601.2	645 687.8	2 716 600.3	
25/06/2020	05:35:27	R2_ENV_053	WS	BOT	2179	28.9	644 210.0	2 714 222.5	644 651.6	2 714 464.3	
25/06/2020	05:41:04	R2_ENV_053	WP	YSI Exo2	2180	28.9	644 210.0	2 714 222.5	644 648.8	2 714 464.5	
25/06/2020	05:45:33	R2_ENV_053	WS	MID	2181	28.9	644 210.0	2 714 222.5	644 651.2	2 714 463.5	
25/06/2020	05:52:27	R2_ENV_053	WS	TOP	2182	28.9	644 210.0	2 714 222.5	644 651.2	2 714 463.3	
24/06/2020	08:28:55	R2_ENV_068	VV	NS	2070	21.3	657 020.1	2 722 057.7	657 019.6	2 722 058.5	
25/06/2020	06:34:55	SO_R2_007	VV	SOIL	2184	27.8	642 996.5	2 714 354.6	642 915.0	2 714 298.2	
24/06/2020	08:32:22	R2_ENV_068	VV	NS	2071	21.0	657 020.1	2 722 057.7	657 011.3	2 722 060.0	
25/06/2020	06:52:26	R2_ENV_052	WS	BOT	2186	27.7	642 996.5	2 714 354.6	642 915.9	2 714 299.6	
25/06/2020	07:00:06	R2_ENV_052	WS	MID	2187	27.7	642 996.5	2 714 354.6	642 918.4	2 714 299.2	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
25/06/2020	07:06:40	R2_ENV_052	WS	TOP	2188	27.8	642 996.5	2 714 354.6	642 918.4	2 714 298.3	
25/06/2020	07:07:55	R2_ENV_052	WP	YSI Exo2	2189	27.8	642 996.5	2 714 354.6	642 912.5	2 714 297.9	
25/06/2020	07:54:14	R2_ENV_051	WS	BOT	2190	31.6	641 951.5	2 714 179.9	641 699.3	2 714 445.9	
25/06/2020	07:58:13	R2_ENV_051	WP	YSI Exo2	2191	31.6	641 951.5	2 714 179.9	641 698.9	2 714 445.5	
25/06/2020	08:01:29	R2_ENV_051	WS	MID	2192	31.6	641 951.5	2 714 179.9	641 701.0	2 714 447.3	
25/06/2020	08:08:38	R2_ENV_051	WS	TOP	2193	31.6	641 951.5	2 714 179.9	641 699.0	2 714 443.9	
24/06/2020	08:39:36	R2_ENV_068	VV	PC	2072	21.2	657 020.1	2 722 057.7	657 027.6	2 722 052.0	
24/06/2020	07:22:31	R2_ENV_069	VV	PC	2068	20.8	657 559.6	2 723 152.7	657 560.5	2 723 154.6	
24/06/2020	05:44:07	R2_ENV_070	VV	Partial Sample	2057	19.5	658 773.0	2 723 020.6	658 773.0	2 723 021.7	
25/06/2020	09:02:07	R2_ENV_050	WS	BOT	2197	25.2	642 610.5	2 712 765.3	642 611.4	2 712 766.1	
25/06/2020	09:08:48	R2_ENV_050	WS	MID	2198	25.2	642 610.5	2 712 765.3	642 610.1	2 712 766.9	
25/06/2020	09:15:27	R2_ENV_050	WP	YSI Exo2	2199	25.4	642 610.5	2 712 765.3	642 607.4	2 712 764.6	
25/06/2020	09:22:00	R2_ENV_050	WS	TOP	2200	25.2	642 610.5	2 712 765.3	642 609.1	2 712 764.2	
25/06/2020	09:53:02	R2_ENV_049	WS	BOT	2201	27.7	641 734.6	2 711 915.1	641 734.8	2 711 916.1	
25/06/2020	09:59:14	R2_ENV_049	WP	YSI Exo2	2202	27.9	641 734.6	2 711 915.1	641 731.6	2 711 915.5	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
25/06/2020	10:01:49	R2_ENV_049	WS	MID	2203	27.7	641 734.6	2 711 915.1	641 735.6	2 711 915.8	
25/06/2020	10:08:27	R2_ENV_049	WS	TOP	2204	27.6	641 734.6	2 711 915.1	641 734.4	2 711 914.7	
24/06/2020	05:54:05	R2_ENV_070	VV	Partial Sample	2058	19.2	658 773.0	2 723 020.6	658 764.7	2 723 026.0	HM and PSD
24/06/2020	06:00:31	R2_ENV_070	VV	Partial Sample	2059	19.2	658 773.0	2 723 020.6	658 782.7	2 723 018.6	
21/06/2020	08:22:40	R2_ENV_071	VV	PC	2029	15.4	659 986.5	2 722 888.5	659 985.4	2 722 889.3	
24/06/2020	05:03:56	R2_ENV_072	VV	PC	2056	16.4	660 189.0	2 724 597.0	660 191.4	2 724 600.2	
25/06/2020	11:06:55	R2_ENV_048	WS	BOT	2209	28.7	640 858.7	2 711 065.0	640 858.3	2 711 063.8	
25/06/2020	11:14:43	R2_ENV_048	WS	MID	2210	28.3	640 858.7	2 711 065.0	640 858.3	2 711 066.0	
25/06/2020	11:20:07	R2_ENV_048	WP	YSI Exo2	2211	28.2	640 858.7	2 711 065.0	640 855.8	2 711 064.5	
25/06/2020	11:21:02	R2_ENV_048	WS	TOP	2212	28.1	640 858.7	2 711 065.0	640 858.5	2 711 065.9	
25/06/2020	12:05:16	R2_ENV_047	WS	BOT	2213	22.8	642 045.2	2 709 819.1	642 044.3	2 709 819.7	
25/06/2020	12:07:21	R2_ENV_047	WP	YSI Exo2	2214	22.9	642 045.2	2 709 819.1	642 047.9	2 709 818.3	
25/06/2020	12:12:29	R2_ENV_047	WS	MID	2215	22.8	642 045.2	2 709 819.1	642 044.5	2 709 818.8	
25/06/2020	12:19:51	R2_ENV_047	WS	TOP	2216	22.9	642 045.2	2 709 819.1	642 044.3	2 709 819.0	
21/06/2020	05:55:21	R2_ENV_073	VV	NS	2019	16.3	661 402.5	2 724 464.9	661 401.3	2 724 465.4	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East

Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
21/06/2020	06:06:41	R2_ENV_073	VV	PC	2020	16.3	661 402.5	2 724 464.9	661 393.3	2 724 464.9	
25/06/2020	13:03:33	R2_ENV_046	WS	BOT	2219	36.9	641 169.3	2 708 968.9	641 171.5	2 708 968.6	
25/06/2020	13:14:28	R2_ENV_046	WS	MID	2220	37.0	641 169.3	2 708 968.9	641 168.4	2 708 969.5	
25/06/2020	13:18:43	R2_ENV_046	WP	YSI Exo2	2221	37.2	641 169.3	2 708 968.9	641 170.1	2 708 969.1	
25/06/2020	13:24:50	R2_ENV_046	WS	TOP	2222	37.0	641 169.3	2 708 968.9	641 170.4	2 708 968.7	
21/06/2020	05:12:34	R2_ENV_074	VV	NS	2017	16.0	662 778.9	2 724 866.1	662 779.1	2 724 866.8	
25/06/2020	14:49:29	R2_ENV_041	WS	BOT	2224	36.8	640 914.5	2 703 926.6	640 913.7	2 703 926.2	
25/06/2020	14:57:15	R2_ENV_041	WS	MID	2225	37.0	640 914.5	2 703 926.6	640 914.7	2 703 924.8	
25/06/2020	15:02:33	R2_ENV_041	WS	TOP	2226	36.9	640 914.5	2 703 926.6	640 915.1	2 703 925.4	
25/06/2020	15:13:19	R2_ENV_041	WP	YSI Exo2	2227	36.9	640 914.5	2 703 926.6	640 911.4	2 703 920.5	
25/06/2020	16:02:15	R2_ENV_040	WS	BOT	2228	39.4	640 038.6	2 703 076.4	640 038.0	2 703 075.5	
25/06/2020	16:13:32	R2_ENV_040	WS	MID	2229	39.4	640 038.6	2 703 076.4	640 038.1	2 703 075.7	
25/06/2020	16:20:44	R2_ENV_040	WS	TOP	2230	39.5	640 038.6	2 703 076.4	640 037.8	2 703 075.4	
21/06/2020	05:17:23	R2_ENV_074	VV	PC	2018	16.0	662 778.9	2 724 866.1	662 769.4	2 724 868.5	
21/06/2020	03:05:17	R2_ENV_075	VV	PC	2008	16.4	661 758.7	2 726 251.4	661 758.5	2 726 252.5	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
25/06/2020	17:01:03	R2_ENV_040	WP	YSI Exo2	2233	39.8	640 038.6	2 703 076.4	640 036.5	2 703 076.0	
16/06/2020	18:11:36	R2_ENV_076	VV	NS	1761	16.3	662 734.6	2 726 984.6	662 735.3	2 726 985.0	
16/06/2020	18:24:56	R2_ENV_076	VV	PC	1762	16.4	662 734.6	2 726 984.6	662 735.3	2 726 974.4	
25/06/2020	18:00:24	R2_ENV_039	WS	BOT	2236	38.5	639 675.4	2 701 745.9	639 675.4	2 701 745.5	
25/06/2020	18:11:34	R2_ENV_039	WS	MID	2237	38.5	639 675.4	2 701 745.9	639 676.6	2 701 744.4	
25/06/2020	18:18:52	R2_ENV_039	WS	TOP	2238	38.6	639 675.4	2 701 745.9	639 677.9	2 701 745.0	
25/06/2020	18:30:14	R2_ENV_039	WP	YSI Exo2	2239	38.5	639 675.4	2 701 745.9	639 673.3	2 701 745.3	
16/06/2020	19:55:49	R2_ENV_077	VV	PC	1767	17.3	663 710.6	2 727 717.8	663 710.0	2 727 716.0	
16/06/2020	21:50:32	R2_ENV_078	VV	PC	1775	16.2	662 690.3	2 729 103.1	662 690.9	2 729 103.7	
16/06/2020	23:01:39	R2_ENV_079	VV	PC	1777	18.3	663 666.3	2 729 836.3	663 664.0	2 729 836.9	
25/06/2020	19:58:24	R2_ENV_038	WS	BOT	2243	37.4	641 392.7	2 701 851.3	641 394.5	2 701 850.4	
25/06/2020	20:06:01	R2_ENV_038	WS	MID	2244	37.4	641 392.7	2 701 851.3	641 392.7	2 701 850.0	
25/06/2020	20:13:35	R2_ENV_038	WS	TOP	2245	37.3	641 392.7	2 701 851.3	641 394.2	2 701 848.2	
25/06/2020	20:26:28	R2_ENV_038	WP	YSI Exo2	2246	37.1	641 392.7	2 701 851.3	641 393.6	2 701 852.1	
25/06/2020	21:11:21	R2_ENV_037	WS	BOT	2247	33.0	640 935.4	2 700 192.7	640 935.2	2 700 192.8	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
25/06/2020	21:20:05	R2_ENV_037	WS	MID	2248	33.0	640 935.4	2 700 192.7	640 934.4	2 700 192.9	
25/06/2020	21:26:20	R2_ENV_037	WS	TOP	2249	33.0	640 935.4	2 700 192.7	640 935.7	2 700 193.8	
17/06/2020	02:51:19	R2_ENV_080	VV	PC	1784	17.6	664 642.2	2 730 569.5	664 643.9	2 730 570.7	
25/06/2020	21:55:46	R2_ENV_037	WP	YSI Exo2	2251	32.9	640 935.4	2 700 192.7	640 935.9	2 700 193.9	
17/06/2020	04:41:52	R2_ENV_081	VV	PC	1792	22.3	663 622.0	2 731 954.8	663 622.3	2 731 955.7	
25/06/2020	22:46:54	SO_R2_005	VV	SOIL	2253	31.3	642 109.0	2 699 857.1	642 106.9	2 699 855.5	
25/06/2020	23:03:03	R2_ENV_036	WS	BOT	2254	31.3	642 109.0	2 699 857.1	642 109.7	2 699 855.7	
25/06/2020	23:11:39	R2_ENV_036	WS	MID	2255	31.3	642 109.0	2 699 857.1	642 107.9	2 699 856.4	
25/06/2020	23:18:23	R2_ENV_036	WS	TOP	2256	31.3	642 109.0	2 699 857.1	642 109.7	2 699 855.5	
25/06/2020	23:31:05	R2_ENV_036	WP	YSI Exo2	2257	31.2	642 109.0	2 699 857.1	642 107.0	2 699 859.9	
26/06/2020	00:20:30	R2_ENV_035	WS	BOT	2258	29.7	642 195.4	2 698 639.5	642 196.4	2 698 640.1	
26/06/2020	00:27:45	R2_ENV_035	WS	MID	2259	29.8	642 195.4	2 698 639.5	642 196.8	2 698 640.9	
26/06/2020	00:34:43	R2_ENV_035	WS	TOP	2260	29.7	642 195.4	2 698 639.5	642 196.6	2 698 640.6	
19/06/2020	12:55:09	R2_ENV_082	VV	PC	1793	16.1	664 597.9	2 732 688.0	664 596.2	2 732 687.7	
19/06/2020	14:29:44	R2_ENV_083	VV	PC	1798	22.9	665 573.9	2 733 421.1	665 573.0	2 733 421.2	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
19/06/2020	15:49:08	R2_ENV_084	VV	PC	1803	27.6	664 553.6	2 734 806.5	664 552.8	2 734 807.0	
26/06/2020	01:19:38	R2_ENV_035	WP	YSI Exo2	2264	29.4	642 195.4	2 698 639.5	642 197.9	2 698 642.6	
26/06/2020	02:51:43	R2_ENV_045	WS	BOT	2265	31.7	640 293.4	2 708 118.7	640 278.7	2 708 040.0	
26/06/2020	02:57:31	R2_ENV_045	WP	YSI Exo2	2266	32.6	640 293.4	2 708 118.7	640 281.0	2 708 039.0	
26/06/2020	03:01:28	R2_ENV_045	WS	MID	2267	32.3	640 293.4	2 708 118.7	640 279.1	2 708 041.4	
26/06/2020	03:07:51	R2_ENV_045	WS	TOP	2268	30.2	640 293.4	2 708 118.7	640 277.9	2 708 042.4	
19/06/2020	17:56:38	R2_ENV_085	VV	NS	1812	18.1	665 529.6	2 735 539.6	665 530.9	2 735 542.6	
26/06/2020	03:47:56	SO_R2_006	VV	SOIL	2270	36.6	641 479.8	2 706 872.8	641 478.6	2 706 874.9	
19/06/2020	18:03:28	R2_ENV_085	VV	PC	1813	18.3	665 529.6	2 735 539.6	665 531.0	2 735 547.9	
26/06/2020	04:12:18	R2_ENV_044	WS	BOT	2272	36.5	641 479.8	2 706 872.8	641 480.0	2 706 873.3	
26/06/2020	04:20:06	R2_ENV_044	WS	MID	2273	36.5	641 479.8	2 706 872.8	641 479.0	2 706 872.8	
26/06/2020	04:27:47	R2_ENV_044	WP	YSI Exo2	2274	36.6	641 479.8	2 706 872.8	641 480.3	2 706 871.9	
26/06/2020	04:28:08	R2_ENV_044	WS	TOP	2275	36.6	641 479.8	2 706 872.8	641 477.5	2 706 874.1	
26/06/2020	05:10:49	R2_ENV_043	WS	BOT	2276	28.2	640 603.9	2 706 022.6	640 604.4	2 706 024.1	
26/06/2020	05:13:39	R2_ENV_043	WP	YSI Exo2	2277	28.2	640 603.9	2 706 022.6	640 602.2	2 706 022.6	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
26/06/2020	05:18:55	R2_ENV_043	WS	MID	2278	28.1	640 603.9	2 706 022.6	640 604.7	2 706 022.6	
26/06/2020	05:25:23	R2_ENV_043	WS	TOP	2279	28.1	640 603.9	2 706 022.6	640 605.0	2 706 022.6	
19/06/2020	19:12:12	R2_ENV_086	VV	PC	1815	18.1	666 505.5	2 736 272.8	666 502.7	2 736 271.9	
19/06/2020	21:04:14	R2_ENV_087	VV	NS	1823	17.6	665 485.3	2 737 658.1	665 482.3	2 737 658.0	
26/06/2020	06:26:48	R2_ENV_042	WS	BOT	2282	38.0	639 728.0	2 705 172.5	639 728.2	2 705 172.5	
26/06/2020	06:33:53	R2_ENV_042	WS	MID	2283	38.0	639 728.0	2 705 172.5	639 727.9	2 705 172.4	
26/06/2020	06:37:54	R2_ENV_042	WP	YSI Exo2	2284	38.0	639 728.0	2 705 172.5	639 726.9	2 705 170.9	
26/06/2020	06:39:34	R2_ENV_042	WS	TOP	2285	38.0	639 728.0	2 705 172.5	639 727.7	2 705 173.1	
26/06/2020	07:20:29	R2_TR03	Video	SOL	2286	36.0	639 750.9	2 704 945.1	639 754.4	2 704 942.7	
26/06/2020	07:20:52	R2_TR03	Still	R2_TR03_001	2287	35.5	-	-	639 750.6	2 704 942.7	
26/06/2020	07:21:07	R2_TR03	Still	R2_TR03_002	2288	35.7	-	-	639 747.9	2 704 943.0	
26/06/2020	07:21:43	R2_TR03	Still	R2_TR03_003	2289	36.4	-	-	639 742.3	2 704 944.0	
26/06/2020	07:21:57	R2_TR03	Still	R2_TR03_004	2290	36.4	-	-	639 739.7	2 704 944.4	
26/06/2020	07:22:43	R2_TR03	Still	R2_TR03_005	2291	36.5	-	-	639 731.4	2 704 946.2	
26/06/2020	07:23:32	R2_TR03	Still	R2_TR03_006	2292	37.1	-	-	639 721.9	2 704 945.8	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
26/06/2020	07:23:58	R2_TR03	Still	R2_TR03_007	2293	37.1	-	-	639 716.9	2 704 947.6	
26/06/2020	07:24:12	R2_TR03	Still	R2_TR03_008	2294	37.0	-	-	639 713.9	2 704 947.6	
26/06/2020	07:24:49	R2_TR03	Still	R2_TR03_009	2295	37.3	-	-	639 706.1	2 704 948.1	
26/06/2020	07:25:14	R2_TR03	Still	R2_TR03_010	2296	36.8	-	-	639 700.7	2 704 949.6	
26/06/2020	07:25:46	R2_TR03	Still	R2_TR03_011	2297	36.7	-	-	639 695.0	2 704 949.3	
26/06/2020	07:26:02	R2_TR03	Still	R2_TR03_012	2298	36.0	-	-	639 692.5	2 704 951.2	
26/06/2020	07:26:34	R2_TR03	Still	R2_TR03_013	2299	35.6	-	-	639 686.7	2 704 952.6	
26/06/2020	07:27:02	R2_TR03	Still	R2_TR03_014	2300	36.0	-	-	639 681.8	2 704 952.2	
26/06/2020	07:27:03	R2_TR03	Still	R2_TR03_015	-	36.0	-	-	639 681.6	2 704 952.2	
26/06/2020	07:27:33	R2_TR03	Still	R2_TR03_016	2301	36.7	-	-	639 675.9	2 704 951.8	
26/06/2020	07:27:50	R2_TR03	Still	R2_TR03_017	2302	36.7	-	-	639 672.3	2 704 951.7	
26/06/2020	07:28:08	R2_TR03	Still	R2_TR03_018	2303	36.8	-	-	639 668.7	2 704 951.8	
26/06/2020	07:28:27	R2_TR03	Still	R2_TR03_019	2304	36.7	-	-	639 664.6	2 704 952.2	
26/06/2020	07:28:33	R2_TR03	Still	R2_TR03_020	-	36.7	-	-	639 663.9	2 704 952.6	
26/06/2020	07:28:35	R2_TR03	Still	R2_TR03_021	2305	36.6	-	-	639 663.4	2 704 952.8	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
26/06/2020	07:29:06	R2_TR03	Still	R2_TR03_022	2306	36.2	-	-	639 655.3	2 704 954.6	
26/06/2020	07:29:37	R2_TR03	Still	R2_TR03_023	2307	35.7	-	-	639 648.6	2 704 955.1	
26/06/2020	07:30:03	R2_TR03	Still	R2_TR03_024	2308	34.4	-	-	639 642.8	2 704 955.9	
26/06/2020	07:30:38	R2_TR03	Still	R2_TR03_025	2309	34.4	-	-	639 636.1	2 704 957.7	
26/06/2020	07:31:13	R2_TR03	Still	R2_TR03_026	2310	35.0	-	-	639 630.2	2 704 959.0	
26/06/2020	07:31:34	R2_TR03	Still	R2_TR03_027	2311	35.3	-	-	639 626.2	2 704 959.3	
26/06/2020	07:31:59	R2_TR03	Still	R2_TR03_028	2312	36.2	-	-	639 620.5	2 704 958.9	
26/06/2020	07:32:19	R2_TR03	Still	R2_TR03_029	2313	36.5	-	-	639 615.8	2 704 959.0	
26/06/2020	07:32:58	R2_TR03	Video	EOL	2314	37.1	639 609.2	2 704 961.4	639 605.5	2 704 959.6	
26/06/2020	08:42:22	R2_ENV_034	WP	YSI Exo2	2315	20.8	643 386.7	2 698 313.9	643 388.8	2 698 314.5	
26/06/2020	08:43:08	R2_ENV_034	WS	BOT	2316	20.8	643 386.7	2 698 313.9	643 386.3	2 698 312.8	
26/06/2020	08:50:56	R2_ENV_034	WS	MID	2317	20.9	643 386.7	2 698 313.9	643 386.1	2 698 312.7	
26/06/2020	08:56:19	R2_ENV_034	WS	TOP	2318	20.8	643 386.7	2 698 313.9	643 386.7	2 698 313.8	
19/06/2020	21:16:59	R2_ENV_087	VV	PC	1824	18.0	665 485.3	2 737 658.1	665 485.1	2 737 658.4	
19/06/2020	22:10:59	R2_ENV_088	VV	NS	1826	18.7	666 461.2	2 738 391.3	666 461.8	2 738 391.0	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
19/06/2020	22:21:58	R2_ENV_088	VV	NS	1827	18.7	666 461.2	2 738 391.3	666 461.1	2 738 383.9	
19/06/2020	22:25:59	R2_ENV_088	VV	NS	1828	18.8	666 461.2	2 738 391.3	666 459.4	2 738 400.9	
19/06/2020	23:42:23	R2_ENV_089	VV	NS	1833	15.3	667 391.1	2 738 983.6	667 391.0	2 738 984.6	
26/06/2020	10:21:58	R2_ENV_033	WP	YSI Exo2	2324	20.7	644 542.6	2 697 968.3	644 543.8	2 697 969.6	
26/06/2020	10:22:07	R2_ENV_033	WS	BOT	2325	20.7	644 542.6	2 697 968.3	644 541.8	2 697 968.3	
26/06/2020	10:29:14	R2_ENV_033	WS	MID	2326	20.7	644 542.6	2 697 968.3	644 541.2	2 697 969.5	
26/06/2020	10:35:13	R2_ENV_033	WS	TOP	2327	20.9	644 542.6	2 697 968.3	644 541.7	2 697 968.9	
26/06/2020	11:11:35	R2_ENV_032	WS	BOT	2328	20.1	644 085.4	2 696 309.7	644 085.2	2 696 309.8	
26/06/2020	11:12:54	R2_ENV_032	WP	NS	2329	20.3	644 085.4	2 696 309.7	644 086.7	2 696 309.3	
26/06/2020	11:19:00	R2_ENV_032	WS	MID	2330	20.4	644 085.4	2 696 309.7	644 084.2	2 696 309.4	
26/06/2020	11:27:49	R2_ENV_032	WS	TOP	2331	20.5	644 085.4	2 696 309.7	644 082.2	2 696 309.6	
26/06/2020	11:36:08	R2_ENV_032	WP	YSI Exo2	2332	20.2	644 085.4	2 696 309.7	644 087.7	2 696 309.9	
19/06/2020	23:51:23	R2_ENV_089	VV	NS	1834	14.6	667 391.1	2 738 983.6	667 390.8	2 738 974.6	
19/06/2020	23:55:55	R2_ENV_089	VV	NS	1835	14.8	667 391.1	2 738 983.6	667 389.7	2 738 993.8	
20/06/2020	00:58:08	R2_ENV_090	VV	NS	1840	14.2	666 669.0	2 740 557.1	666 668.4	2 740 558.1	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
20/06/2020	01:07:29	R2_ENV_090	VV	NS	1841	14.1	666 669.0	2 740 557.1	666 665.4	2 740 566.4	
26/06/2020	12:49:38	R2_ENV_031	WS	BOT	2337	33.2	645 259.0	2 695 974.1	645 258.8	2 695 973.6	
26/06/2020	12:56:53	R2_ENV_031	WP	YSI Exo2	2338	33.3	645 259.0	2 695 974.1	645 260.1	2 695 973.0	
26/06/2020	12:58:47	R2_ENV_031	WS	MID	2339	33.5	645 259.0	2 695 974.1	645 255.1	2 695 974.1	
26/06/2020	13:09:03	R2_ENV_031	WS	TOP	2340	33.3	645 259.0	2 695 974.1	645 257.5	2 695 973.6	
20/06/2020	01:11:40	R2_ENV_090	VV	NS	1842	14.2	666 669.0	2 740 557.1	666 673.2	2 740 549.1	
26/06/2020	15:38:23	R2_ENV_030	WS	BOT	2342	27.8	646 432.6	2 695 638.5	646 430.5	2 695 635.1	
26/06/2020	15:45:53	R2_ENV_030	WS	MID	2343	27.6	646 432.6	2 695 638.5	646 432.2	2 695 636.7	
26/06/2020	15:53:15	R2_ENV_030	WS	TOP	2344	27.8	646 432.6	2 695 638.5	646 429.1	2 695 636.5	
26/06/2020	16:19:31	R2_ENV_030	WP	YSI Exo2	2345	27.9	646 432.6	2 695 638.5	646 433.8	2 695 639.5	
26/06/2020	17:01:46	R2_ENV_029	WS	BOT	2346	25.9	645 975.3	2 693 979.9	645 974.5	2 693 977.3	
26/06/2020	17:09:37	R2_ENV_029	WS	MID	2347	25.8	645 975.3	2 693 979.9	645 975.1	2 693 976.7	
26/06/2020	17:18:04	R2_ENV_029	WS	TOP	2348	25.9	645 975.3	2 693 979.9	645 973.3	2 693 977.3	
20/06/2020	03:11:41	R2_ENV_091	VV	NS	1851	14.7	667 775.7	2 741 071.9	667 776.0	2 741 073.0	
26/06/2020	17:56:15	R2_ENV_029	WP	YSI Exo2	2351	26.1	645 975.3	2 693 979.9	645 976.2	2 693 977.0	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
20/06/2020	03:14:47	R2_ENV_091	VV	NS	1852	14.7	667 775.7	2 741 071.9	667 774.6	2 741 072.6	
20/06/2020	03:27:18	R2_ENV_091	VV	NS	1853	14.6	667 775.7	2 741 071.9	667 783.4	2 741 076.7	
20/06/2020	03:58:34	R2_ENV_092	VV	NS	1855	13.2	668 882.5	2 741 586.7	668 882.2	2 741 589.0	
26/06/2020	19:09:42	SO_R2_004	VV	SOIL	2355	30.9	647 149.0	2 693 644.3	647 148.6	2 693 644.4	
20/06/2020	04:01:23	R2_ENV_092	VV	NS	1856	13.1	668 882.5	2 741 586.7	668 874.1	2 741 586.8	
20/06/2020	04:05:30	R2_ENV_092	VV	NS	1857	13.1	668 882.5	2 741 586.7	668 890.7	2 741 591.0	
26/06/2020	19:41:40	R2_ENV_028	WS	BOT	2358	31.0	647 149.0	2 693 644.3	647 149.9	2 693 645.0	
26/06/2020	19:50:23	R2_ENV_028	WS	MID	2359	31.0	647 149.0	2 693 644.3	647 148.8	2 693 644.6	
26/06/2020	19:56:53	R2_ENV_028	WS	TOP	2360	31.1	647 149.0	2 693 644.3	647 150.0	2 693 643.3	
26/06/2020	20:09:07	R2_ENV_028	WP	YSI Exo2	2361	30.9	647 149.0	2 693 644.3	647 151.5	2 693 642.8	
20/06/2020	05:36:38	R2_ENV_093	VV	NS	1866	15.7	668 171.9	2 743 153.5	668 172.2	2 743 152.7	
20/06/2020	05:52:48	R2_ENV_093	VV	NS	1868	15.8	668 171.9	2 743 153.5	668 180.5	2 743 155.0	
26/06/2020	21:08:40	R2_ENV_027	WS	BOT	2364	30.2	648 322.6	2 693 308.7	648 323.0	2 693 308.4	
26/06/2020	21:16:27	R2_ENV_027	WS	MID	2365	30.3	648 322.6	2 693 308.7	648 322.8	2 693 308.7	
26/06/2020	21:25:45	R2_ENV_027	WS	TOP	2366	30.3	648 322.6	2 693 308.7	648 322.6	2 693 308.4	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
26/06/2020	21:38:37	R2_ENV_027	WP	YSI Exo2	2367	30.1	648 322.6	2 693 308.7	648 324.1	2 693 310.2	
26/06/2020	22:17:22	R2_ENV_026	WS	BOT	2368	27.1	647 865.3	2 691 650.1	647 867.3	2 691 650.3	
26/06/2020	22:24:07	R2_ENV_026	WS	MID	2369	27.2	647 865.3	2 691 650.1	647 864.7	2 691 648.9	
26/06/2020	22:30:31	R2_ENV_026	WS	TOP	2370	27.1	647 865.3	2 691 650.1	647 864.9	2 691 649.2	
20/06/2020	05:43:33	R2_ENV_093	VV	Partial Sample	1867	15.7	668 171.9	2 743 153.5	668 162.6	2 743 153.2	HC and HM
20/06/2020	11:25:32	R2_ENV_094	VV	NS	1931	18.2	669 278.7	2 743 668.3	669 278.5	2 743 670.1	
20/06/2020	11:29:09	R2_ENV_094	VV	NS	1932	18.0	669 278.7	2 743 668.3	669 272.4	2 743 660.3	
20/06/2020	11:33:38	R2_ENV_094	VV	NS	1933	18.4	669 278.7	2 743 668.3	669 282.9	2 743 676.0	
26/06/2020	23:03:27	R2_ENV_026	WP	YSI Exo2	2375	27.1	647 865.3	2 691 650.1	647 867.4	2 691 651.6	
20/06/2020	12:01:24	R2_ENV_095	VV	NS	1934	15.6	670 385.5	2 744 183.1	670 337.0	2 744 095.0	
26/06/2020	23:50:54	R2_ENV_025	WS	BOT	2377	20.9	649 038.9	2 691 314.5	649 039.5	2 691 314.0	
26/06/2020	23:58:04	R2_ENV_025	WS	MID	2378	20.9	649 038.9	2 691 314.5	649 038.5	2 691 314.0	
27/06/2020	00:04:26	R2_ENV_025	WS	TOP	2379	20.9	649 038.9	2 691 314.5	649 038.5	2 691 315.2	
27/06/2020	00:19:46	R2_ENV_025	WP	YSI Exo2	2380	20.7	649 038.9	2 691 314.5	649 038.6	2 691 316.8	
20/06/2020	12:07:10	R2_ENV_095	VV	NS	1935	15.5	670 385.5	2 744 183.1	670 337.8	2 744 084.8	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
27/06/2020	01:13:25	R2_ENV_024	WS	BOT	2382	16.6	650 212.5	2 690 978.9	650 211.5	2 690 980.0	
27/06/2020	01:21:45	R2_ENV_024	WS	MID	2383	16.6	650 212.5	2 690 978.9	650 211.8	2 690 979.3	
27/06/2020	01:29:07	R2_ENV_024	WS	TOP	2384	16.5	650 212.5	2 690 978.9	650 213.5	2 690 978.4	
27/06/2020	01:40:14	R2_ENV_024	WP	YSI Exo2	2385	16.6	650 212.5	2 690 978.9	650 213.1	2 690 979.4	
27/06/2020	02:47:41	R2_ENV_023	WS	BOT	2386	17.4	649 755.3	2 689 320.3	649 755.2	2 689 319.9	
27/06/2020	02:50:56	R2_ENV_023	WP	YSI Exo2	2387	17.4	649 755.3	2 689 320.3	649 755.4	2 689 318.3	
27/06/2020	02:54:43	R2_ENV_023	WS	MID	2388	17.4	649 755.3	2 689 320.3	649 753.6	2 689 322.5	
27/06/2020	03:01:31	R2_ENV_023	WS	TOP	2389	17.3	649 755.3	2 689 320.3	649 755.6	2 689 321.7	
20/06/2020	12:16:19	R2_ENV_095	VV	NS	1936	15.5	670 385.5	2 744 183.1	670 346.7	2 744 101.3	
20/06/2020	13:36:30	R2_ENV_096	VV	NS	1945	17.0	669 674.8	2 745 749.9	669 674.1	2 745 750.5	
20/06/2020	13:39:52	R2_ENV_096	VV	PC	1946	17.1	669 674.8	2 745 749.9	669 668.6	2 745 741.8	
20/06/2020	14:31:21	R2_ENV_097	VV	NS	1947	17.2	670 781.6	2 746 264.7	670 779.3	2 746 265.7	
27/06/2020	04:38:51	R2_ENV_015	WS	BOT	2394	19.4	652 194.8	2 682 409.0	652 194.8	2 682 412.6	
27/06/2020	04:45:28	R2_ENV_015	WS	MID	2395	19.4	652 194.8	2 682 409.0	652 196.7	2 682 410.1	
27/06/2020	04:53:30	R2_ENV_015	WP	YSI Exo2	2396	19.3	652 194.8	2 682 409.0	652 191.7	2 682 410.1	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
27/06/2020	04:54:25	R2_ENV_015	WS	TOP	2397	19.3	652 194.8	2 682 409.0	652 194.7	2 682 411.6	
27/06/2020	05:34:51	R2_ENV_013	WS	BOT	2398	16.8	651 202.0	2 680 611.0	651 204.3	2 680 611.8	
27/06/2020	05:38:32	R2_ENV_013	WP	YSI Exo2	2399	16.9	651 202.0	2 680 611.0	651 199.7	2 680 608.4	
27/06/2020	05:41:54	R2_ENV_013	WS	MID	2400	16.7	651 202.0	2 680 611.0	651 205.3	2 680 610.9	
27/06/2020	05:48:53	R2_ENV_013	WS	TOP	2401	16.8	651 202.0	2 680 611.0	651 204.2	2 680 610.2	
20/06/2020	14:37:08	R2_ENV_097	VV	Partial Sample	1948	17.3	670 781.6	2 746 264.7	670 771.3	2 746 266.3	HC
20/06/2020	14:41:57	R2_ENV_097	VV	Partial Sample	1949	17.2	670 781.6	2 746 264.7	670 788.8	2 746 264.8	HM and PSD
20/06/2020	16:37:53	R2_ENV_098	VV	NS	1957	17.1	671 888.4	2 746 779.5	671 888.4	2 746 781.3	
27/06/2020	06:58:17	R2_TR01	Video	SOL	2405	13.4	651 886.5	2 680 253.9	651 889.2	2 680 252.0	
27/06/2020	06:58:52	R2_TR01	Still	R2_TR01_001	2406	13.4	-	-	651 882.0	2 680 253.5	
27/06/2020	06:59:42	R2_TR01	Still	R2_TR01_002	2407	13.5	-	-	651 868.9	2 680 255.5	
27/06/2020	07:00:16	R2_TR01	Still	R2_TR01_003	2408	13.5	-	-	651 859.7	2 680 256.4	
27/06/2020	07:01:19	R2_TR01	Still	R2_TR01_004	2409	13.6	-	-	651 844.8	2 680 258.8	
27/06/2020	07:01:39	R2_TR01	Still	R2_TR01_005	2410	13.6	-	-	651 840.3	2 680 259.2	
27/06/2020	07:02:02	R2_TR01	Still	R2_TR01_006	2411	13.6	-	-	651 836.4	2 680 260.2	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
27/06/2020	07:02:44	R2_TR01	Still	R2_TR01_007	2412	13.6	-	-	651 829.4	2 680 263.5	
27/06/2020	07:03:04	R2_TR01	Still	R2_TR01_008	2413	13.6	-	-	651 825.5	2 680 264.0	
27/06/2020	07:03:45	R2_TR01	Still	R2_TR01_009	2414	13.7	-	-	651 816.4	2 680 262.9	
27/06/2020	07:04:15	R2_TR01	Still	R2_TR01_010	2415	13.7	-	-	651 810.2	2 680 263.2	
27/06/2020	07:04:48	R2_TR01	Still	R2_TR01_011	2416	13.8	-	-	651 804.5	2 680 265.5	
27/06/2020	07:05:45	R2_TR01	Still	R2_TR01_012	2417	13.8	-	-	651 794.5	2 680 268.4	
27/06/2020	07:06:15	R2_TR01	Still	R2_TR01_013	2418	13.9	-	-	651 787.3	2 680 269.4	
27/06/2020	07:07:02	R2_TR01	Still	R2_TR01_014	2419	13.9	-	-	651 776.9	2 680 270.3	
27/06/2020	07:07:12	R2_TR01	Still	R2_TR01_015	2420	13.9	-	-	651 774.2	2 680 270.6	
27/06/2020	07:08:08	R2_TR01	Video	EOL	2421	14.0	651 764.8	2 680 273.5	651 761.8	2 680 274.5	
27/06/2020	08:10:15	R2_ENV_012	WS	BOT	2422	12.9	651 726.6	2 679 445.7	651 726.9	2 679 445.9	
27/06/2020	08:13:09	R2_ENV_012	WP	YSI Exo2	2423	12.9	651 726.6	2 679 445.7	651 728.4	2 679 443.6	
27/06/2020	08:17:37	R2_ENV_012	WS	MID	2424	12.9	651 726.6	2 679 445.7	651 726.5	2 679 444.9	
27/06/2020	08:25:14	R2_ENV_012	WS	TOP	2425	12.9	651 726.6	2 679 445.7	651 728.0	2 679 446.4	
20/06/2020	16:48:12	R2_ENV_098	VV	NS	1958	17.0	671 888.4	2 746 779.5	671 890.2	2 746 787.8	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
27/06/2020	08:44:26	SO_R2_002	VV	SOIL	2427	12.9	651 726.6	2 679 445.7	651 727.0	2 679 448.3	
20/06/2020	16:53:07	R2_ENV_098	VV	NS	1959	17.1	671 888.4	2 746 779.5	671 887.6	2 746 771.5	
27/06/2020	09:32:31	R2_ENV_011	WS	BOT	2429	13.6	650 187.6	2 678 676.5	650 188.1	2 678 678.6	
27/06/2020	09:39:33	R2_ENV_011	WS	MID	2430	13.5	650 187.6	2 678 676.5	650 188.0	2 678 677.5	
27/06/2020	09:46:08	R2_ENV_011	WS	TOP	2431	13.5	650 187.6	2 678 676.5	650 186.9	2 678 676.4	
27/06/2020	09:48:07	R2_ENV_011	WP	NS	2432	13.6	650 187.6	2 678 676.5	650 189.7	2 678 676.8	
27/06/2020	10:30:35	R2_ENV_010	WS	BOT	2433	12.6	651 602.0	2 677 804.5	651 601.6	2 677 805.2	
27/06/2020	10:35:19	R2_ENV_010	WP	YSI Exo2	2434	12.7	651 602.0	2 677 804.5	651 603.5	2 677 804.0	
27/06/2020	10:38:57	R2_ENV_010	WS	MID	2435	12.7	651 602.0	2 677 804.5	651 599.8	2 677 804.7	
27/06/2020	10:45:44	R2_ENV_010	WS	TOP	2436	12.5	651 602.0	2 677 804.5	651 601.4	2 677 804.6	
20/06/2020	17:37:35	R2_ENV_099	VV	NS	1961	16.2	671 177.7	2 748 346.3	671 175.8	2 748 347.8	
20/06/2020	17:41:17	R2_ENV_099	VV	NS	1962	16.2	671 177.7	2 748 346.3	671 177.4	2 748 354.4	
20/06/2020	17:46:05	R2_ENV_099	VV	NS	1963	16.1	671 177.7	2 748 346.3	671 176.9	2 748 338.7	
27/06/2020	11:59:05	R2_ENV_009	WS	BOT	2440	13.1	651 356.4	2 676 661.7	651 356.3	2 676 660.5	
27/06/2020	12:09:03	R2_ENV_009	WS	MID	2441	13.1	651 356.4	2 676 661.7	651 356.2	2 676 661.9	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
27/06/2020	12:10:08	R2_ENV_009	WP	YSI Exo2	2442	13.1	651 356.4	2 676 661.7	651 359.2	2 676 661.1	
27/06/2020	12:17:15	R2_ENV_009	WS	TOP	2443	13.1	651 356.4	2 676 661.7	651 355.5	2 676 661.7	
27/06/2020	12:53:00	R2_ENV_011	WP	YSI Exo2	2444	13.6	650 187.6	2 678 676.5	650 188.7	2 678 677.5	
27/06/2020	13:29:04	R2_ENV_014	WS	BOT	2445	18.7	650 655.9	2 681 639.7	650 656.3	2 681 639.9	
27/06/2020	13:30:43	R2_ENV_014	WP	YSI Exo2	2446	18.7	650 655.9	2 681 639.7	650 659.1	2 681 639.2	
27/06/2020	13:34:56	R2_ENV_014	WS	MID	2447	18.6	650 655.9	2 681 639.7	650 655.6	2 681 641.4	
27/06/2020	13:40:50	R2_ENV_014	WS	TOP	2448	18.7	650 655.9	2 681 639.7	650 653.3	2 681 639.5	
20/06/2020	19:36:34	R2_ENV_100	VV	NS	1971	15.7	672 284.5	2 748 861.1	672 284.5	2 748 861.6	
20/06/2020	19:41:49	R2_ENV_100	VV	NS	1972	15.8	672 284.5	2 748 861.1	672 282.4	2 748 870.3	
27/06/2020	14:46:34	R2_ENV_016	WS	BOT	2451	21.2	651 659.4	2 683 506.0	651 659.6	2 683 505.5	
27/06/2020	14:54:21	R2_ENV_016	WS	MID	2452	21.2	651 659.4	2 683 506.0	651 659.4	2 683 504.9	
27/06/2020	15:01:51	R2_ENV_016	WS	TOP	2453	21.2	651 659.4	2 683 506.0	651 659.5	2 683 504.6	
27/06/2020	15:25:51	R2_ENV_016	WP	YSI Exo2	2454	20.8	651 659.4	2 683 506.0	651 660.9	2 683 504.7	Data not accepted
27/06/2020	15:58:22	R2_ENV_016	WP	YSI Exo2	2455	20.9	651 659.4	2 683 506.0	651 660.5	2 683 503.9	
27/06/2020	16:35:06	R2_ENV_017	WS	BOT	2456	23.0	651 124.1	2 684 603.0	651 123.5	2 684 601.1	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East

Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
27/06/2020	16:41:58	R2_ENV_017	WS	MID	2457	23.0	651 124.1	2 684 603.0	651 123.0	2 684 601.3	
27/06/2020	16:48:40	R2_ENV_017	WS	TOP	2458	23.0	651 124.1	2 684 603.0	651 122.2	2 684 601.6	
20/06/2020	19:46:34	R2_ENV_100	VV	NS	1973	15.8	672 284.5	2 748 861.1	672 284.3	2 748 851.6	
27/06/2020	17:16:51	R2_ENV_017	WP	YSI Exo2	2460	23.0	651 124.1	2 684 603.0	651 125.2	2 684 601.8	
28/06/2020	08:57:51	R2_ENV_101	VV	NS	2515	14.6	673 391.3	2 749 375.9	673 390.2	2 749 375.9	
27/06/2020	18:11:44	R2_ENV_018	WS	BOT	2462	25.2	652 663.0	2 685 372.2	652 662.5	2 685 371.9	
27/06/2020	18:21:05	R2_ENV_018	WS	MID	2463	25.2	652 663.0	2 685 372.2	652 662.5	2 685 372.0	
27/06/2020	18:27:47	R2_ENV_018	WS	TOP	2464	25.3	652 663.0	2 685 372.2	652 663.0	2 685 372.4	
27/06/2020	18:42:30	R2_ENV_018	WP	YSI Exo2	2465	25.3	652 663.0	2 685 372.2	652 664.3	2 685 370.2	
27/06/2020	19:41:27	R2_ENV_019	WS	BOT	2466	19.6	652 127.7	2 686 469.2	652 126.5	2 686 468.6	
27/06/2020	19:49:25	R2_ENV_019	WS	MID	2467	19.5	652 127.7	2 686 469.2	652 127.2	2 686 470.3	
27/06/2020	19:58:16	R2_ENV_019	WS	TOP	2468	19.5	652 127.7	2 686 469.2	652 127.7	2 686 469.4	
28/06/2020	09:04:07	R2_ENV_101	VV	NS	2516	14.7	673 391.3	2 749 375.9	673 399.5	2 749 369.9	
27/06/2020	20:29:04	R2_ENV_019	WP	YSI Exo2	2470	19.5	652 127.7	2 686 469.2	652 125.8	2 686 468.5	
28/06/2020	09:08:41	R2_ENV_101	VV	NS	2517	14.6	673 391.3	2 749 375.9	673 383.5	2 749 379.9	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East

Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
27/06/2020	21:18:20	SO_R2_003	VV	SOIL	2472	17.8	651 524.8	2 687 139.0	651 526.6	2 687 141.9	
27/06/2020	21:34:49	R2_ENV_020	WS	BOT 1	2473	17.8	651 524.8	2 687 139.0	651 525.7	2 687 140.5	
27/06/2020	21:44:41	R2_ENV_020	WS	BOT 2	2474	17.7	651 524.8	2 687 139.0	651 526.2	2 687 139.1	
27/06/2020	21:49:27	R2_ENV_020	WS	MID	2475	17.7	651 524.8	2 687 139.0	651 524.5	2 687 140.1	
27/06/2020	21:56:00	R2_ENV_020	WS	TOP	2476	17.8	651 524.8	2 687 139.0	651 524.5	2 687 140.9	
27/06/2020	22:10:07	R2_ENV_020	WP	YSI Exo2	2477	17.7	651 524.8	2 687 139.0	651 525.4	2 687 138.1	
27/06/2020	22:44:15	R2_ENV_021	WS	BOT	2478	20.1	652 102.5	2 688 649.1	652 102.2	2 688 650.9	
27/06/2020	22:51:08	R2_ENV_021	WS	MID	2479	19.9	652 102.5	2 688 649.1	652 102.3	2 688 649.3	
27/06/2020	22:58:13	R2_ENV_021	WS	TOP	2480	19.9	652 102.5	2 688 649.1	652 102.6	2 688 649.4	
20/06/2020	20:40:55	R2_ENV_102	VV	NS	1976	15.4	672 680.6	2 750 942.7	672 681.3	2 750 942.9	
20/06/2020	20:46:15	R2_ENV_102	VV	NS	1977	15.4	672 680.6	2 750 942.7	672 681.1	2 750 953.5	
27/06/2020	23:33:44	R2_ENV_021	WP	YSI Exo2	2483	19.6	652 102.5	2 688 649.1	652 102.2	2 688 650.1	
20/06/2020	20:50:06	R2_ENV_102	VV	Partial Sample	1978	15.4	672 680.6	2 750 942.7	672 682.8	2 750 934.0	PSD
28/06/2020	00:29:56	R2_ENV_022	WS	BOT	2485	23.9	650 928.9	2 688 984.7	650 928.4	2 688 984.3	
28/06/2020	00:38:48	R2_ENV_022	WS	MID	2486	23.9	650 928.9	2 688 984.7	650 928.2	2 688 985.1	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East

Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
28/06/2020	00:45:49	R2_ENV_022	WS	TOP	2487	23.8	650 928.9	2 688 984.7	650 928.4	2 688 984.6	
28/06/2020	00:58:30	R2_ENV_022	WP	YSI Exo2	2488	23.8	650 928.9	2 688 984.7	650 926.7	2 688 985.5	
28/06/2020	02:58:23	R2_TR02	Video	SOL	2489	15.9	651 352.6	2 688 488.8	651 353.5	2 688 485.9	
28/06/2020	02:58:58	R2_TR02	Still	R2_TR02_001	2490	16.0	-	-	651 349.6	2 688 491.5	
28/06/2020	02:59:08	R2_TR02	Still	R2_TR02_002	2491	16.0	-	-	651 348.7	2 688 493.4	
28/06/2020	02:59:44	R2_TR02	Still	R2_TR02_003	2492	16.1	-	-	651 343.0	2 688 500.0	
28/06/2020	03:00:07	R2_TR02	Still	R2_TR02_004	2493	16.1	-	-	651 339.4	2 688 503.9	
28/06/2020	03:00:54	R2_TR02	Still	R2_TR02_005	2494	16.4	-	-	651 338.8	2 688 504.4	
28/06/2020	03:01:17	R2_TR02	Still	R2_TR02_006	2495	16.4	-	-	651 330.9	2 688 510.7	
28/06/2020	03:01:52	R2_TR02	Still	R2_TR02_007	2496	16.6	-	-	651 327.8	2 688 515.3	
28/06/2020	03:02:01	R2_TR02	Still	R2_TR02_008	2497	16.6	-	-	651 321.9	2 688 522.4	
28/06/2020	03:02:34	R2_TR02	Still	R2_TR02_009	2498	16.8	-	-	651 320.3	2 688 523.7	
28/06/2020	03:02:42	R2_TR02	Still	R2_TR02_010	2499	16.9	-	-	651 315.4	2 688 529.8	
28/06/2020	03:02:51	R2_TR02	Still	R2_TR02_011	2500	16.8	-	-	651 312.3	2 688 530.7	
28/06/2020	03:03:53	R2_TR02	Still	R2_TR02_012	2501	17.2	-	-	651 303.7	2 688 538.7	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
28/06/2020	03:04:03	R2_TR02	Still	R2_TR02_013	2502	17.2	-	-	651 302.1	2 688 540.5	
28/06/2020	03:04:33	R2_TR02	Still	R2_TR02_014	2503	17.3	-	-	651 297.5	2 688 545.9	
28/06/2020	03:05:12	R2_TR02	Still	R2_TR02_015	2504	17.6	-	-	651 291.1	2 688 554.2	
28/06/2020	03:05:32	R2_TR02	Still	R2_TR02_016	2505	17.7	-	-	651 287.9	2 688 557.3	
28/06/2020	03:05:46	R2_TR02	Still	R2_TR02_017	2506	17.7	-	-	651 286.4	2 688 558.8	
28/06/2020	03:06:01	R2_TR02	Still	R2_TR02_018	2507	17.8	-	-	651 284.5	2 688 560.8	
28/06/2020	03:06:43	R2_TR02	Still	R2_TR02_019	2508	18.2	-	-	651 278.4	2 688 565.6	
28/06/2020	03:07:25	R2_TR02	Still	R2_TR02_020	2509	18.4	-	-	651 273.4	2 688 571.2	
28/06/2020	03:08:20	R2_TR02	Vid	EOL	2510	18.8	651 267.7	2 688 579.6	651 263.9	2 688 581.4	
28/06/2020	08:34:40	R2_ENV_101	WS	BOT	2511	14.8	673 391.3	2 749 375.9	673 391.6	2 749 375.7	
28/06/2020	08:37:57	R2_ENV_101	WP	YSI Exo2	2512	14.7	673 391.3	2 749 375.9	673 392.8	2 749 377.8	
28/06/2020	08:43:17	R2_ENV_101	WS	MID	2513	14.6	673 391.3	2 749 375.9	673 392.0	2 749 375.8	
28/06/2020	08:49:53	R2_ENV_101	WS	TOP	2514	14.6	673 391.3	2 749 375.9	673 390.2	2 749 374.5	
30/06/2020	12:10:21	R2_ENV_103	VV	PC	2805	17.3	673 787.4	2 751 457.5	673 967.7	2 751 925.3	
30/06/2020	10:35:24	R2_ENV_104	VV	NS	2793	16.4	674 894.2	2 751 972.3	674 892.7	2 751 973.8	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East

Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
30/06/2020	10:42:42	R2_ENV_104	VV	NS	2794	16.5	674 894.2	2 751 972.3	674 892.1	2 751 962.3	
28/06/2020	09:57:00	SO_R2_014	VV	SOIL	2518	17.0	675 686.4	2 756 135.5	675 685.5	2 756 134.8	
30/06/2020	10:46:59	R2_ENV_104	VV	NS	2795	16.6	674 894.2	2 751 972.3	674 891.0	2 751 980.6	
28/06/2020	20:07:00	R2_ENV_105	VV	Partial Sample	2557	16.8	674 183.5	2 753 539.1	674 181.4	2 753 538.2	
28/06/2020	20:12:18	R2_ENV_105	VV	Partial Sample	2558	16.7	674 183.5	2 753 539.1	674 182.0	2 753 529.9	
28/06/2020	10:30:34	R2_ENV_108	WS	BOT	2522	17.0	675 686.4	2 756 135.5	675 686.1	2 756 135.3	
28/06/2020	10:38:59	R2_ENV_108	WS	MID	2523	17.0	675 686.4	2 756 135.5	675 686.0	2 756 137.1	
28/06/2020	10:40:20	R2_ENV_108	WP	YSI Exo2	2524	17.0	675 686.4	2 756 135.5	675 687.6	2 756 135.9	
28/06/2020	10:46:05	R2_ENV_108	WS	TOP	2525	17.0	675 686.4	2 756 135.5	675 685.4	2 756 135.8	
28/06/2020	11:20:51	R2_ENV_109	WS	BOT	2526	17.3	676 793.2	2 756 650.3	676 793.1	2 756 649.3	
28/06/2020	11:23:14	R2_ENV_109	WP	YSI Exo2	2527	17.3	676 793.2	2 756 650.3	676 794.4	2 756 651.8	
28/06/2020	11:31:48	R2_ENV_109	WS	MID	2528	17.3	676 793.2	2 756 650.3	676 790.9	2 756 648.7	
28/06/2020	11:42:14	R2_ENV_109	WS	TOP	2529	17.4	676 793.2	2 756 650.3	676 792.1	2 756 647.0	
28/06/2020	20:17:34	R2_ENV_105	VV	Partial Sample	2559	16.7	674 183.5	2 753 539.1	674 180.5	2 753 548.8	
28/06/2020	21:09:59	R2_ENV_106	VV	PC	2561	17.3	675 290.3	2 754 053.9	675 290.1	2 754 054.0	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East

Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
28/06/2020	23:07:53	R2_ENV_107	VV	PC	2569	17.3	676 397.1	2 754 568.6	676 396.2	2 754 568.0	
28/06/2020	12:53:40	R2_ENV_110	WS	BOT	2533	17.5	677 900.0	2 757 165.0	677 899.5	2 757 166.4	
28/06/2020	13:05:11	R2_ENV_110	WP	YSI Exo2	2534	17.4	677 900.0	2 757 165.0	677 898.2	2 757 165.4	Data not accepted
28/06/2020	13:06:18	R2_ENV_110	WS	MID	2535	17.5	677 900.0	2 757 165.0	677 899.5	2 757 164.3	
28/06/2020	13:21:27	R2_ENV_110	WS	TOP	2536	17.6	677 900.0	2 757 165.0	677 897.9	2 757 165.5	
28/06/2020	13:31:12	R2_ENV_110	WP	YSI Exo2	2537	17.5	677 900.0	2 757 165.0	677 899.0	2 757 162.1	
28/06/2020	10:14:18	R2_ENV_108	VV	NS	2519	17.1	675 686.4	2 756 135.5	675 688.1	2 756 134.0	
28/06/2020	15:04:29	R2_ENV_111	WP	YSI Exo2	2539	18.3	677 189.3	2 758 731.9	677 191.9	2 758 724.2	
28/06/2020	10:22:59	R2_ENV_108	VV	NS	2520	17.0	675 686.4	2 756 135.5	675 693.8	2 756 129.4	
28/06/2020	15:42:25	R2_ENV_111	WS	BOT	2541	18.3	677 189.3	2 758 731.9	677 188.7	2 758 730.0	
28/06/2020	15:52:42	R2_ENV_111	WS	MID	2542	18.3	677 189.3	2 758 731.9	677 188.3	2 758 730.4	
28/06/2020	16:00:03	R2_ENV_111	WS	TOP	2543	18.2	677 189.3	2 758 731.9	677 189.9	2 758 729.5	
28/06/2020	16:29:14	R2_ENV_112	WS	BOT	2544	18.1	678 296.1	2 759 246.7	678 295.1	2 759 245.1	
28/06/2020	16:35:17	R2_ENV_112	WS	MID	2545	18.2	678 296.1	2 759 246.7	678 294.9	2 759 245.4	
28/06/2020	16:42:21	R2_ENV_112	WS	TOP	2546	18.2	678 296.1	2 759 246.7	678 295.3	2 759 246.1	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
28/06/2020	10:27:06	R2_ENV_108	VV	NS	2521	17.1	675 686.4	2 756 135.5	675 679.0	2 756 138.6	
28/06/2020	17:21:56	R2_ENV_112	WP	YSI Exo2	2548	18.2	678 296.1	2 759 246.7	678 290.8	2 759 243.8	
28/06/2020	11:57:59	R2_ENV_109	VV	PC	2530	17.3	676 793.2	2 756 650.3	676 791.1	2 756 646.5	
28/06/2020	18:11:28	R2_ENV_113	WP	YSI Exo2	2550	18.1	679 402.9	2 759 761.4	679 404.7	2 759 760.9	
28/06/2020	18:18:12	R2_ENV_113	WS	BOT	2551	18.1	679 402.9	2 759 761.4	679 401.0	2 759 761.8	
28/06/2020	18:26:37	R2_ENV_113	WS	MID	2552	18.0	679 402.9	2 759 761.4	679 402.2	2 759 760.7	
28/06/2020	18:34:28	R2_ENV_113	WS	TOP	2553	18.1	679 402.9	2 759 761.4	679 402.8	2 759 760.1	
28/06/2020	19:37:47	R2_ENV_105	WS	BOT	2554	16.8	674 183.5	2 753 539.1	674 180.9	2 753 536.6	
28/06/2020	19:51:37	R2_ENV_105	WS	MID	2555	16.8	674 183.5	2 753 539.1	674 182.0	2 753 539.1	
28/06/2020	19:59:05	R2_ENV_105	WS	TOP	2556	16.6	674 183.5	2 753 539.1	674 182.5	2 753 538.6	
28/06/2020	12:44:31	R2_ENV_110	VV	PC	2532	17.4	677 900.0	2 757 165.0	677 899.7	2 757 154.8	
28/06/2020	12:39:32	R2_ENV_110	VV	Partial Sample	2531	17.4	677 900.0	2 757 165.0	677 897.7	2 757 165.8	
28/06/2020	14:50:15	R2_ENV_111	VV	NS	2538	18.5	677 189.3	2 758 731.9	677 192.7	2 758 728.6	
28/06/2020	20:28:47	R2_ENV_105	WP	YSI Exo2	2560	16.8	674 183.5	2 753 539.1	674 184.7	2 753 537.6	
28/06/2020	15:19:12	R2_ENV_111	VV	PC	2540	18.2	677 189.3	2 758 731.9	677 187.5	2 758 720.3	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
28/06/2020	21:23:10	R2_ENV_106	WS	BOT	2562	17.1	675 290.3	2 754 053.9	675 290.5	2 754 053.4	
28/06/2020	21:30:03	R2_ENV_106	WS	MID	2563	17.2	675 290.3	2 754 053.9	675 290.9	2 754 054.5	
28/06/2020	21:36:28	R2_ENV_106	WS	TOP	2564	17.2	675 290.3	2 754 053.9	675 289.5	2 754 054.7	
28/06/2020	21:51:37	R2_ENV_106	WP	YSI Exo2	2565	17.2	675 290.3	2 754 053.9	675 292.5	2 754 053.7	
28/06/2020	22:32:12	R2_ENV_107	WS	BOT	2566	17.4	676 397.1	2 754 568.6	676 396.9	2 754 568.2	
28/06/2020	22:52:08	R2_ENV_107	WS	MID	2567	17.4	676 397.1	2 754 568.6	676 397.4	2 754 567.7	
28/06/2020	22:59:30	R2_ENV_107	WS	TOP	2568	17.4	676 397.1	2 754 568.6	676 398.1	2 754 568.9	
28/06/2020	17:01:29	R2_ENV_112	VV	PC	2547	18.2	678 296.1	2 759 246.7	678 295.5	2 759 246.4	
28/06/2020	23:31:23	R2_ENV_107	WP	YSI Exo2	2570	17.3	676 397.1	2 754 568.6	676 399.0	2 754 569.6	
28/06/2020	18:05:29	R2_ENV_113	VV	PC	2549	18.2	679 402.9	2 759 761.4	679 401.1	2 759 758.9	
29/06/2020	01:40:32	R2_ENV_126	WS	BOT	2572	25.0	685 112.9	2 771 496.6	685 110.1	2 771 499.7	
29/06/2020	01:47:01	R2_ENV_126	WS	MID	2573	25.0	685 112.9	2 771 496.6	685 114.1	2 771 497.2	
29/06/2020	01:53:48	R2_ENV_126	WS	TOP	2574	25.0	685 112.9	2 771 496.6	685 112.3	2 771 495.7	
29/06/2020	02:51:32	R2_ENV_134	WS	BOT	2575	26.5	687 599.0	2 778 893.5	687 598.0	2 778 895.3	
29/06/2020	02:56:52	R2_ENV_134	WP	NS	2576	26.5	687 599.0	2 778 893.5	687 600.2	2 778 891.8	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East

Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
29/06/2020	02:58:23	R2_ENV_134	WS	MID	2577	26.5	687 599.0	2 778 893.5	687 598.2	2 778 894.1	
29/06/2020	03:07:27	R2_ENV_134	WS	TOP	2578	26.6	687 599.0	2 778 893.5	687 599.0	2 778 893.7	
29/06/2020	03:22:32	R2_ENV_134	WP	YSI Exo2	2579	26.5	687 599.0	2 778 893.5	687 600.4	2 778 892.8	
30/06/2020	07:14:17	R2_ENV_114	VV	Partial Sample	2781	17.9	678 730.4	2 761 334.7	678 731.1	2 761 334.9	
30/06/2020	07:19:34	R2_ENV_114	VV	NS	2782	17.8	678 730.4	2 761 334.7	678 729.5	2 761 344.7	
30/06/2020	07:22:09	R2_ENV_114	VV	NS	2783	17.8	678 730.4	2 761 334.7	678 733.8	2 761 326.1	
29/06/2020	04:54:43	R2_TR09	Video	SOL	2583	22.6	687 816.8	2 779 037.0	687 819.7	2 779 036.9	
29/06/2020	04:55:02	R2_TR09	Still	R2_TR09_001	2584	22.6	-	-	687 818.9	2 779 036.7	
29/06/2020	04:55:34	R2_TR09	Still	R2_TR09_002	2585	22.7	-	-	687 810.7	2 779 033.6	
29/06/2020	04:56:32	R2_TR09	Still	R2_TR09_003	2586	23.1	-	-	687 798.6	2 779 026.7	
29/06/2020	04:56:49	R2_TR09	Still	R2_TR09_004	-	23.3	-	-	687 795.5	2 779 024.5	
29/06/2020	04:56:50	R2_TR09	Still	R2_TR09_005	2587	23.1	-	-	687 795.4	2 779 024.4	
29/06/2020	04:57:07	R2_TR09	Still	R2_TR09_006	2588	23.2	-	-	687 793.1	2 779 022.8	
29/06/2020	04:57:35	R2_TR09	Still	R2_TR09_007	2589	23.3	-	-	687 788.2	2 779 022.8	
29/06/2020	04:57:52	R2_TR09	Still	R2_TR09_008	2590	23.4	-	-	687 785.8	2 779 021.9	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
29/06/2020	04:59:06	R2_TR09	Still	R2_TR09_009	2591	23.8	-	-	687 770.6	2 779 015.2	
29/06/2020	04:59:06	R2_TR09	Still	R2_TR09_010	-	23.8	-	-	687 770.6	2 779 015.2	
29/06/2020	04:59:22	R2_TR09	Still	R2_TR09_011	2592	23.9	-	-	687 767.4	2 779 013.8	
29/06/2020	04:59:44	R2_TR09	Still	R2_TR09_012	2593	24.0	-	-	687 763.2	2 779 011.1	
29/06/2020	05:00:14	R2_TR09	Still	R2_TR09_013	2594	24.2	-	-	687 757.6	2 779 007.4	
29/06/2020	05:00:44	R2_TR09	Still	R2_TR09_014	2595	24.2	-	-	687 753.2	2 779 004.7	
29/06/2020	05:01:20	R2_TR09	Still	R2_TR09_015	2596	24.3	-	-	687 747.5	2 779 002.7	
29/06/2020	05:02:19	R2_TR09	Still	R2_TR09_016	2597	24.5	-	-	687 735.3	2 778 998.8	
29/06/2020	05:03:14	R2_TR09	Still	R2_TR09_017	2598	24.8	-	-	687 724.7	2 778 992.4	
29/06/2020	05:03:40	R2_TR09	Still	R2_TR09_018	2599	24.8	-	-	687 719.3	2 778 989.9	
29/06/2020	05:03:59	R2_TR09	Still	R2_TR09_019	2600	24.9	-	-	687 715.4	2 778 987.9	
29/06/2020	05:05:09	R2_TR09	Video	EOL	2601	25.2	687 704.6	2 778 984.0	687 702.1	2 778 981.1	
29/06/2020	05:30:34	R2_ENV_133	WS	BOT	2602	28.1	687 669.7	2 777 635.3	687 668.5	2 777 635.0	
29/06/2020	05:33:11	R2_ENV_133	WP	NS	2603	28.1	687 669.7	2 777 635.3	687 670.4	2 777 632.6	
29/06/2020	05:38:43	R2_ENV_133	WS	MID	2604	28.0	687 669.7	2 777 635.3	687 668.8	2 777 634.9	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
29/06/2020	05:46:01	R2_ENV_133	WS	TOP	2605	28.1	687 669.7	2 777 635.3	687 668.5	2 777 634.9	
29/06/2020	05:48:48	R2_ENV_133	WP	YSI Exo2	2606	28.3	687 669.7	2 777 635.3	687 670.1	2 777 634.1	
30/06/2020	09:06:07	R2_ENV_115	VV	PC	2792	19.7	679 855.0	2 761 809.3	679 854.4	2 761 809.4	
30/06/2020	06:30:48	R2_ENV_116	VV	PC	2778	22.0	680 979.7	2 762 283.8	680 979.9	2 762 283.5	
30/06/2020	04:05:21	R2_ENV_117	VV	PC	2726	21.0	680 326.0	2 763 875.2	680 324.8	2 763 875.8	
30/06/2020	03:14:47	R2_ENV_118	VV	PC	2725	24.1	681 450.6	2 764 349.7	681 451.5	2 764 349.8	
29/06/2020	06:45:57	R2_ENV_131	WS	BOT	2611	26.6	687 072.3	2 775 676.5	687 010.0	2 777 324.3	
29/06/2020	06:52:25	R2_ENV_131	WP	NS	2612	26.5	687 072.3	2 775 676.5	687 012.3	2 777 321.8	
29/06/2020	06:54:29	R2_ENV_131	WS	MID	2613	26.5	687 072.3	2 775 676.5	687 010.8	2 777 323.7	
29/06/2020	07:01:24	R2_ENV_131	WS	TOP	2614	26.5	687 072.3	2 775 676.5	687 011.3	2 777 324.1	
29/06/2020	07:13:05	R2_ENV_131	WP	YSI Exo2	2615	26.5	687 072.3	2 775 676.5	687 012.5	2 777 321.7	
29/06/2020	07:44:57	R2_ENV_132	WS	BOT	2616	23.9	688 311.9	2 776 581.0	688 310.4	2 776 579.0	
29/06/2020	07:53:00	R2_ENV_132	WS	MID	2617	23.9	688 311.9	2 776 581.0	688 312.3	2 776 582.2	
29/06/2020	07:55:19	R2_ENV_132	WP	YSI Exo2	2618	23.9	688 311.9	2 776 581.0	688 310.8	2 776 577.8	
29/06/2020	08:00:55	R2_ENV_132	WS	TOP	2619	24.0	688 311.9	2 776 581.0	688 311.1	2 776 582.6	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
30/06/2020	01:20:06	R2_ENV_119	VV	PC	2715	25.1	682 575.3	2 764 824.2	682 575.4	2 764 823.9	
29/06/2020	08:18:02	SO_R2_017	VV	SOIL	2621	23.8	688 311.9	2 776 581.0	688 310.7	2 776 581.0	
30/06/2020	00:10:31	R2_ENV_120	VV	PC	2710	23.7	681 921.6	2 766 415.7	681 921.3	2 766 415.2	
29/06/2020	09:13:43	R2_ENV_130	WS	BOT	2623	26.9	687 431.6	2 774 644.7	687 431.0	2 774 644.7	
29/06/2020	09:22:10	R2_ENV_130	WS	MID	2624	26.9	687 431.6	2 774 644.7	687 430.3	2 774 645.0	
29/06/2020	09:23:28	R2_ENV_130	WP	YSI Exo2	2625	27.0	687 431.6	2 774 644.7	687 431.0	2 774 642.4	
29/06/2020	09:29:39	R2_ENV_130	WS	TOP	2626	26.9	687 431.6	2 774 644.7	687 432.0	2 774 643.4	
29/06/2020	10:06:40	R2_ENV_129	WS	BOT	2627	25.9	687 872.7	2 773 258.4	687 872.1	2 773 256.1	
29/06/2020	10:08:40	R2_ENV_129	WP	YSI Exo2	2628	25.9	687 872.7	2 773 258.4	687 872.9	2 773 259.2	
29/06/2020	10:15:50	R2_ENV_129	WS	MID	2629	25.9	687 872.7	2 773 258.4	687 871.6	2 773 257.3	
29/06/2020	10:22:17	R2_ENV_129	WS	TOP	2630	25.9	687 872.7	2 773 258.4	687 871.4	2 773 258.3	
29/06/2020	22:58:44	R2_ENV_121	VV	NS	2706	24.1	683 046.3	2 766 890.2	683 047.0	2 766 891.9	At an angle
29/06/2020	23:05:21	R2_ENV_121	VV	PC	2707	24.2	683 046.3	2 766 890.2	683 056.5	2 766 891.7	
29/06/2020	11:16:35	R2_ENV_128	WS	BOT	2633	25.9	686 176.6	2 773 190.3	686 175.6	2 773 190.5	
29/06/2020	11:25:09	R2_ENV_128	WS	MID	2634	25.9	686 176.6	2 773 190.3	686 176.6	2 773 188.7	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East

Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
29/06/2020	11:27:45	R2_ENV_128	WP	YSI Exo2	2635	25.9	686 176.6	2 773 190.3	686 178.6	2 773 191.4	
29/06/2020	11:32:05	R2_ENV_128	WS	TOP	2636	26.0	686 176.6	2 773 190.3	686 176.1	2 773 190.4	
29/06/2020	12:07:32	R2_ENV_127	WS	BOT	2637	25.1	686 237.5	2 771 971.1	686 236.7	2 771 970.8	
29/06/2020	12:10:37	R2_ENV_127	WP	YSI Exo2	2638	25.2	686 237.5	2 771 971.1	686 238.9	2 771 970.7	
29/06/2020	12:14:58	R2_ENV_127	WS	MID	2639	25.2	686 237.5	2 771 971.1	686 235.3	2 771 970.5	
29/06/2020	12:22:08	R2_ENV_127	WS	TOP	2640	25.2	686 237.5	2 771 971.1	686 237.0	2 771 971.3	
29/06/2020	20:33:35	R2_ENV_122	VV	PC	2697	23.2	684 170.9	2 767 364.7	684 170.6	2 767 366.4	
29/06/2020	13:17:00	R2_TR08	Video	SOL	2642	23.0	685 068.9	2 771 164.7	685 067.3	2 771 163.1	
29/06/2020	13:17:18	R2_TR08	Still	R2_TR08_001	2643	23.1	-	-	685 068.9	2 771 165.6	
29/06/2020	13:17:35	R2_TR08	Still	R2_TR08_002	2644	23.0	-	-	685 070.2	2 771 168.1	
29/06/2020	13:17:58	R2_TR08	Still	R2_TR08_003	2645	23.1	-	-	685 071.3	2 771 171.6	
29/06/2020	13:18:20	R2_TR08	Still	R2_TR08_004	2646	23.3	-	-	685 073.3	2 771 174.4	
29/06/2020	13:19:05	R2_TR08	Still	R2_TR08_005	2647	23.3	-	-	685 077.4	2 771 180.4	
29/06/2020	13:19:36	R2_TR08	Still	R2_TR08_006	2648	23.2	-	-	685 078.9	2 771 185.9	
29/06/2020	13:20:00	R2_TR08	Still	R2_TR08_007	2649	23.2	-	-	685 081.1	2 771 189.2	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
29/06/2020	13:20:12	R2_TR08	Still	R2_TR08_008	2650	23.2	-	-	685 082.3	2 771 191.0	
29/06/2020	13:20:31	R2_TR08	Still	R2_TR08_009	2651	23.2	-	-	685 084.4	2 771 193.6	
29/06/2020	13:20:55	R2_TR08	Still	R2_TR08_010	2652	23.2	-	-	685 087.5	2 771 197.5	
29/06/2020	13:21:22	R2_TR08	Still	R2_TR08_011	2653	23.2	-	-	685 088.8	2 771 201.7	
29/06/2020	13:21:37	R2_TR08	Still	R2_TR08_012	2654	23.3	-	-	685 089.7	2 771 203.7	
29/06/2020	13:21:45	R2_TR08	Still	R2_TR08_013	2655	23.2	-	-	685 090.5	2 771 204.8	
29/06/2020	13:22:24	R2_TR08	Still	R2_TR08_014	2656	23.2	-	-	685 093.0	2 771 211.1	
29/06/2020	13:22:57	R2_TR08	Still	R2_TR08_015	2657	23.2	-	-	685 096.2	2 771 216.0	
29/06/2020	13:24:30	R2_TR08	Still	R2_TR08_016	2658	23.3	-	-	685 103.9	2 771 229.5	
29/06/2020	13:24:51	R2_TR08	Still	R2_TR08_017	2659	23.3	-	-	685 105.5	2 771 232.8	
29/06/2020	13:25:06	R2_TR08	Still	R2_TR08_018	2660	23.4	-	-	685 106.7	2 771 235.2	
29/06/2020	13:25:24	R2_TR08	Still	R2_TR08_019	2661	23.3	-	-	685 108.1	2 771 237.6	
29/06/2020	13:25:48	R2_TR08	Still	R2_TR08_020	2662	23.3	-	-	685 111.1	2 771 240.6	
29/06/2020	13:26:10	R2_TR08	Still	R2_TR08_021	2663	23.3	-	-	685 112.3	2 771 244.4	
29/06/2020	13:26:19	R2_TR08	Still	R2_TR08_022	2664	23.3	-	-	685 112.7	2 771 245.9	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
29/06/2020	13:26:31	R2_TR08	Still	R2_TR08_023	2665	23.2	-	-	685 113.2	2 771 247.6	
29/06/2020	13:26:41	R2_TR08	Still	R2_TR08_024	2666	23.2	-	-	685 113.9	2 771 249.1	
29/06/2020	13:26:54	R2_TR08	Still	R2_TR08_025	2667	23.2	-	-	685 115.2	2 771 250.7	
29/06/2020	13:27:10	R2_TR08	Still	R2_TR08_026	2668	23.3	-	-	685 116.3	2 771 253.1	
29/06/2020	13:27:24	R2_TR08	Still	R2_TR08_027	2669	23.3	-	-	685 117.7	2 771 254.8	
29/06/2020	13:27:44	R2_TR08	Still	R2_TR08_028	2670	23.3	-	-	685 119.4	2 771 257.7	
29/06/2020	13:27:58	R2_TR08	Still	R2_TR08_029	2671	23.2	-	-	685 120.3	2 771 260.0	
29/06/2020	13:28:17	R2_TR08	Still	R2_TR08_030	2672	23.2	-	-	685 121.5	2 771 262.2	
29/06/2020	13:28:35	R2_TR08	Still	R2_TR08_031	2673	23.3	-	-	685 123.2	2 771 264.8	
29/06/2020	13:29:09	R2_TR08	Still	R2_TR08_032	2674	23.4	-	-	685 126.8	2 771 270.0	
29/06/2020	13:30:00	R2_TR08	Video	EOL	2675	23.7	685 130.7	2 771 275.9	685 131.1	2 771 279.2	
29/06/2020	14:23:33	R2_ENV_126	WP	YSI Exo2	2676	26.3	685 112.9	2 771 496.6	685 110.9	2 771 495.8	
29/06/2020	15:00:37	R2_ENV_125	WS	BOT	2677	26.2	685 766.6	2 769 905.2	685 766.4	2 769 905.2	
29/06/2020	15:09:04	R2_ENV_125	WS	MID	2678	26.2	685 766.6	2 769 905.2	685 765.5	2 769 905.4	
29/06/2020	15:15:16	R2_ENV_125	WS	TOP	2679	26.2	685 766.6	2 769 905.2	685 766.8	2 769 905.2	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
29/06/2020	18:24:01	R2_ENV_123	VV	Partial Sample	2691	21.1	683 517.2	2 768 956.2	683 516.5	2 768 957.4	HC
29/06/2020	15:43:46	R2_ENV_125	WP	YSI Exo2	2681	26.2	685 766.6	2 769 905.2	685 764.5	2 769 903.7	
29/06/2020	18:32:01	R2_ENV_123	VV	NS	2692	21.1	683 517.2	2 768 956.2	683 526.1	2 768 958.3	
29/06/2020	16:37:24	SO_R2_016	VV	SOIL	2683	24.6	684 641.9	2 769 430.7	684 639.9	2 769 431.3	
29/06/2020	16:54:07	R2_ENV_124	WS	BOT	2684	24.6	684 641.9	2 769 430.7	684 638.6	2 769 433.1	
29/06/2020	17:02:01	R2_ENV_124	WS	MID	2685	24.6	684 641.9	2 769 430.7	684 641.6	2 769 430.8	
29/06/2020	17:08:42	R2_ENV_124	WS	TOP	2686	24.6	684 641.9	2 769 430.7	684 641.2	2 769 431.0	
29/06/2020	17:18:36	R2_ENV_124	WP	YSI Exo2	2687	24.6	684 641.9	2 769 430.7	684 642.2	2 769 428.8	
29/06/2020	18:04:13	R2_ENV_123	WS	BOT	2688	21.1	683 517.2	2 768 956.2	683 516.2	2 768 957.0	
29/06/2020	18:11:28	R2_ENV_123	WS	MID	2689	21.1	683 517.2	2 768 956.2	683 516.6	2 768 956.9	
29/06/2020	18:17:40	R2_ENV_123	WS	TOP	2690	21.2	683 517.2	2 768 956.2	683 515.8	2 768 958.5	
29/06/2020	18:38:26	R2_ENV_123	VV	Partial Sample	2693	20.9	683 517.2	2 768 956.2	683 506.6	2 768 954.7	PSD and HM
29/06/2020	16:19:56	R2_ENV_124	VV	PC	2682	24.5	684 641.9	2 769 430.7	684 640.2	2 769 430.4	
29/06/2020	15:25:29	R2_ENV_125	VV	PC	2680	26.1	685 766.6	2 769 905.2	685 766.6	2 769 905.4	
29/06/2020	18:59:28	R2_ENV_123	WP	YSI Exo2	2694	21.2	683 517.2	2 768 956.2	683 518.1	2 768 954.3	Data not accepted

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
29/06/2020	19:26:59	R2_ENV_123	WP	YSI Exo2	2695	21.1	683 517.2	2 768 956.2	683 516.0	2 768 956.2	Data not accepted
29/06/2020	19:48:05	R2_ENV_123	WP	YSI Exo2	2696	21.0	683 517.2	2 768 956.2	683 513.2	2 768 957.4	
29/06/2020	01:26:31	R2_ENV_126	VV	PC	2571	25.0	685 112.9	2 771 496.6	685 111.2	2 771 497.1	
29/06/2020	20:51:59	R2_ENV_122	WS	BOT	2698	23.3	684 170.9	2 767 364.7	684 170.9	2 767 365.3	
29/06/2020	21:00:29	R2_ENV_122	WS	MID	2699	23.1	684 170.9	2 767 364.7	684 170.4	2 767 366.1	
29/06/2020	21:06:49	R2_ENV_122	WS	TOP	2700	23.2	684 170.9	2 767 364.7	684 171.5	2 767 365.0	
29/06/2020	21:19:20	R2_ENV_122	WP	YSI Exo2	2701	23.3	684 170.9	2 767 364.7	684 170.6	2 767 363.1	Data not accepted
29/06/2020	22:06:51	R2_ENV_122	WP	YSI Exo2	2702	23.1	684 170.9	2 767 364.7	684 171.6	2 767 363.3	
29/06/2020	22:35:51	R2_ENV_121	WS	BOT	2703	24.2	683 046.3	2 766 890.2	683 046.0	2 766 890.3	
29/06/2020	22:44:26	R2_ENV_121	WS	MID	2704	24.2	683 046.3	2 766 890.2	683 045.4	2 766 890.8	
29/06/2020	22:51:38	R2_ENV_121	WS	TOP	2705	24.2	683 046.3	2 766 890.2	683 045.9	2 766 891.1	
29/06/2020	12:29:25	R2_ENV_127	VV	PC	2641	25.2	686 237.5	2 771 971.1	686 236.0	2 771 970.6	
29/06/2020	11:07:31	R2_ENV_128	VV	PC	2632	26.0	686 176.6	2 773 190.3	686 175.6	2 773 189.4	
29/06/2020	23:25:45	R2_ENV_121	WP	YSI Exo2	2708	24.2	683 046.3	2 766 890.2	683 046.3	2 766 888.8	Data not accepted
29/06/2020	23:44:03	R2_ENV_121	WP	YSI Exo2	2709	24.1	683 046.3	2 766 890.2	683 045.9	2 766 892.5	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East

Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
29/06/2020	10:29:17	R2_ENV_129	VV	PC	2631	25.9	687 872.7	2 773 258.4	687 872.1	2 773 257.9	
30/06/2020	00:26:21	R2_ENV_120	WS	BOT	2711	23.8	681 921.6	2 766 415.7	681 922.6	2 766 415.8	
30/06/2020	00:33:51	R2_ENV_120	WS	MID	2712	23.7	681 921.6	2 766 415.7	681 923.0	2 766 414.4	
30/06/2020	00:40:00	R2_ENV_120	WS	TOP	2713	23.7	681 921.6	2 766 415.7	681 922.6	2 766 416.5	
30/06/2020	00:48:16	R2_ENV_120	WP	YSI Exo2	2714	23.7	681 921.6	2 766 415.7	681 920.1	2 766 417.7	
29/06/2020	09:05:48	R2_ENV_130	VV	PC	2622	26.9	687 431.6	2 774 644.7	687 431.2	2 774 645.6	
30/06/2020	01:25:38	R2_ENV_119	WS	BOT	2716	25.0	682 575.3	2 764 824.2	682 576.0	2 764 823.4	
30/06/2020	01:32:08	R2_ENV_119	WP	YSI Exo2	2717	25.0	682 575.3	2 764 824.2	682 576.1	2 764 825.9	
30/06/2020	01:36:18	R2_ENV_119	WS	MID	2718	25.0	682 575.3	2 764 824.2	682 576.0	2 764 823.3	
30/06/2020	01:45:00	R2_ENV_119	WS	TOP	2719	25.1	682 575.3	2 764 824.2	682 575.9	2 764 823.7	
30/06/2020	02:50:03	R2_ENV_118	WS	BOT	2720	24.1	681 450.6	2 764 349.7	681 450.9	2 764 350.1	
30/06/2020	02:50:12	R2_ENV_118	WP	YSI Exo2	2721	24.1	681 450.6	2 764 349.7	681 449.0	2 764 351.2	Data not accepted
30/06/2020	02:59:36	R2_ENV_118	WS	MID	2722	24.1	681 450.6	2 764 349.7	681 451.0	2 764 349.4	
30/06/2020	03:07:10	R2_ENV_118	WS	TOP	2723	24.1	681 450.6	2 764 349.7	681 451.1	2 764 349.3	
30/06/2020	03:11:04	R2_ENV_118	WP	YSI Exo2	2724	24.2	681 450.6	2 764 349.7	681 449.8	2 764 351.5	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
29/06/2020	06:37:33	R2_ENV_131	VV	PC	2610	26.5	687 072.3	2 775 676.5	687 011.2	2 777 324.3	
29/06/2020	08:09:15	R2_ENV_132	VV	PC	2620	23.8	688 311.9	2 776 581.0	688 311.2	2 776 581.6	
30/06/2020	04:13:39	R2_ENV_117	WS	BOT	2727	20.9	680 326.0	2 763 875.2	680 324.9	2 763 876.4	
30/06/2020	04:20:54	R2_ENV_117	WS	MID	2728	20.9	680 326.0	2 763 875.2	680 325.5	2 763 876.2	
30/06/2020	04:27:04	R2_ENV_117	WS	TOP	2729	20.9	680 326.0	2 763 875.2	680 325.0	2 763 875.9	
30/06/2020	04:30:05	R2_ENV_117	WP	YSI Exo2	2730	21.0	680 326.0	2 763 875.2	680 326.4	2 763 877.8	
30/06/2020	05:18:36	R2_TR07	Video	SOL	2731	22.6	681 004.1	2 763 482.2	681 010.0	2 763 485.8	
30/06/2020	05:18:57	R2_TR07	Still	R2_TR07_001	2732	22.6	-	-	681 005.4	2 763 483.0	
30/06/2020	05:19:17	R2_TR07	Still	R2_TR07_002	2733	22.5	-	-	681 001.1	2 763 480.2	
30/06/2020	05:19:33	R2_TR07	Still	R2_TR07_003	2734	22.5	-	-	680 998.3	2 763 478.1	
30/06/2020	05:19:47	R2_TR07	Still	R2_TR07_004	2735	22.5	-	-	680 996.7	2 763 476.0	
30/06/2020	05:19:56	R2_TR07	Still	R2_TR07_005	2736	22.5	-	-	680 995.6	2 763 475.0	
30/06/2020	05:20:24	R2_TR07	Still	R2_TR07_006	2737	22.4	-	-	680 991.3	2 763 474.4	
30/06/2020	05:20:58	R2_TR07	Still	R2_TR07_007	2738	22.5	-	-	680 984.4	2 763 471.8	
30/06/2020	05:20:59	R2_TR07	Still	R2_TR07_008	-	22.6	-	-	680 984.3	2 763 471.6	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East

Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
30/06/2020	05:21:15	R2_TR07	Still	R2_TR07_009	2739	22.4	-	-	680 981.0	2 763 469.9	
30/06/2020	05:21:40	R2_TR07	Still	R2_TR07_010	2740	22.3	-	-	680 977.4	2 763 465.5	
30/06/2020	05:21:55	R2_TR07	Still	R2_TR07_011	2741	22.2	-	-	680 974.7	2 763 464.4	
30/06/2020	05:22:12	R2_TR07	Still	R2_TR07_012	2742	22.2	-	-	680 973.1	2 763 461.8	
30/06/2020	05:22:36	R2_TR07	Still	R2_TR07_013	2743	22.3	-	-	680 970.8	2 763 460.9	
30/06/2020	05:22:44	R2_TR07	Still	R2_TR07_014	2744	22.2	-	-	680 969.9	2 763 461.1	
30/06/2020	05:23:17	R2_TR07	Still	R2_TR07_015	2745	22.0	-	-	680 965.9	2 763 460.3	
30/06/2020	05:24:00	R2_TR07	Still	R2_TR07_016	2746	21.7	-	-	680 960.1	2 763 456.3	
30/06/2020	05:24:40	R2_TR07	Still	R2_TR07_017	2747	21.4	-	-	680 953.6	2 763 453.4	
30/06/2020	05:25:08	R2_TR07	Still	R2_TR07_018	2748	21.0	-	-	680 949.9	2 763 450.8	
30/06/2020	05:25:18	R2_TR07	Still	R2_TR07_019	2749	20.9	-	-	680 948.1	2 763 449.6	
30/06/2020	05:26:04	R2_TR07	Still	R2_TR07_020	2750	20.6	-	-	680 941.1	2 763 446.1	
30/06/2020	05:26:37	R2_TR07	Still	R2_TR07_021	2751	20.6	-	-	680 937.1	2 763 443.6	
30/06/2020	05:27:12	R2_TR07	Still	R2_TR07_022	2752	20.6	-	-	680 933.4	2 763 440.9	
30/06/2020	05:27:58	R2_TR07	Still	R2_TR07_023	2753	20.6	-	-	680 926.2	2 763 437.8	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
30/06/2020	05:28:11	R2_TR07	Still	R2_TR07_024	2754	20.6	-	-	680 924.4	2 763 437.4	
30/06/2020	05:28:30	R2_TR07	Still	R2_TR07_025	2755	20.6	-	-	680 921.2	2 763 435.0	
30/06/2020	05:28:50	R2_TR07	Still	R2_TR07_026	2756	20.6	-	-	680 918.6	2 763 433.3	
30/06/2020	05:29:07	R2_TR07	Still	R2_TR07_027	2757	20.6	-	-	680 915.4	2 763 431.8	
30/06/2020	05:29:53	R2_TR07	Still	R2_TR07_028	2758	20.4	-	-	680 908.0	2 763 427.6	
30/06/2020	05:30:33	R2_TR07	Still	R2_TR07_029	2759	20.5	-	-	680 903.5	2 763 423.2	
30/06/2020	05:30:53	R2_TR07	Still	R2_TR07_030	2760	20.6	-	-	680 901.2	2 763 422.0	
30/06/2020	05:31:10	R2_TR07	Still	R2_TR07_031	2761	20.7	-	-	680 899.0	2 763 421.2	
30/06/2020	05:31:40	R2_TR07	Still	R2_TR07_032	2762	20.6	-	-	680 894.5	2 763 420.4	
30/06/2020	05:32:23	R2_TR07	Still	R2_TR07_033	2763	20.5	-	-	680 890.1	2 763 417.6	
30/06/2020	05:33:06	R2_TR07	Still	R2_TR07_034	2764	20.5	-	-	680 844.2	2 763 413.9	
30/06/2020	05:33:27	R2_TR07	Still	R2_TR07_035	2765	20.5	-	-	680 881.3	2 763 410.8	
30/06/2020	05:33:56	R2_TR07	Still	R2_TR07_036	2766	20.6	-	-	680 875.1	2 763 408.5	
30/06/2020	05:34:20	R2_TR07	Still	R2_TR07_037	2767	20.5	-	-	680 870.7	2 763 406.0	
30/06/2020	05:34:40	R2_TR07	Still	R2_TR07_038	2768	20.7	-	-	680 866.7	2 763 401.6	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East

Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
30/06/2020	05:35:08	R2_TR07	Still	R2_TR07_039	2769	20.7	-	-	680 861.4	2 763 399.6	
30/06/2020	05:36:06	R2_TR07	Still	R2_TR07_040	2770	20.7	-	-	680 851.0	2 763 393.5	
30/06/2020	05:36:28	R2_TR07	Still	R2_TR07_041	2771	20.6	-	-	680 847.5	2 763 391.6	
30/06/2020	05:37:12	R2_TR07	Still	R2_TR07_042	2772	20.7	-	-	680 841.4	2 763 386.2	
30/06/2020	05:38:05	R2_TR07	Video	EOL	2773	20.7	680 832.6	2 763 383.5	680 830.3	2 763 380.9	
30/06/2020	06:02:36	R2_ENV_116	WS	BOT	2774	22.0	680 979.7	2 762 283.8	680 979.6	2 762 284.7	
30/06/2020	06:06:01	R2_ENV_116	WP	YSI Exo2	2775	22.0	680 979.7	2 762 283.8	680 979.3	2 762 286.4	
30/06/2020	06:16:43	R2_ENV_116	WS	MID	2776	22.0	680 979.7	2 762 283.8	680 979.6	2 762 283.3	
30/06/2020	06:23:36	R2_ENV_116	WS	TOP	2777	22.0	680 979.7	2 762 283.8	680 978.7	2 762 284.2	
29/06/2020	05:56:36	R2_ENV_133	VV	Partial Sample	2607	28.1	687 669.7	2 777 635.3	687 667.8	2 777 634.7	HM and HC
29/06/2020	06:04:42	R2_ENV_133	VV	Partial Sample	2608	28.2	687 669.7	2 777 635.3	687 666.3	2 777 644.5	PSD
30/06/2020	06:38:22	SO_R2_015	VV	Partial Sample	2779	22.0	680 979.7	2 762 283.8	680 979.8	2 762 283.9	
30/06/2020	06:42:24	SO_R2_015	VV	Partial Sample	2780	22.0	680 979.7	2 762 283.8	680 989.3	2 762 285.4	
29/06/2020	06:12:48	R2_ENV_133	VV	NS	2609	28.2	687 669.7	2 777 635.3	687 662.2	2 777 628.4	
29/06/2020	03:23:57	R2_ENV_134	VV	Partial Sample	2580	26.5	687 599.0	2 778 893.5	687 600.3	2 778 893.3	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
30/06/2020	07:25:17	R2_ENV_114	WS	BOT	2784	17.8	678 730.4	2 761 334.7	678 730.7	2 761 335.8	
30/06/2020	07:32:04	R2_ENV_114	WS	MID	2785	17.8	678 730.4	2 761 334.7	678 732.6	2 761 337.0	
30/06/2020	07:37:34	R2_ENV_114	WP	YSI Exo2	2786	17.8	678 730.4	2 761 334.7	678 727.2	2 761 338.0	
30/06/2020	07:38:06	R2_ENV_114	WS	TOP	2787	17.8	678 730.4	2 761 334.7	678 730.3	2 761 334.7	
30/06/2020	08:42:12	R2_ENV_115	WS	BOT	2788	19.7	679 855.0	2 761 809.3	679 854.5	2 761 809.7	
30/06/2020	08:46:56	R2_ENV_115	WP	YSI Exo2	2789	19.6	679 855.0	2 761 809.3	679 853.9	2 761 807.9	
30/06/2020	08:51:14	R2_ENV_115	WS	MID	2790	19.7	679 855.0	2 761 809.3	679 854.9	2 761 808.5	
30/06/2020	08:57:24	R2_ENV_115	WS	TOP	2791	19.7	679 855.0	2 761 809.3	679 854.6	2 761 809.0	
29/06/2020	03:39:44	R2_ENV_134	VV	Partial Sample	2581	26.4	687 599.0	2 778 893.5	687 602.1	2 778 902.0	HM and HC
29/06/2020	03:48:09	R2_ENV_134	VV	Partial Sample	2582	26.5	687 599.0	2 778 893.5	687 589.5	2 778 891.3	PSD
20/06/2020	09:51:00	R2_ENV_REF	VV	NS	1920	10.9	671 026.3	2 743 362.9	671 024.7	2 743 361.1	
20/06/2020	09:54:01	R2_ENV_REF	VV	NS	1921	11.0	671 026.3	2 743 362.9	671 025.4	2 743 353.5	
30/06/2020	10:50:42	R2_ENV_104	WS	BOT	2796	16.5	674 894.2	2 751 972.3	674 892.4	2 751 973.7	
30/06/2020	10:55:26	R2_ENV_104	WP	NS	2797	16.6	674 894.2	2 751 972.3	674 897.5	2 751 971.8	
30/06/2020	10:57:43	R2_ENV_104	WS	MID	2798	16.2	674 894.2	2 751 972.3	674 900.8	2 751 969.6	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East											
Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
30/06/2020	11:07:27	R2_ENV_104	WS	TOP	2799	16.6	674 894.2	2 751 972.3	674 894.9	2 751 968.4	
30/06/2020	11:15:42	R2_ENV_104	WP	YSI Exo2	2800	16.6	674 894.2	2 751 972.3	674 892.0	2 751 970.7	
30/06/2020	11:49:12	R2_ENV_103	WS	BOT	2801	17.3	673 787.4	2 751 457.5	673 965.4	2 751 924.6	
30/06/2020	11:53:18	R2_ENV_103	WP	YSI Exo2	2802	17.3	673 787.4	2 751 457.5	673 961.3	2 751 924.1	
30/06/2020	11:56:56	R2_ENV_103	WS	MID	2803	17.5	673 787.4	2 751 457.5	673 966.4	2 751 922.6	
30/06/2020	12:03:43	R2_ENV_103	WS	TOP	2804	17.4	673 787.4	2 751 457.5	673 965.6	2 751 921.1	
20/06/2020	10:01:17	R2_ENV_REF	VV	NS	1922	11.1	671 026.3	2 743 362.9	671 024.8	2 743 372.1	
30/06/2020	12:54:59	R2_TR08A	Video	SOL	2806	16.2	672 239.4	2 750 185.3	672 248.2	2 750 194.4	
30/06/2020	12:55:26	R2_TR08A	Still	R2_TR08A_001	2807	16.1	-	-	672 251.4	2 750 198.9	
30/06/2020	12:55:42	R2_TR08A	Still	R2_TR08A_002	2808	15.9	-	-	672 253.9	2 750 201.0	
30/06/2020	12:56:05	R2_TR08A	Still	R2_TR08A_003	2809	16.0	-	-	672 255.3	2 750 205.7	
30/06/2020	12:56:34	R2_TR08A	Still	R2_TR08A_004	2810	15.8	-	-	672 259.2	2 750 208.8	
30/06/2020	12:56:44	R2_TR08A	Still	R2_TR08A_005	2811	15.7	-	-	672 260.4	2 750 210.3	
30/06/2020	12:57:02	R2_TR08A	Still	R2_TR08A_006	2812	15.6	-	-	672 263.5	2 750 212.3	
30/06/2020	12:57:11	R2_TR08A	Still	R2_TR08A_007	2813	15.5	-	-	672 264.9	2 750 213.2	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East

Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
30/06/2020	12:57:40	R2_TR08A	Still	R2_TR08A_008	-	15.5	-	-	672 269.3	2 750 218.3	
30/06/2020	12:57:41	R2_TR08A	Still	R2_TR08A_009	2814	15.4	-	-	672 269.4	2 750 218.5	
30/06/2020	12:58:30	R2_TR08A	Still	R2_TR08A_010	2815	15.1	-	-	672 276.4	2 750 226.4	
30/06/2020	12:58:38	R2_TR08A	Still	R2_TR08A_011	2816	15.1	-	-	672 277.5	2 750 227.3	
30/06/2020	12:58:53	R2_TR08A	Still	R2_TR08A_012	2817	15.1	-	-	672 280.7	2 750 229.9	
30/06/2020	12:59:31	R2_TR08A	Still	R2_TR08A_013	2818	15.0	-	-	672 285.9	2 750 236.0	
30/06/2020	12:59:59	R2_TR08A	Still	R2_TR08A_014	2819	14.9	-	-	672 289.6	2 750 240.7	
30/06/2020	13:00:36	R2_TR08A	Still	R2_TR08A_015	2820	14.8	-	-	672 295.3	2 750 246.4	
30/06/2020	13:01:03	R2_TR08A	Still	R2_TR08A_016	2821	14.7	-	-	672 299.9	2 750 250.9	
30/06/2020	13:01:20	R2_TR08A	Still	R2_TR08A_017	2822	14.6	-	-	672 302.8	2 750 253.9	
30/06/2020	13:02:07	R2_TR08A	Still	R2_TR08A_018	2823	14.6	-	-	672 308.3	2 750 262.5	
30/06/2020	13:02:32	R2_TR08A	Still	R2_TR08A_019	2824	14.8	-	-	672 312.2	2 750 265.7	
30/06/2020	13:02:40	R2_TR08A	Still	R2_TR08A_020	2825	14.8	-	-	672 313.2	2 750 266.9	
30/06/2020	13:03:14	R2_TR08A	Still	R2_TR08A_021	2826	14.9	-	-	672 319.1	2 750 272.4	
30/06/2020	13:03:39	R2_TR08A	Still	R2_TR08A_022	2827	14.8	-	-	672 322.3	2 750 276.2	

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East

Date	Time [UTC]	Transect/ Station	Type	Sample Rep/ Still No.	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]	
30/06/2020	13:03:56	R2_TR08A	Still	R2_TR08A_023	2828	14.8	-	-	672 324.6	2 750 279.7	
30/06/2020	13:04:11	R2_TR08A	Still	R2_TR08A_024	2829	14.7	-	-	672 327.2	2 750 281.8	
30/06/2020	13:04:51	R2_TR08A	Vid	EOL	2830	14.7	672 151.2	2 750 099.8	672 334.0	2 750 289.3	

Notes
UTC = Coordinated Universal Time
BSL =Below sea level
VV = Single van Veen grab
NS = No sample
PC = Physico-chemical sample
PSD = Particle size distribution
HM = Heavy metal sample
HC = Hydrocarbon sample
PSD = Particle size sample
TOP = Surface water sample
MID = Mid water depth sample
BOT = Near seabed water sample
EOL = End of line
SOL -= Start of line
WP = Water profile
WS = Water sample

C.2 Grab Log

Date	Time [UTC]	Station	Sample	Fix No.	Sample Depth [cm]	Temp [˚C]	Redox [mV]	pH	Sediment Description (including stratigraphy)			Comments (fauna, smell, bioturbation, debris)
									Sediment Type	Sediment Description	Munsell colour	
03/04/2020	13:21:00	R2_ENV_002	NS	7	< 4	-	-	-	gS	Gravelly coarse sand with few shell fragments	-	-
03/04/2020	13:27:00	R2_ENV_002	NS	8	< 4	-	-	-	-	-	-	
03/04/2020	13:32:00	R2_ENV_002	NS	9	< 4	-	-	-	-	-	-	
04/04/2020	06:22:00	R2_ENV_001	PC	11	4	-	-	-	S	Coarse sand with shell fragments	-	
04/04/2020	07:02:00	R2_ENV_003	NS	12	0	-	-	-	-	-	-	
04/04/2020	07:05:00	R2_ENV_003	NS	13	0	-	-	-	-	-	-	
04/04/2020	07:14:00	R2_ENV_003	NS	14	0	-	-	-	-	-	-	
04/04/2020	07:23:00	R2_ENV_004	NS	15	0	-	-	-	-	-	-	
04/04/2020	07:27:00	R2_ENV_004	NS	16	0	-	-	-	-	-	-	
04/04/2020	07:29:00	R2_ENV_004	NS	17	0	-	-	-	-	-	-	
04/04/2020	07:39:00	R2_ENV_005	NS	18	0	-	-	-	-	-	-	
04/04/2020	07:42:00	R2_ENV_005	NS	19	0	-	-	-	-	-	-	
04/04/2020	07:44:00	R2_ENV_005	NS	20	0	-	-	-	-	-	-	
04/04/2020	07:53:00	R2_ENV_006	NS	21	0	-	-	-	-	-	-	
04/04/2020	07:55:00	R2_ENV_006	NS	22	0	-	-	-	-	-	-	

Date	Time [UTC]	Station	Sample	Fix No.	Sample Depth [cm]	Temp [˚C]	Redox [mV]	pH	Sediment Description (including stratigraphy)			Comments (fauna, smell, bioturbation, debris)
									Sediment Type	Sediment Description	Munsell colour	
04/04/2020	07:58:00	R2_ENV_006	NS	23	0	-	-	-	-	-	-	
04/04/2020	08:14:00	R2_ENV_007	NS	24	0	-	-	-	-	-	-	
04/04/2020	08:15:00	R2_ENV_007	NS	25	0	-	-	-	-	-	-	
04/04/2020	08:18:00	R2_ENV_007	NS	26	0	-	-	-	-	-	-	
04/04/2020	08:30:00	R2_ENV_008	NS	27	0	-	-	-	-	-	-	
04/04/2020	08:30:00	SO_R2_001	NS	28	0	-	-	-	-	-	-	
04/04/2020	08:33:00	R2_ENV_008	NS	29	0	-	-	-	-	-	-	
04/04/2020	08:33:00	SO_R2_001	NS	30	0	-	-	-	-	-	-	
04/04/2020	08:36:00	R2_ENV_008	NS	31	0	-	-	-	-	-	-	
04/04/2020	08:36:00	SO_R2_001	NS	32	0	-	-	-	-	-	-	
16/06/2020	18:11:36	R2_ENV_076	NS	1761	0	-	-	-	-	-	-	
16/06/2020	18:24:56	R2_ENV_076	PC	1762	5	31.2	316	4.5	(g)mS	Slightly muddy gravelly sand	Grayish brown (2.5Y 5/2)	
16/06/2020	18:37:02	SO_R2_010	PC	1763	5	-	-	-	(g)mS	Slightly muddy gravelly sand	Grayish brown (2.5Y 5/2)	
16/06/2020	19:55:49	R2_ENV_077	PC	1767	5	31.1	203	4.2	gS	Gravelly sand	Light olive gray (5Y 6/2)	
17/06/2020	02:51:19	R2_ENV_080	PC	1784	6	29.7	207	5.3	(g)mS	Muddy gravelly sand	Greenish gray (10Y 6/1)	

Date	Time [UTC]	Station	Sample	Fix No.	Sample Depth [cm]	Temp [˚C]	Redox [mV]	pH	Sediment Description (including stratigraphy)			Comments (fauna, smell, bioturbation, debris)
									Sediment Type	Sediment Description	Munsell colour	
17/06/2020	04:41:52	R2_ENV_081	PC	1792	5.5	29.2	63	6.4	gM	Gravelly mud	Dark gray (10YR 4/1)	
17/06/2020	21:50:32	R2_ENV_078	PC	1775	6	29.9	124	6.9	(g)mS	Muddy gravelly sand	Gley (5/10Y)	
17/06/2020	23:01:39	R2_ENV_079	PC	1777	4.5	31.2	180	5.4	(g)mS	Muddy gravelly sand	Greenish gray (10Y 6/1)	
19/06/2020	12:55:09	R2_ENV_082	PC	1793	5.5	30.0	240	6.4	(g)mS	Gravelly muddy coarse sand	Gray (2.5Y 5/1)	
19/06/2020	14:29:44	R2_ENV_083	PC	1798	6	31.9	5	4	mS	Muddy sand with shell fragments	Gley 1 (6/10Y)	
19/06/2020	15:49:08	R2_ENV_084	PC	1803	5	31.7	110	6.7	m	Mud	Light olive gray (5Y 6/2)	
19/06/2020	16:03:28	SO_R2_011	PC	1804	8	31.9	123	6.8	m	Mud	Light olive gray (5Y 6/2)	
19/06/2020	17:56:38	R2_ENV_085	NS	1812	0	-	-	-	-	-	-	
19/06/2020	18:03:28	R2_ENV_085	PC	1813	5	31.9	310	4.6	(g)mS	Muddy coarse gravelly fragments	Gray (5Y 5/1)	
19/06/2020	19:12:12	R2_ENV_086	PC	1815	5	29.7	205	6.4	(g)mS	Muddy coarse gravelly sand	Dark gray (5Y 4/1)	
19/06/2020	21:04:14	R2_ENV_087	NS	1823	0	-	-	-	-	-	-	
19/06/2020	21:16:59	R2_ENV_087	PC	1824	5	31.7	289	6.8	mS	Muddy coarse sand	Gray (5Y 5/1)	

Date	Time [UTC]	Station	Sample	Fix No.	Sample Depth [cm]	Temp [˚C]	Redox [mV]	pH	Sediment Description (including stratigraphy)			Comments (fauna, smell, bioturbation, debris)
									Sediment Type	Sediment Description	Munsell colour	
19/06/2020	22:10:59	R2_ENV_088	NS	1826	0	-	-	-	-	-	-	
19/06/2020	22:21:58	R2_ENV_088	NS	1827	0	-	-	-	-	-	-	
19/06/2020	22:25:59	R2_ENV_088	NS	1828	0	-	-	-	-	-	-	
19/06/2020	23:42:23	R2_ENV_089	NS	1833	0	-	-	-	-	-	-	
19/06/2020	23:51:23	R2_ENV_089	NS	1834	0	-	-	-	-	-	-	
19/06/2020	23:55:55	R2_ENV_089	NS	1835	0	-	-	-	-	-	-	
20/06/2020	00:58:08	R2_ENV_090	NS	1840	0	-	-	-	-	-	-	
20/06/2020	01:07:29	R2_ENV_090	NS	1841	0	-	-	-	-	-	-	
20/06/2020	01:11:40	R2_ENV_090	NS	1842	0	-	-	-	-	-	-	
20/06/2020	03:11:41	R2_ENV_091	NS	1851	0	-	-	-	-	-	-	
20/06/2020	03:14:47	R2_ENV_091	NS	1852	0	-	-	-	-	-	-	
20/06/2020	03:27:18	R2_ENV_091	NS	1853	< 2	30.1	202	6.9	S	Coarse sand	Yellow (2.5Y 8/6)	
20/06/2020	03:54:07	SO_R2_012	NS	1854	0	-	-	-	-	-	-	
20/06/2020	03:58:34	R2_ENV_092	NS	1855	0	-	-	-	-	-	-	
20/06/2020	04:01:23	R2_ENV_092	NS	1856	0	-	-	-	-	-	-	
20/06/2020	04:05:30	R2_ENV_092	NS	1857	0	-	-	-	-	-	-	
20/06/2020	05:36:38	R2_ENV_093	NS	1866	< 2	-	-	-	-	Coarse sand	Yellow (2.5Y 8/6)	

Date	Time [UTC]	Station	Sample	Fix No.	Sample Depth [cm]	Temp [˚C]	Redox [mV]	pH	Sediment Description (including stratigraphy)			Comments (fauna, smell, bioturbation, debris)
									Sediment Type	Sediment Description	Munsell colour	
20/06/2020	05:43:33	R2_ENV_093	PC	1867	3.5	30.8	325	5.3	S	Coarse sand	Yellow (2.5Y 8/6)	
20/06/2020	05:52:48	R2_ENV_093	NS	1868	< 2	-	-	-	S	Coarse sand	Yellow (2.5Y 8/6)	
20/06/2020	09:44:10	SO_R2_REF	NS	1919	< 1	-	-	-	S	Coarse sand	Yellow (2.5Y 8/6)	
20/06/2020	09:51:00	R2_ENV_REF	NS	1920	< 1	-	-	-	S	Coarse sand	Yellow (2.5Y 8/6)	
20/06/2020	09:54:01	R2_ENV_REF	NS	1921	0	-	-	-	-	-	-	
20/06/2020	10:01:17	R2_ENV_REF	NS	1922	0	-	-	-	-	-	-	
20/06/2020	11:25:32	R2_ENV_094	NS	1931	0	-	-	-	gS	-	-	
20/06/2020	11:29:09	R2_ENV_094	NS	1932	0	-	-	-	-	-	-	
20/06/2020	11:33:38	R2_ENV_094	NS	1933	2	29.6	110	6.9	gS	Coarse gravelly sand	Yellow (2.5Y 8/6)	
20/06/2020	12:01:24	R2_ENV_095	NS	1934	< 1	-	-	-	S	Coarse sand		
20/06/2020	12:07:10	R2_ENV_095	NS	1935	0	-	-	-	-	-	-	
20/06/2020	12:16:19	R2_ENV_095	NS	1936	0	-	-	-	-	-	-	
20/06/2020	13:36:30	R2_ENV_096	NS	1945	0	-	-	-	-	-	-	
20/06/2020	13:39:52	R2_ENV_096	PC	1946	6	32.6	304	7.2	gS	Coarse gravelly sand	Very pale brown (2.5Y 8/4)	
20/06/2020	14:31:21	R2_ENV_097	NS	1947	2	-	-	-	S	Sand	Pale brown (10YR 6/3)	Porifera

Date	Time [UTC]	Station	Sample	Fix No.	Sample Depth [cm]	Temp [˚C]	Redox [mV]	pH	Sediment Description (including stratigraphy)			Comments (fauna, smell, bioturbation, debris)
									Sediment Type	Sediment Description	Munsell colour	
20/06/2020	14:37:08	R2_ENV_097	Partial sample	1948	2	-	-	-	S	Sand	Pale brown (10YR 6/3)	
20/06/2020	14:41:57	R2_ENV_097	Partial sample	1949	4	30.9	198	6.4	S	Sand with coral rubble	Pale brown (10YR 6/3)	
20/06/2020	16:37:53	R2_ENV_098	NS	1957	0	-	-	-	-	-	-	
20/06/2020	16:48:12	R2_ENV_098	NS	1958	0	-	-	-	-	-	-	
20/06/2020	16:53:07	R2_ENV_098	NS	1959	< 1	-	-	-	S	Sand	-	
20/06/2020	17:37:35	R2_ENV_099	NS	1961	0	-	-	-	-	-	-	
20/06/2020	17:41:17	R2_ENV_099	NS	1962	0	-	-	-	-	-	-	
20/06/2020	17:46:05	R2_ENV_099	NS	1963	< 1	-	-	-	S	Sand	Light gray (10YR 7/2)	
20/06/2020	19:36:34	R2_ENV_100	NS	1971	0	-	-	-	-	-	-	Porifera and bivalvia
20/06/2020	19:41:49	R2_ENV_100	NS	1972	0	-	-	-	-	-	-	Porifera in jaws
20/06/2020	19:46:34	R2_ENV_100	NS	1973	0	-	-	-	-	-	-	
20/06/2020	19:50:10	SO_R2_013	NS	1974	0	-	-	-	-	-	-	
20/06/2020	20:40:55	R2_ENV_102	NS	1976	<1	-	-	-	S	Sand	Light gray (10YR 7/2)	Echinoidea and Bivalvia
20/06/2020	20:46:15	R2_ENV_102	NS	1977	0	-	-	-	-	-	-	

Date	Time [UTC]	Station	Sample	Fix No.	Sample Depth [cm]	Temp [°C]	Redox [mV]	pH	Sediment Description (including stratigraphy)			Comments (fauna, smell, bioturbation, debris)
									Sediment Type	Sediment Description	Munsell colour	
20/06/2020	20:50:06	R2_ENV_102	NS	1978	2	-	-	-	S	Sand and shell	Light brownish gray (10YR 6/2)	
21/06/2020	03:05:17	R2_ENV_075	PC	2008	5.5	30.2	204	7.6	gmS	Gravelly muddy sand	Greyish brown (2.5Y 5/2)	
21/06/2020	05:12:34	R2_ENV_074	NS	2017	0	-	-	-	-	-	-	
21/06/2020	05:17:23	R2_ENV_074	PC	2018	5.5	29.3	203	7.5	gmS	Gravelly muddy coarse sand with shell fragments	Greyish brown (2.5Y 5/2)	
21/06/2020	05:55:21	R2_ENV_073	NS	2019	0	-	-	-	-	-	-	
21/06/2020	06:06:41	R2_ENV_073	PC	2020	5.5	29.9	209	7.5	gS	Gravelly coarse sand	Light yellow brown (10YR 6/4)	
21/06/2020	08:22:40	R2_ENV_071	PC	2029	5	31.8	203	7.6	S	Coarse sand with shell fragments	Yellow (10YR 8/6)	
21/06/2020	09:11:43	R2_ENV_067	NS	2030	0	-	-	-	-	-	-	
21/06/2020	09:15:24	R2_ENV_067	PC	2031	5.5	32.9	154	7.4	gS	Gravelly coarse sand	Light grey (10YR 7/11)	
21/06/2020	11:32:09	R2_ENV_065	NS	2041	0	-	-	-	-	-	-	
21/06/2020	11:37:00	R2_ENV_065	NS	2042	0	-	-	-	-	-	-	
21/06/2020	11:39:55	R2_ENV_065	NS	2043	0	-	-	-	-	-	-	
21/06/2020	12:45:38	R2_ENV_064	NS	2044	0	-	-	-	-	-	-	

Date	Time [UTC]	Station	Sample	Fix No.	Sample Depth [cm]	Temp [°C]	Redox [mV]	pH	Sediment Description (including stratigraphy)			Comments (fauna, smell, bioturbation, debris)
									Sediment Type	Sediment Description	Munsell colour	
21/06/2020	12:49:21	R2_ENV_064	NS	2045	2	-	-	-	gS	Gravelly coarse sand	Very pale brown (10YR 8/4)	
21/06/2020	12:57:12	R2_ENV_064	NS	2046	5.5	32.1	174	7.6	gS	Gravelly fine sand	-	
24/06/2020	13:27:58	R2_ENV_072	PC	2056	5	29.1	504	6.8	gS	Gravelly coarse sand with shell fragments	Pale yellow (5Y 7/4)	
24/06/2020	05:44:07	R2_ENV_070	PC	2057	3	28.8	393	4.6	gS	Gravelly sand	Pale yellow (5Y 7/4)	
24/06/2020	05:54:05	R2_ENV_070	PC	2058	3	30.8	320	2.4	gS	Gravelly sand	Pale yellow (5Y 7/4)	
24/06/2020	06:00:31	R2_ENV_070	NS	2059	0	-	-	-	-	-	-	
24/06/2020	07:22:31	R2_ENV_069	PC	2068	5	32.0	956	7.5	S	Muddy sand with shell fragments	Light gray (2.5Y 7/2)	
24/06/2020	07:22:31	R2_ENV_069	NS	-	5	-	-	-	-	-	-	
24/06/2020	08:28:55	R2_ENV_068	NS	2070	0	-	-	-	-	-	-	
24/06/2020	08:32:22	R2_ENV_068	NS	2071	0	-	-	-	-	-	-	
24/06/2020	08:39:36	R2_ENV_068	NS	2072	5	31.8	204	7.2	S	Muddy sand with shell fragments	Olive yellow (2.5Y 6/8)	
24/06/2020	10:23:50	R2_ENV_066	PC	2082	6	32.5	802	6.8	gS	Gravelly coarse sand	Olive yellow (2.5Y 6/8)	
24/06/2020	11:11:57	R2_ENV_063	PC	2084	3	32.9	903	7.6	S	Muddy sand	Gray (2.5Y 6/1)	

Date	Time [UTC]	Station	Sample	Fix No.	Sample Depth [cm]	Temp [˚C]	Redox [mV]	pH	Sediment Description (including stratigraphy)			Comments (fauna, smell, bioturbation, debris)
									Sediment Type	Sediment Description	Munsell colour	
24/06/2020	11:20:35	R2_ENV_063	PC	2085	3.5	32.1	857	7.7	S	Muddy sand	Gray (2.5Y 6/1)	
24/06/2020	11:27:24	R2_ENV_063	NS	2086	0	-	-	-	-	-	-	
24/06/2020	13:27:58	R2_ENV_055	PC	2095	< 2	29.8	903	7.8	gS	Gravelly sand with shell fragments	Gray (2.5Y 6/1)	
24/06/2020	14:40:13	R2_ENV_055	PC	2096	4.5	31.1	-1000	7.6	gS	Gravelly sand with shell fragments	Greyish brown (2.5Y 5/2)	
24/06/2020	15:32:53	R2_ENV_056	PC	2097	5	31.2	-1000	6.6	gS	Gravelly coarse sand	Gray (2.5Y 5/1)	
24/06/2020	17:50:20	R2_ENV_057	NS	2106	0	-	-	-	-	-	-	
24/06/2020	17:53:47	R2_ENV_057	NS	2107	0	-	-	-	-	-	-	
24/06/2020	17:57:33	R2_ENV_057	PC	2108	8	31.2	-1000	7.2	gS	Muddy gravelly sand with shell fragments	Light brownish gray (2.5Y 6/2)	
24/06/2020	18:53:59	R2_ENV_058	PC	2110	6	31.9	-1000	6.8	gS	Muddy gravelly sand	Gray (2.5Y 5/1)	Echinoidea
24/06/2020	20:57:01	R2_ENV_059	NS	2118	0	-	-	-	-	-	-	
24/06/2020	21:05:20	R2_ENV_059	NS	2119	0	-	-	-	-	Large calcaronite rock with corals	-	
24/06/2020	21:10:42	R2_ENV_059	NS	2120	< 1	-	-	-	S	Sand	Pale yellow (2.5Y 7/3)	Sand dollar
24/06/2020	22:35:58	R2_ENV_060	NS	2125	0	-	-	-		Sand	Pale yellow (2.5Y 7/3)	

Date	Time [UTC]	Station	Sample	Fix No.	Sample Depth [cm]	Temp [°C]	Redox [mV]	pH	Sediment Description (including stratigraphy)			Comments (fauna, smell, bioturbation, debris)
									Sediment Type	Sediment Description	Munsell colour	
24/06/2020	22:39:11	R2_ENV_060	NS	2126	1	-	-	-	S	Sand	Pale yellow (2.5Y 7/3)	
24/06/2020	22:43:33	R2_ENV_060	NS	2127	< 1	-	-	-	S	Sand	Pale yellow (2.5Y 7/3)	Gastropod
24/06/2020	23:34:53	R2_ENV_061	NS	2130	< 1	-	-	-	gS	Gravelly sand	Light brownish gray (2.5Y 6/2)	
24/06/2020	23:38:10	R2_ENV_061	NS	2131	< 1	-	-	-	gS	Gravelly sand with shell	Light brownish gray (2.5Y 6/2)	
24/06/2020	23:41:00	R2_ENV_061	NS	2132	< 1	-	-	-	gS	Gravelly sand with shell	Light brownish gray (2.5Y 6/2)	
25/06/2020	01:17:06	R2_ENV_062	PC	2140	3.5	30.9	-1000	6.8	mS	Slightly gravelly muddy sand	Light brownish gray (2.5Y 6/2)	
25/06/2020	01:22:58	R2_ENV_062	PC	2141	3.5	31.1	-1000	6.9	mS	Slightly gravelly muddy sand	Light brownish gray (2.5Y 6/2)	
25/06/2020	01:29:47	R2_ENV_062	PC	2142	7	30.8	-1000	6.2	mS	Slightly gravelly muddy sand	Light brownish gray (2.5Y 6/2)	
25/06/2020	03:36:31	R2_ENV_054	NS	2148	< 1	-	-	-	gS	Coarse gravelly sand with patches of coral rubble and shell fragments	-	
25/06/2020	03:41:25	R2_ENV_054	NS	2149	0	-	-	-	-	-	-	
25/06/2020	03:47:05	R2_ENV_054	NS	2150	< 2	-	-	-	gS	Gravelly sand		

Date	Time [UTC]	Station	Sample	Fix No.	Sample Depth [cm]	Temp [˚C]	Redox [mV]	pH	Sediment Description (including stratigraphy)			Comments (fauna, smell, bioturbation, debris)
									Sediment Type	Sediment Description	Munsell colour	
25/06/2020	06:00:42	R2_ENV_053	PC	2183	8	32.5	804	8.6	S	Coarse sand	Gray (2.5Y 6/1)	
25/06/2020	06:34:55	SO_R2_007	NS	-	8	-	-	-	S	Coarse sand	Pink (7.5 YR 7/4)	
25/06/2020	06:44:02	R2_ENV_052	PC	2185	6	32.5	126	7.9	S	Coarse sand	Pink (7.5 YR 7/4)	
25/06/2020	08:20:40	R2_ENV_051	PC	2195	10.5	37.1	25	7.8	sM	Sand with shell fragments	Light brownish gray (10YR 6/2)	
25/06/2020	08:52:48	R2_ENV_050	PC	2196	5	32.4	197	7.4	gS	Sand with shell fragments	Gray (10 YR 6/1)	
25/06/2020	10:15:57	R2_ENV_049	PC	2205	7	31.1	93	7.2	S	Sand with shell fragments	Gray (10 YR 6/1)	
25/06/2020	10:49:20	R2_ENV_048	NS	2206	< 1	-	-	-	S	Sand with coral rubble	-	
25/06/2020	10:53:30	R2_ENV_048	NS	2207	<2	-	-	-	mS	Muddy sand with coral rubble	-	
25/06/2020	10:58:27	R2_ENV_048	PC	2208	3.5	31.8	237	7.1	mS	Gravelly muddy sand with coral rubble	Pink (7.5YR 7/3)	
25/06/2020	12:26:40	R2_ENV_047	PC	2217		35.5	101	7.7	gS	Muddy sand with shell fragments	Brownish yellow (10 YR 6/8)	
25/06/2020	14:33:36	R2_ENV_041	PC	2223	11	31.0	-84	6.5	msG	Gravelly muddy sand	Gley 1 (6/5GY)	
25/06/2020	16:30:46	R2_ENV_040	NS	2231	0	-	-	-	-	-	-	
25/06/2020	16:42:11	R2_ENV_040	PC	2232	14	31.2	-146	7.5	M	Soft mud	Light olive gray (5Y 6/2)	Porifera and bryozoa
25/06/2020	17:43:42	R2_ENV_039	NS	2234	0	-	-	-	-	-	-	

Date	Time [UTC]	Station	Sample	Fix No.	Sample Depth [cm]	Temp [°C]	Redox [mV]	pH	Sediment Description (including stratigraphy)			Comments (fauna, smell, bioturbation, debris)
									Sediment Type	Sediment Description	Munsell colour	
25/06/2020	17:47:46	R2_ENV_039	PC	2235	15	31.1	-106	7.4	msG	Gravelly muddy sand	Gray (5Y 5/1)	
25/06/2020	19:26:22	R2_ENV_038	NS	2240	0	-	-	-	-	-	-	
25/06/2020	19:38:22	R2_ENV_038	NS	2241	0	-	-	-	-	-	-	
25/06/2020	19:42:06	R2_ENV_038	PC	2242	15	30.1	-90	7.6	msG	Gravelly muddy sand	Gray (5Y 5/1)	
25/06/2020	21:34:02	R2_ENV_037	PC	2250	12	31.0	-147	7.6	msG	Gravelly muddy sand	Olive gray (5Y 5/2)	
25/06/2020	22:34:43	R2_ENV_036	PC	2252	10	31.1	-260	7.8	msG	Gravelly muddy sand	Gley 1 (5/10Y)	
25/06/2020	22:46:54	SO_R2_005	PC	-	11	31.1	-273	7.8	msG	Gravelly muddy sand	Gley 1 (5/10Y)	
26/06/2020	00:42:50	R2_ENV_035	NS	2261	0	-	-	-	-	-	-	
26/06/2020	00:51:47	R2_ENV_035	PC	2262	4.5	31.2	-131	7.5	msG	Gravelly muddy sand	Gray (5Y 6/1)	
26/06/2020	00:58:38	R2_ENV_035	PC	2263	1	31.1	-140	7.5	msG	Gravelly muddy sand	Gray (5Y 6/1)	
26/06/2020	04:00:51	R2_ENV_044	PC	2271	8	30.5	132	7.9	mS	Coarse gravelly muddy sand with shell fragments	Brownish yellow (10 YR 6/6)	
26/06/2020	04:00:51	R2_ENV_044	PC	-	17	30.1	-106	7.8	sM	Sandy mud with shell fragments		
26/06/2020	05:44:27	R2_ENV_043	PC	2280	7	32.2	138	7.4	S	Sandy mud with shell fragments	Brown (10 YR 4/3)	
26/06/2020	06:15:23	R2_ENV_042	PC	2281		31.4	-63	8.1	sM	Sandy mud with shell fragments	Gray (2.5Y 6/1)	Bryozoa
26/06/2020	09:07:51	R2_ENV_034	NS	2319	0	-	-	-	-	-	-	

Date	Time [UTC]	Station	Sample	Fix No.	Sample Depth [cm]	Temp [˚C]	Redox [mV]	pH	Sediment Description (including stratigraphy)			Comments (fauna, smell, bioturbation, debris)
									Sediment Type	Sediment Description	Munsell colour	
26/06/2020	09:11:14	R2_ENV_034	PC	2320	5	31.6	93	8.1	S	Coarse sand with mud and shell fragments	Grey (2.5Y 6/3)	
26/06/2020	09:38:49	R2_ENV_033	NS	2321	2	-	-	-	S	Coarse sand with shell fragments	-	
26/06/2020	09:43:11	R2_ENV_033	NS	2322	3	32.1	93	8.1	S	Coarse sand with shell fragments	-	
26/06/2020	09:49:09	R2_ENV_033	NS	2323	2	31.8	71	8.1	S	Coarse sand	Grey (2.5Y 6/3)	
26/06/2020	11:55:56	R2_ENV_032	NS	2333	< 2	-	-	-	S	Coarse sand with shell fragments	-	
26/06/2020	11:50:30	R2_ENV_032	NS	2334	3	32.3	109	7.4	gS	Coarse gravelly sand	Olive yellow (2.5Y 6/6)	
26/06/2020	12:02:34	R2_ENV_032	NS	2335	0				S	Coarse sand		
26/06/2020	12:29:55	R2_ENV_031	PC	2336	11	32.4	-78	8.4	sM	Sandy mud with shell fragments	Greenish grey (Gley 1 6K0Y)	
26/06/2020	14:44:19	R2_ENV_030	PC	2341	11	31.8	30	8	(g)mS	Gravelly muddy sand	Gray (5Y 5/1)	
26/06/2020	17:36:45	R2_ENV_029	PC	2349	6	31.0	-47	7.6	(g)mS	Gravelly muddy sand	Gray (5Y 5/1)	
26/06/2020	18:48:41	R2_ENV_028	NS	2352	0	-	-	-	-	-	-	
26/06/2020	18:58:37	R2_ENV_028	NS	2353	0	-	-	-	-	-	-	
26/06/2020	19:03:45	R2_ENV_028	NS	2354	0	-	-	-	-	-	-	

Date	Time [UTC]	Station	Sample	Fix No.	Sample Depth [cm]	Temp [˚C]	Redox [mV]	pH	Sediment Description (including stratigraphy)			Comments (fauna, smell, bioturbation, debris)
									Sediment Type	Sediment Description	Munsell colour	
26/06/2020	19:09:42	SO_R2_004	PC	-	4	28.8	-228	7.6	(g)mS	Gravelly muddy sand	Gray (5Y 5/1)	
26/06/2020	19:23:19	R2_ENV_028	NS	2356	0	-	-	-	-	-	-	
26/06/2020	19:27:57	R2_ENV_028	PC	2357	9.5	31.0	-238	7.6	(g)mS	Gravelly muddy sand	Gray (5Y 5/1)	
26/06/2020	20:47:28	R2_ENV_027	NS	2362	0	-	-	-	-	-	-	
26/06/2020	20:52:30	R2_ENV_027	PC	2363	11	30.9	-215	7.6	(g)mS	Gravelly muddy sand	Gray (5Y 5/1)	
26/06/2020	22:46:10	R2_ENV_026	PC	2371	3	31.1	-240	7.6	(g)mS	Slightly gravelly muddy sand	Gray (5Y 5/1)	
26/06/2020	22:52:21	R2_ENV_026	PC	2372	3.	29.8	-243	7.6	(g)sM	Slightly gravelly muddy sand	Gray (5Y 5/1)	
26/06/2020	22:57:02	R2_ENV_026	NS	2373	0	-	-	-	-	Empty grab		
26/06/2020	22:57:02	R2_ENV_026	NS	2374	0	-	-	-	-	Empty grab		
26/06/2020	23:35:29	R2_ENV_025	PC	2376	4.5	29.9	-32	7.8	mS	muddy sand	Gley 1 (5/10GY)	
27/06/2020	00:54:51	R2_ENV_024	PC	2381	6	30.5	6	7.7	S	Medium sand with shell fragments	Gley 1 (5/10Y)	
27/06/2020	03:11:01	R2_ENV_023	PC	2390	4	32.1	109	7.8	S	Coarse sand with shell fragments	Yellow (2.5Y 8/8)	
27/06/2020	03:23:55	R2_ENV_023	NS	2391	0	-	-	-	-	-	-	
27/06/2020	03:18:55	R2_ENV_023	NS	2392	0	-	-	-	-	-	-	
27/06/2020	04:20:59	R2_ENV_015	PC	2393	11	30.5	-120	8.4	sM	Sandy mud	Gley (6/10Y)	

Date	Time [UTC]	Station	Sample	Fix No.	Sample Depth [cm]	Temp [˚C]	Redox [mV]	pH	Sediment Description (including stratigraphy)			Comments (fauna, smell, bioturbation, debris)
									Sediment Type	Sediment Description	Munsell colour	
27/06/2020	06:00:31	R2_ENV_013	NS	2402	4	31.5	39	8.1	mS	Muddy sand	-	
27/06/2020	06:09:45	R2_ENV_013	NS	2403	4	31.7	25	8.0	S	Coarse muddy sand	-	
27/06/2020	06:19:06	R2_ENV_013	PC	2404	5	31.9	48	8.1	S	Coarse muddy sand	-	
27/06/2020	08:44:26	SO_R2_002	PC	-	5	-	-	-	S	Coarse muddy sand	Brown (2.5Y 7/3)	
27/06/2020	08:33:30	R2_ENV_012	PC	2426	5	32.7	78	8.1	S	Coarse muddy sand	Brown (2.5Y 7/3)	
27/06/2020	09:20:34	R2_ENV_011	PC	2428	9	32.1	-39	7.8	mS	Muddy sand with coral rubble	Dark gray (2.5Y 4/1)	
27/06/2020	10:55:19	R2_ENV_010	PC	2437	7	26.4	102	8.1	mS	Muddy sand	-	
27/06/2020	11:35:52	R2_ENV_009	NS	2438	4	35.8	-223	7.8	mS	Muddy sand	-	Seagrass
27/06/2020	11:44:45	R2_ENV_009	PC	2439	10	35.3	-98	7.8	mS	Coarse muddy sand with shell fragments	Light brownish gray (2.5Y 6/2)	Anoxic layer (2-8cm)
27/06/2020	13:48:20	R2_ENV_014	PC	2449	14	35.5	-223	6.9	sM	Sandy mud with shell fragments	Gray (5GY/2)	
27/06/2020	14:30:48	R2_ENV_016	PC	2450	11	31.3	-177	7.7	(g)mS	Slightly gravelly muddy sand	Gray (5Y 5/1)	
27/06/2020	16:55:22	R2_ENV_017	PC	2459	14	31.6	-230	7.3	M	Mud	Gray (5Y 5/1)	
27/06/2020	17:53:58	R2_ENV_018	PC	2461	15	31.6	-299	7.6	M	Mud	Gley 1 (6/10Y)	
27/06/2020	20:05:55	R2_ENV_019	PC	2469	6	31.2	-26	7.7	gmS	Gravelly muddy sand	Gley 1 (5/10GY)	

Date	Time [UTC]	Station	Sample	Fix No.	Sample Depth [cm]	Temp [°C]	Redox [mV]	pH	Sediment Description (including stratigraphy)			Comments (fauna, smell, bioturbation, debris)
									Sediment Type	Sediment Description	Munsell colour	
27/06/2020	21:06:24	R2_ENV_020	PC	2471	6	31.6	-40	7.8	(g)mS	Slightly muddy gravelly sand	Gray (5Y 5/1)	
27/06/2020	21:18:20	SO_R2_003	PC	-	6	30.8	-36	7.8	(g)mS	Slightly muddy gravelly sand	Gray (5Y 5/1)	
27/06/2020	23:06:28	R2_ENV_021	NS	2481	0	-	-	-	-	-	-	
27/06/2020	23:17:12	R2_ENV_021	PC	2482	5	30.6	-40	7.5	gmS	Gravelly muddy sand	Dark gray (5Y 4/1)	
28/06/2020	00:09:25	R2_ENV_022	PC	2484	1	30.7	-199	7.4	sM	Sandy mud	2 Gray (2.5Y 6/1)	
28/06/2020	08:57:51	R2_ENV_101	NS	2515	< 1	-	-	-	S	Coarse sand	-	
28/06/2020	09:04:07	R2_ENV_101	NS	2516	< 1	-	-	-	S	Coarse sand	-	
28/06/2020	09:08:41	R2_ENV_101	PC	2517	1	-	-	-	S	Coarse sand	-	
28/06/2020	09:57:00	SO_R2_014	PC	-	5	-	-	-	gS	Coarse gravelly sand	Yellow (10YR 7/6)	
28/06/2020	10:14:18	R2_ENV_108	NS	2519	0	-	-	-	S	Coarse sand	-	
28/06/2020	10:22:59	R2_ENV_108	PC	2520	1	-	-	-	gS	Coarse gravelly sand	-	
28/06/2020	10:27:06	R2_ENV_108	NS	2521	0	-	-	-	-	-	-	
28/06/2020	11:57:59	R2_ENV_109	PC	2530	5	30.5	89	8.2	gS	Coarse sand with gravel	Light yellowish brown (2.5Y 6/4)	
28/06/2020	12:44:31	R2_ENV_110	NS	2531	0	-	-	-	-	-	-	
28/06/2020	12:39:32	R2_ENV_110	PC	2532	5	31.5	38	8.2	gS	Coarse gravelly sand	Brownish yellow (10 YR 6/6)	

Date	Time [UTC]	Station	Sample	Fix No.	Sample Depth [cm]	Temp [˚C]	Redox [mV]	pH	Sediment Description (including stratigraphy)			Comments (fauna, smell, bioturbation, debris)
									Sediment Type	Sediment Description	Munsell colour	
28/06/2020	14:50:15	R2_ENV_111	NS	2538	0	-	-	-	-	-	-	
28/06/2020	15:19:12	R2_ENV_111	PC	2540	9	31.6	-162	8.0	gS	Coarse gravelly sand with shell fragments	Light gray (10YR 7/2)	
28/06/2020	17:01:29	R2_ENV_112	PC	2547	6	30.7	55	7.8	gS	Coarse gravelly sand with shell fragments	Very pale brown (10 YR 7/3)	
28/06/2020	18:05:29	R2_ENV_113	PC	2549	6	29.8	71	7.8	gS	Gravelly coarse sand with shell fragments	Grey (2.5Y 6/3)	
28/06/2020	20:07:00	R2_ENV_105	PC	2557	1.5	-	-	-	S	Coarse sand with shell fragments	Light gray (2.5Y 7/2)	
28/06/2020	20:12:18	R2_ENV_105	PC	2558	1	-	-	-	S	Coarse sand with shell fragments	Light gray (2.5Y 7/2)	
28/06/2020	20:17:34	R2_ENV_105	PC	2559	2.5	-	-	-	S	Coarse sand with shell fragments	Light gray (2.5Y 7/2)	
28/06/2020	21:09:59	R2_ENV_106	PC	2561	6	29.9	86	7.6	S	Sand	Light gray (2.5Y 7/2)	
28/06/2020	23:07:53	R2_ENV_107	PC	2569	5.5	30.0	112	7.9	S	Sand with coral rubble	-	Echinoidea
29/06/2020	03:23:57	R2_ENV_134	PC	2580	12	30.0	-139	7.7	M	Mud	Gley 1 (5/5GY)	
29/06/2020	03:39:44	R2_ENV_134	PC	2581	4	30.1	104	8.1	gmS	Gravelly silty sand with shell fragments	Gley 1 (4/N Grey)	
29/06/2020	03:48:09	R2_ENV_134	PC	2582	4	30.2	89	6.2	gmS	Gravelly silty sand with shell fragments	Gley 1 (4/N Grey)	

Date	Time [UTC]	Station	Sample	Fix No.	Sample Depth [cm]	Temp [°C]	Redox [mV]	pH	Sediment Description (including stratigraphy)			Comments (fauna, smell, bioturbation, debris)
									Sediment Type	Sediment Description	Munsell colour	
29/06/2020	03:23:57	R2_ENV_134	NS	-	0	-	-	-	-	-	-	
29/06/2020	05:56:36	R2_ENV_133	PC	2607	4	31.8	204	7.5	gS	Gravelly sand	-	
29/06/2020	06:04:42	R2_ENV_133	PC	2608	4	32.4	212	7.8	gS	Gravelly sand	-	
29/06/2020	06:12:48	R2_ENV_133	NS	2609	4	-	-	-	-	-	-	
29/06/2020	06:37:33	R2_ENV_131	PC	2610	9	30.4	74	6.2	mS	Muddy sand with shell fragments	Dark gray (2.5Y 4/1)	
29/06/2020	08:18:02	SO_R2_017	PC	-	5	27.8	98	8.3	gS	Gravelly coarse sand	Pinkish gray (7.5YR 6/2)	
29/06/2020	09:05:48	R2_ENV_130	PC	2622	5	27.2	11	8.3	gS	Gravelly coarse sand	Pinkish gray (7.5YR 6/2)	
29/06/2020	09:05:48	R2_ENV_130	PC	-	9.5	32.6	-195	7.8	gmS	Gravelly silty fine sand with shell fragments	Greyish brown (10YR 5/2)	
29/06/2020	10:29:17	R2_ENV_129	PC	2631	11	27.8	-198	7.8	sM	Sandy mud with shell fragments	Gley 1 (6/N grey)	
29/06/2020	11:07:31	R2_ENV_128	PC	2632	11	30.4	-146	7.9	sM	Sandy mud with shell fragments	Gley 1 (6/N grey)	
29/06/2020	12:29:25	R2_ENV_127	PC	2641	12.5	29.8	-114	7.8	sM	Mud/clay with sand	Gley 1 (4/N dark grey)	
29/06/2020	15:25:29	R2_ENV_125	PC	2680	11	29.8	-107	7.8	sM	Mud/clay with sand	Gley 1 (4/10Y)	
29/06/2020	16:19:56	R2_ENV_124	PC	2682	11	30.0	-280	7.4	sM	Mud/clay with sand	Gley 1 (5/10Y)	

Date	Time [UTC]	Station	Sample	Fix No.	Sample Depth [cm]	Temp [°C]	Redox [mV]	pH	Sediment Description (including stratigraphy)			Comments (fauna, smell, bioturbation, debris)
									Sediment Type	Sediment Description	Munsell colour	
29/06/2020	16:37:24	SO_R2_016	PC	-	12	30.2	-274	7.4	sM	Mud/clay with sand	Gley 1 (5/10Y)	
29/06/2020	18:24:01	R2_ENV_123	PC	2691	3	30.2	65	8.1	S	Coarse sand with shell fragments	Light brown (7.5YR 6/4)	
29/06/2020	18:32:01	R2_ENV_123	NS	2692	1.5	-	-	-	S	Coarse sand with shell fragments	Light brown (7.5YR 6/4)	
29/06/2020	18:38:26	R2_ENV_123	PC	2693	3.5	29.9	70	8.0	S	Coarse sand with shell fragments	Light brown (7.5YR 6/4)	
29/06/2020	20:33:35	R2_ENV_122	PC	2697	6	29.3	-204	7.7	gmS	Gravelly muddy sand	Gray (10YR 5/1)	
29/06/2020	22:58:44	R2_ENV_121	NS	2706	8	30.3	-231	7.6	sM	Sandy mud with shell fragments	Gley 1 (5/10Y)	
29/06/2020	23:05:21	R2_ENV_121	PC	2707	10	30.1	-240	7.7	mS	Muddy sand with shell fragments	Gley 1 (5/10Y)	
30/06/2020	00:10:31	R2_ENV_120	PC	2710	7	31.3	-106	7.7	mS	Muddy sand with shell fragments	Gley 1 (5/10Y)	
30/06/2020	01:20:06	R2_ENV_119	PC	2715	10	31.6	-211	7.7	mS	Muddy sand with shell fragments	Gley 1 (5/10Y)	
30/06/2020	03:14:47	R2_ENV_118	PC	2725	8	29.7	-93	7.8	sM	Sandy mud with shell fragments	Greyish olive (10Y 5/2)	
30/06/2020	04:05:21	R2_ENV_117	PC	2726	5	29.2	14	7.6	mS	Muddy sand with shell fragments	-	Paguridae

Date	Time [UTC]	Station	Sample	Fix No.	Sample Depth [cm]	Temp [°C]	Redox [mV]	pH	Sediment Description (including stratigraphy)			Comments (fauna, smell, bioturbation, debris)
									Sediment Type	Sediment Description	Munsell colour	
30/06/2020	06:30:48	R2_ENV_116	PC	2778	5	30.1	191	7.6	mS	Muddy sand with shell fragments	-	
30/06/2020	06:38:22	SO_R2_015	PC	2779	4	-	-	-	-	-	-	
30/06/2020	06:42:24	SO_R2_015	PC	2780	4	-	-	-	-	-	-	
30/06/2020	07:14:17	R2_ENV_114	PC	2781	2	29.9	12	8.2	gS	Gravelly coarse sand	Pale yellow (2.5Y 8/4)	
30/06/2020	07:19:34	R2_ENV_114	NS	2782	1	-	-	-	-	-	-	
30/06/2020	07:22:09	R2_ENV_114	NS	2783	1	-	-	-	-	-	-	
30/06/2020	09:06:07	R2_ENV_115	PC	2792	6	31.5	104	8.2	gS	Coarse gravelly sand with shell fragments	Light brown (7.5YR 6/4)	
30/06/2020	10:35:24	R2_ENV_104	NS	2793	1	-	-	-	gS	Gravelly sand	-	
30/06/2020	10:35:24	R2_ENV_104	NS	2794	1	-	-	-	gS	Gravelly sand	-	
30/06/2020	10:42:42	R2_ENV_104	NS	2795	1	-	-	-	gS	Coarse gravelly sand	-	
30/06/2020	12:10:21	R2_ENV_103	PC	2805	5	32.8	116	8.0	gS	Coarse gravelly sand	Light yellowish brown (10YR 6/4)	

Notes
UTC = Coordinated Universal Time
PC = Physico-chemical sample
NS = No sample

C.3 Video and Photographic Log

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East												
Date	Transect	Video File	Time [UTC]	Video Coordinates		Length [m]	Still Nos.	Sediment Description	Fauna/Bioturbation/Debris	Soft Coral Cover	Hard Coral Cover	Seagrass
				Easting [m]	Northing [m]							
27/06/2020	TR01	E0395_R2_TR01	10:58:22	651 888.97	2 680 252.10	129	15	Sand with shell fragment deposits	Seagrass (possible *Halophila stipulacea* and *Halophila ovalis* complex), hermit crabs (*Paguridae*), branching sponge (Porifera), fanshells (*Pinna muricata*), sand dollar (Clypeasteroidea), goatfish (Mullidae), goby (*Cryptocentrus sp.*), faunal burrows	No coral (< 1 %)	No coral (< 1 %)	Seagrass bed 10 %)
			11:08:09	651 761.85	2 680 274.46							
28/06/2020	TR02	E0395_R2_TR02	06:58:26	651 353.51	2 688 485.86	74	12	Sand with shell and coral rubble fragments	Fanshells (*Pinna muricata*), peal oyster (*Pinctada* sp.), Hammer oysters (*Malleus* sp.), encrusting sponge (Porifera), sand dollar (Clypeasteroidea), sea urchins (*Echinometra mathei*), worm tubes (Polychaeta), dorid nudibranch (Nudibranchia), goby (Gobiidae), hydroid (Hydrozoa), green seaweed (*Avrainvillea amadelpha*), coralline algae (Corallinales), algal turf, goby (*Cryptocentrus* sp.), cardinal fish (Apogonidae)	No coral (< 1 %)	No coral (< 1 %)	No seagrass (< 1 %)
			07:03:55	651 302.95	2 688 539.49							
			07:03:55	651 302.95	2 688 539.49	57	8	Sand with shell and coral rubble fragments	Seagrass (*Halophila ovalis* and *Halophila stipulacea*), hydroids (Hydrozoa), fanshells (*Pinna muricata*), pearl oysters (*Pinctada* sp.), starfish (Asteroidea), hermit crabs (Paguridae), gobies (*Cryptocentrus* sp., *Amblygobius* sp.), yellowstripe scads (*Selaroides leptolepis*), coralline algae (Corallinales), faunal burrows	No coral (< 1 %)	No coral (< 1 %)	Seagrass bed 10 %)
			07:08:23	651 263.90	2 688 581.44							

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East

Date	Transect	Video File	Time [UTC]	Video Coordinates Easting [m]	Video Coordinates Northing [m]	Length [m]	Still Nos.	Sediment Description	Fauna/Bioturbation/Debris	Soft Coral Cover	Hard Coral Cover	Seagrass
26/06/2020	TR03	E0395_R2_TR03	11:20:32	639 754.45	2 704 942.66	83	17	Gravelly sand with shell fragments and coral rubble veneer overlying calcarenite. Occasional calcarenite outcrops	Ascidian (*Phallusia nigra*), hydroids (Hydrozoa), gorgonian coral (Alcyonacea), branching sponge/ascidian (Porifera/Tunicata, ?*Didemnum* sp.), bryozoan (Bryozoa), worm tubes (Polychaeta), algal turf (including Rhodophyta and Chlorophyta), coralline algae (Corallinales), sordid rubberlip (?*Plectorhinchus sordidus*), yellow spotted trevally (*Carangoides fulvoguttatus*), faunal burrows	No coral (< 1 %)	No coral (< 1 %)	No seagrass (< 1 %)
			11:27:49	639 671.90	2 704 951.72							
			11:27:49	639 671.90	2 704 951.72	15	4	Calcarenite outcrops with gravelly sand, shell fragments and coral rubble veneer	Gorgonian coral (Plexauridae), sea whip (*Junceella juncea*), ascidian (*Phallusia nigra*), branching sponge/ascidian (Porifera/Tunicata, ?*Didemnum* sp.), encrusting sponges (Porifera), hydroids (Hydrozoa), worm tubes (Polychaeta), brittlestar (*Ophiotela* sp.), long spined sea urchins (*Diadema* sp.), algal turf (including Rhodophyta and Chlorophyta), coralline algae (Corallinales), yellowstripe scad (*Selaroides leptolepis*), unidentified fish (Pisces), faunal burrows, anthropogenic debris	Low coral (1 to 10 %)	No coral (< 1 %)	No coral (< 1 %)
			11:28:55	639 657.27	2 704 953.92							

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East												
Date	Transect	Video File	Time [UTC]	Video Coordinates		Length [m]	Still Nos.	Sediment Description	Fauna/Bioturbation/Debris	Soft Coral Cover	Hard Coral Cover	Seagrass
				Easting [m]	Northing [m]							
			11:28:55	639 657.27	2 704 953.92	30	5	Gravelly sand with shell fragments and coral rubble veneer overlying calcarenite. Occasional calcarenite outcrops	Ascidian (*Phallusia nigra*), encrusting hydroids (Hydrozoa), encrusting sponges (Porifera), algal turf (including Rhodophyta and Chlorophyta), goby (Gobiidae), faunal burrows, anthropogenic debris	No coral (< 1 %)	No coral (< 1 %)	No seagrass (< 1 %)
			11:31:22	639 627.55	2 704 958.51							
			11:31:22	639 627.55	2 704 958.51	83	17	Gravelly sand with shell fragments and coral rubble veneer overlying calcarenite. Occasional calcarenite outcrops	Ascidian (*Phallusia nigra*), hydroids (Hydrozoa), gorgonian coral (Alcyonacea), branching sponge/ascidian (Porifera/Tunicata, ?*Didemnum* sp.), bryozoan (Bryozoa), worm tubes (Polychaeta), algal turf (including Rhodophyta and Chlorophyta), coralline algae (Corallinales), sordid rubberlip (?*Plectorhinchus sordidus*), yellow spotted trevally (*Carangoides fulvoguttatus*), faunal burrows	No coral (< 1 %)	No coral (< 1 %)	No seagrass (< 1 %)
			11:33:03	639 605.79	2 704 959.63							
25/06/2020	TR04	E0395_R2_TR04	09:01:44	645 620.05	2 716 714.88	24	5	Calcarenite with veneer of sand, shell fragments and coral outcrop	Boulder corals (Faviidae, Coscinaraeidae), plate coral (*Turbinaria* sp.), sea urchins (*Echinometra mathei*), long spined sea urchins (*Diadema* sp.), sand dollar (*Clypeaster* sp.), ascidian (*Phallusia nigra*), branching sponges (Porifera), bivalves (Bivalvia), pearl oysters (*Pinctada* sp.), starfish (Asteroidea), peacock weed (*Padina boergesenil*), macroalgae, algal turf (Chlorophyta), unidentified fish (Pisces)	No coral (< 1 %)	Low coral (1 to 10 %)	No seagrass (< 1 %)
			09:03:14	645 630.80	2 716 693.85							

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East

Date	Transect	Video File	Time [UTC]	Video Coordinates		Length [m]	Still Nos.	Sediment Description	Fauna/Bioturbation/Debris	Soft Coral Cover	Hard Coral Cover	Seagrass
				Easting [m]	Northing [m]							
			09:03:14	645 630.80	2 716 693.85	8	3	Calcarenite with veneer of sand, shell fragments and coral outcrop	Boulder corals (Faviidae, *Favia* sp.), finger corals (*Porites* sp.), plate coral (*Turbinaria* sp.), branching sponges (Porifera), sea urchins (*Diadema* sp.), whip corals (*Junceella juncea*), hydroids (Hydrozoa), sand dollar (*Clypeaster* sp.), algal turf (Chlorophyta), grouper (Serranidae)	No coral (0 %)	Moderate coral (10 to 50 %)	No seagrass (< 1 %)
			09:03:50	645 635.18	2 716 686.71							
			09:03:50	645 635.18	2 716 686.71	47	8	Calcarenite with veneer of sand, shell fragments and coral outcrop	Boulder corals (Faviidae), plate coral (*Turbinaria* sp.), branching sponges (Porifera), long spined sea urchins (*Diadema sp.*), sand dollar (Clypeasteroidea), hydroids (Hydrozoa), ascidian (*Phallusia nigra*), pearl oysters (*Pinctada* sp.), macroalgae, algal turf (Cholophyta), unidentified fish (Pisces), faunal burrows, anthropogenic debris	No coral (< 1 %)	Low coral (1 to 10 %)	No seagrass (< 1 %)
			09:06:56	645 660.57	2 716 646.73							
			09:06:56	645 660.57	2 716 646.73	54	12	Calcarenite outcrop with veneer of sand and shell fragments	Boulder corals (Faviidae), plate coral (*Turbinaria* sp.), whip coral (*Junceella juncea*), branching coral (?*Pocillopora* sp.), branching sponges (Porifera), hydroids (Hydrozoa), long spined sea urchins (*Diadema* sp.), brittlestar (*Ophiothela* sp.), ascidian (*Phallusia nigra*), nudibranch (Nudibranchia), faunal burrows, peacock weed (*Padina boergesenil*), algal turf (Cholophyta), yellowband angel fish (*Pomacanthus maculosus*), sordid rubberlip (*Plectorhinchus sordidus*),	No coral (< 1 %)	No coral (< 1 %)	No seagrass (< 1 %)
			09:10:20	645 687.81	2 716 600.51							

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East

Date	Transect	Video File	Time [UTC]	Video Coordinates		Length [m]	Still Nos.	Sediment Description	Fauna/Bioturbation/Debris	Soft Coral Cover	Hard Coral Cover	Seagrass
				Easting [m]	Northing [m]							
									pearly goatfish (*Parupeneus margaritatus*)			
21/06/2020	TR05	E0395_R2_TR05	05:12:14 05:13:29	664 454.28 664 442.64	2 732 103.29 2 732 096.64	13	2	Gravelly sand with shell fragments deposits	Seagrass (*possible Halophila stipulacea* and *Halophila ovalis complex*), encrusting sponge (Porifera), pearl oysters (*Pinctada* sp.), starfish (Asteroidea), conid shell (Conidae), algal turf, file fish (Monacanthidae)	No coral (< 1 %)	No coral (< 1 %)	Seagrass bed 10 %)
			05:13:29 05:14:39	664 442.64 664 432.28	2 732 096.64 2 732 088.86	13	3	Sand with shell fragments and coral rubble veneer overlying calcarenite outcrop	Seagrass (*Halophila ovalis*), gorgonian (?*Euplexaura* sp.), pearl oysters (*Pinctada* sp.), ascidian (*Phallusia nigra*), encrusting sponges/ascidians (Porifera/ Tunicata), sea urchins (*Echinometra mathei*), hermit crabs (Paguridae), coralline algae (Corallinales), yellowstripe scad (*Selaroides leptolepis*), unidentified fish (Pisces)	No coral (< 1 %)	No coral (< 1 %)	Low seagrass cover (1 to 10 %)
			05:14:39 05:14:52	664 432.28 664 430.76	2 732 088.86 2 732 087.61	2	0	Calcarenite outcrop with veneer of sand and shell fragments	Plate coral (Scleractinia), pearl oysters (*Pinctada* sp.), encrusting sponge (Porifera), (peacock weed (*Padina boergesenil*), algal turf, cardinal fish (Apogonidae)	No coral (< 1 %)	No coral (< 1 %)	No seagrass (< 1 %)
			05:14:52 05:15:44	664 430.76 664 424.11	2 732 087.61 2 732 083.43	8	2	Sand with shell fragments and occasional coral rubble	Patches of seagrass (*Halophila ovalis*), pearl oysters (*Pinctada sp.*), ascidian (*Phallusia nigra*)	No coral (< 1 %)	No coral (< 1 %)	Low seagrass cover (1 to 10 %)

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East

Date	Transect	Video File	Time [UTC]	Video Coordinates		Length [m]	Still Nos.	Sediment Description	Fauna/Bioturbation/Debris	Soft Coral Cover	Hard Coral Cover	Seagrass
				Easting [m]	Northing [m]							
			05:15:44	664 424.11	2 732 083.43	62	7	Gravelly sand with shell deposits	Seagrass (*Halophila ovalis* and *Halophila stipulacea*), hermit crabs (Paguridae), pearl oysters (*Pinctada* sp.), fanshell (*Pinna muricata*), hydroids (Hydrozoa), red algae (Rhodophyta), mojarra fish (Gerreidae), goby (Gobiidae), unidentified fish (Pisces)	No coral (< 1 %)	No coral (< 1 %)	Seagrass bed 10 %)
			05:21:46	664 371.95	2 732 049.91							
			05:21:46	664 371.95	2 732 049.91	47	6	Gravelly sand with shell fragments and coral rubble veneer overlying calcarenite. Occasional calcarenite outcrops	Seagrass (*Halophila ovalis* and *Halophila stipulacea*), sea whip (*Junceella juncea*), gorgonians (Alcyonacea including *Euplexaura* sp., ?*Menella* sp.), faunal turf (Bryozoa/Hydrozoa), epiphytic branching sponges/ascidians (Porifera/Ascidiacea), sponges (Porifera), hard coral (?*Siderastrea* sp.), ascidian (*Phallusia nigra*), brittlestars (*Ophiothela* sp.), hermit crabs (Paguridae), faunal burrows	No coral (< 1 %)	No coral (< 1 %)	Low seagrass cover (1 to 10 %)
			05:26:20	664 333.04	2 732 024.21							
			05:26:20	664 333.04	2 732 024.21	27	2	Gravelly sand with shell fragments and occasional coral rubble	Seagrass (*Halophila ovalis*), sea whip (Alcyonacea), sordid rubberlip (*Plectorhinchus sordidus*), ascidian (*Phallusia nigra*), starfish (Asteroidea), hermit crab (Paguridae)	No coral (< 1 %)	No coral (< 1 %)	Low seagrass cover (1 to 10 %)
			05:28:41	664 310.31	2 732 010.44							
20/06/2020	TR06	E0395_R2_TR06	12:14:10	668 619.43	2 742 737.47	67	16	Gravelly sand with shell deposits	Seagrass (*Halophila stipulacea* and possible *Halophila ovalis*), fanshell (*Pinna muricata*), brown algae	No coral (< 1 %)	No coral (< 1 %)	Seagrass bed 10 %)

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East												
Date	Transect	Video File	Time [UTC]	Video Coordinates		Length [m]	Still Nos.	Sediment Description	Fauna/Bioturbation/Debris	Soft Coral Cover	Hard Coral Cover	Seagrass
				Easting [m]	Northing [m]							
			12:19:07	668 684.10	2 742 756.71				(*Canistrocarpus* sp.), possible ascidian (Tunicata), encrusting sponge (Porifera), gobies (*Cryptocentrus* sp., *Amblygobius* sp.), yellowstripe scad (*Selaroides leptolepis*), faunal burrows			
			12:19:07	668 684.10	2 742 756.71	61	7	Gravelly sand with shell deposits	Ascidian (*Phallusia nigra*), possible hard corals (Scleractinia), faunal turf (Hydrozoa/Bryozoa), green algae (Chlorophyta), faunal burrows, gobies (Gobiidae including *Valenciennea* sp., *Cryptocentrus* sp.), cardinal fish (Apogonidae)	No coral (< 1 %)	No coral (< 1 %)	No seagrass (< 1 %)
			12:23:47	668 741.87	2 742 775.06							
21/06/2020	TR07	E0395_R2_TR07	09:18:35	681 009.95	2 763 485.76	175	42	Sandy gravel with shell deposits	Fanshell (*Pinna muricata*), sea anemone (Actinaria), tube-dwelling anemone (Ceriantharia), gorgonian (Alcyonacea), sponge (Porifera), hydroids (Hydrozoa), hermit crabs (Paguridae), faunal burrow and tracks, gobies (Gobiidae including *Valenciennea* sp.), yellowstripe scad (*Selaroides leptolepis*), unidentified fish (Pisces)	No coral (< 1 %)	No coral (< 1 %)	No seagrass (< 1 %)
			09:35:19	680 858.75	2 763 397.79							
22/06/2020	TR08	E0395_R2_TR08	17:17:00	685 067.00	2 771 163.46	132	32	Slightly gravelly sand with shell fragments	Hydroids (Hydrozoa), ascidian (*Phallusia nigra*), hermit crabs (Paguridae), goby (*Cryptocentrus* sp.), faunal tubes, faunal burrows	No coral (< 1 %)	No coral (< 1 %)	No seagrass (< 1 %)
			17:30:00	685 131.14	2 771 279.23							

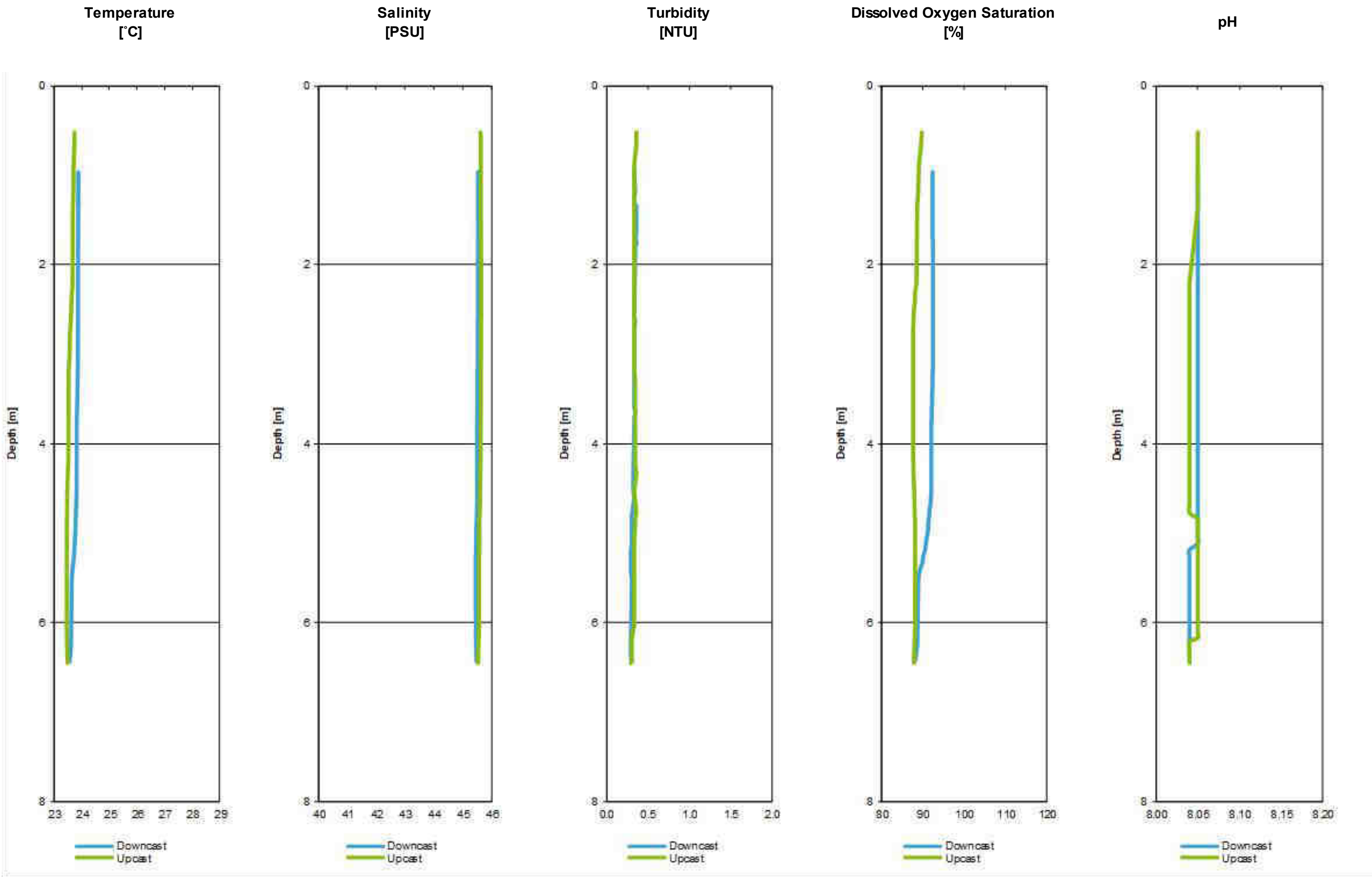
Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East

Date	Transect	Video File	Time [UTC]	Video Coordinates		Length [m]	Still Nos.	Sediment Description	Fauna/Bioturbation/Debris	Soft Coral Cover	Hard Coral Cover	Seagrass
				Easting [m]	Northing [m]							
23/06/2020	TR09	E0395_R2_TR09	08:54:51	687 819.75	2 779 036.95	130	20	Gravelly sand with shell deposits	Hermit crabs (Paguridae), ascidian (*Phallusia nigra*), goby (*Cryptocentrus sp.*), faunal burrows and tracks	No coral (< 1 %)	No coral (< 1 %)	No seagrass (< 1 %)
			09:05:12	687 702.28	2 778 981.25							
24/06/2020	TR10	E0395_R2_TR10	13:11:15	671 071.75	2 743 317.70	123	24	Gravelly sand with shell fragments and coral rubble veneer overlying calcarenite. Occasional calcarenite outcrops	Boulder corals (Faviidae, *Favia* sp.), finger corals (*Porites* sp.), encrusting coral (?*Siderastrea* sp.), gorgonian (Alcyonacea), sea urchins (*Echinometra mathei*), long spined sea urchins (*Diadema* sp.), pearl oysters (*Pinctada sp.*), hammer oysters (*Malleus* sp.), ascidians (Ascidiacaea, ?*Didemnum* sp.), ascidian (*Phallusia nigra*), hydroids (Hydrozoa), encrusting sponges (Porifera), coralline algae (Corallinales), algal turf (Chlorophyta), yellow fin hind (*Cephalopholis hemistiktos*), arabian monacle bream (*Scolopsis ghanam*)	No coral (< 1 %)	Low coral (1 to 10 %)	No seagrass (< 1 %)
			13:20:26	670 978.13	2 743 397.80							

Notes
UTC = Coordinated Universal Time

D. Water Column Profiles

Station R2_ENV_001



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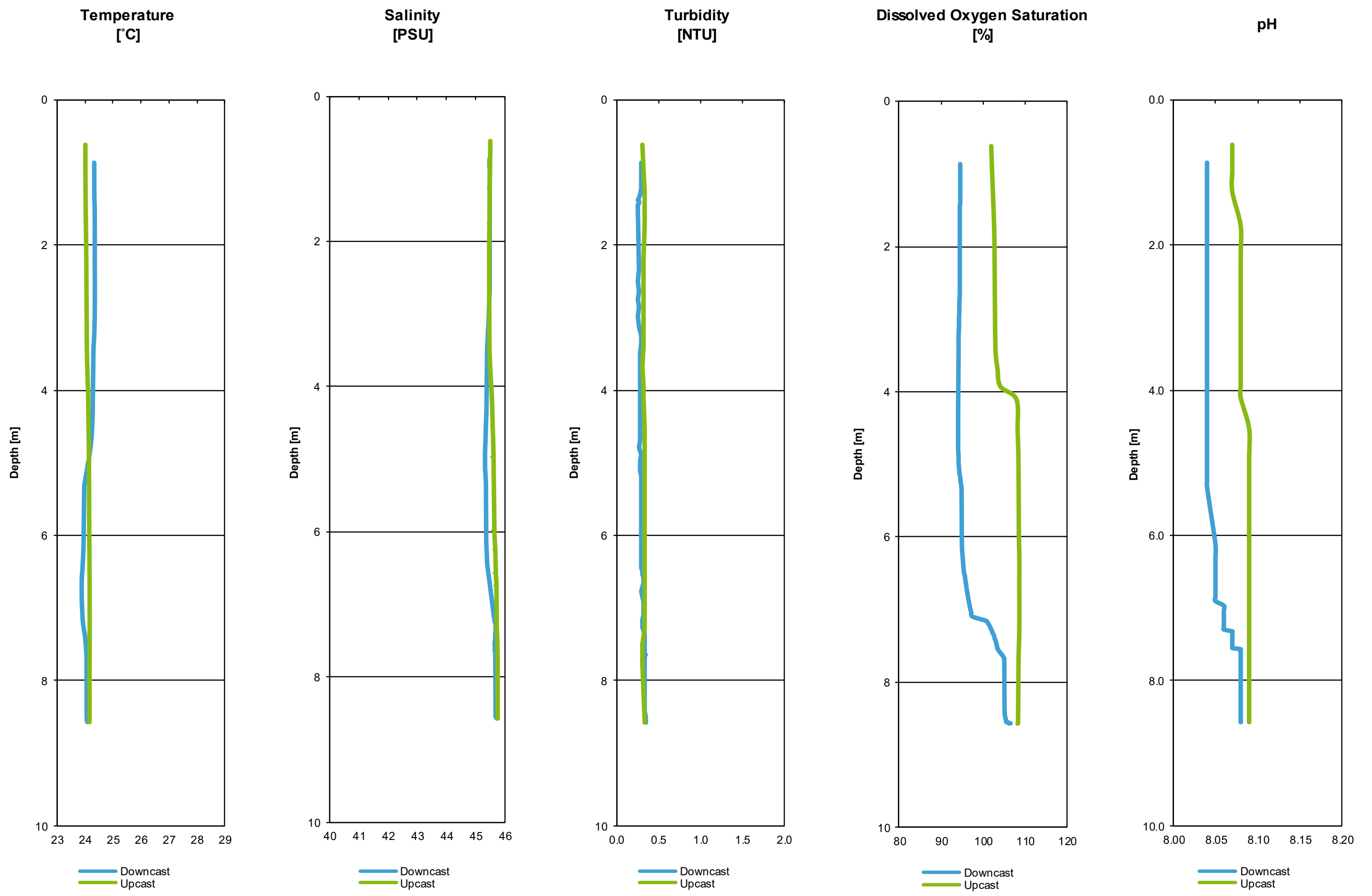

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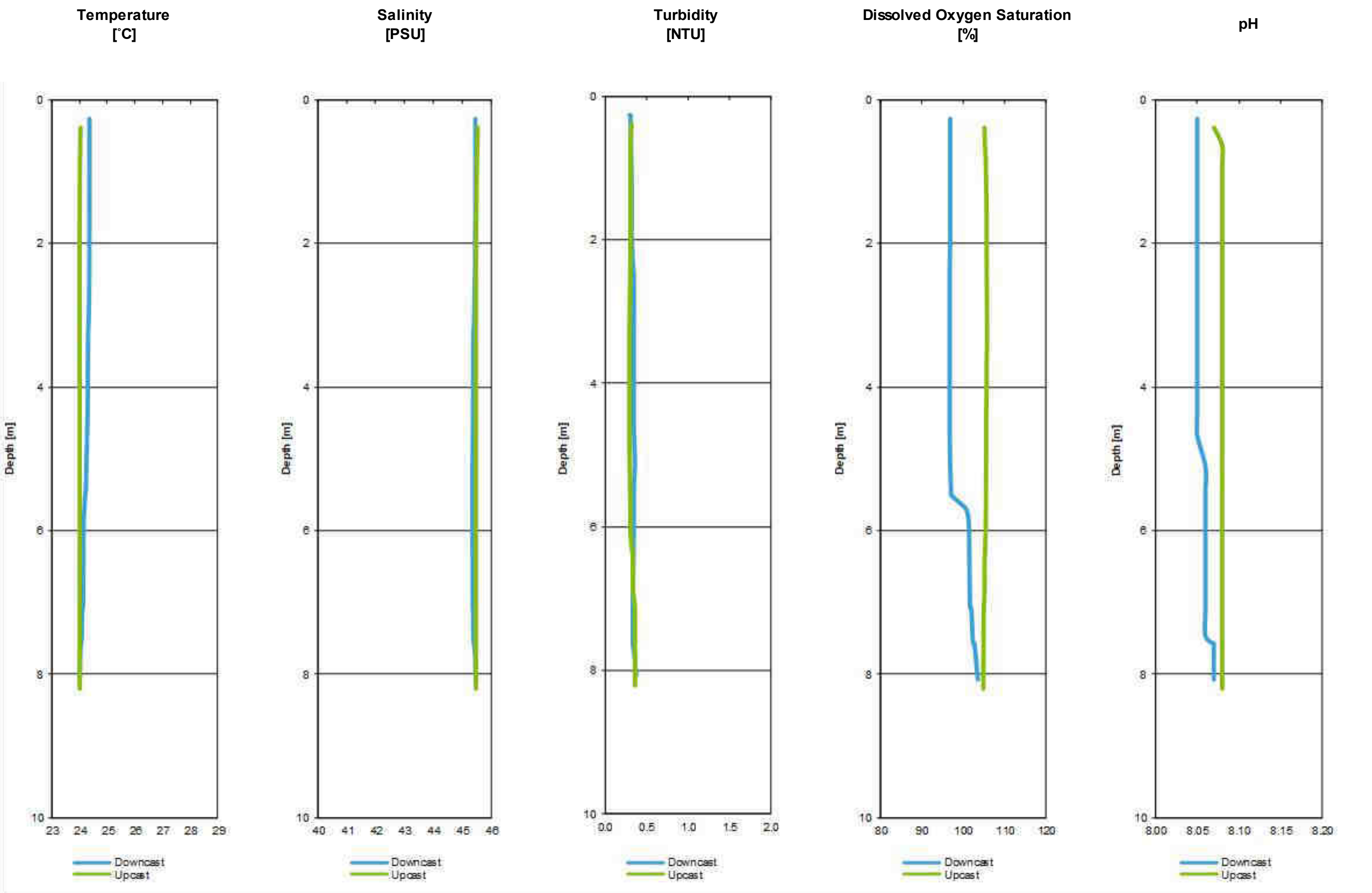
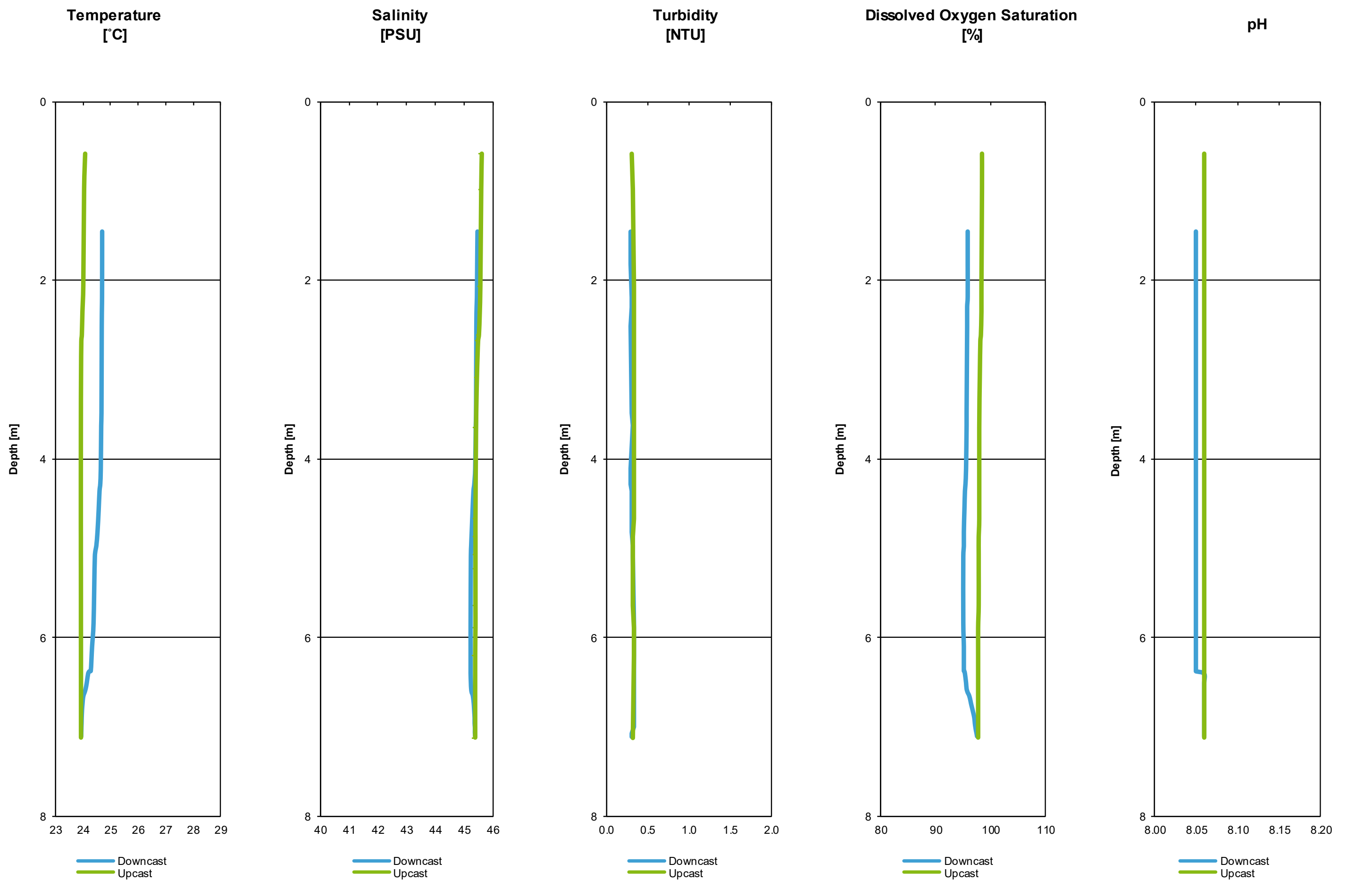
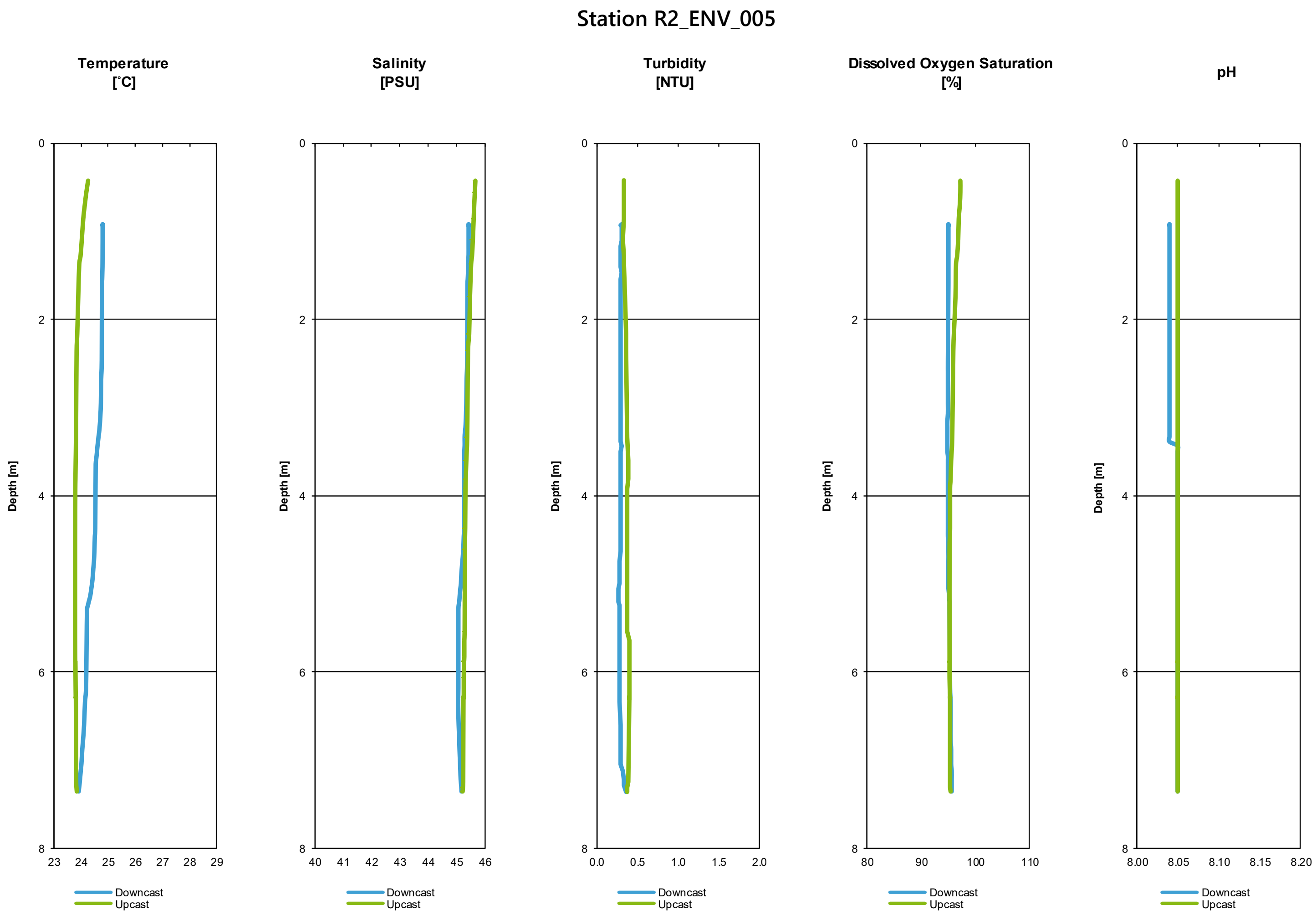
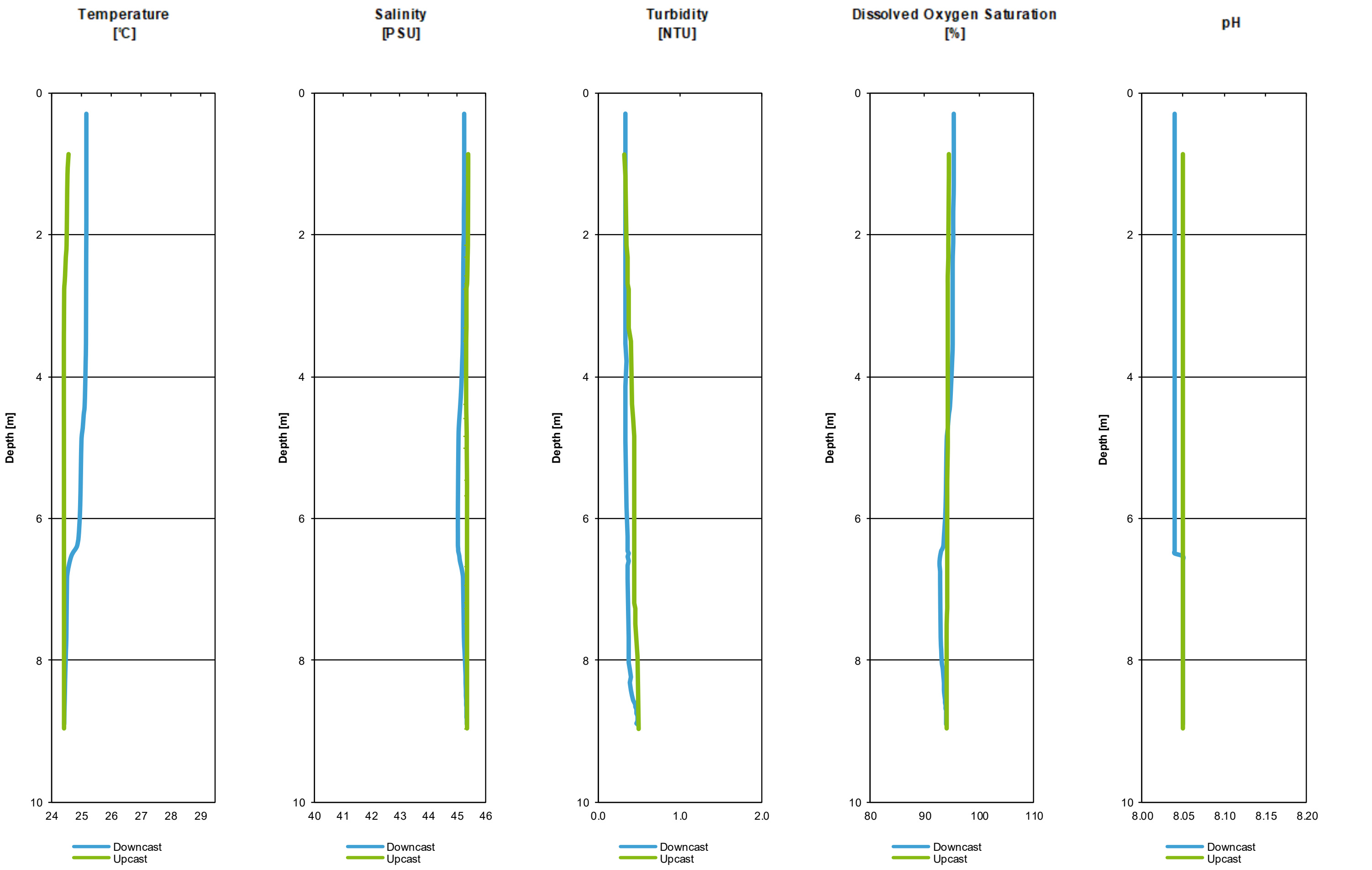


Station R2_ENV_004




Station R2_ENV_005
Temperature [°C]
Salinity [PSU]
Turbidity [NTU]
Dissolved Oxygen Saturation [%]
pH
Depth [m]
Downcast
Upcast

Station R2_ENV_006



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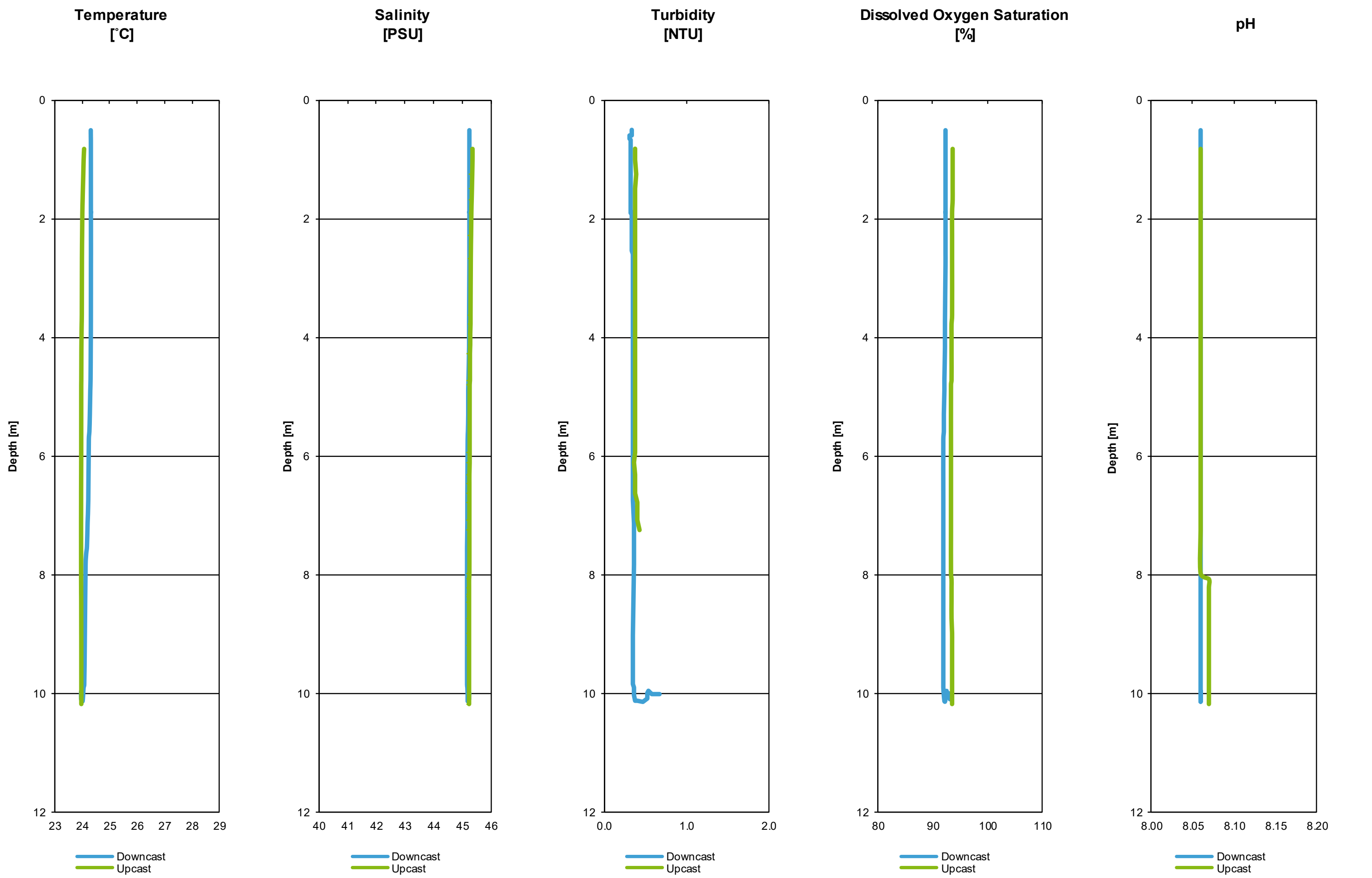
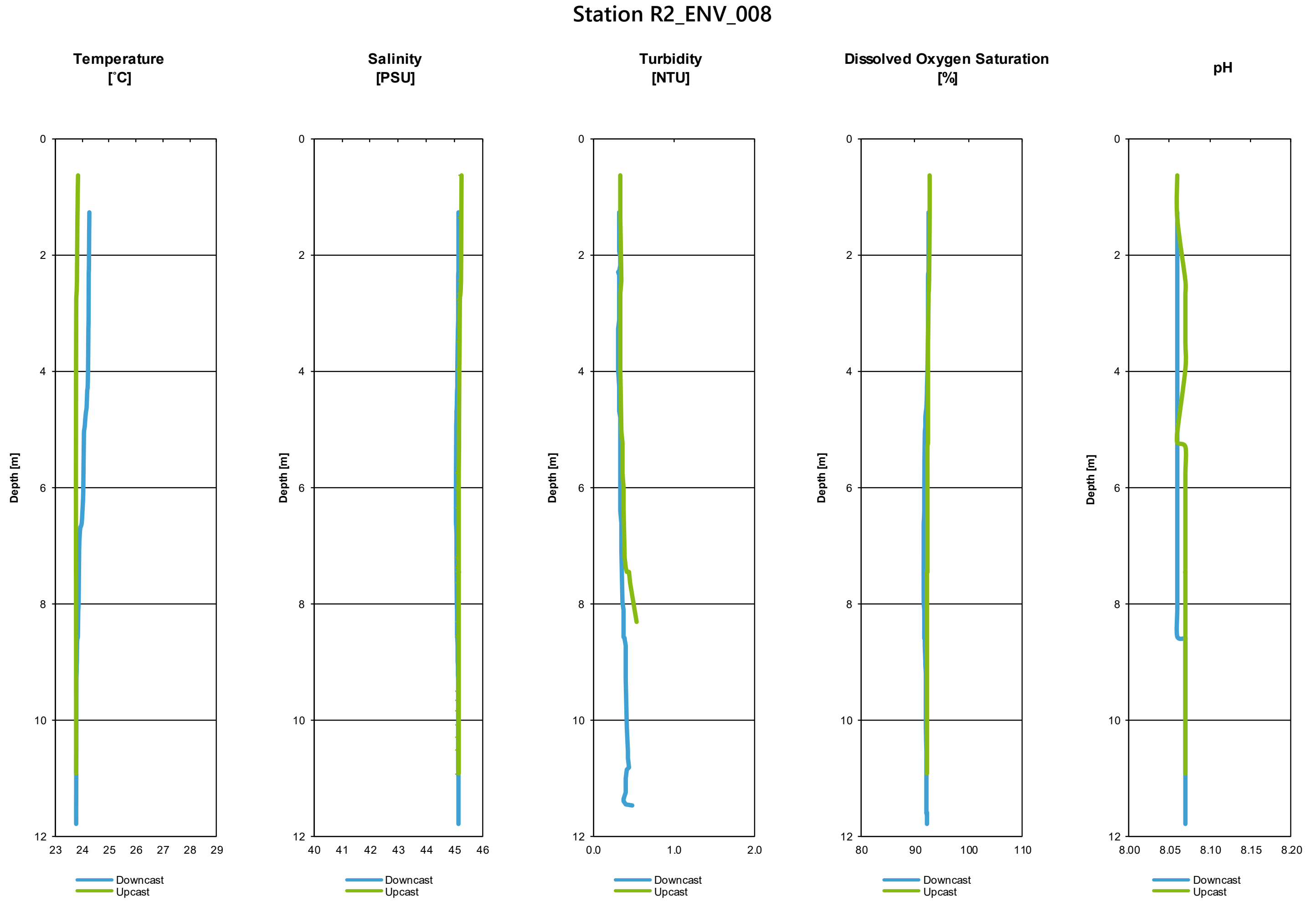
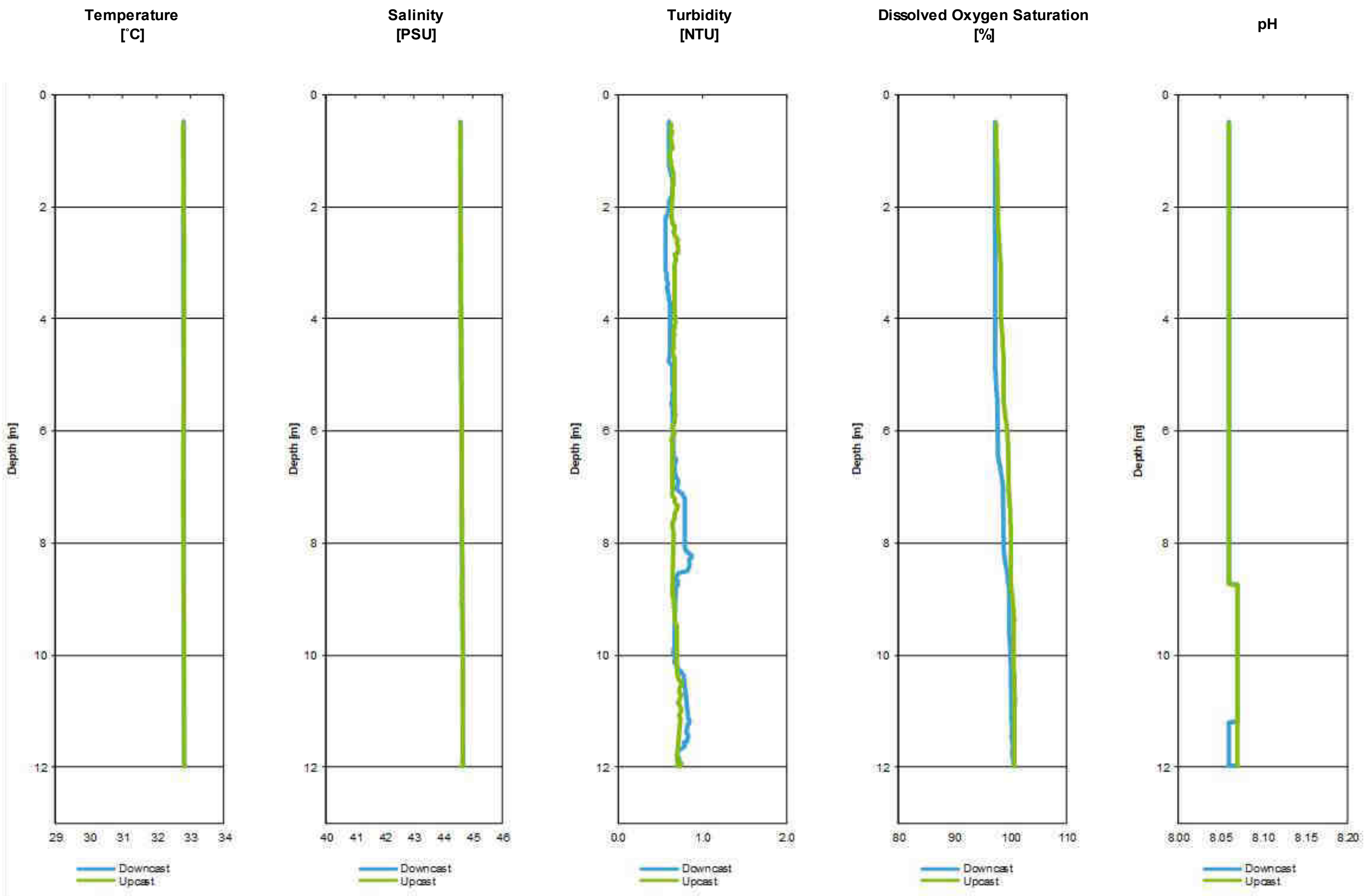



Station R2_ENV_008
Temperature [°C]
Salinity [PSU]
Turbidity [NTU]
Dissolved Oxygen Saturation [%]
pH
Depth [m]
Downcast
Upcast

Station R2_ENV_009



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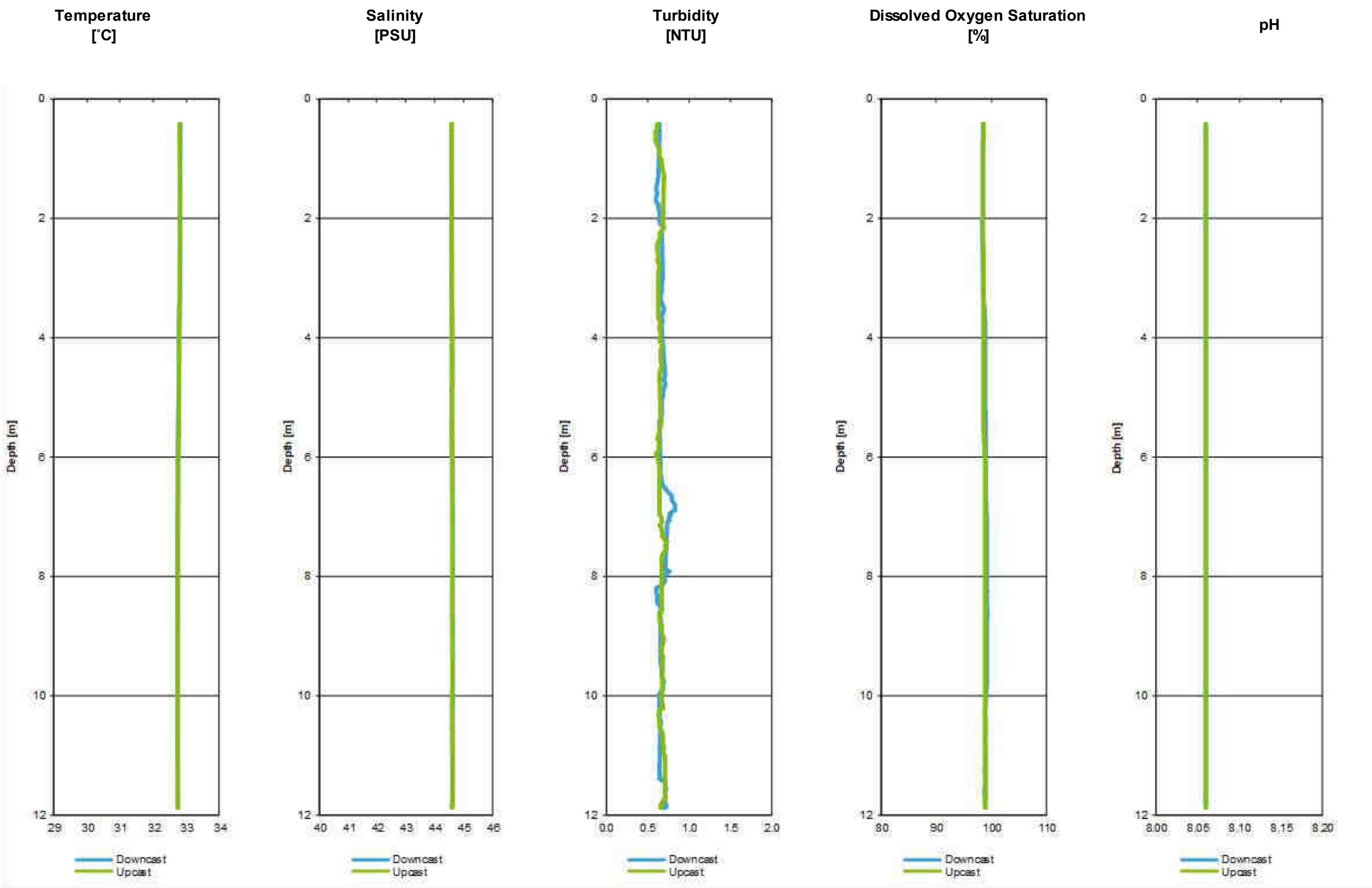

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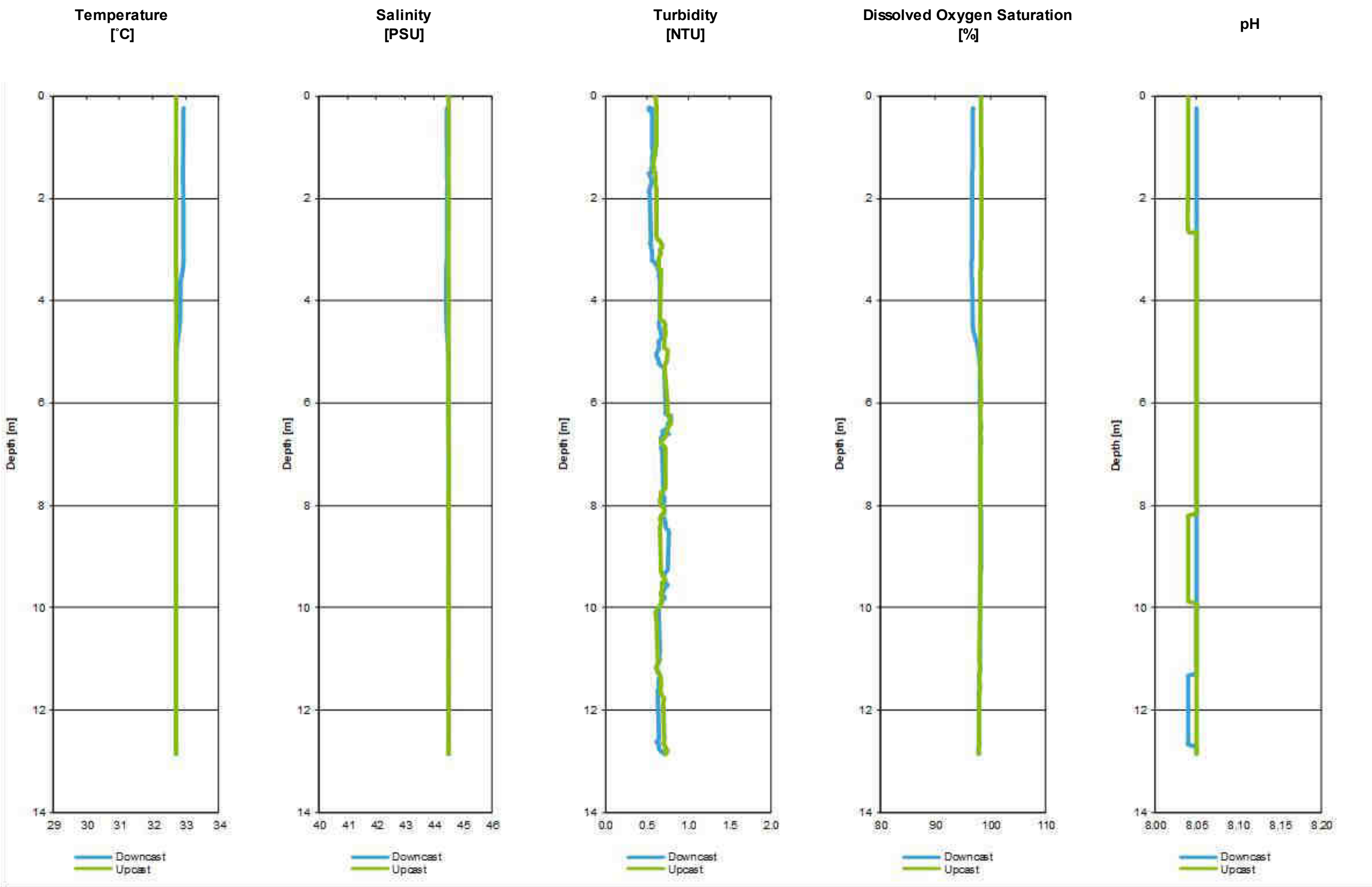
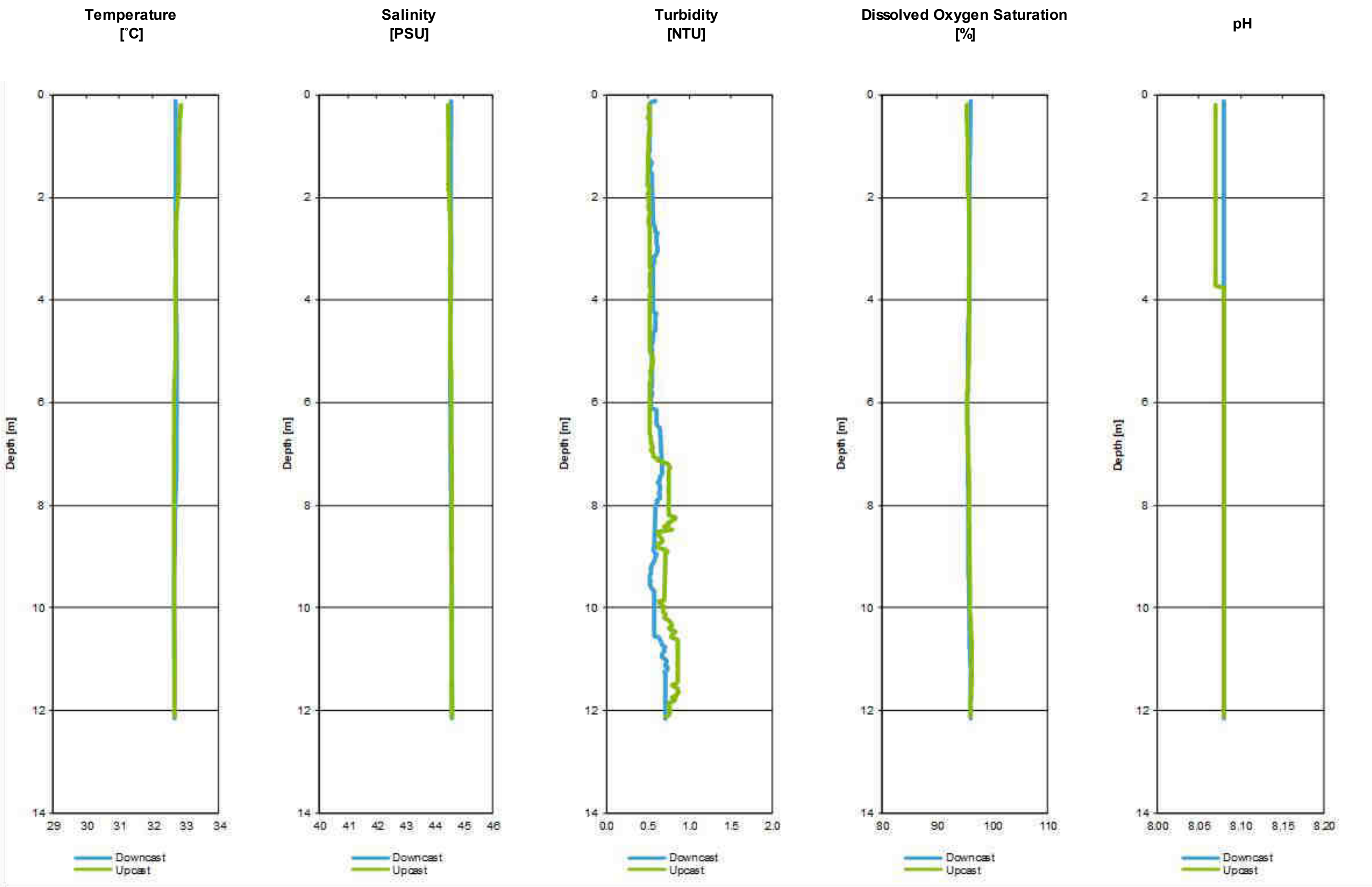


Station R2_ENV_012



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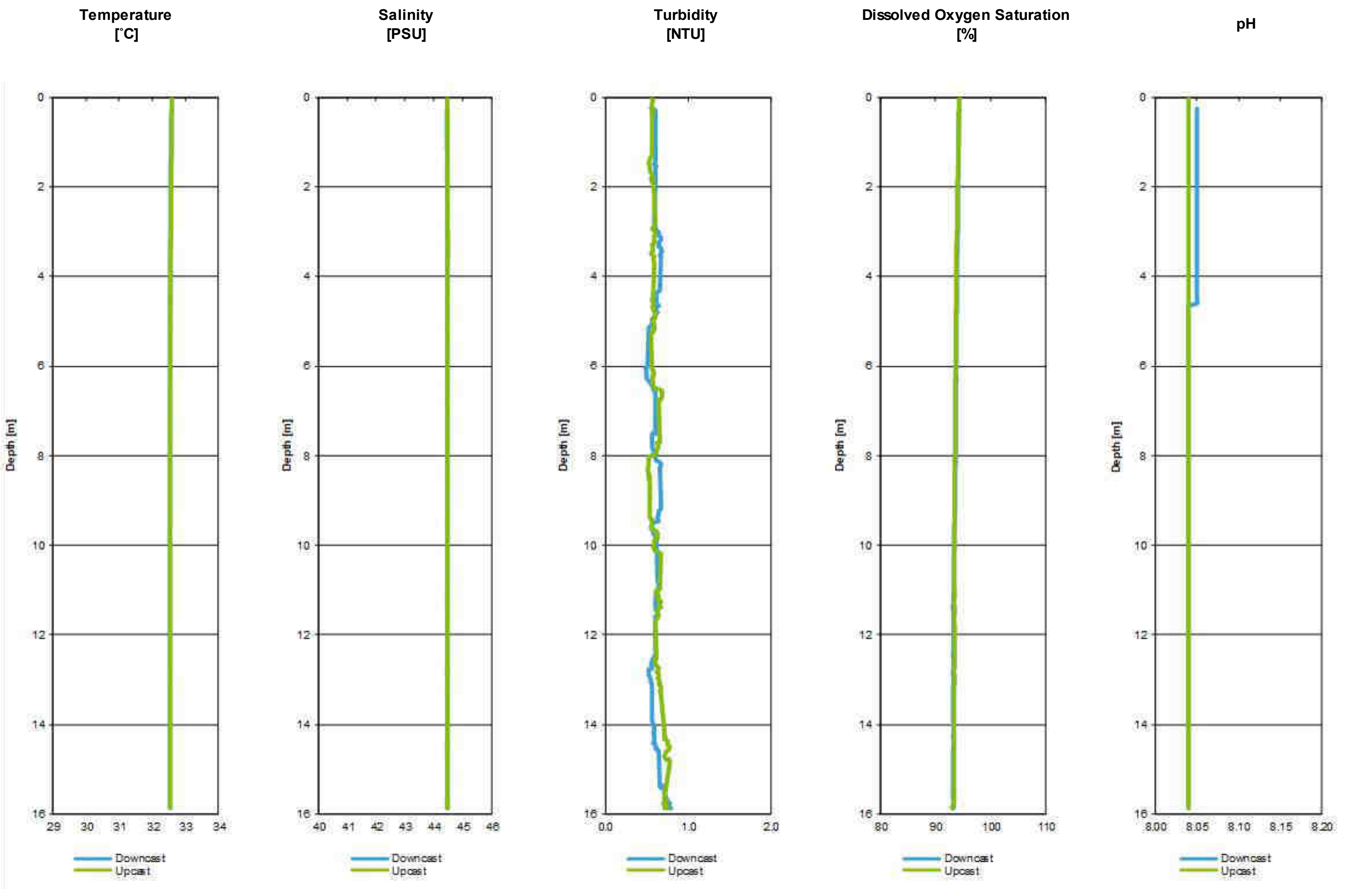

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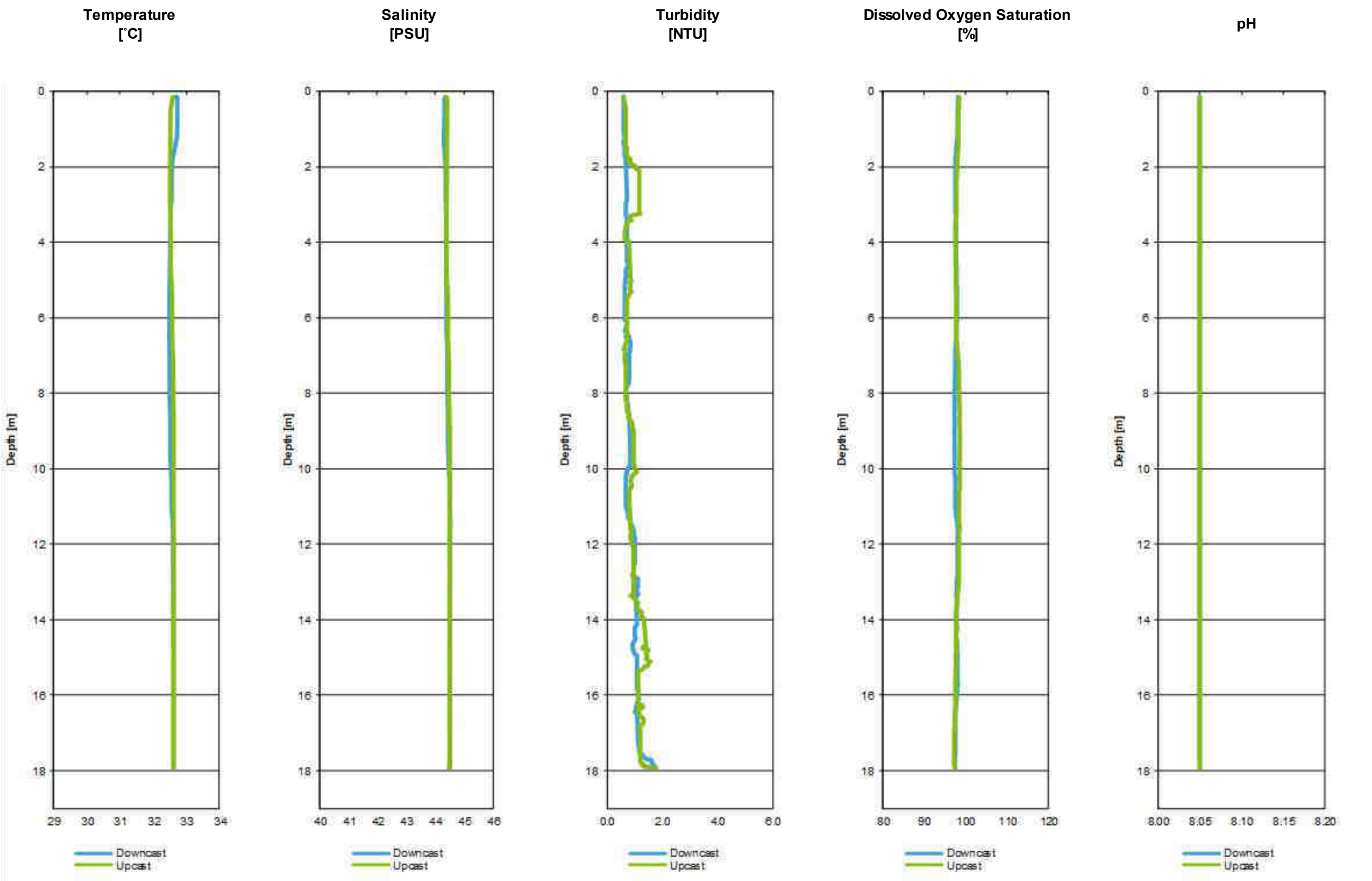

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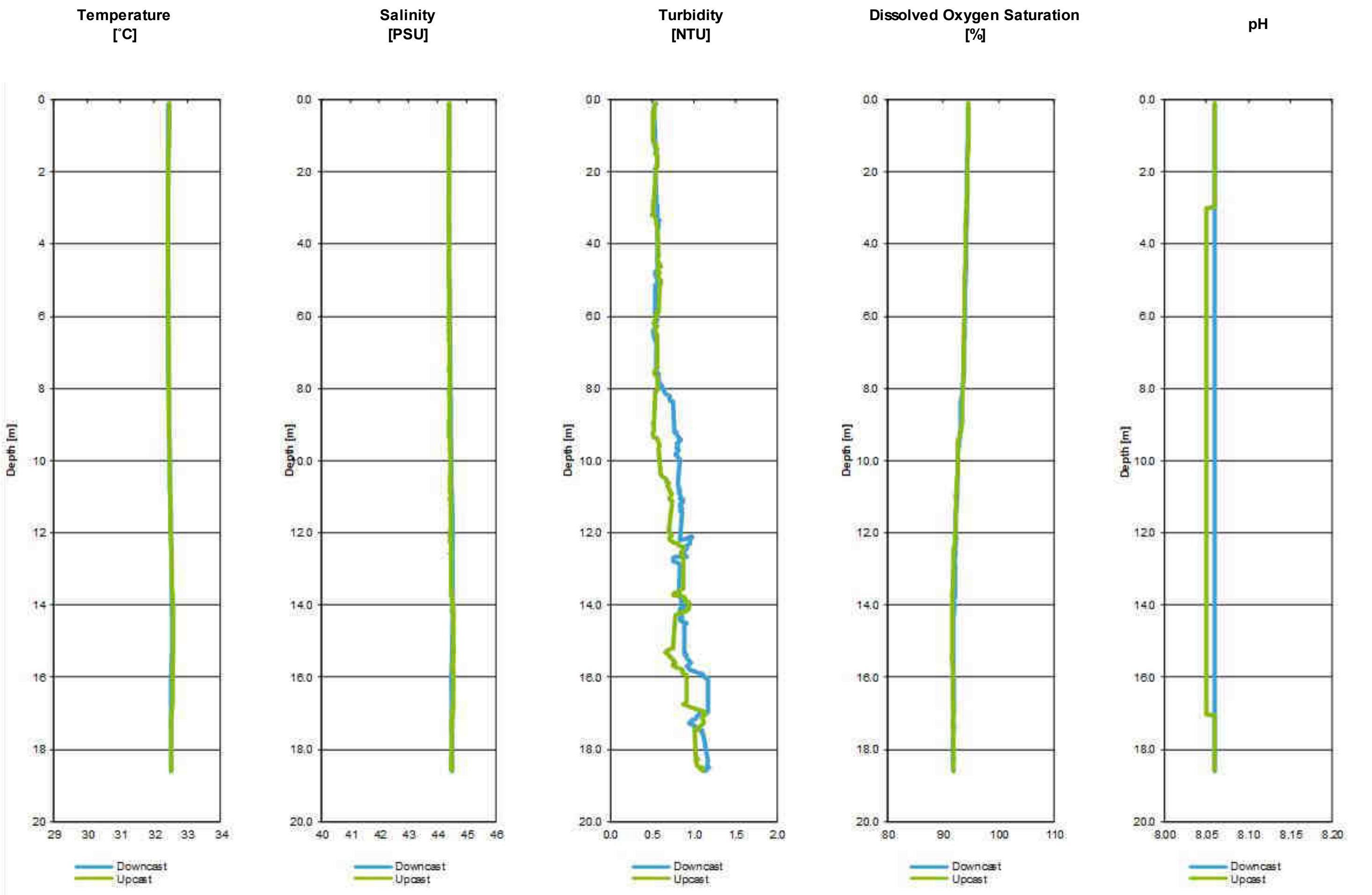
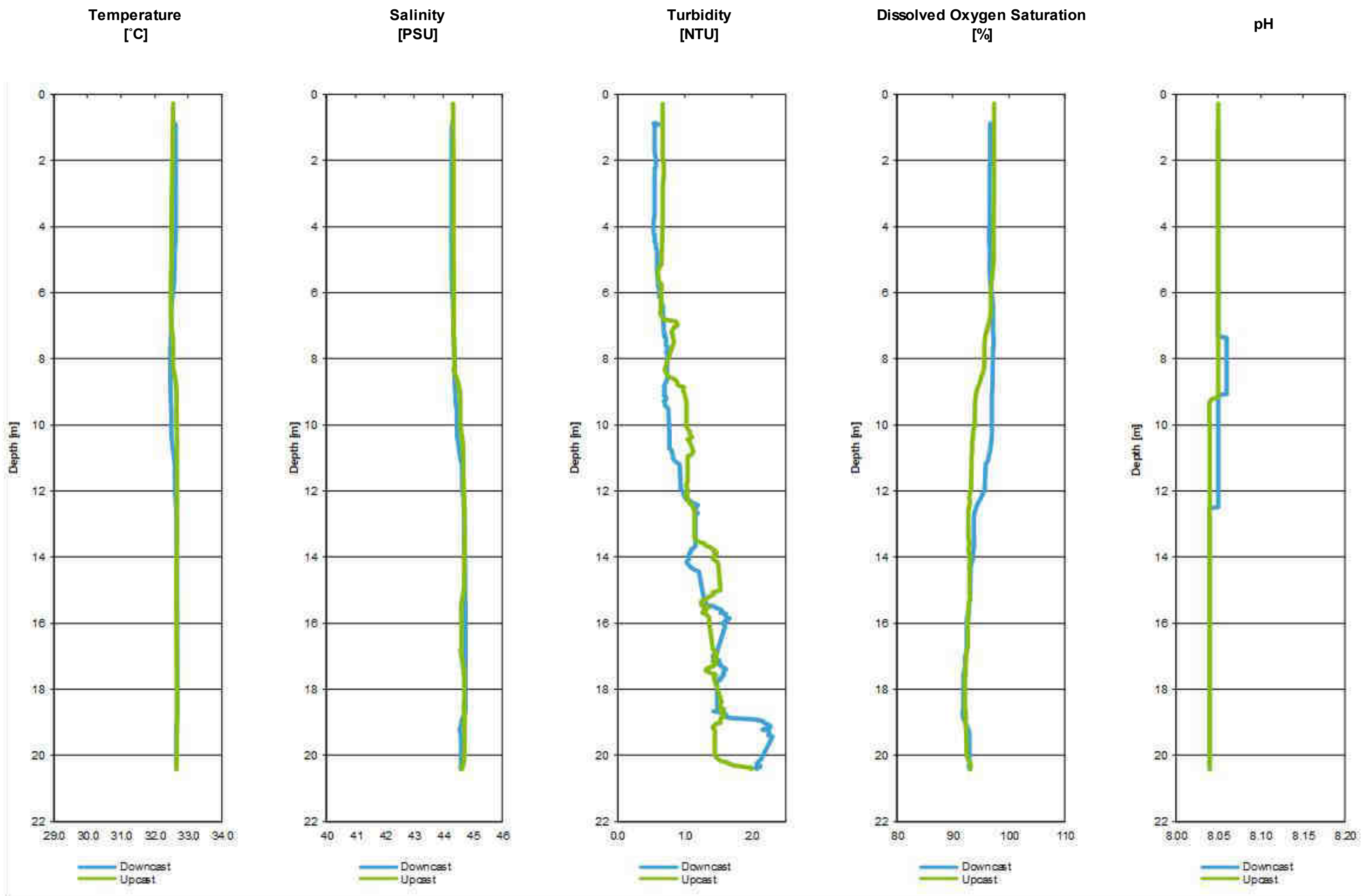
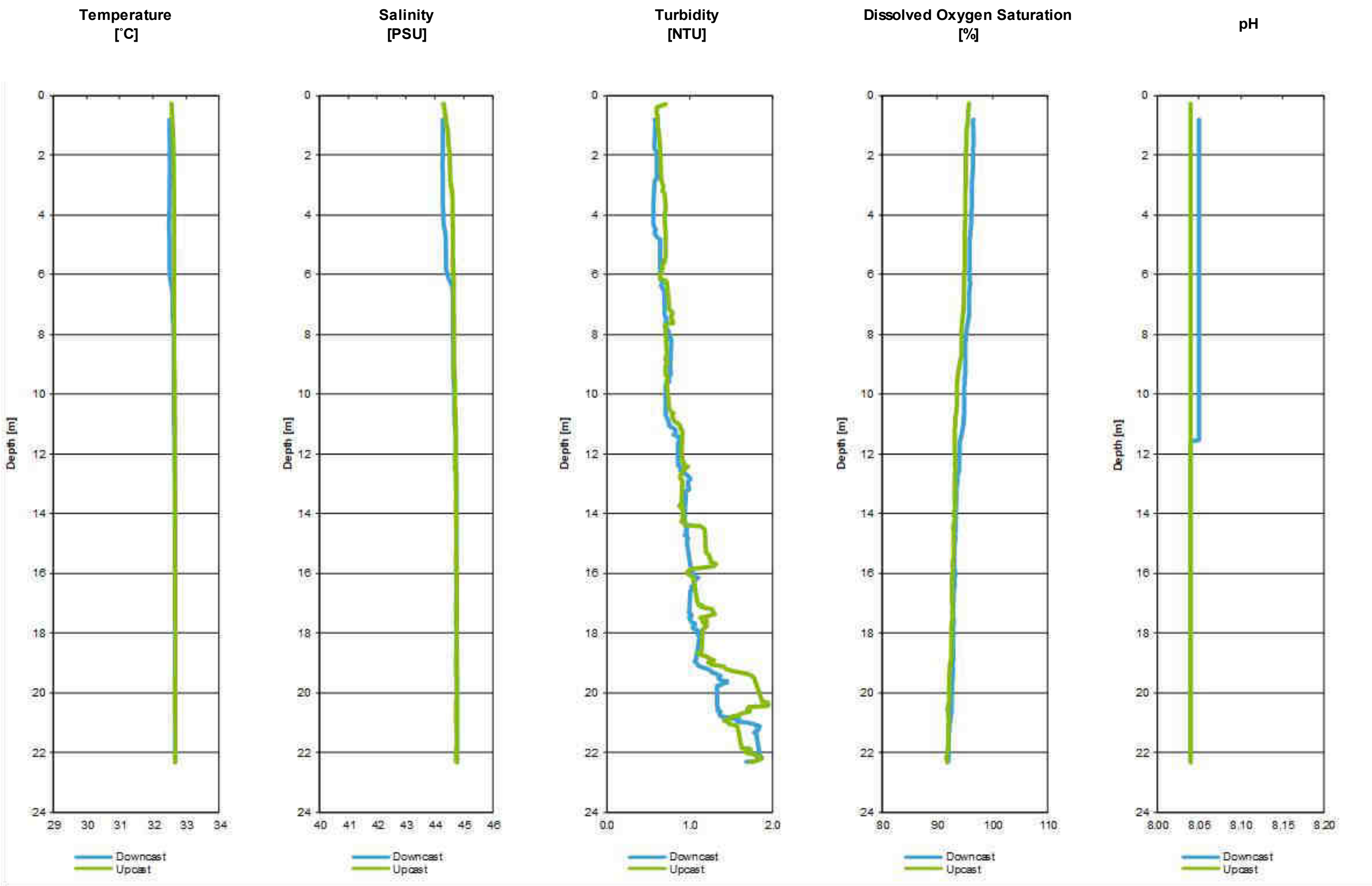


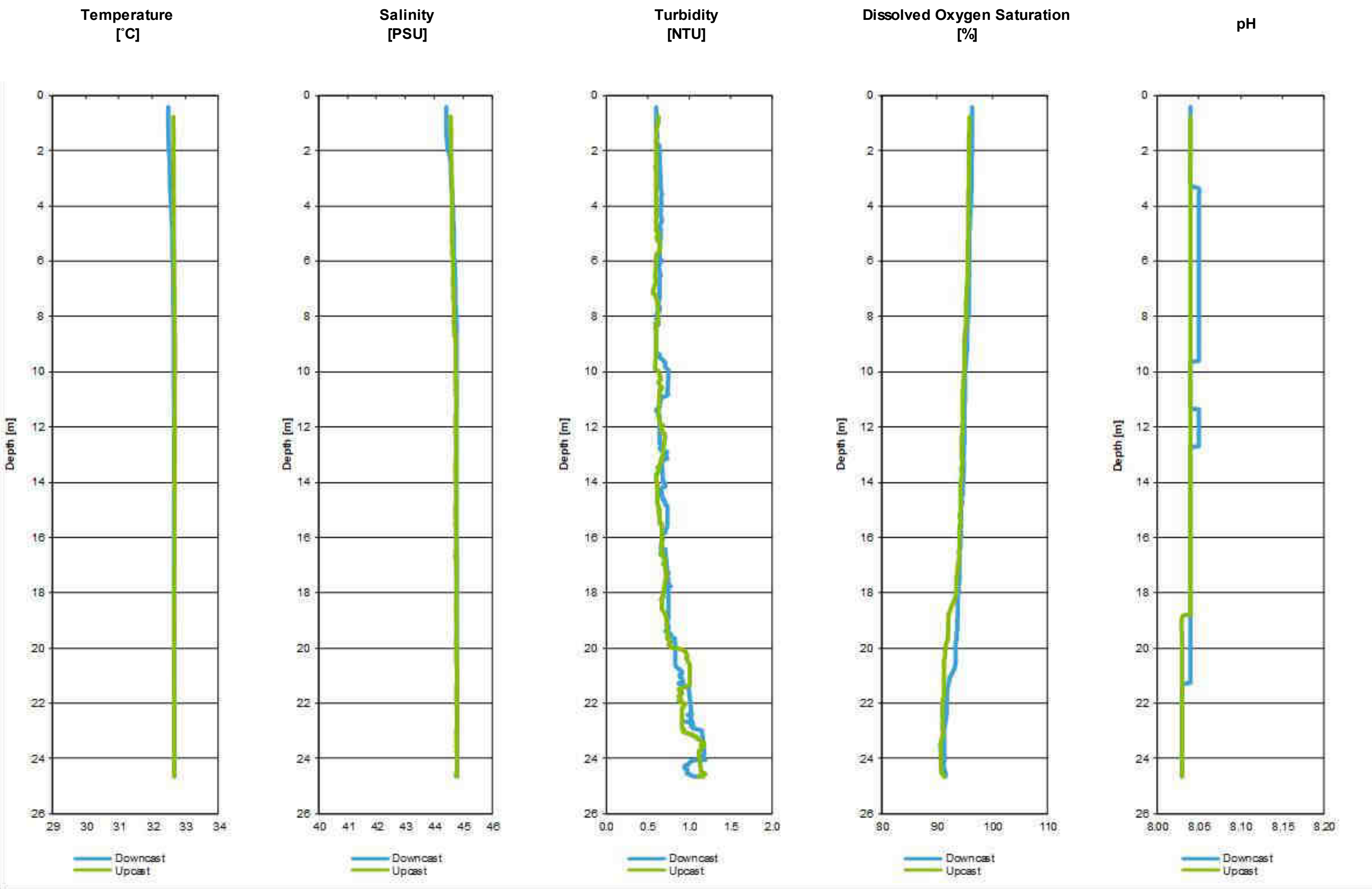
Station R2_ENV_016



Station R2_ENV_017



Station R2_ENV_018



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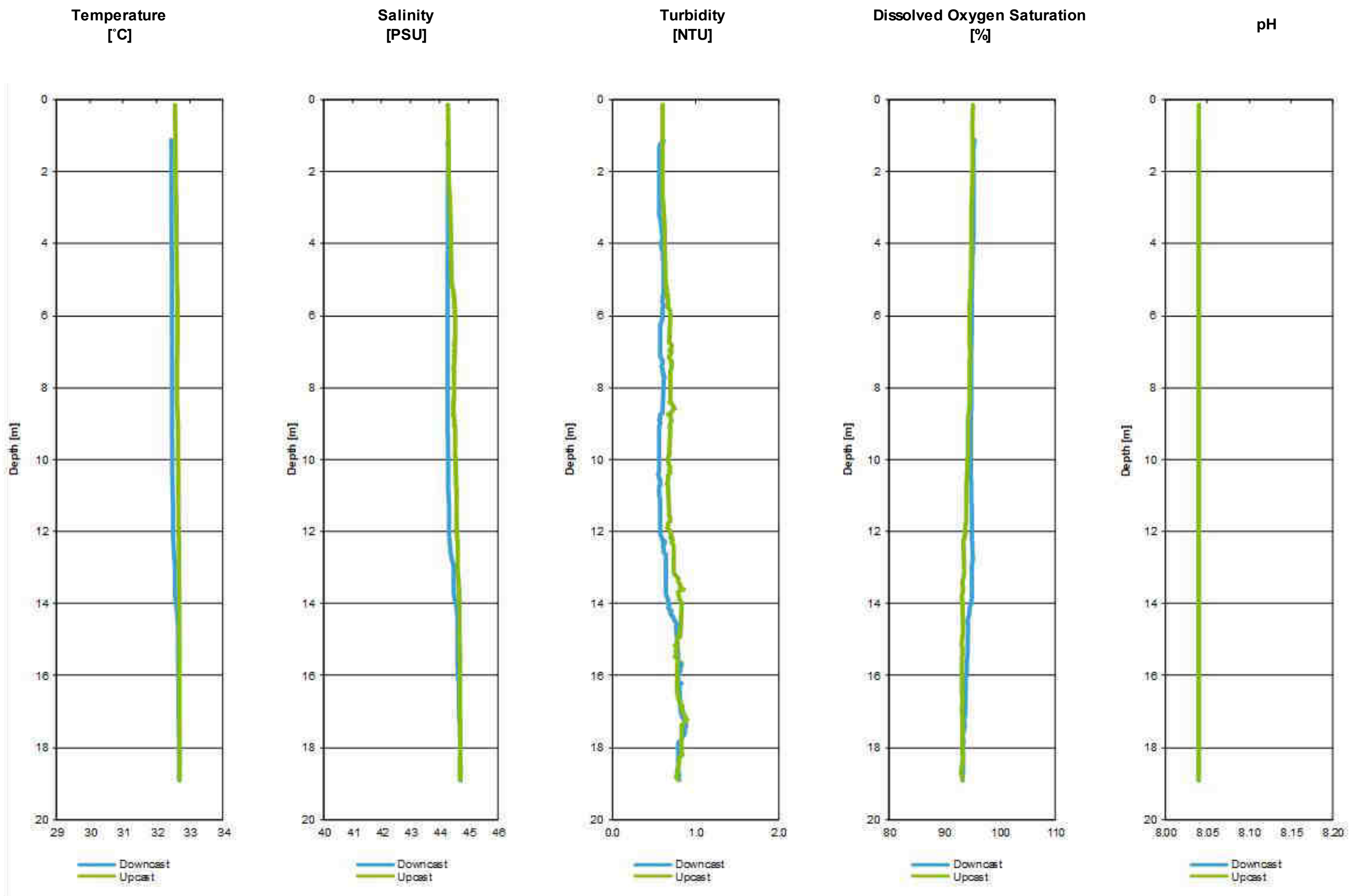
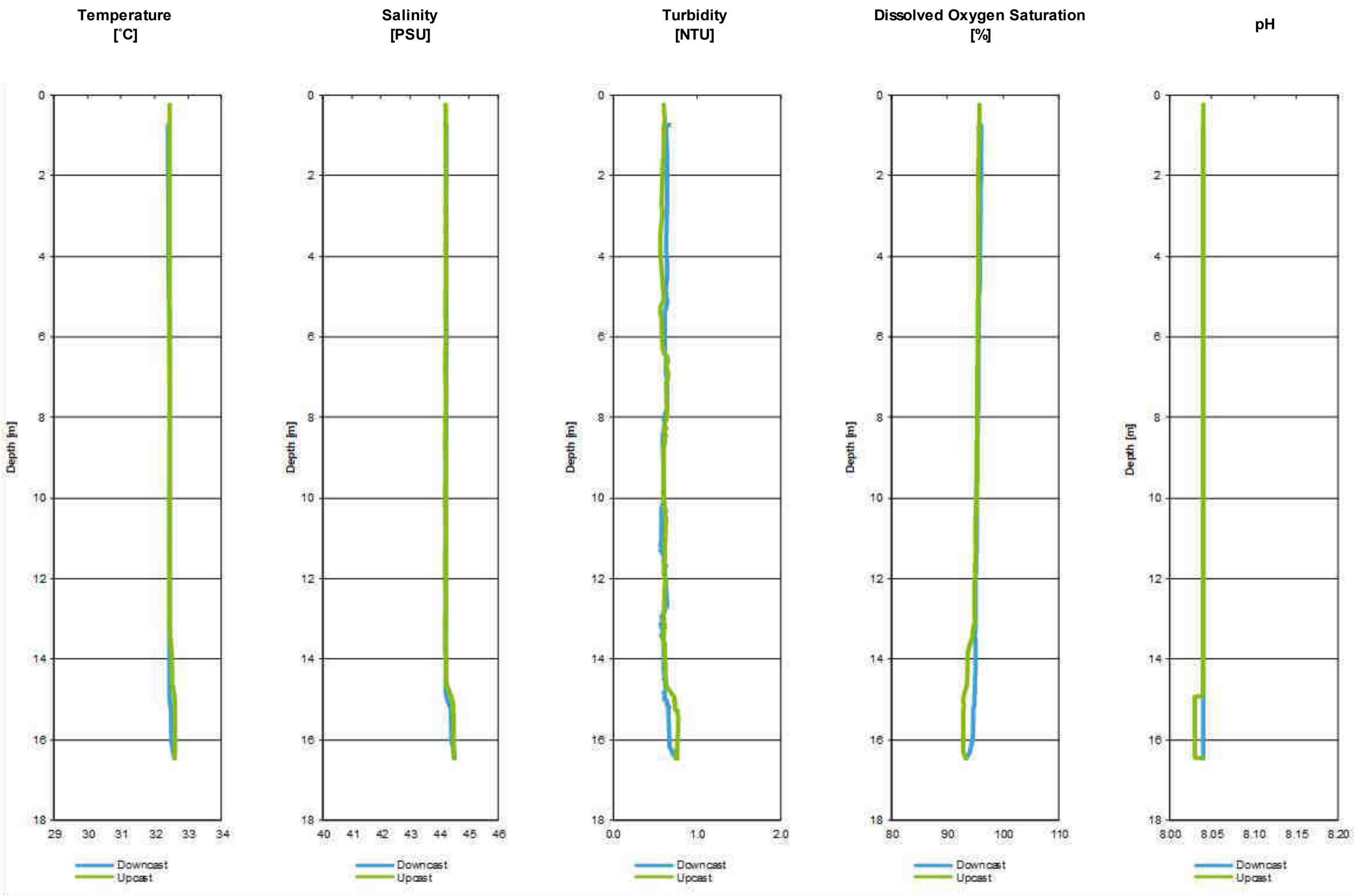
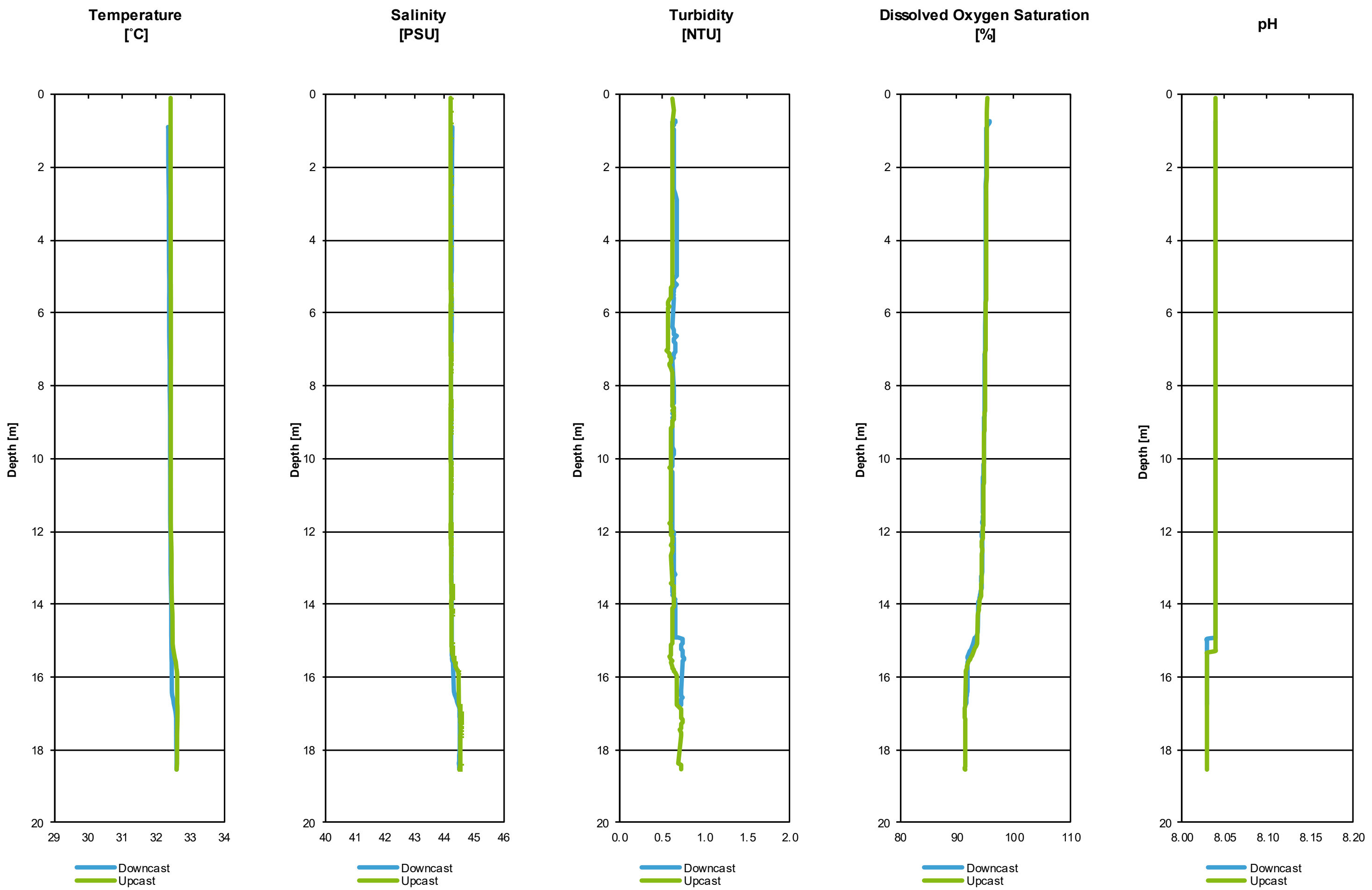


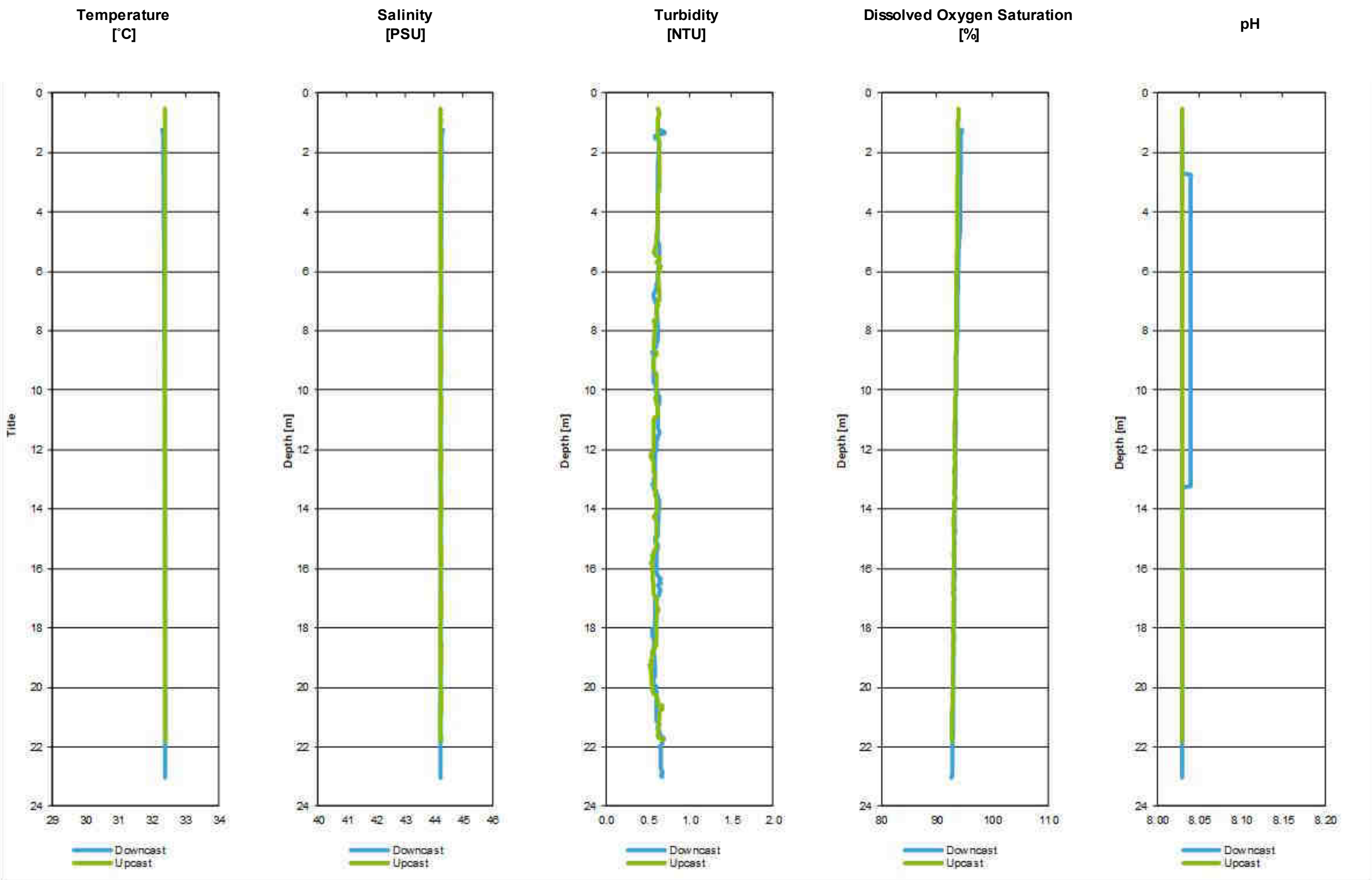
Station R2_ENV_020



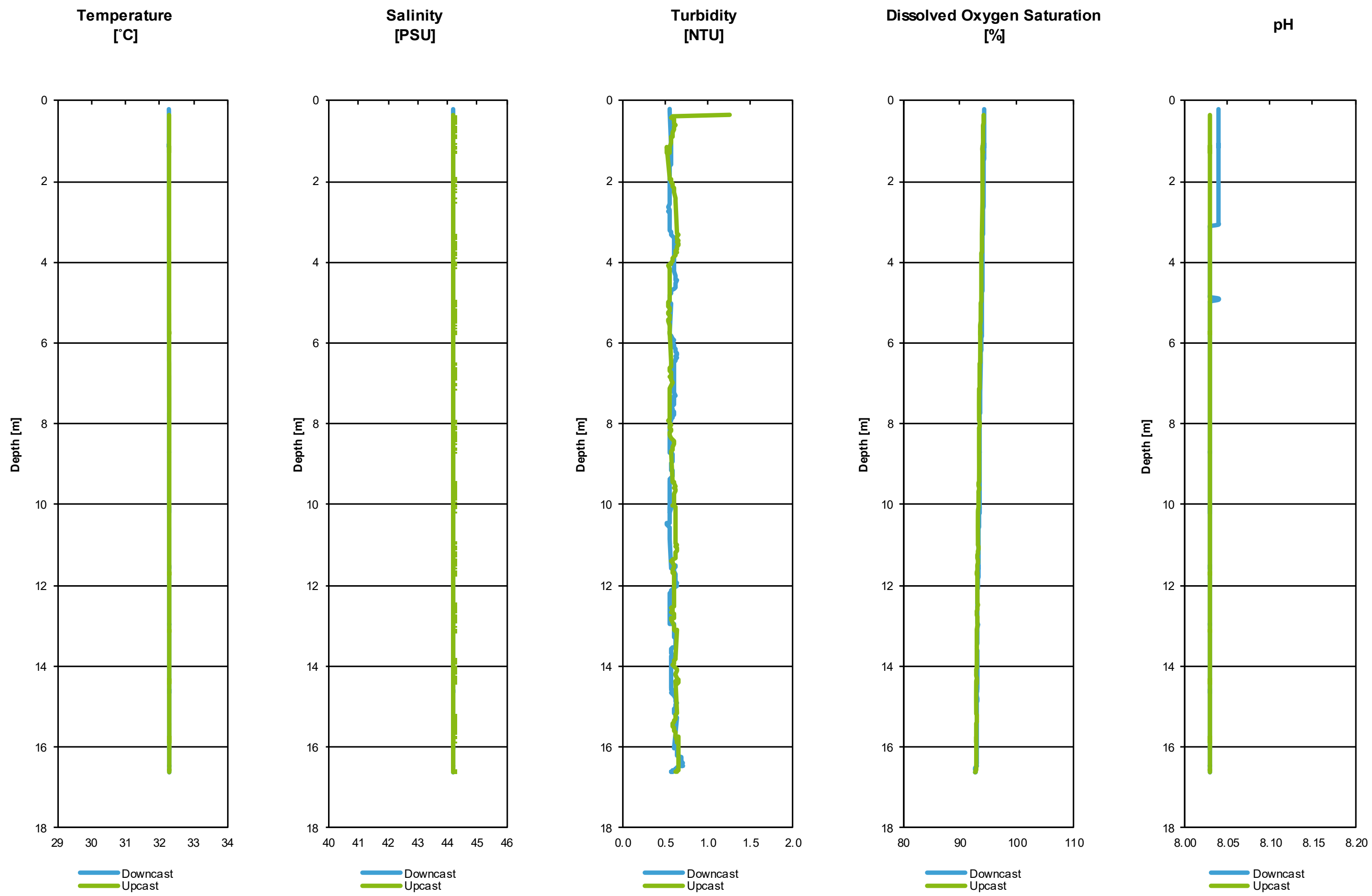
Station R2_ENV_021



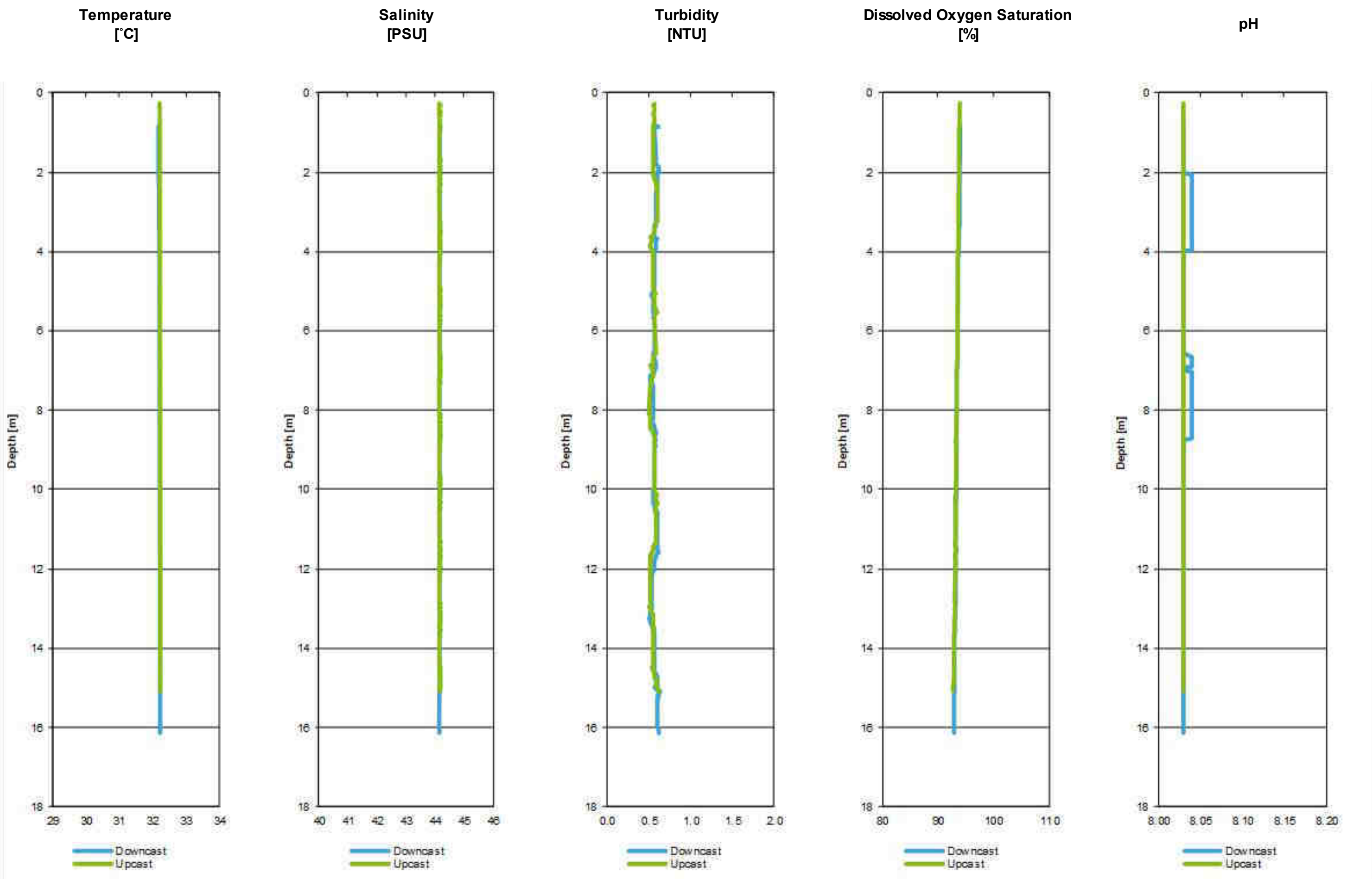
Station R2_ENV_022



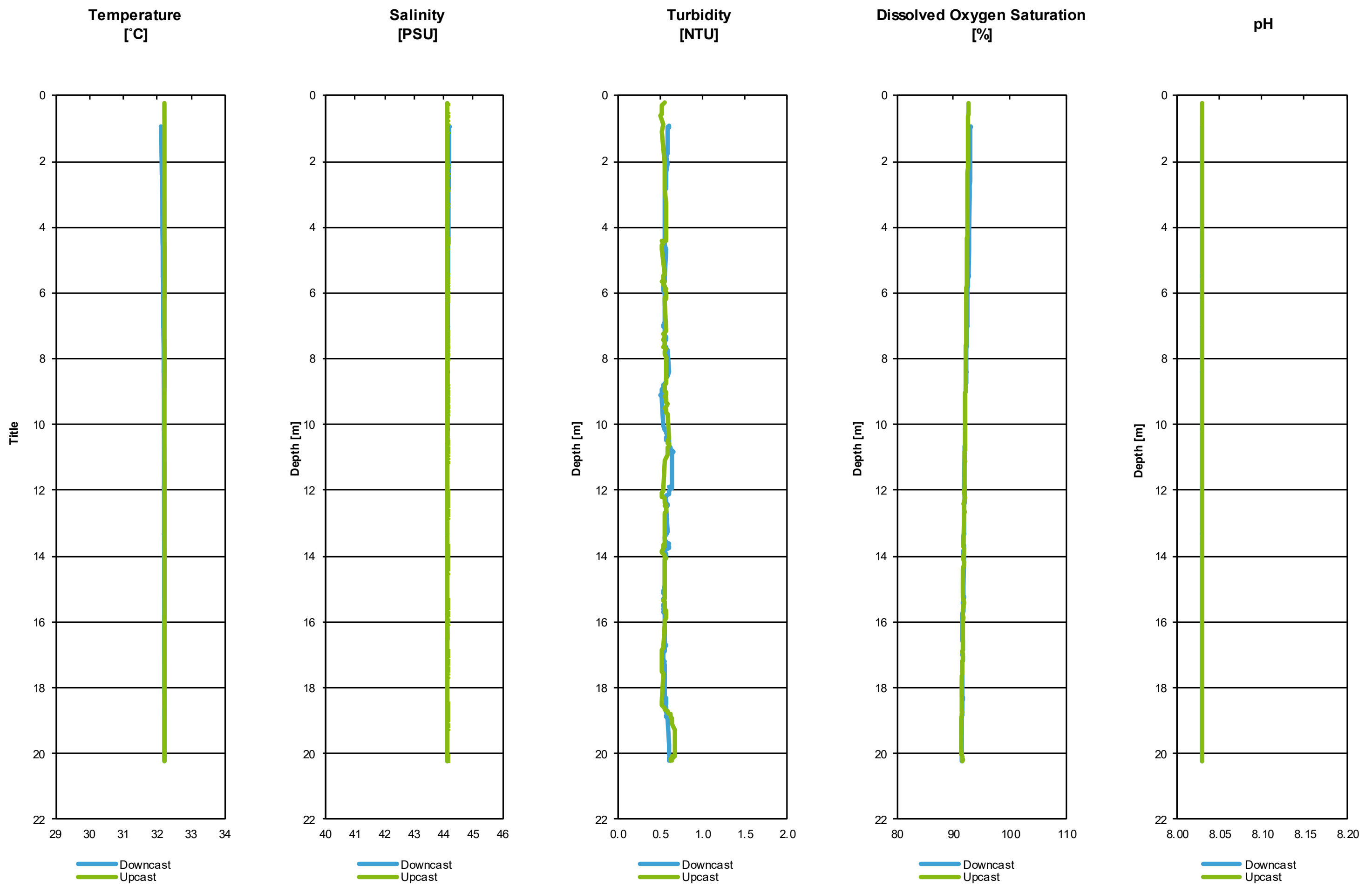
Station R2_ENV_023



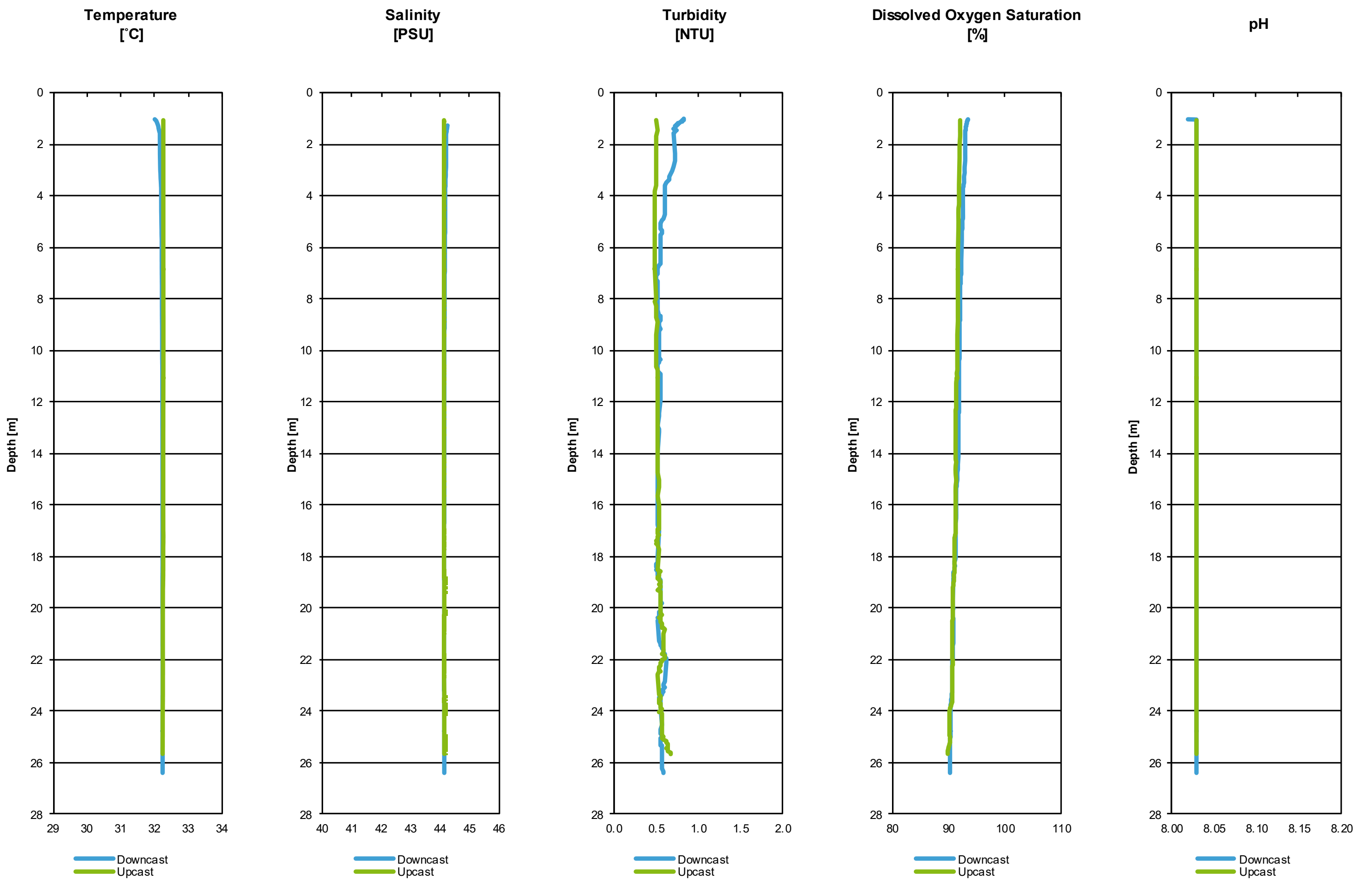
Station R2_ENV_024



Station R2_ENV_025



Station R2_ENV_026



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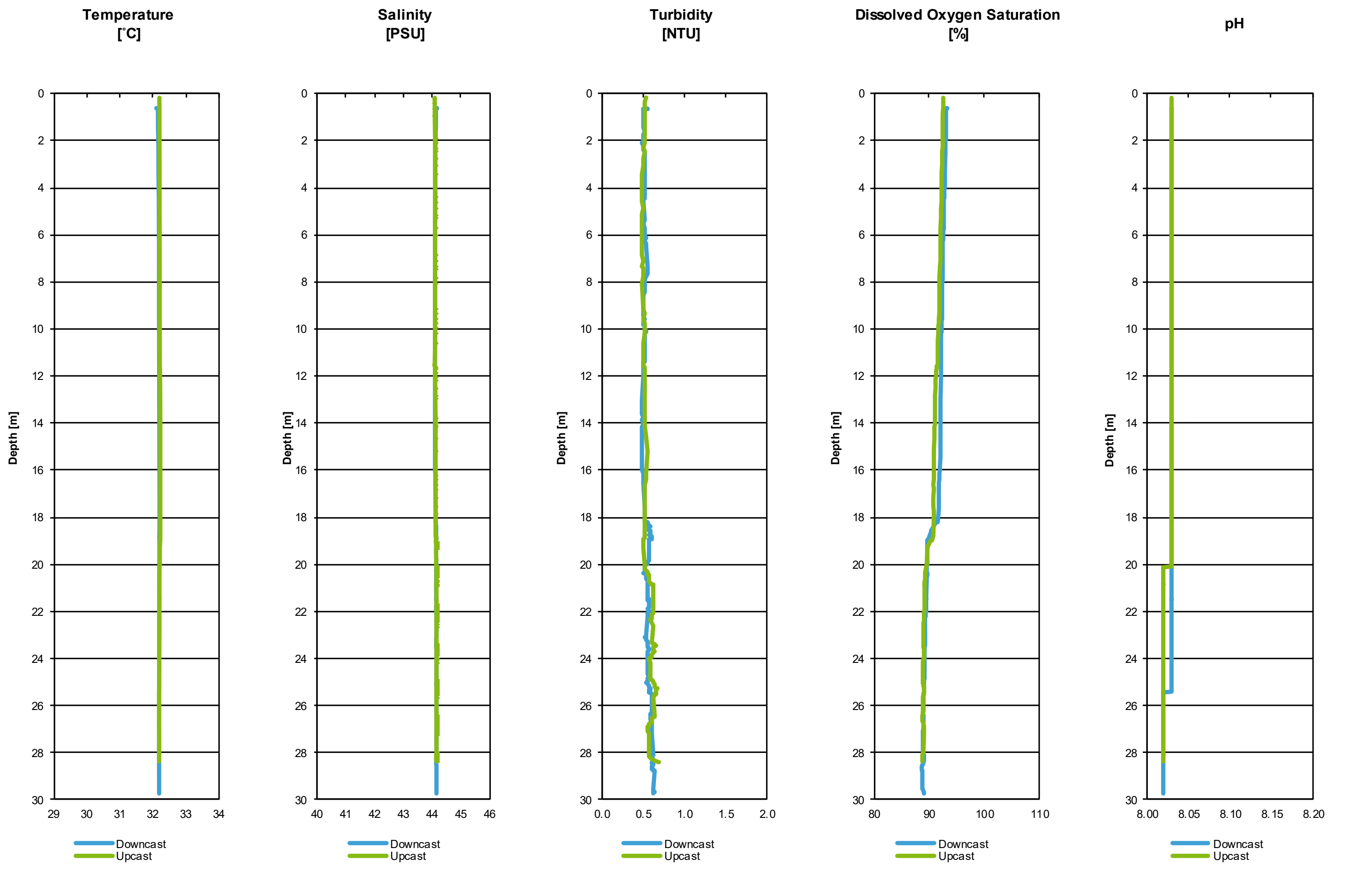
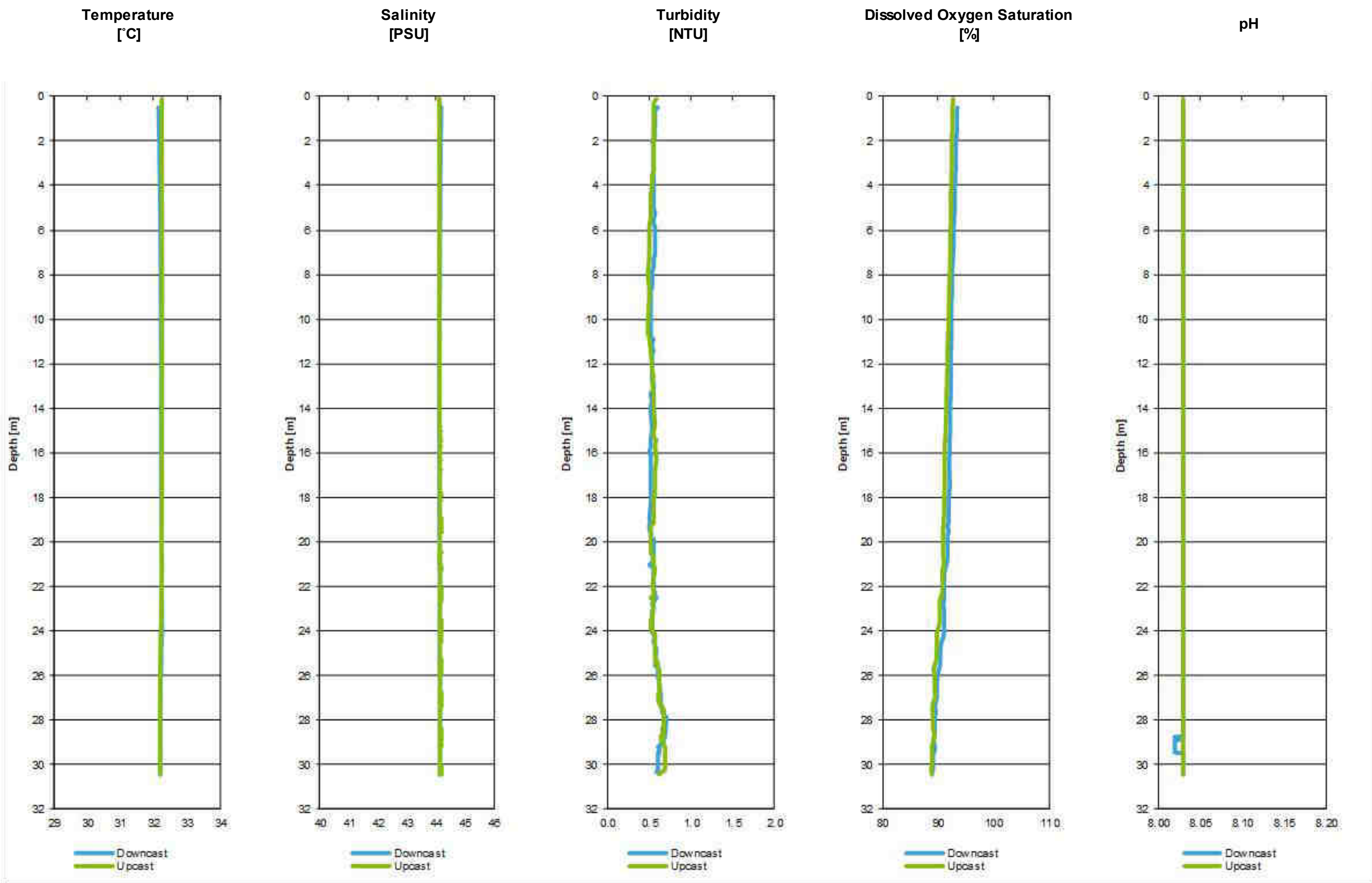
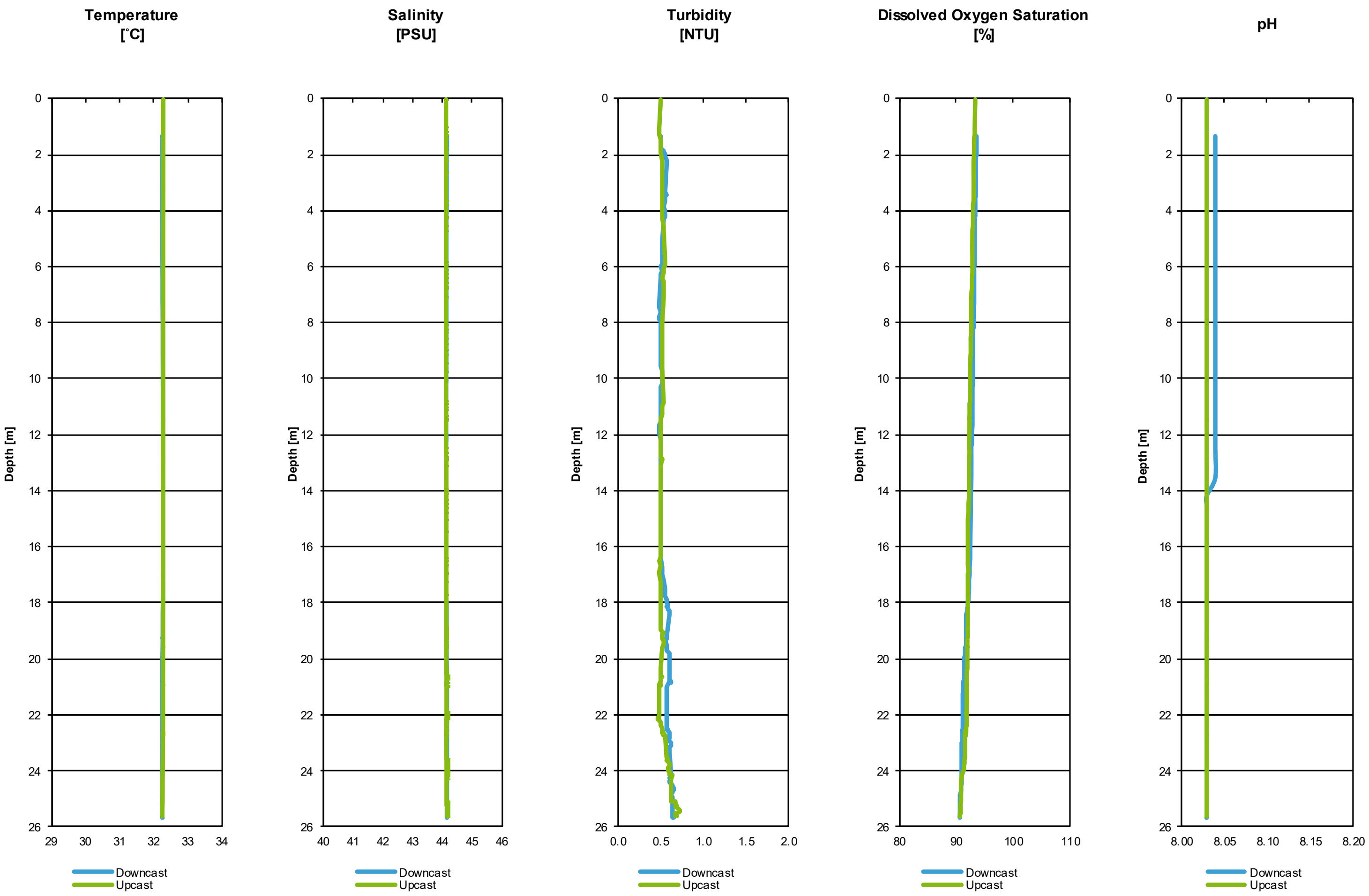


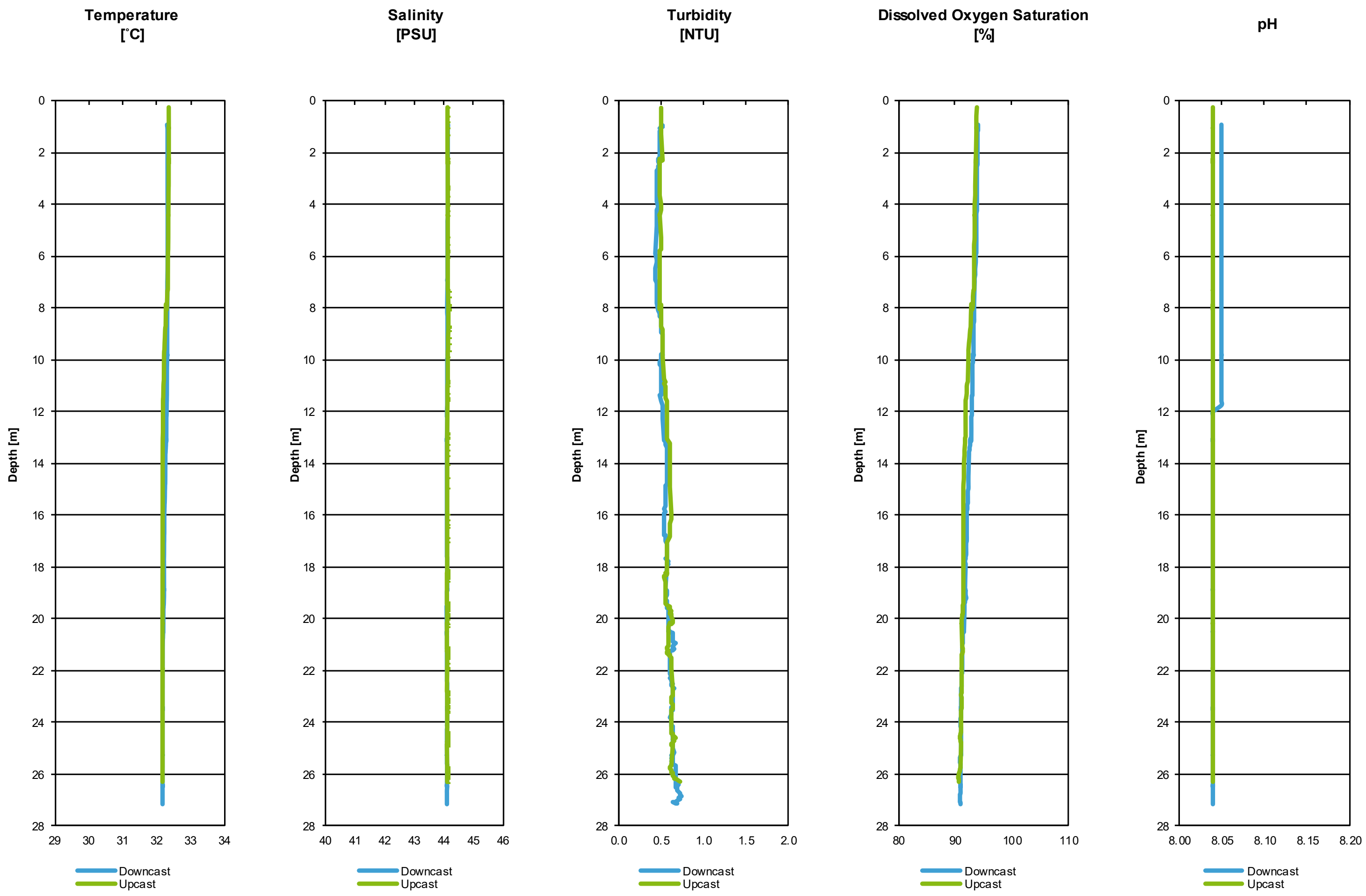
Station R2_ENV_028



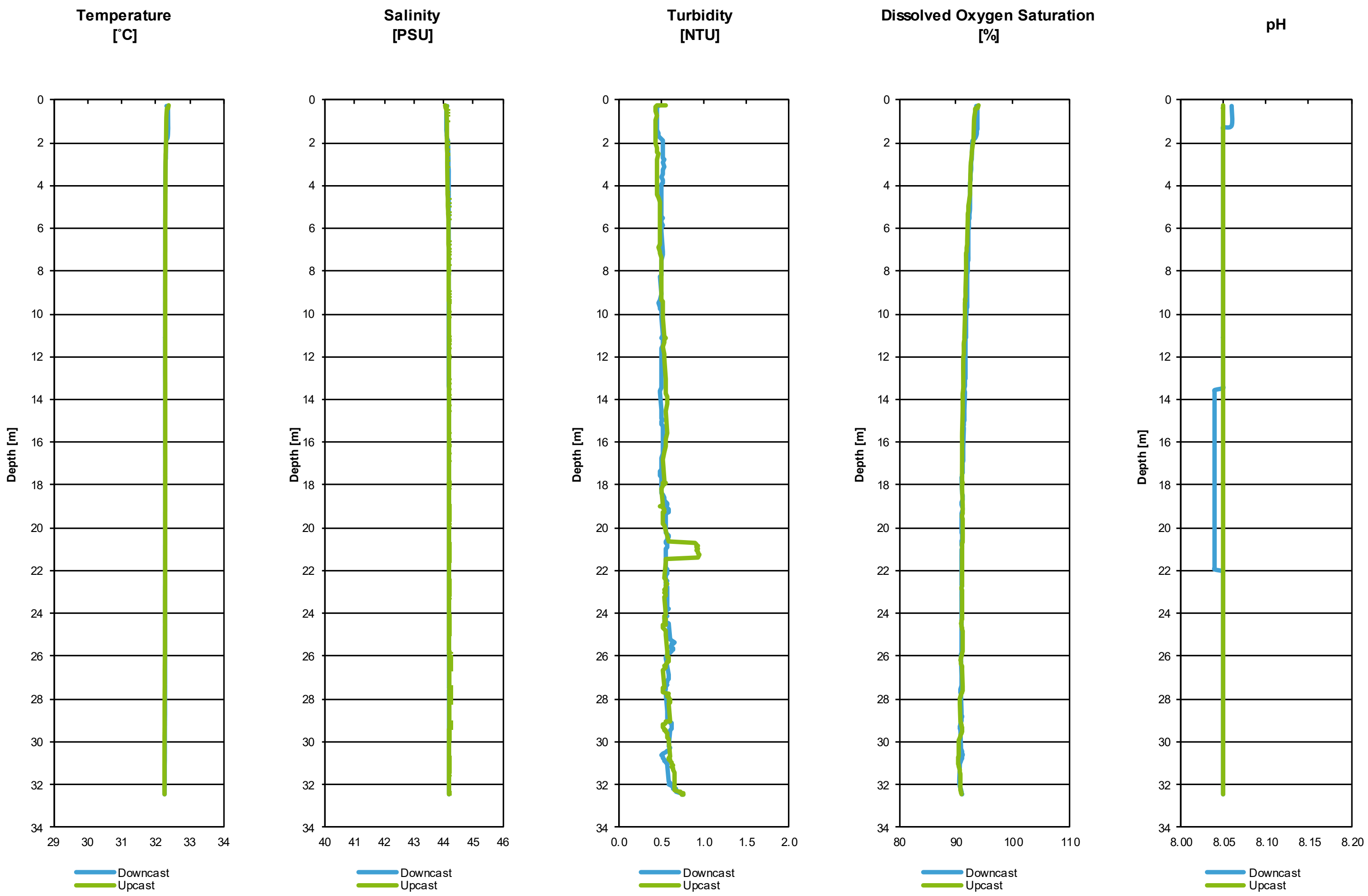
Station R2_ENV_029



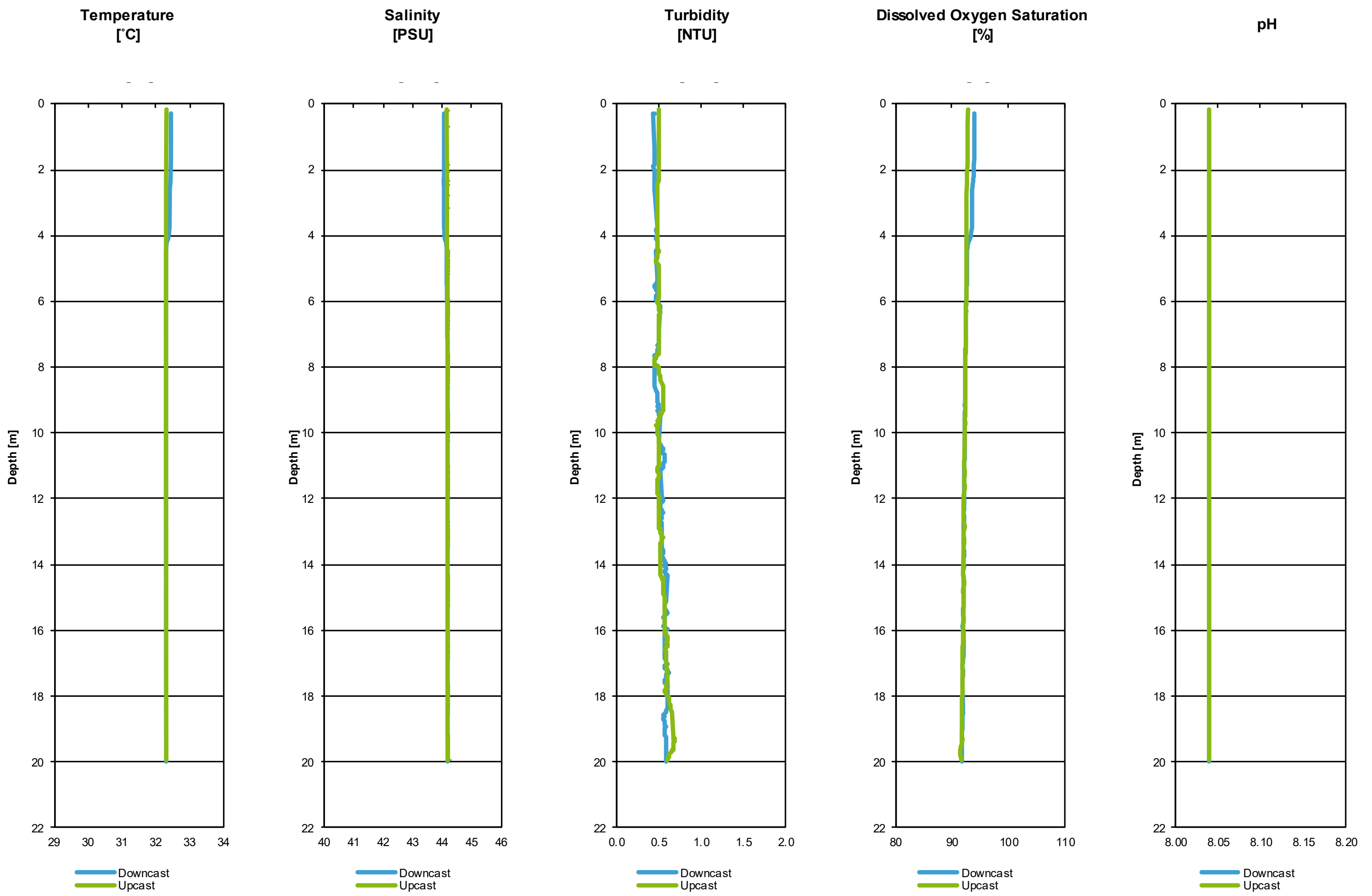
Station R2_ENV_030



Station R2_ENV_031



Station R2_ENV_032



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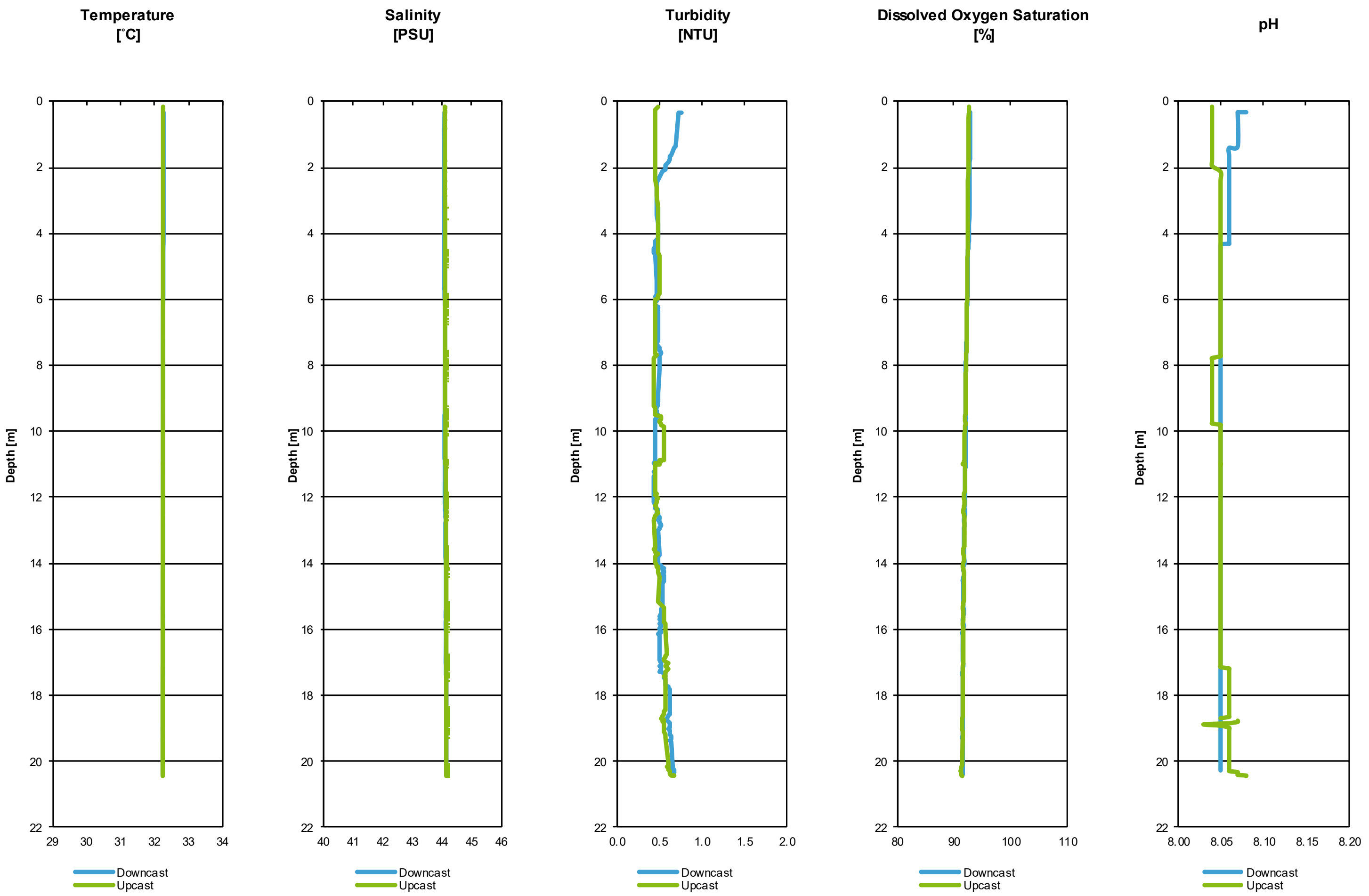

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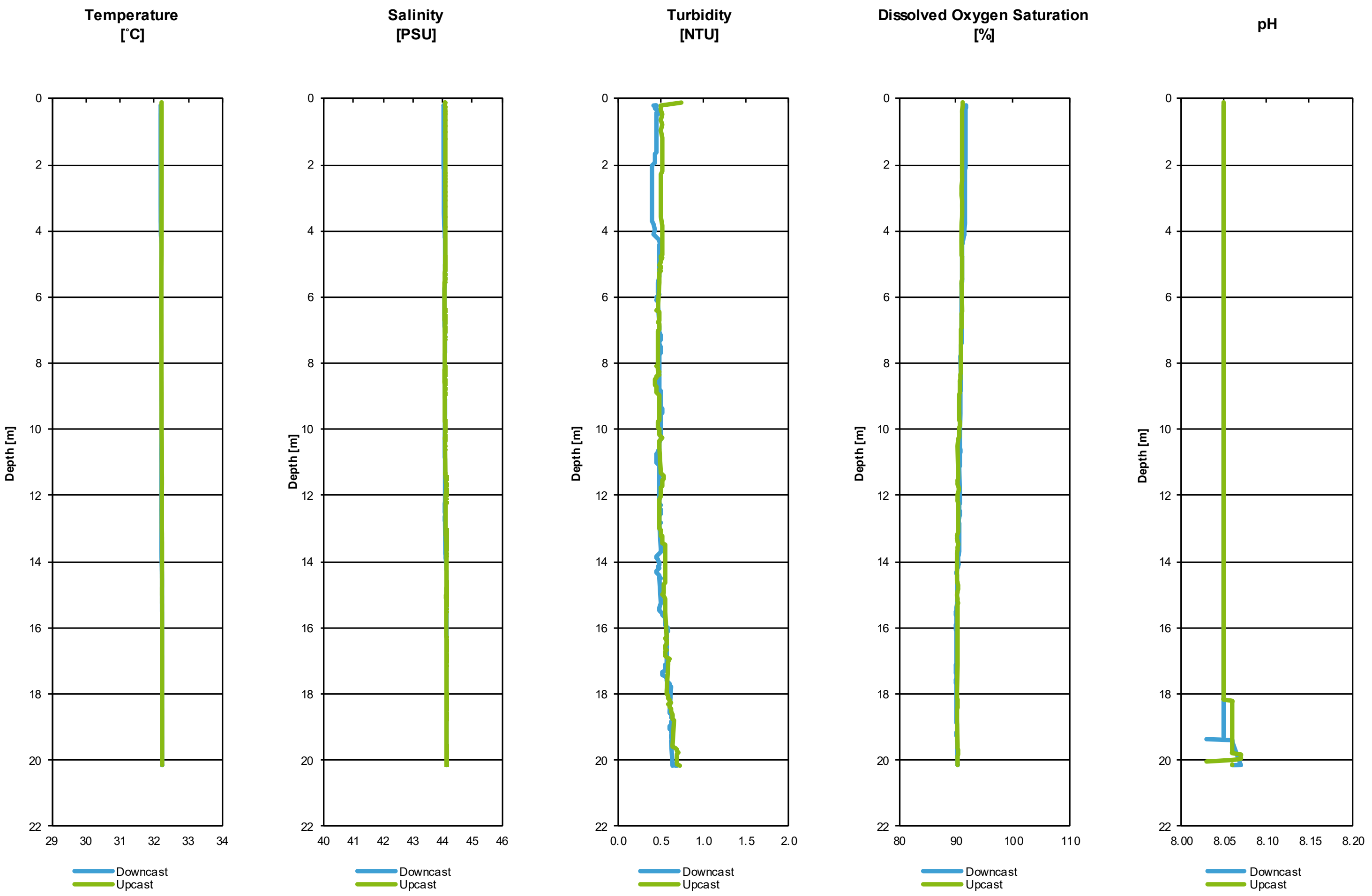
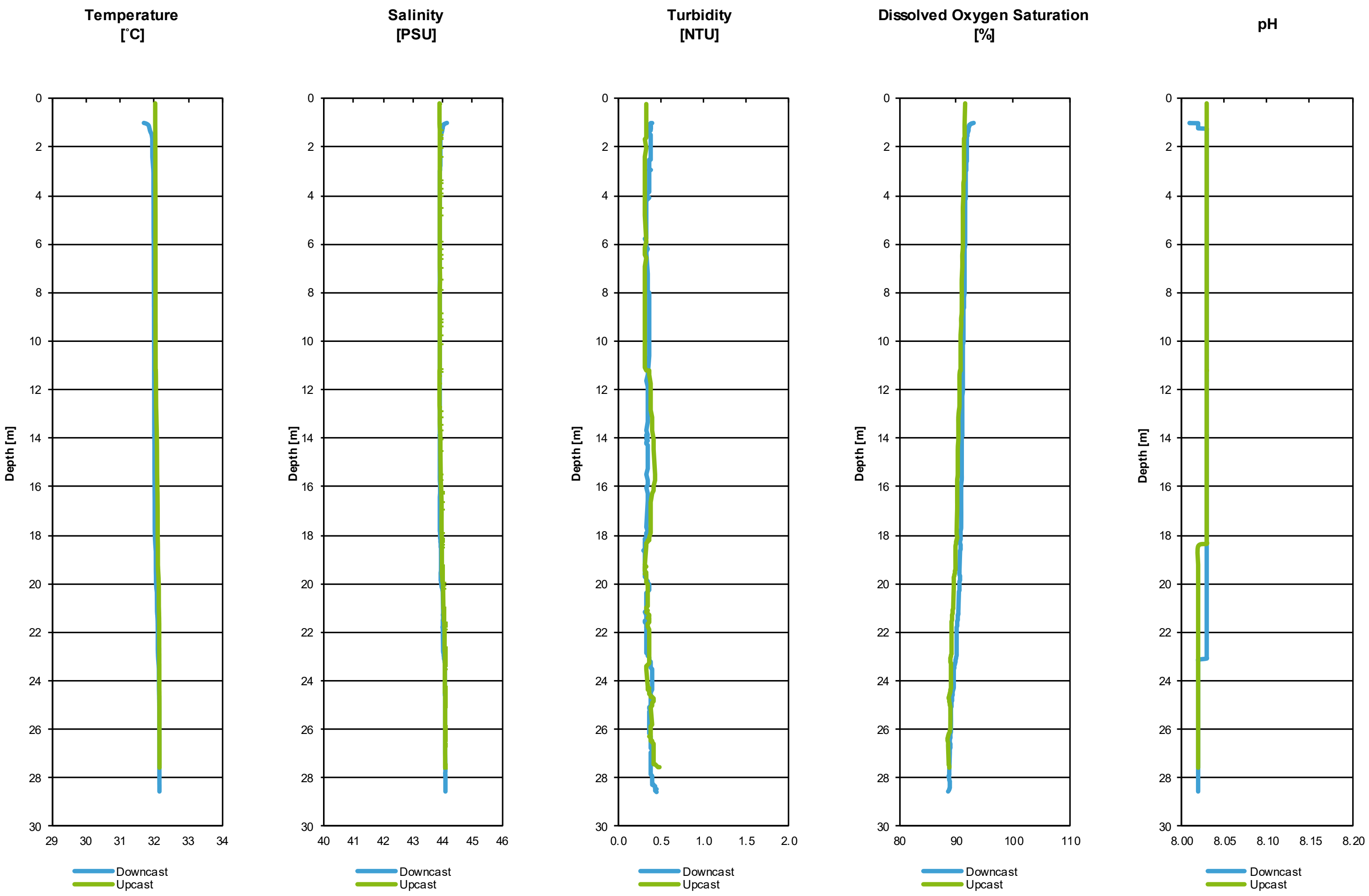


Station R2_ENV_035



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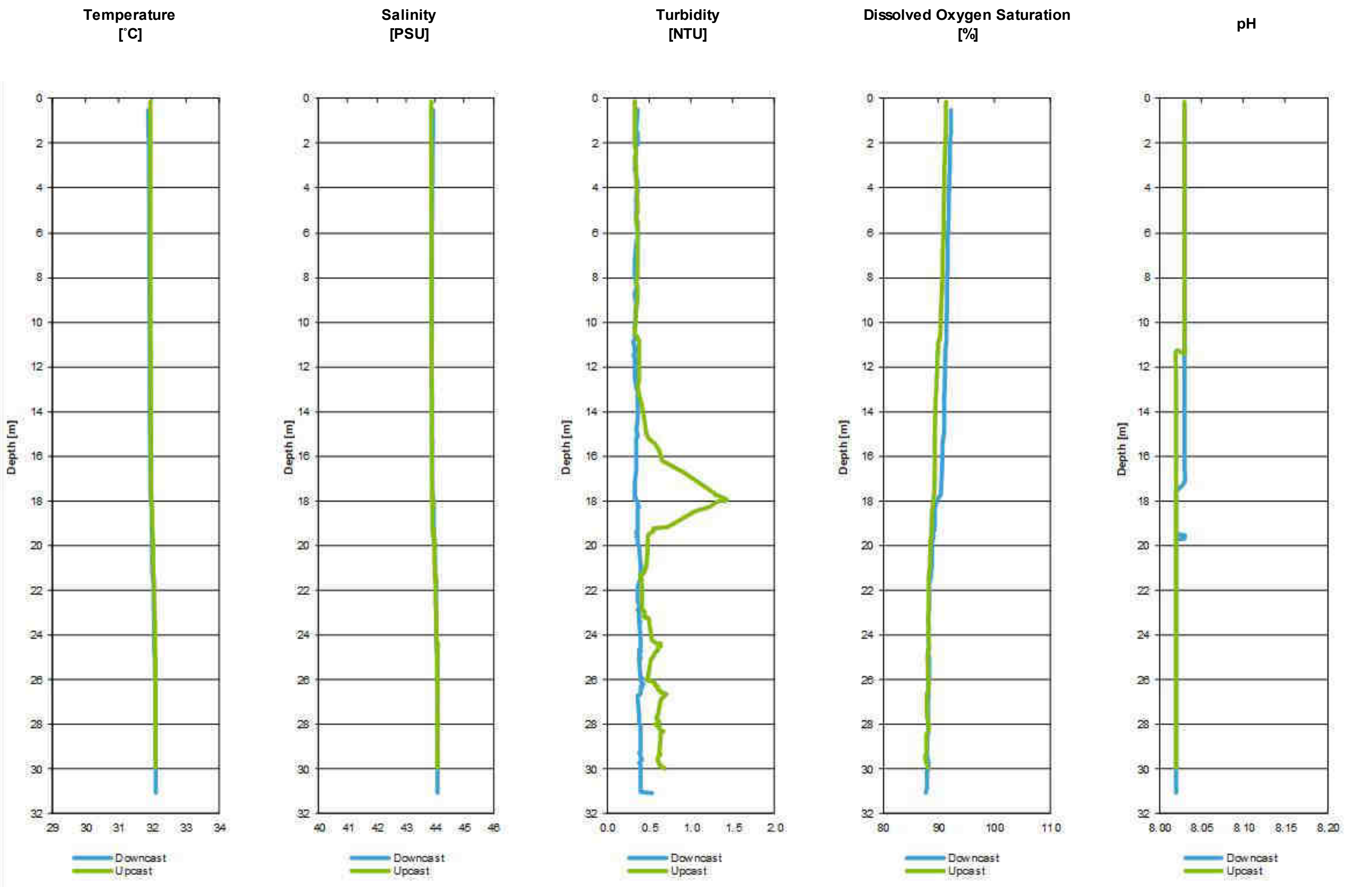
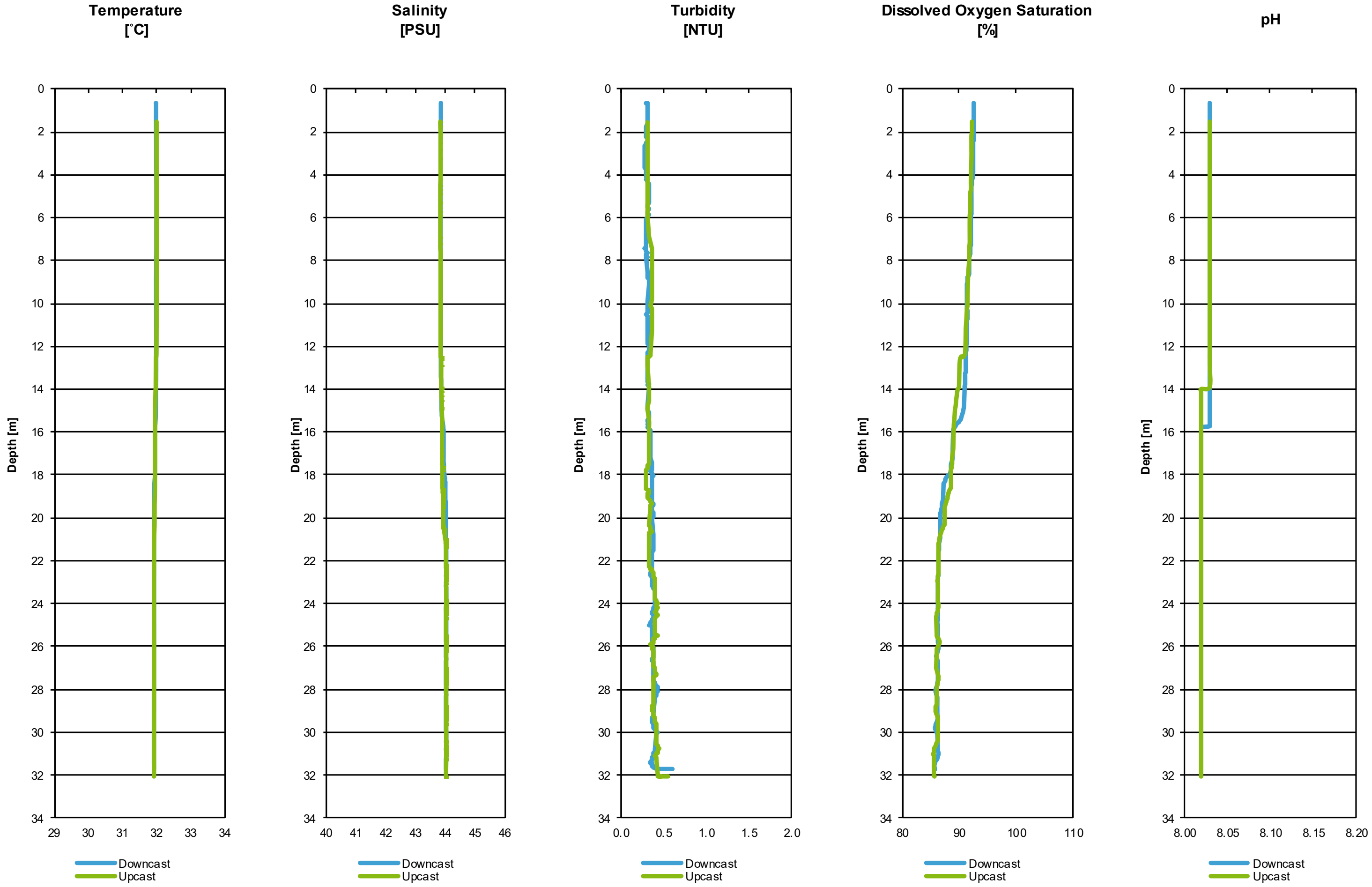
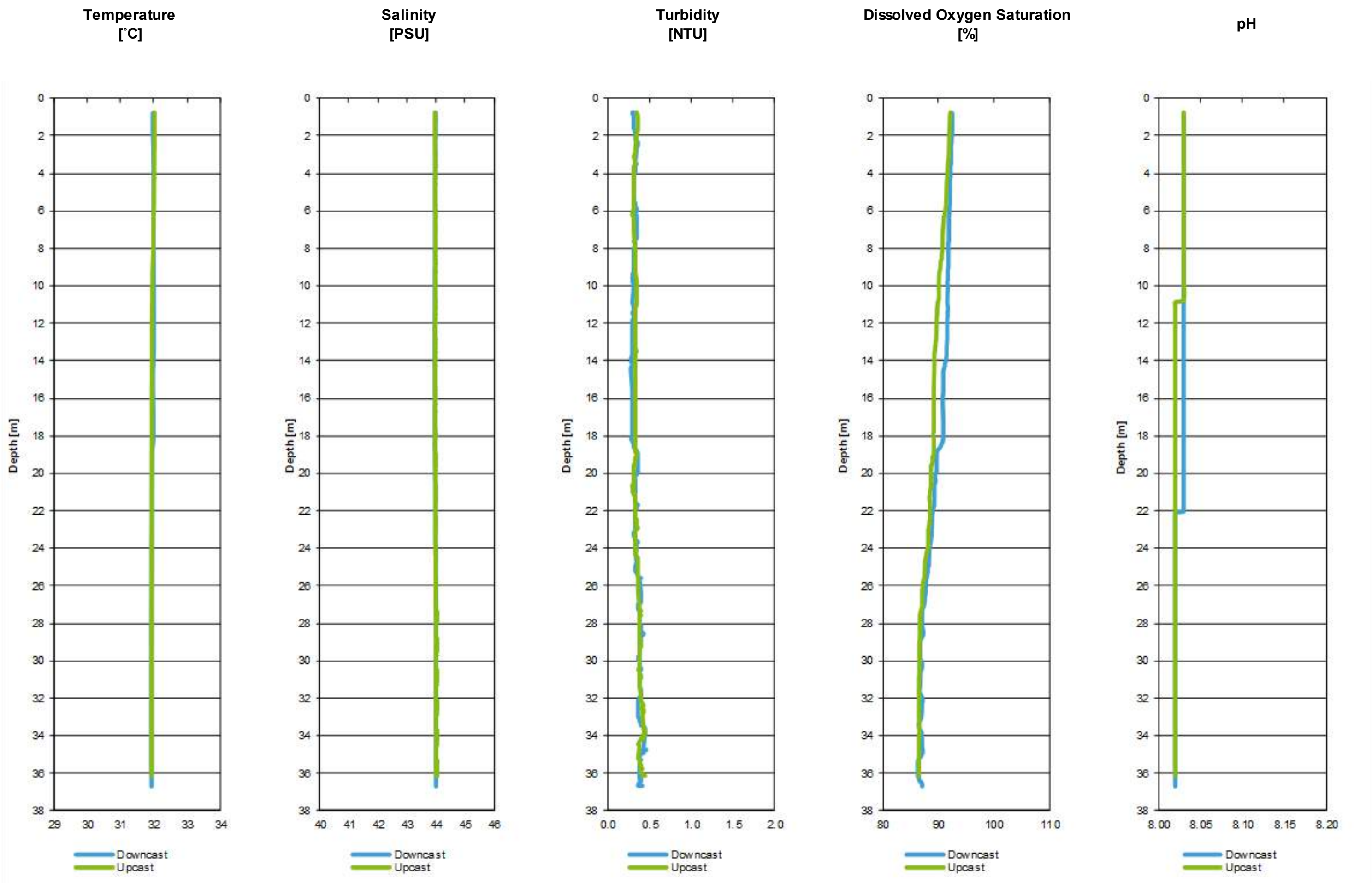


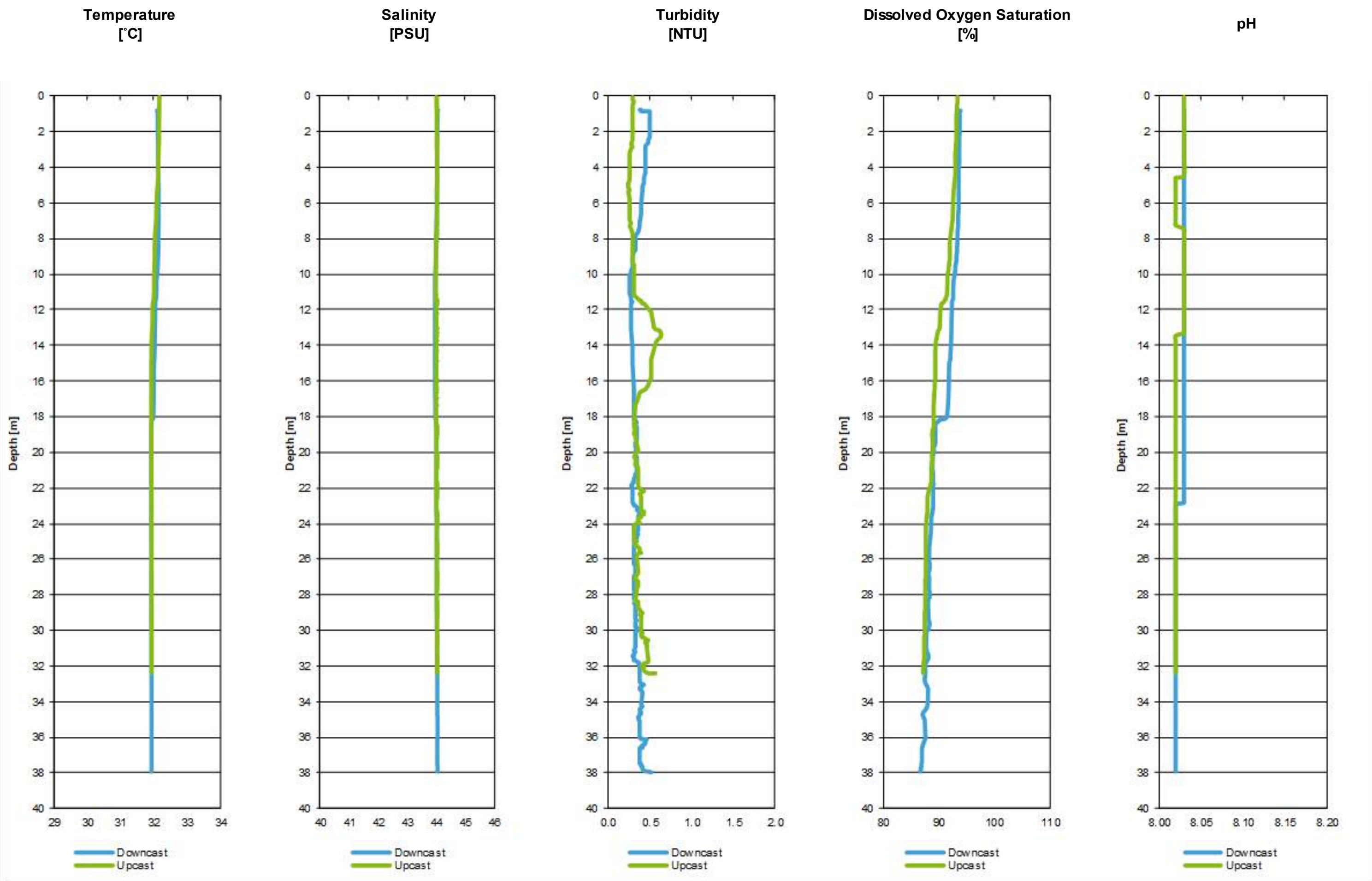
Station R2_ENV_037



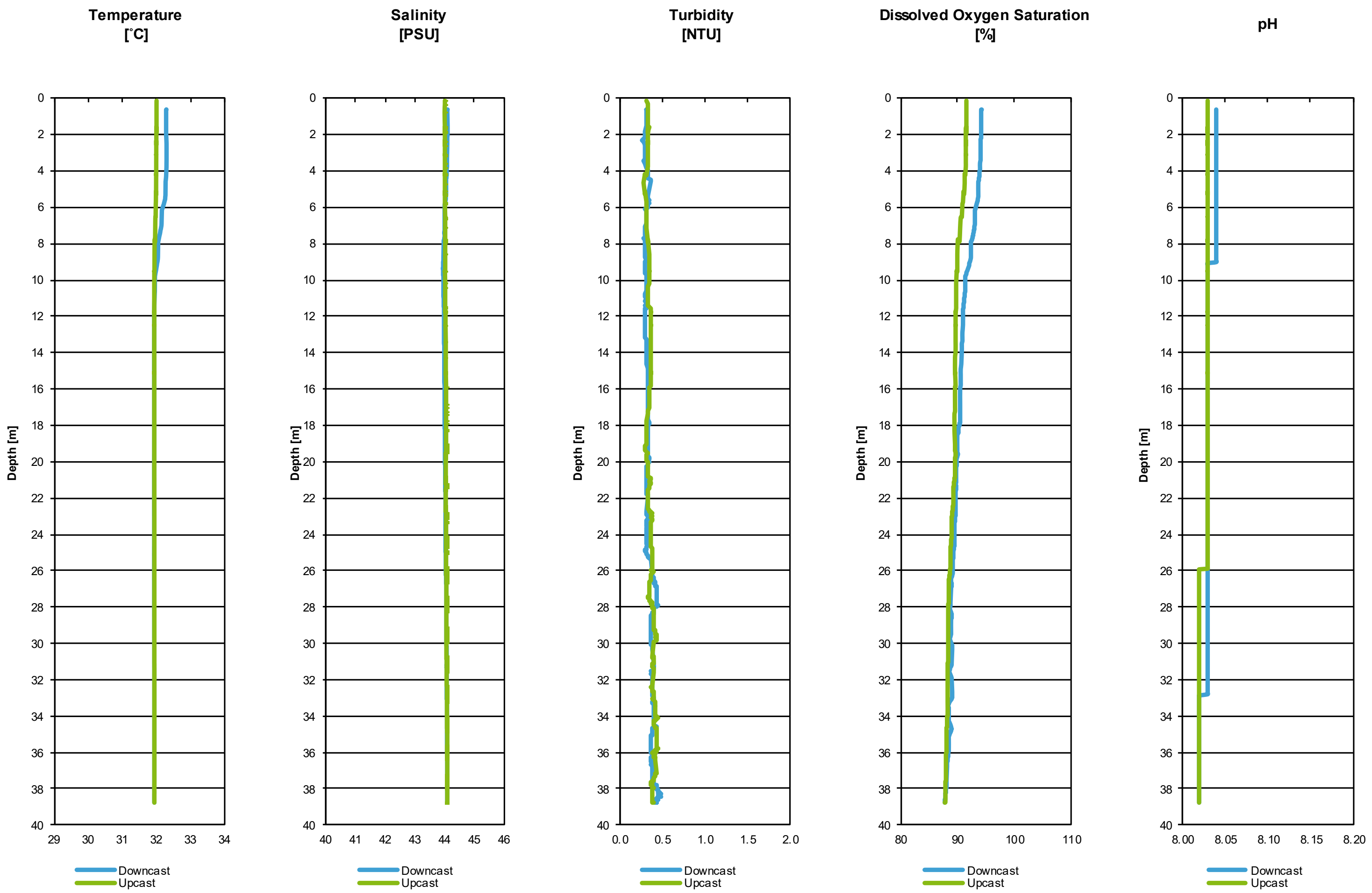
Station R2_ENV_038



Station R2_ENV_039



Station R2_ENV_040



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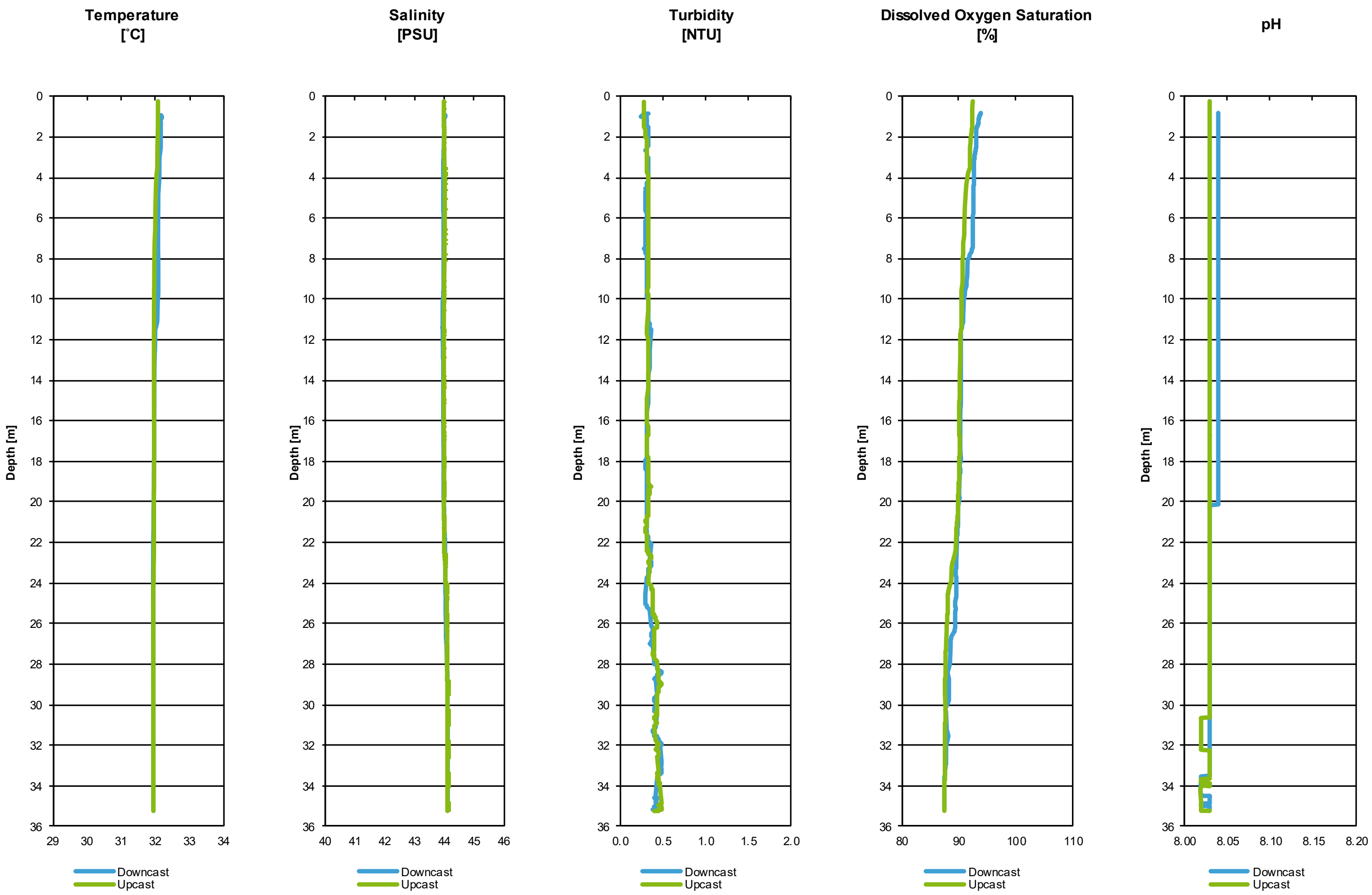

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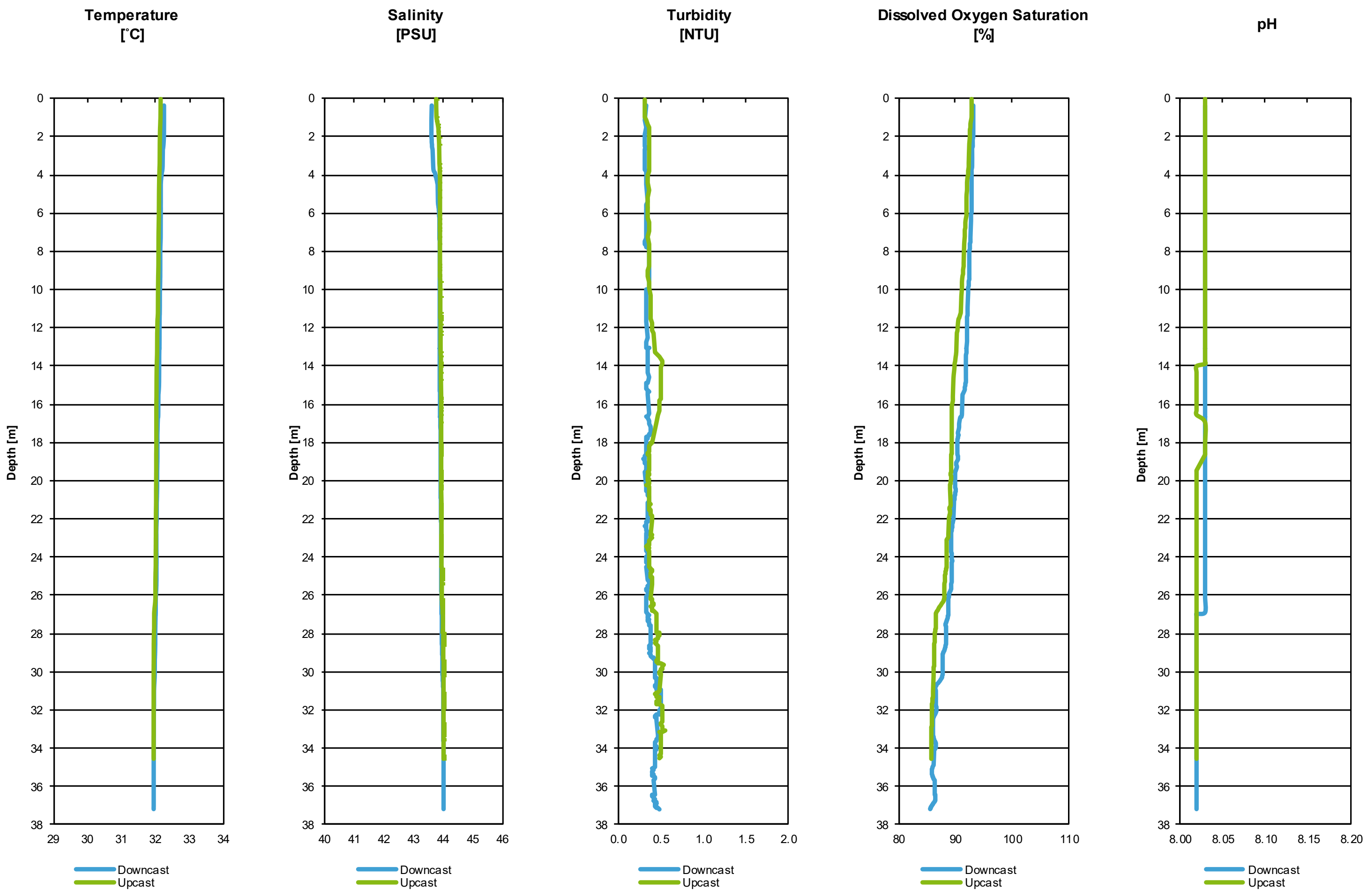
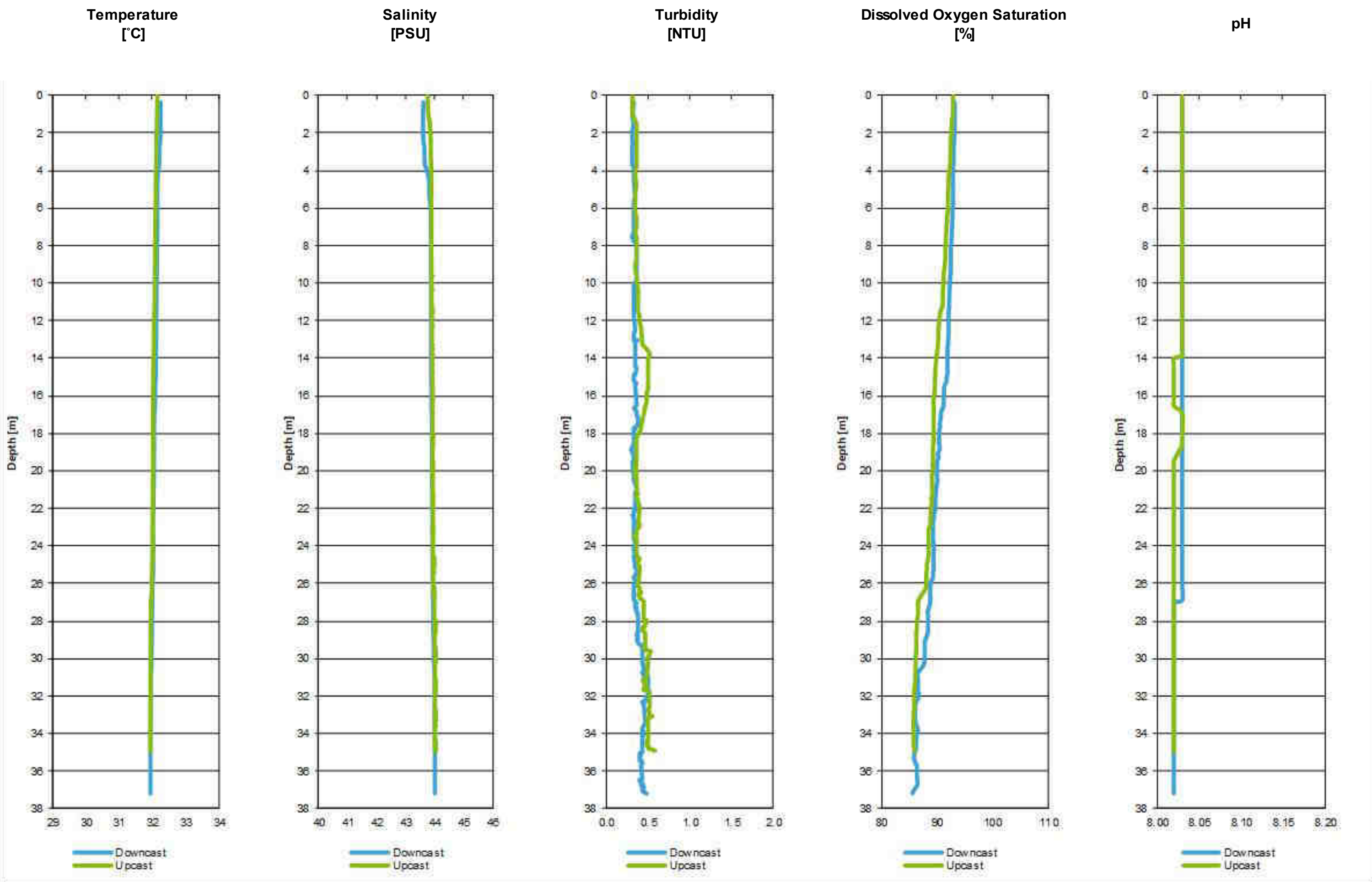
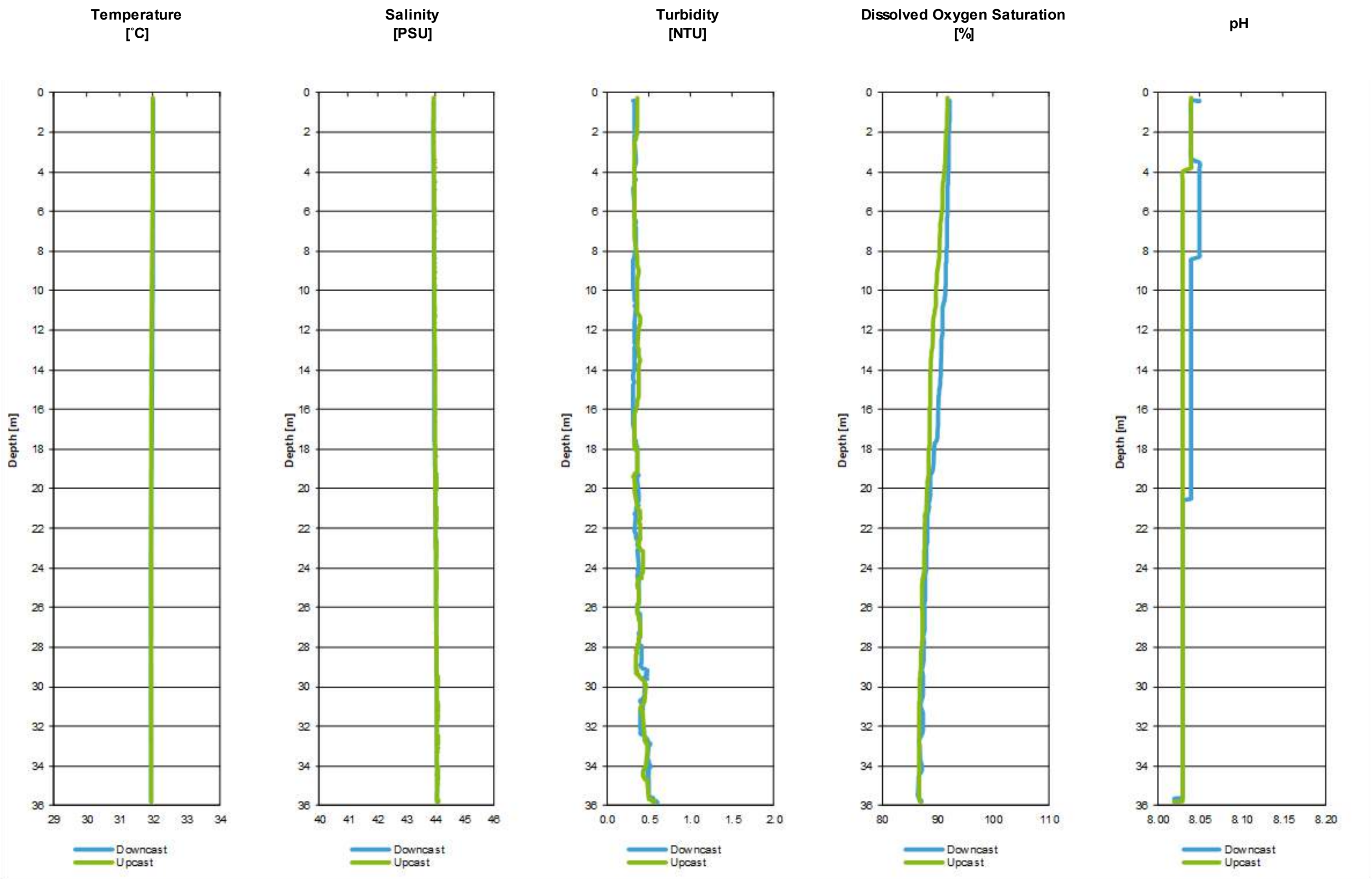
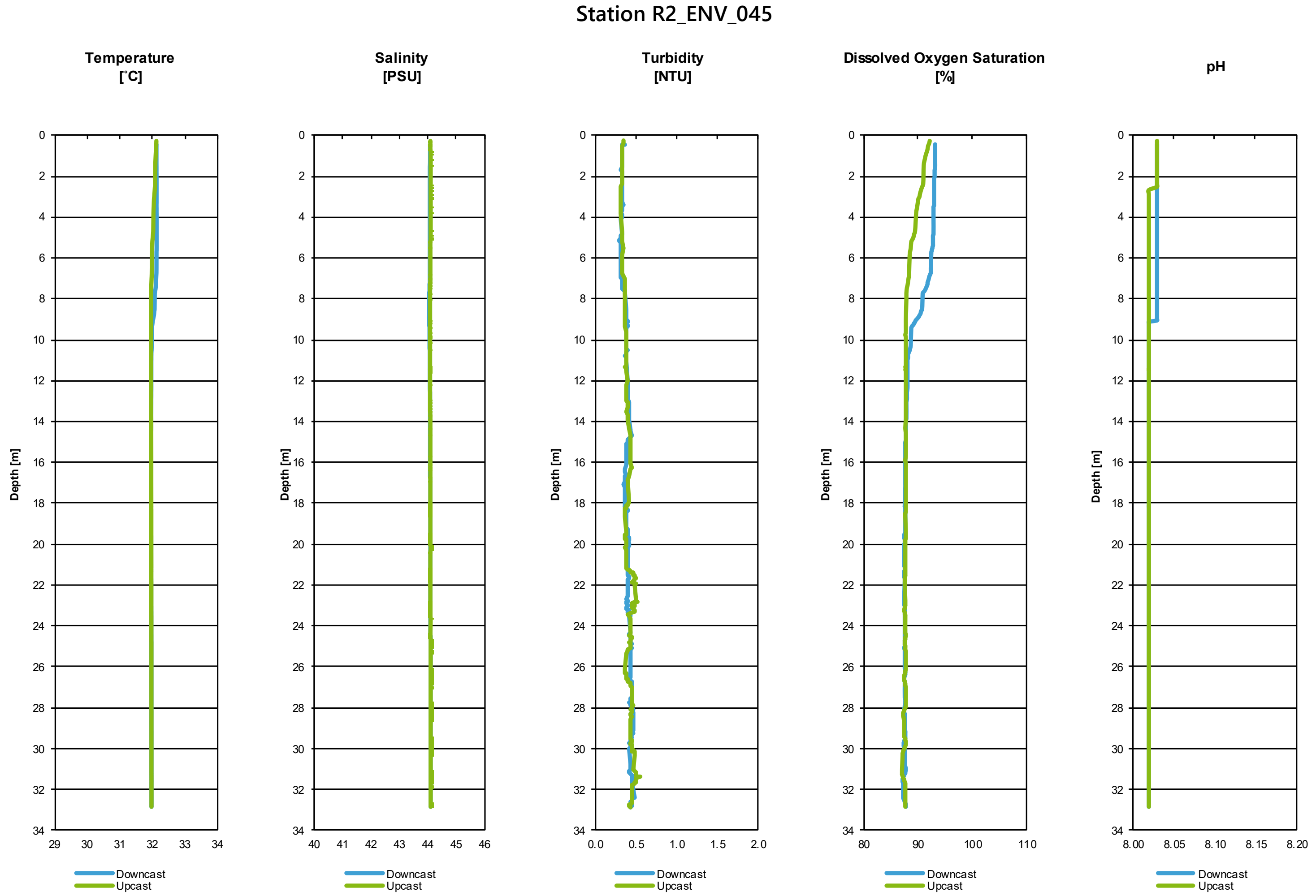


Station R2_ENV_043

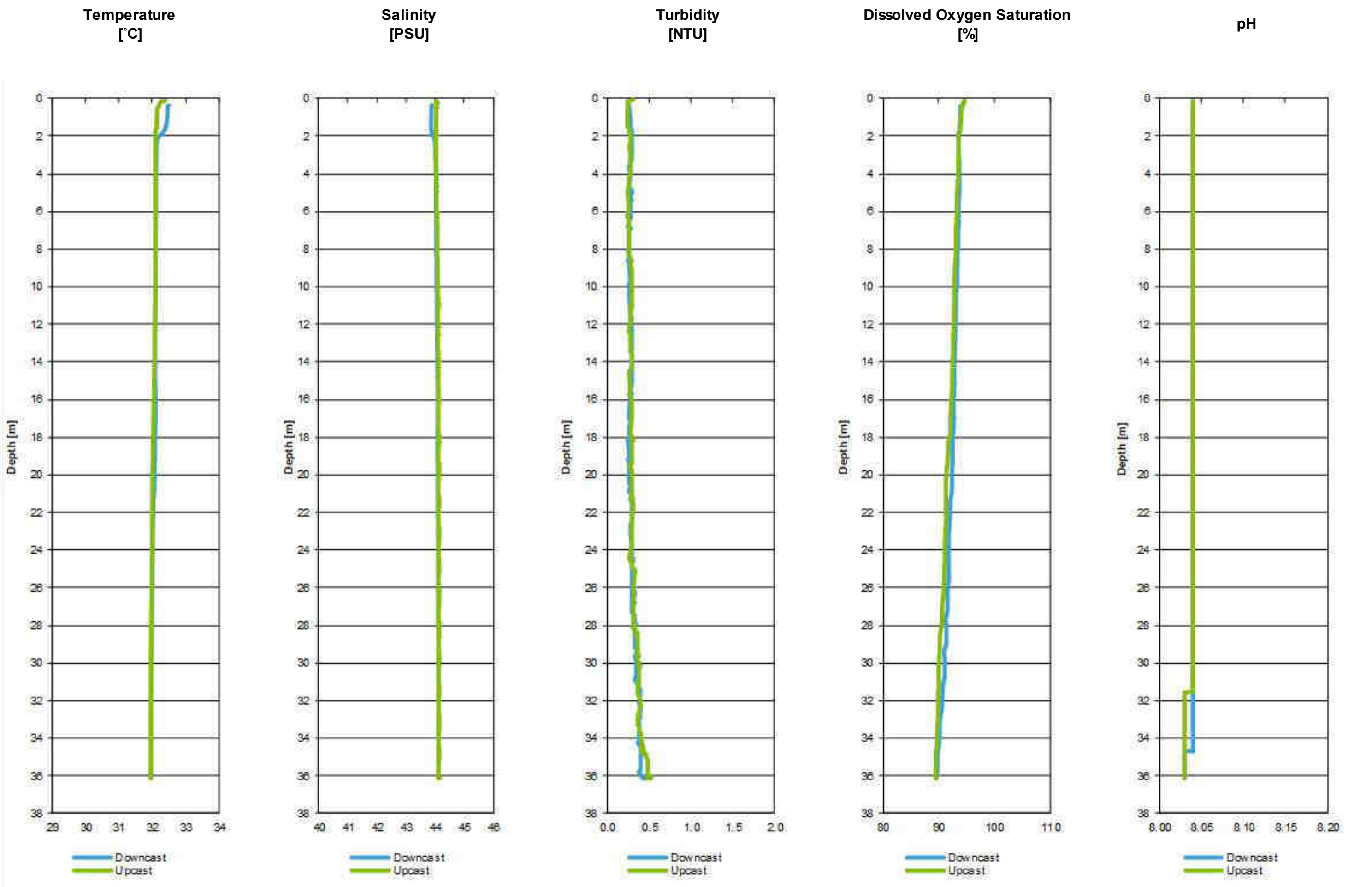


Station R2_ENV_044

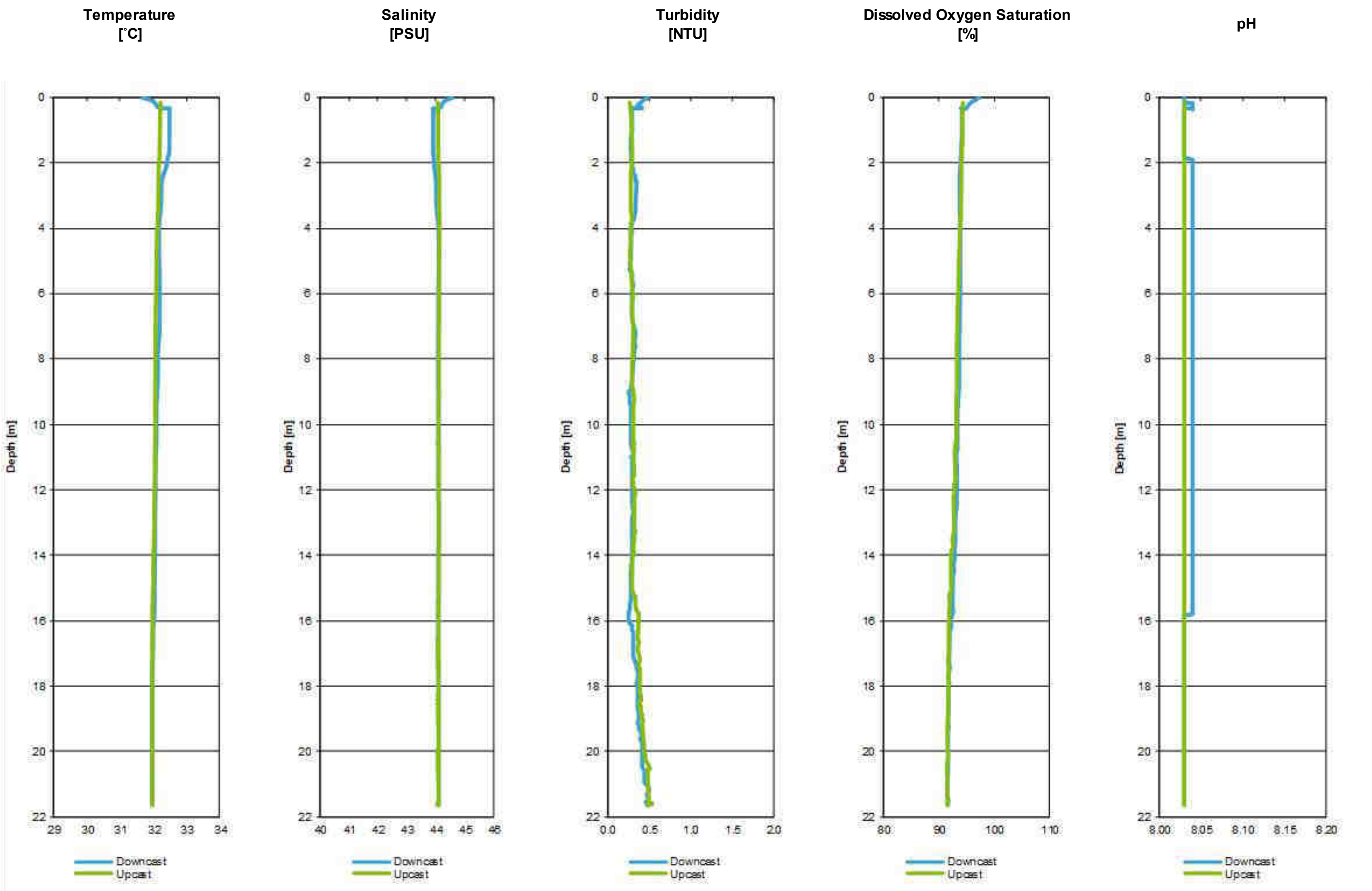



Station R2_ENV_045
Temperature [˚C]
Salinity [PSU]
Turbidity [NTU]
Dissolved Oxygen Saturation [%]
pH
Depth [m]
Downcast
Upcast

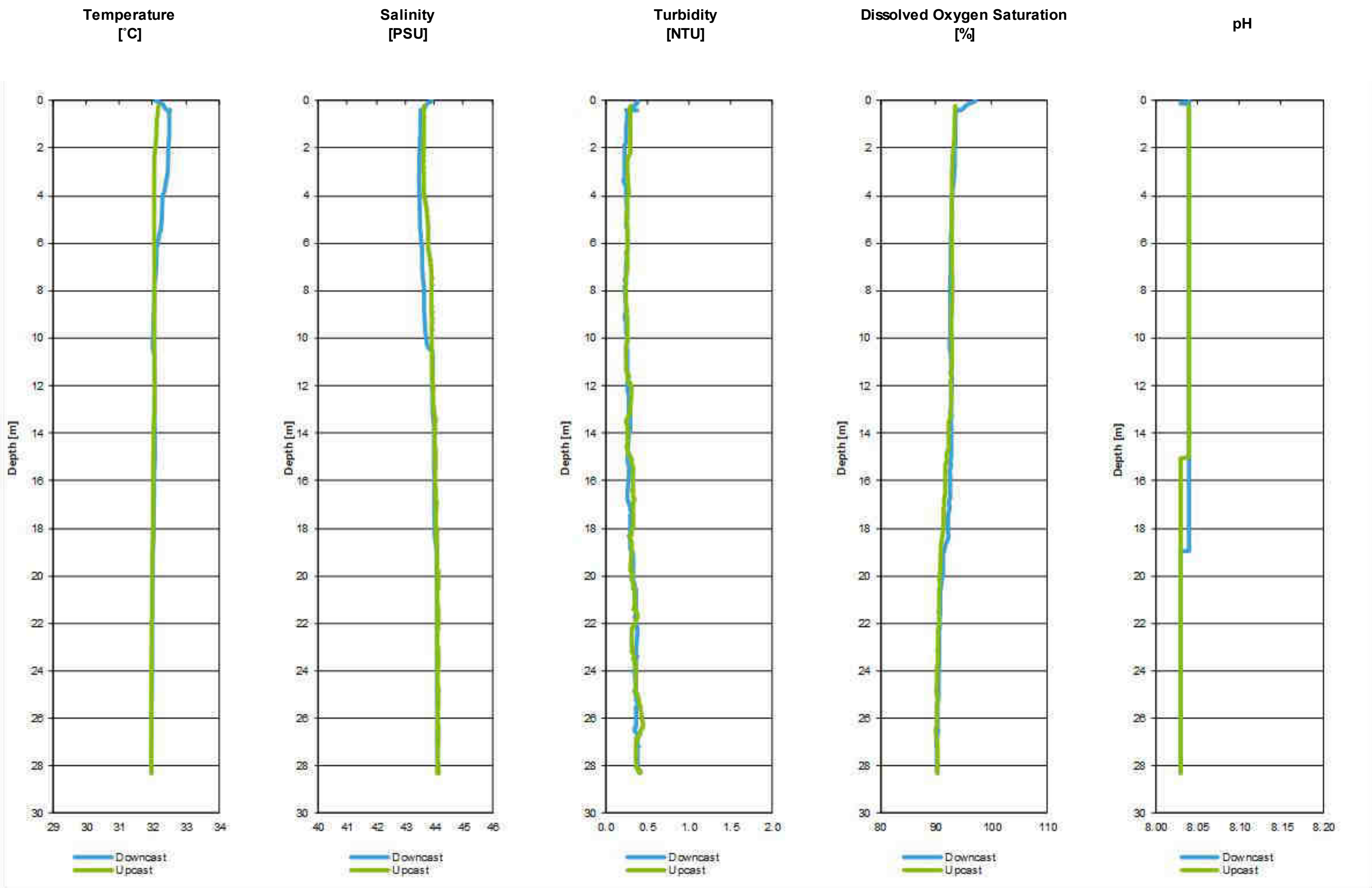
Station R2_ENV_046



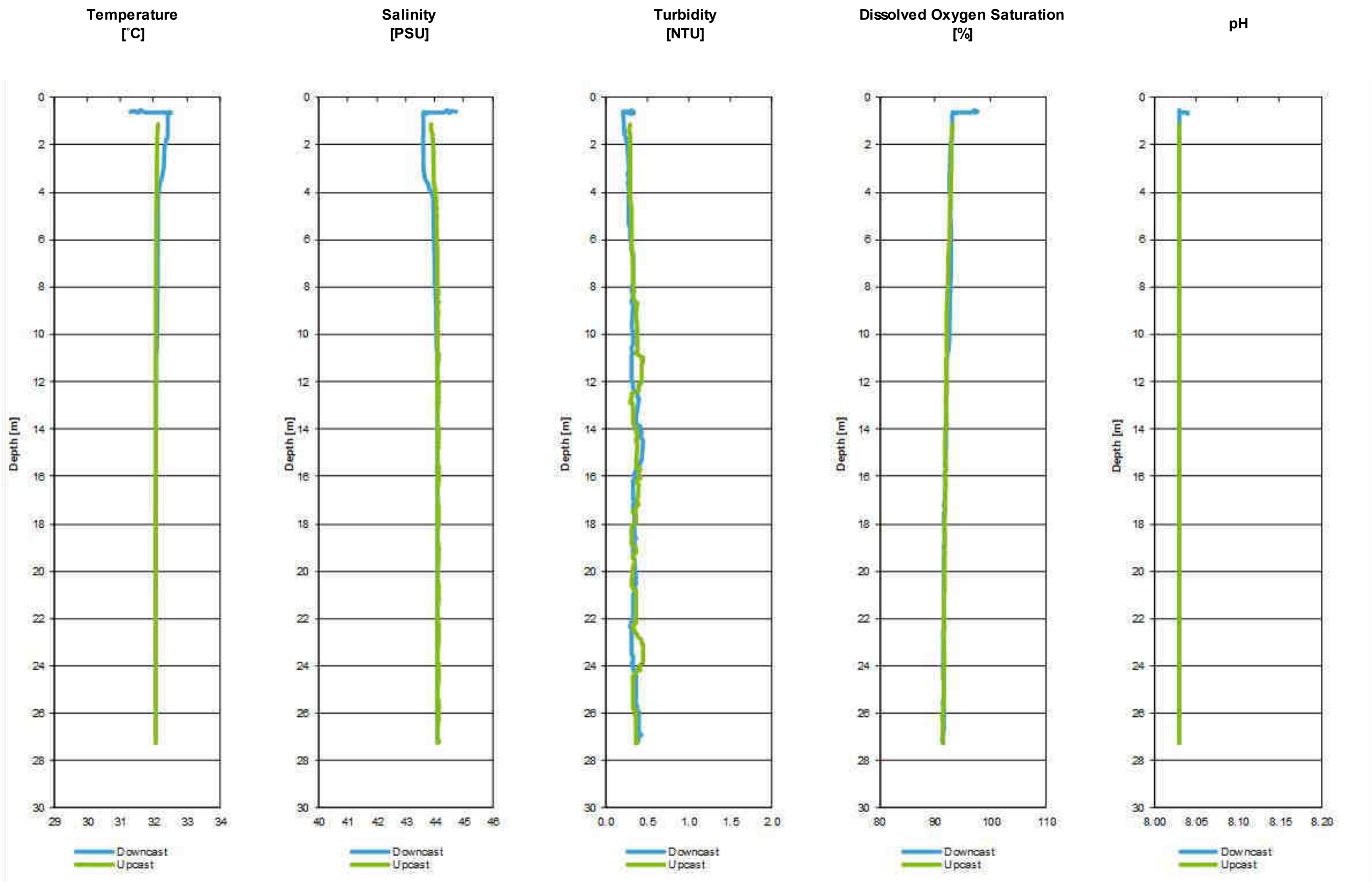
Station R2_ENV_047

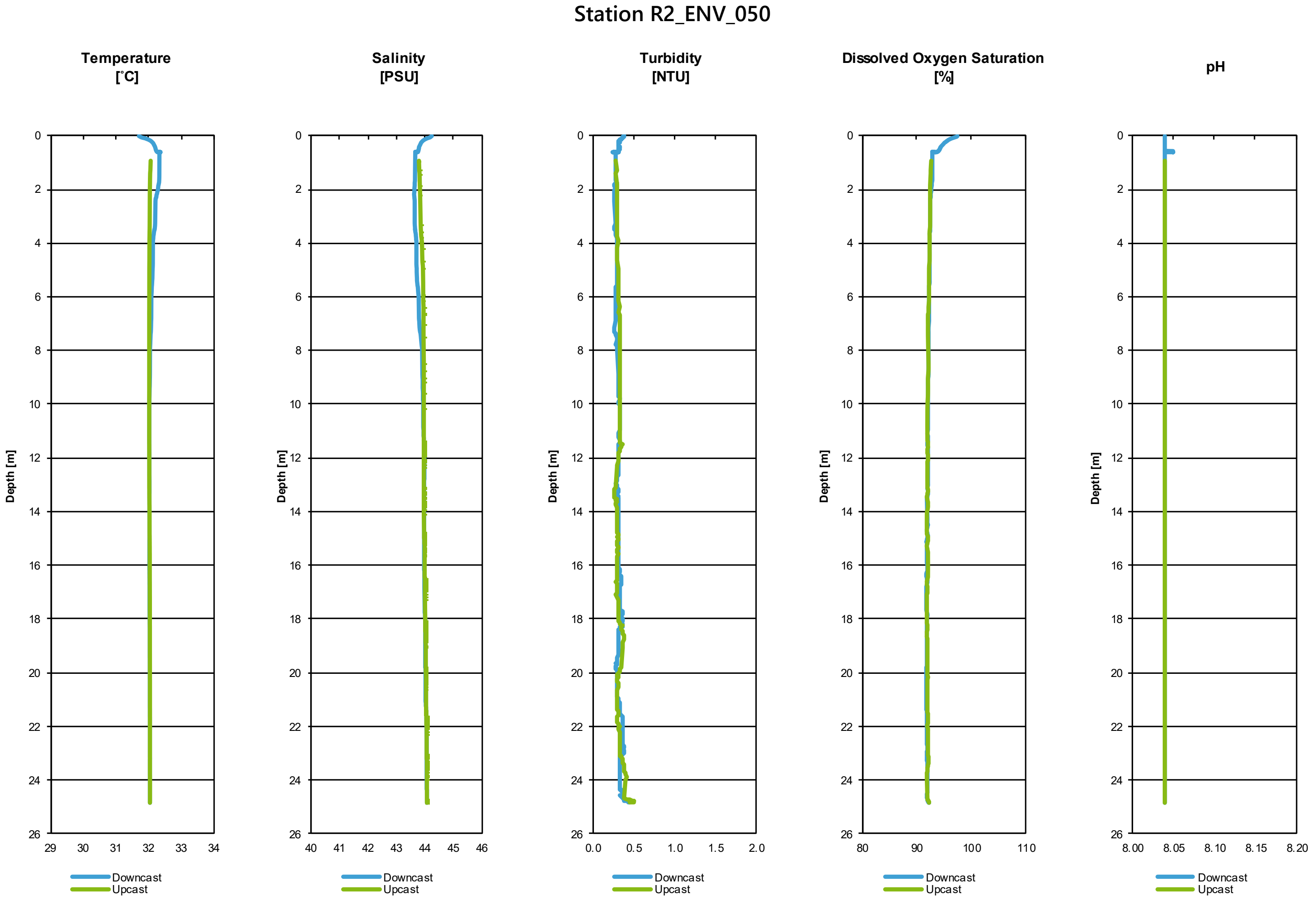


Station R2_ENV_048



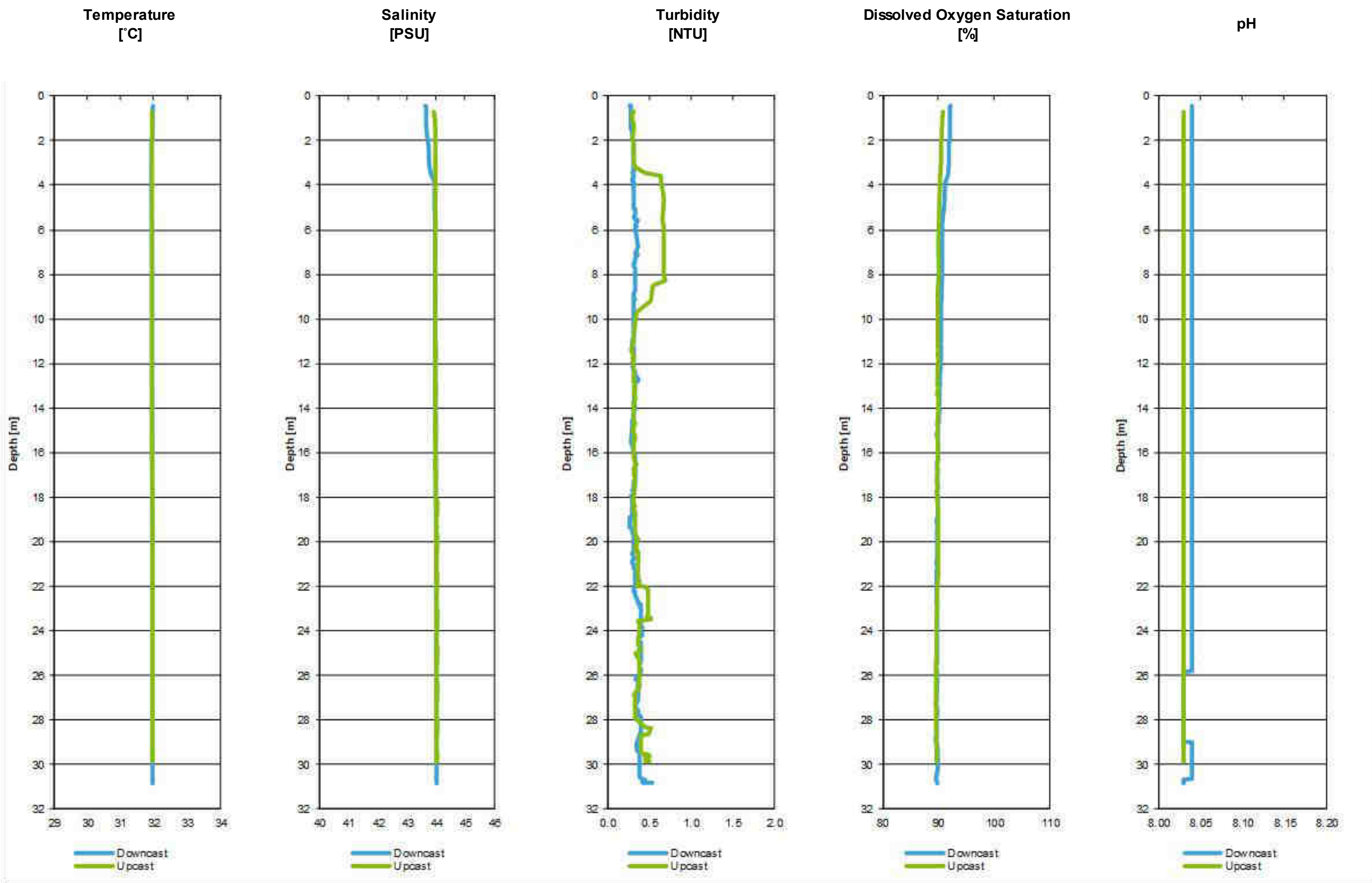
Station R2_ENV_049

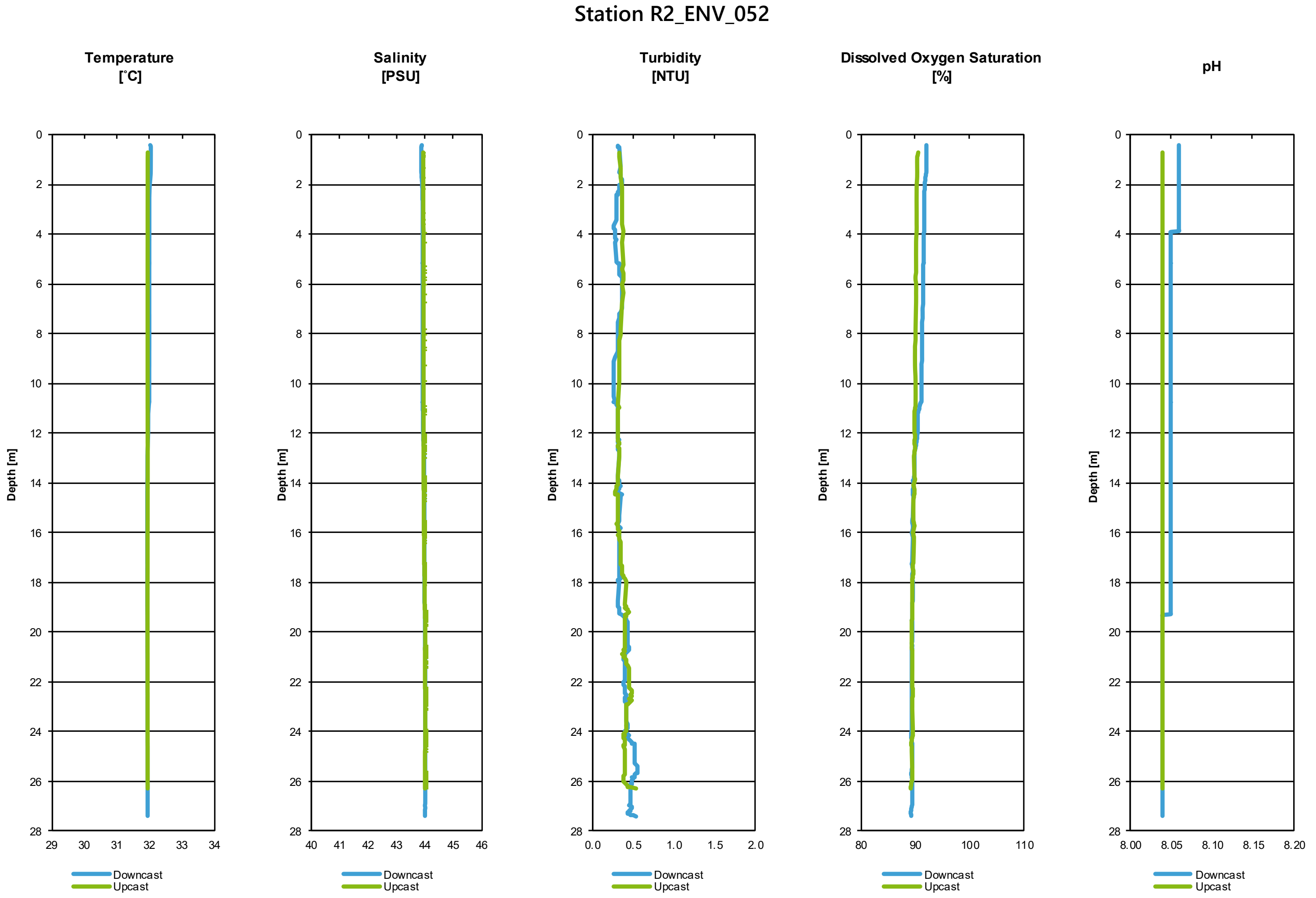




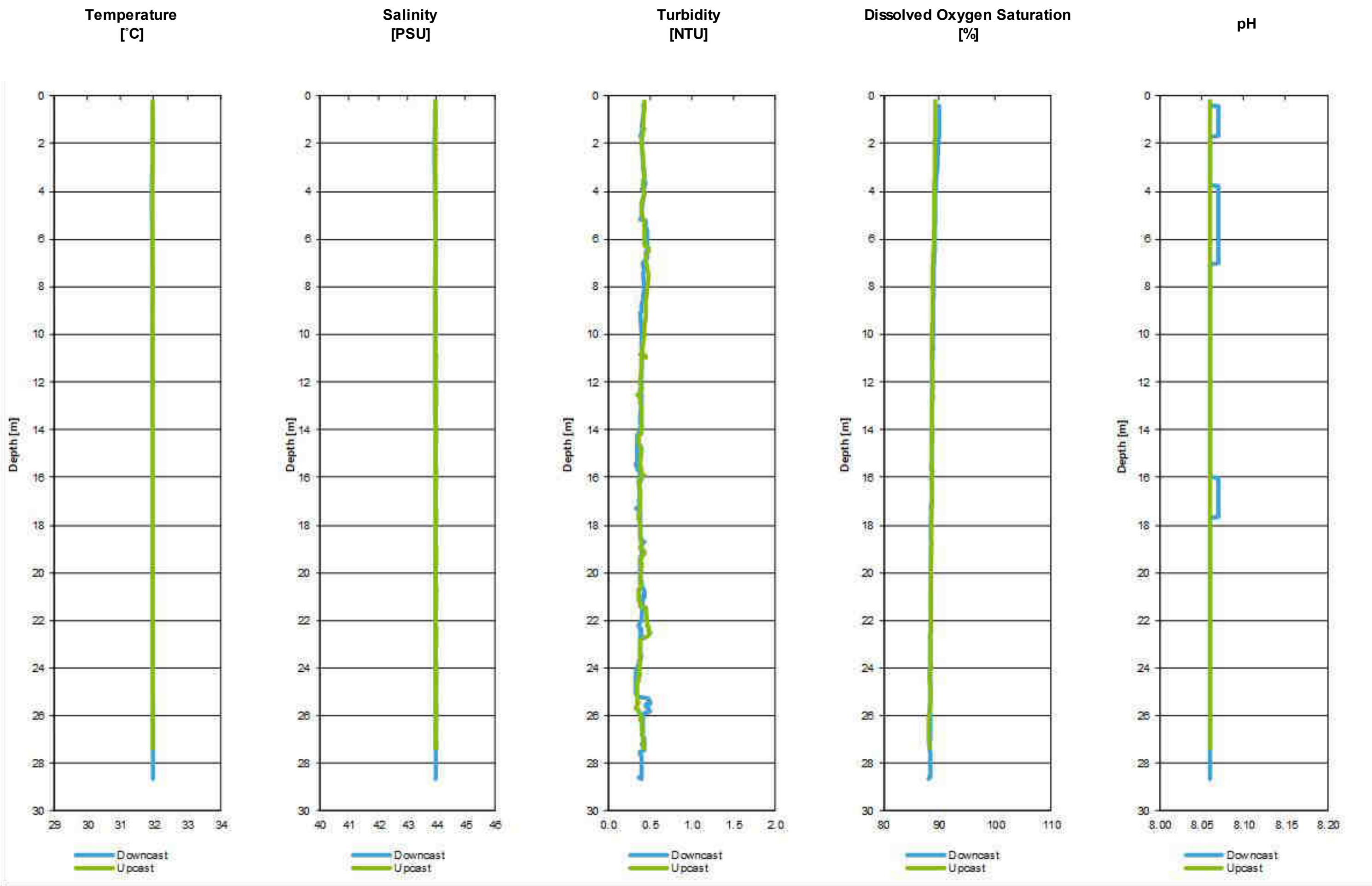
Station R2_ENV_050
Temperature [˚C]
Salinity [PSU]
Turbidity [NTU]
Dissolved Oxygen Saturation [%]
pH
Depth [m]
Downcast
Upcast

Station R2_ENV_051




Station R2_ENV_052
Temperature [˚C]
Salinity [PSU]
Turbidity [NTU]
Dissolved Oxygen Saturation [%]
pH
Depth [m]
Downcast
Upcast

Station R2_ENV_053



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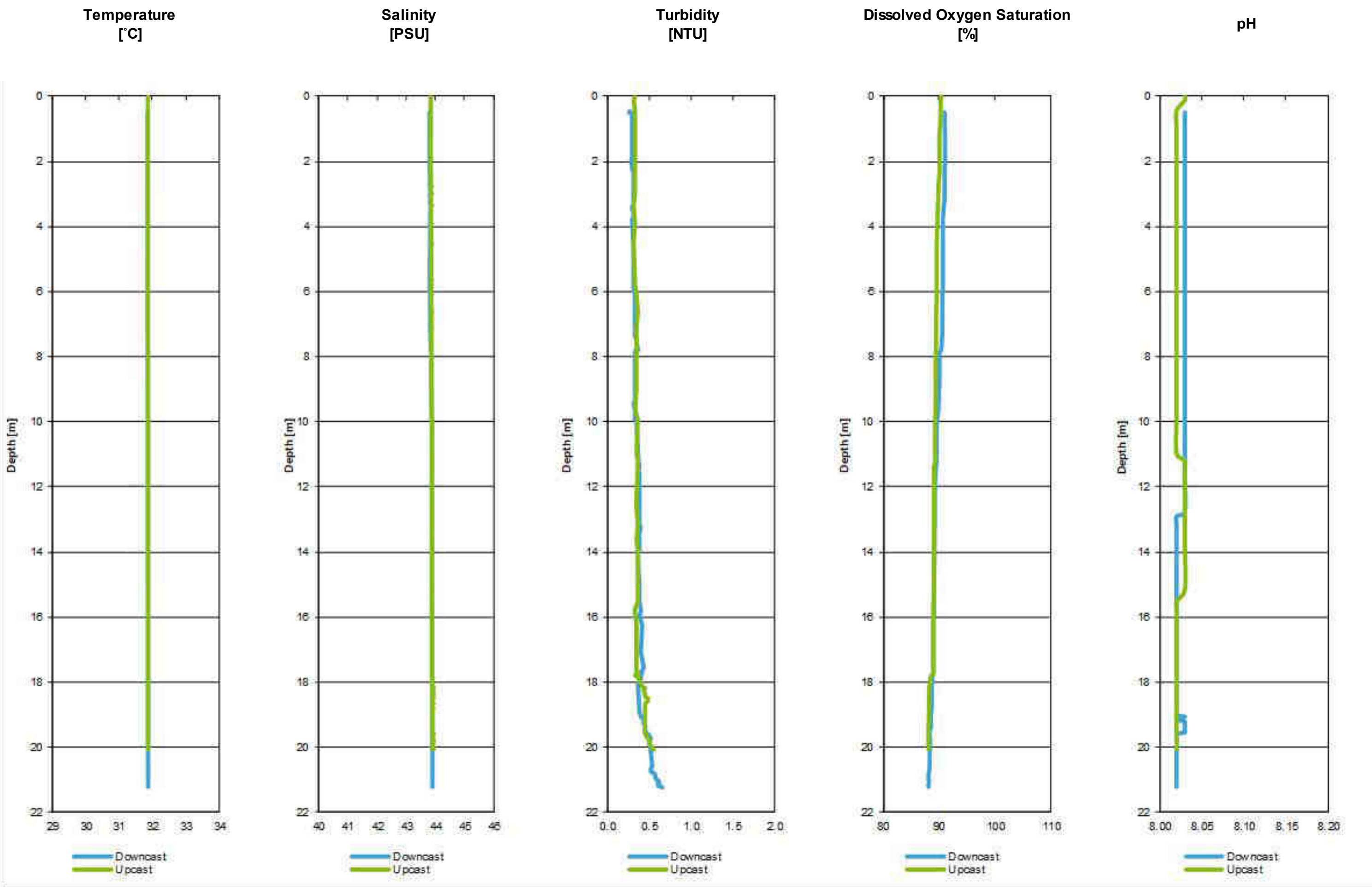

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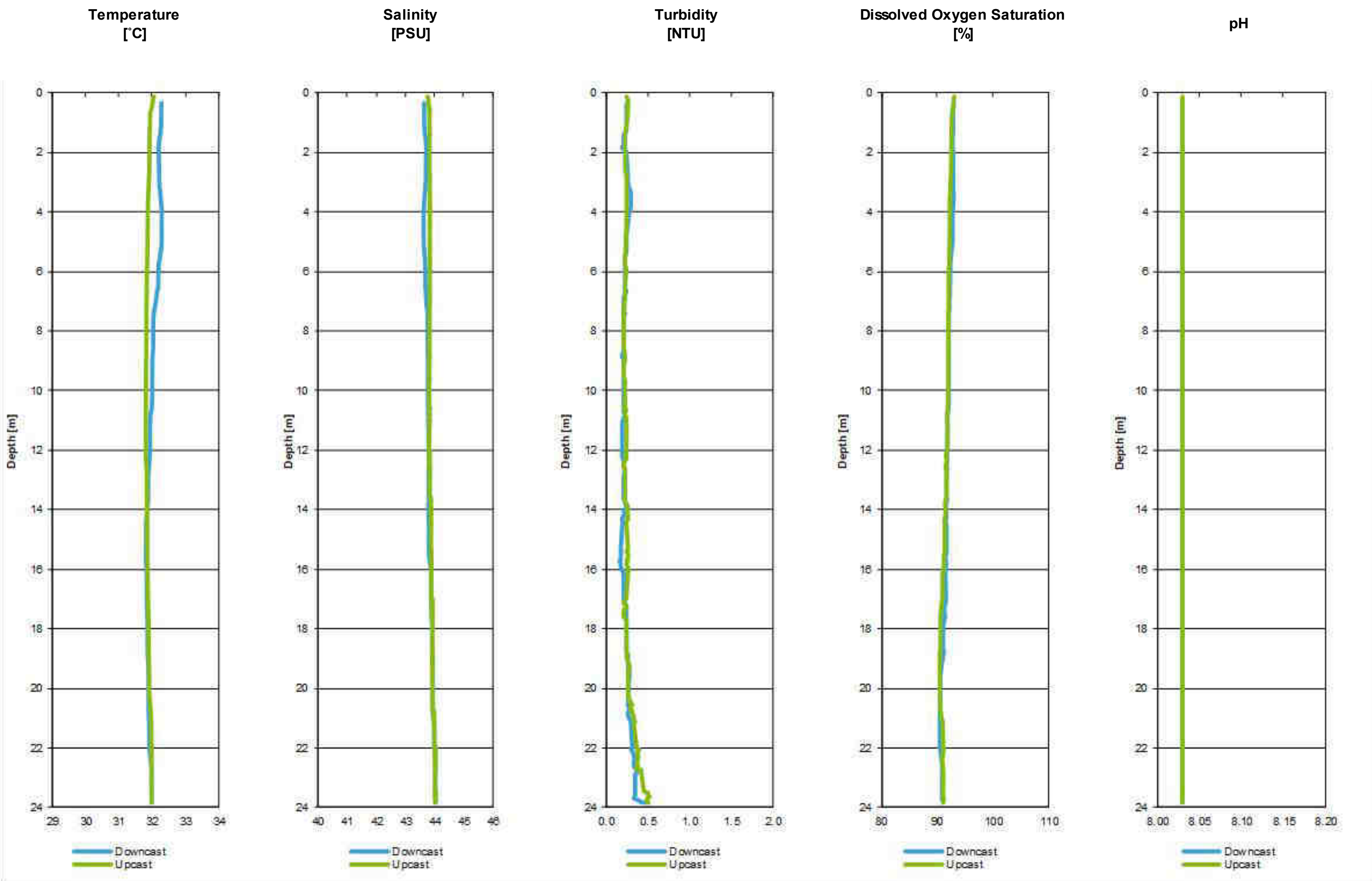

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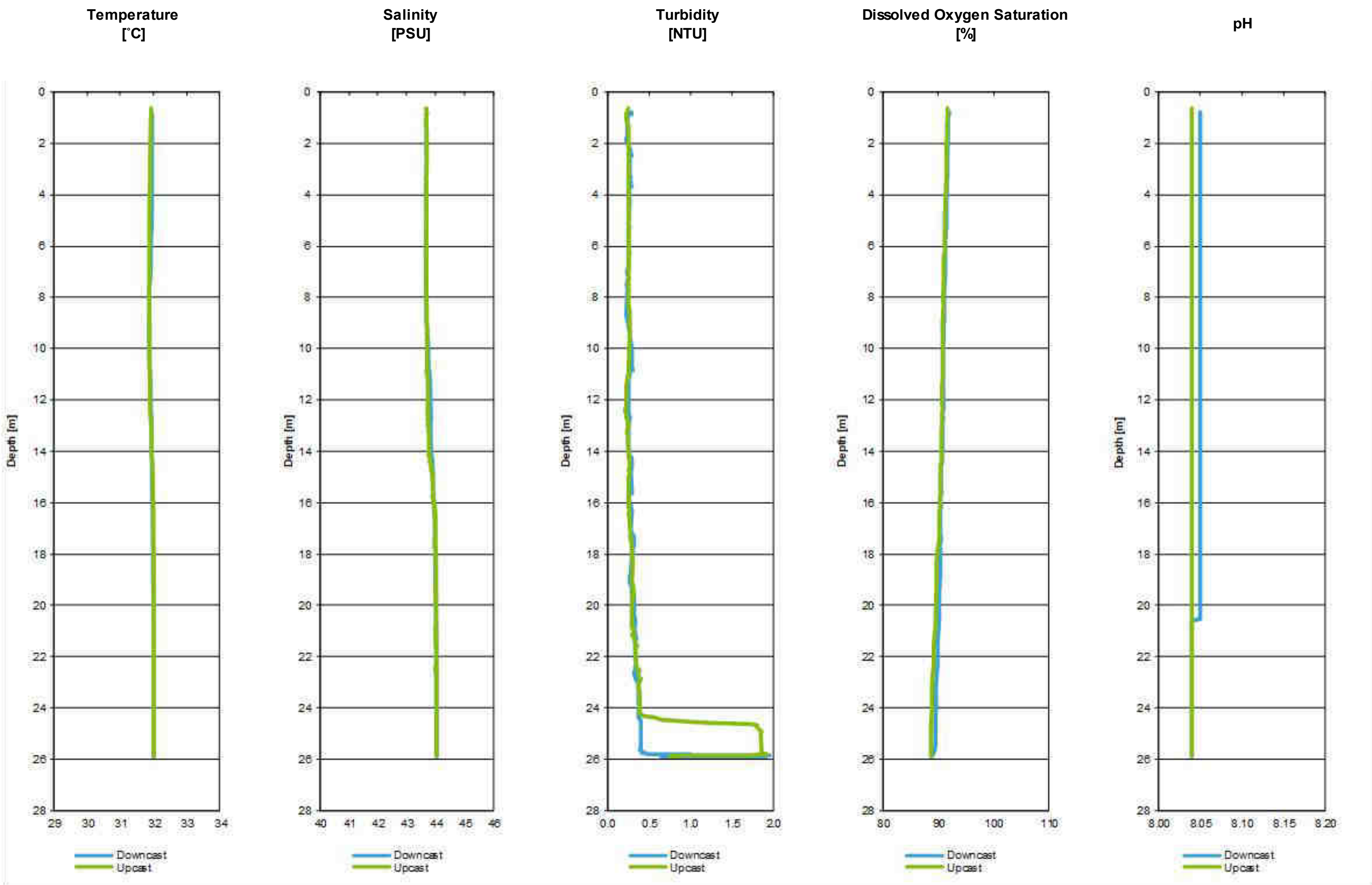

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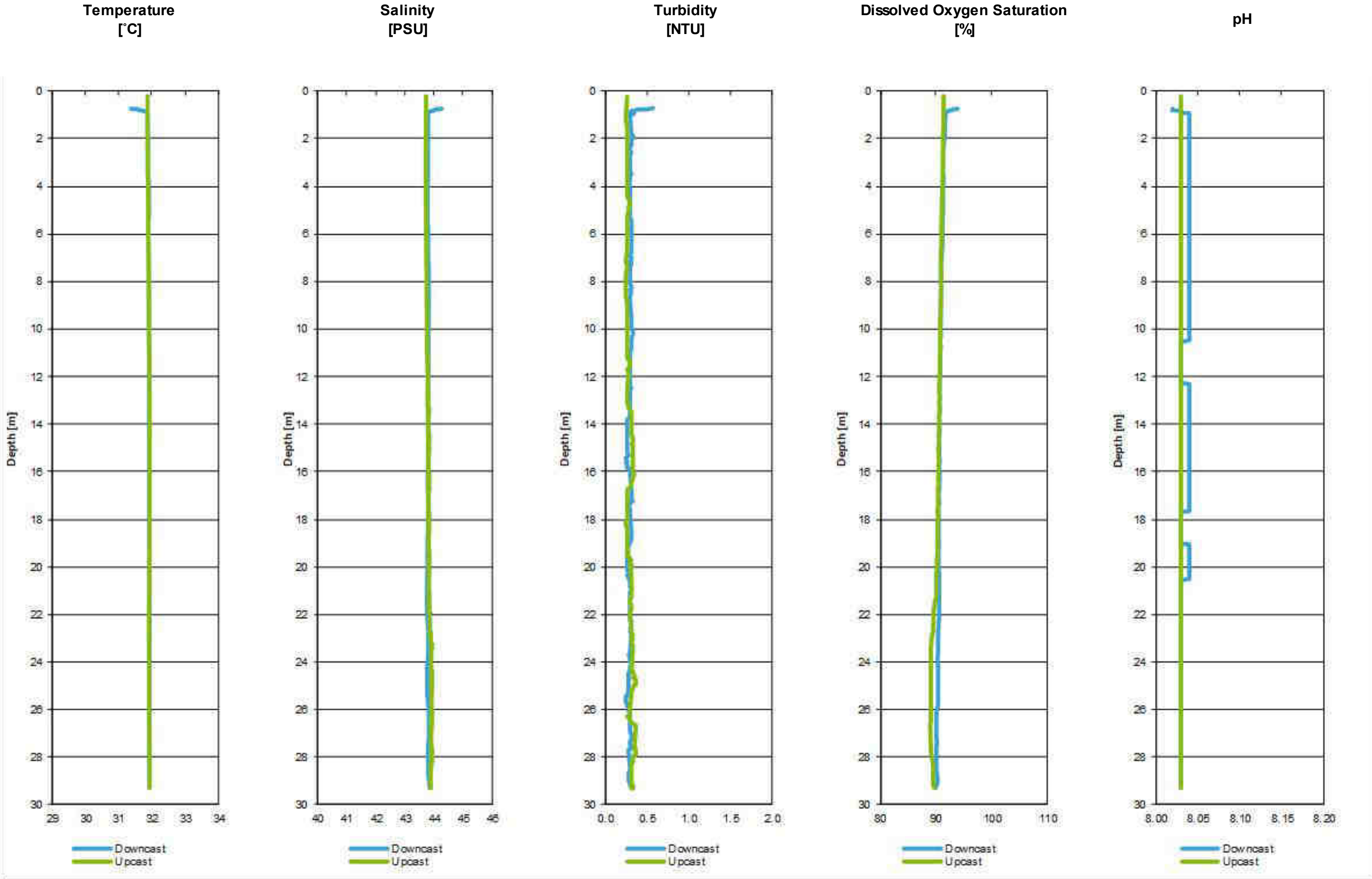

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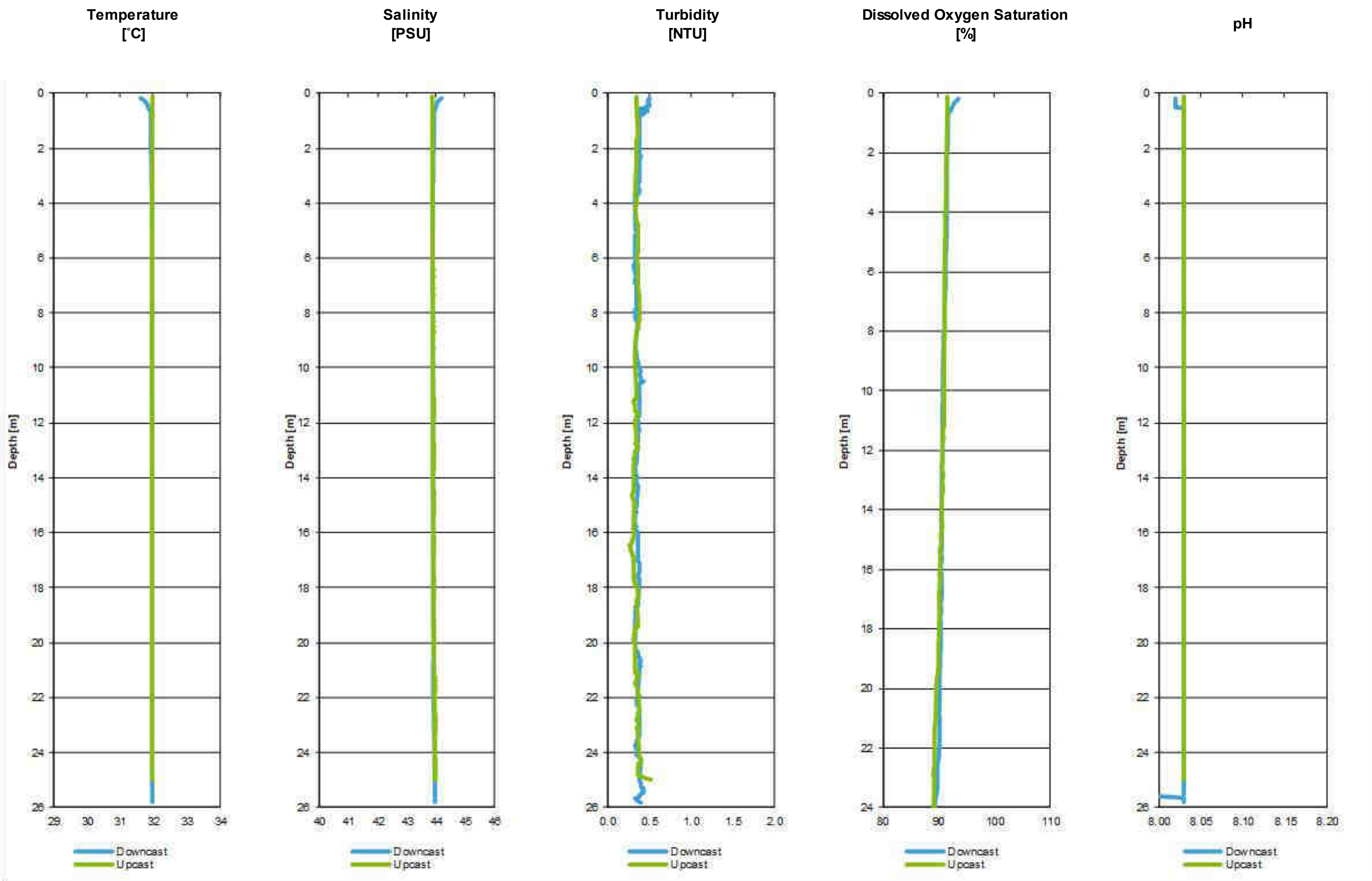

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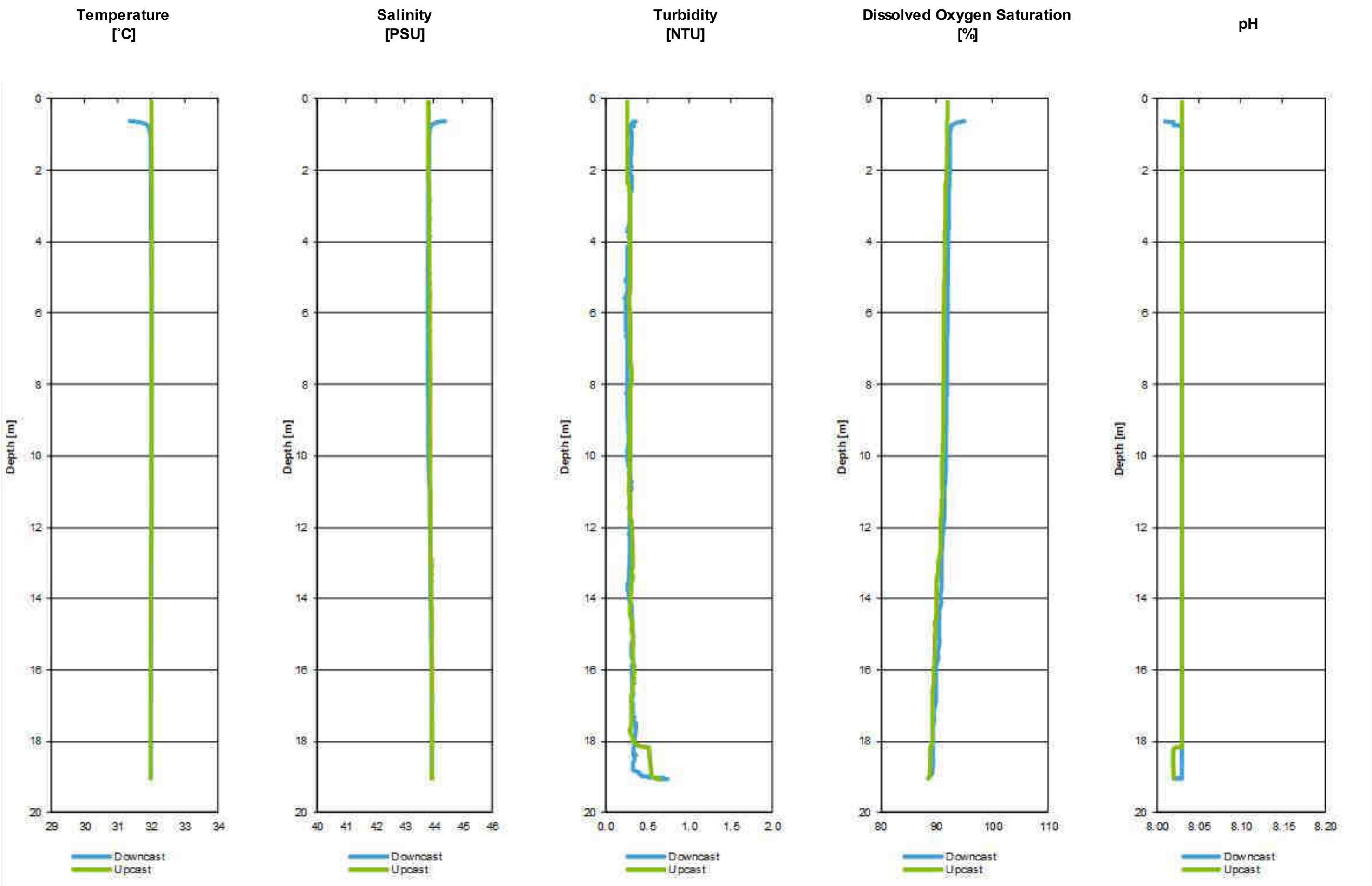

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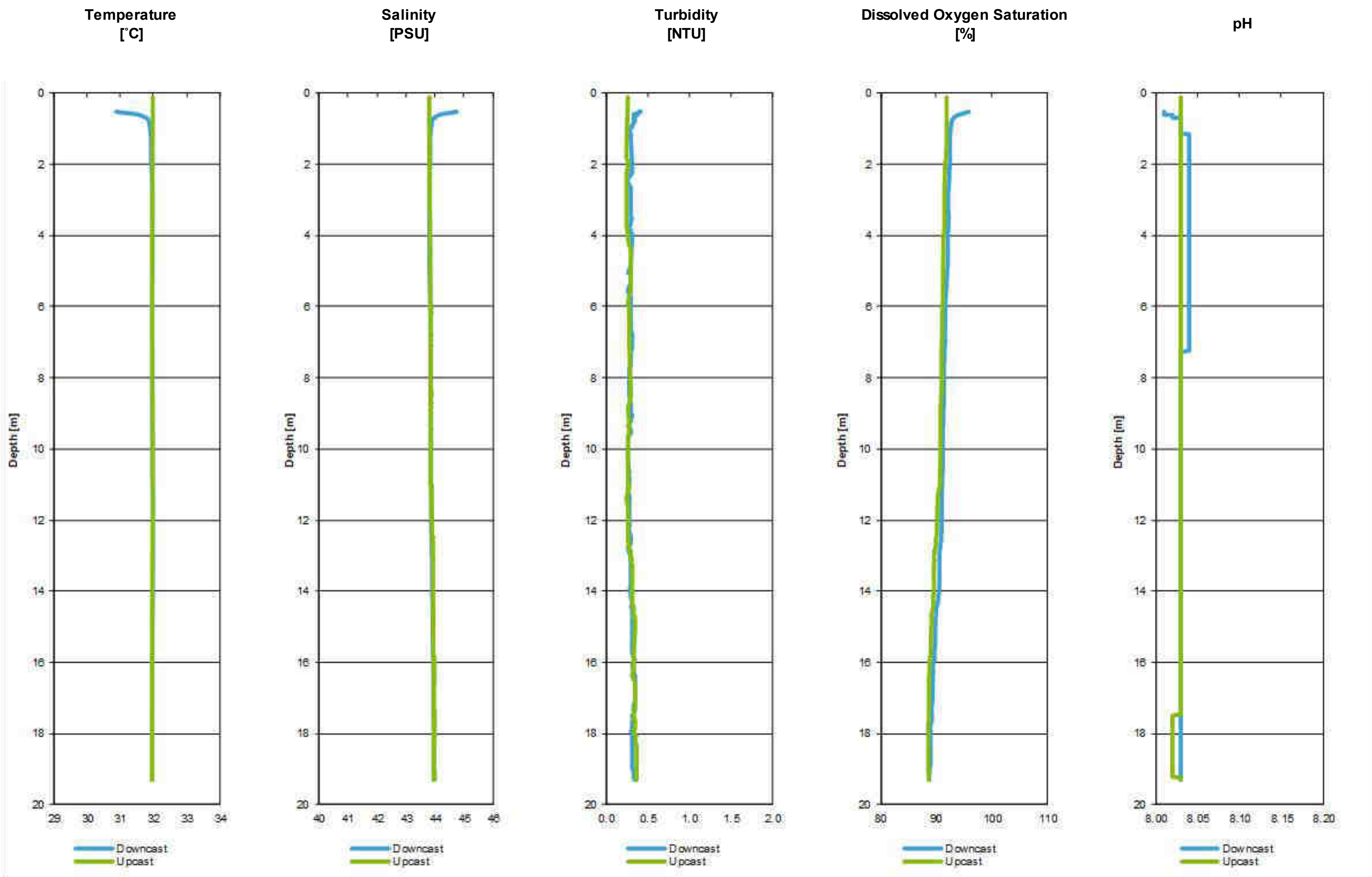

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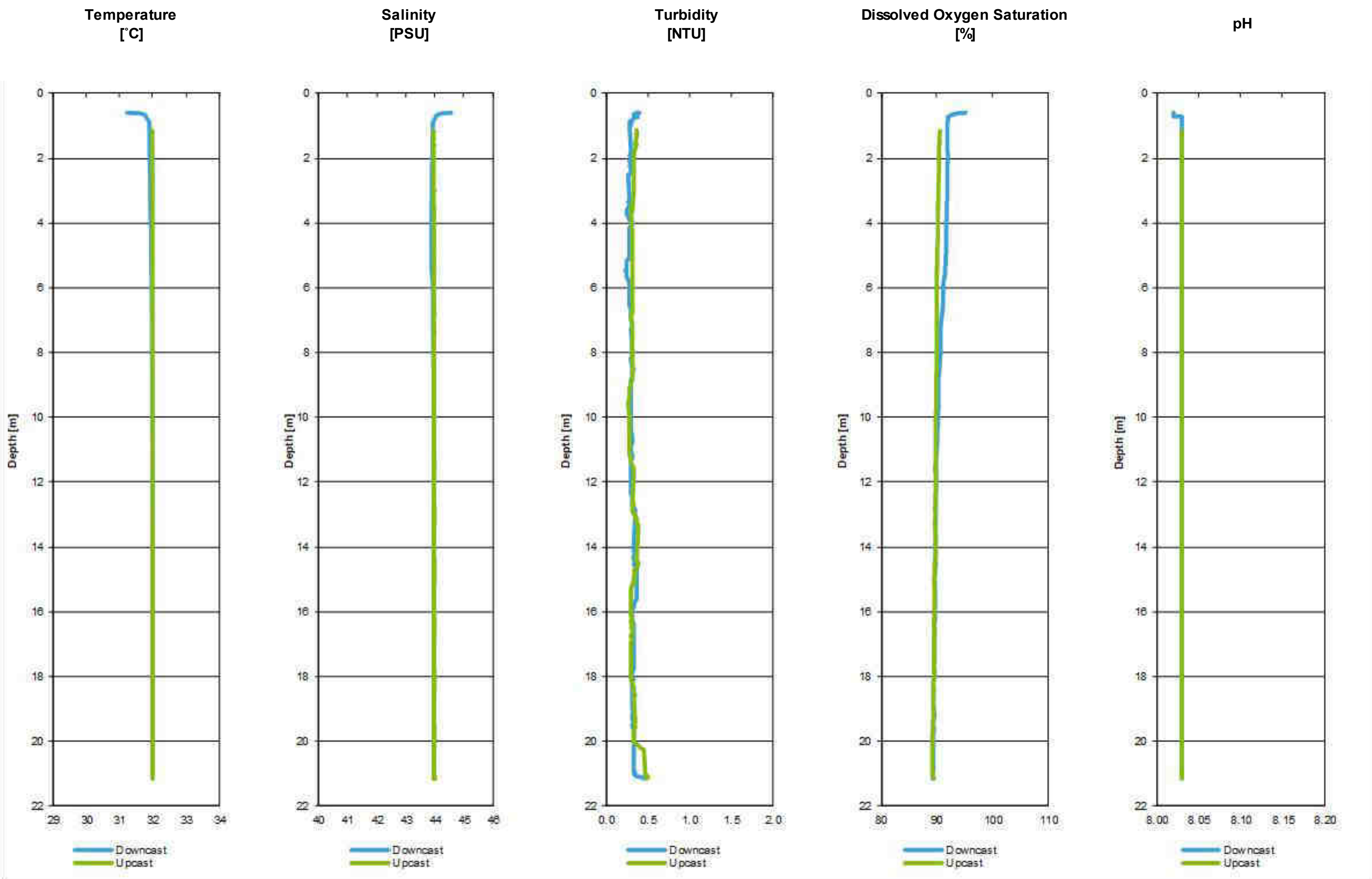

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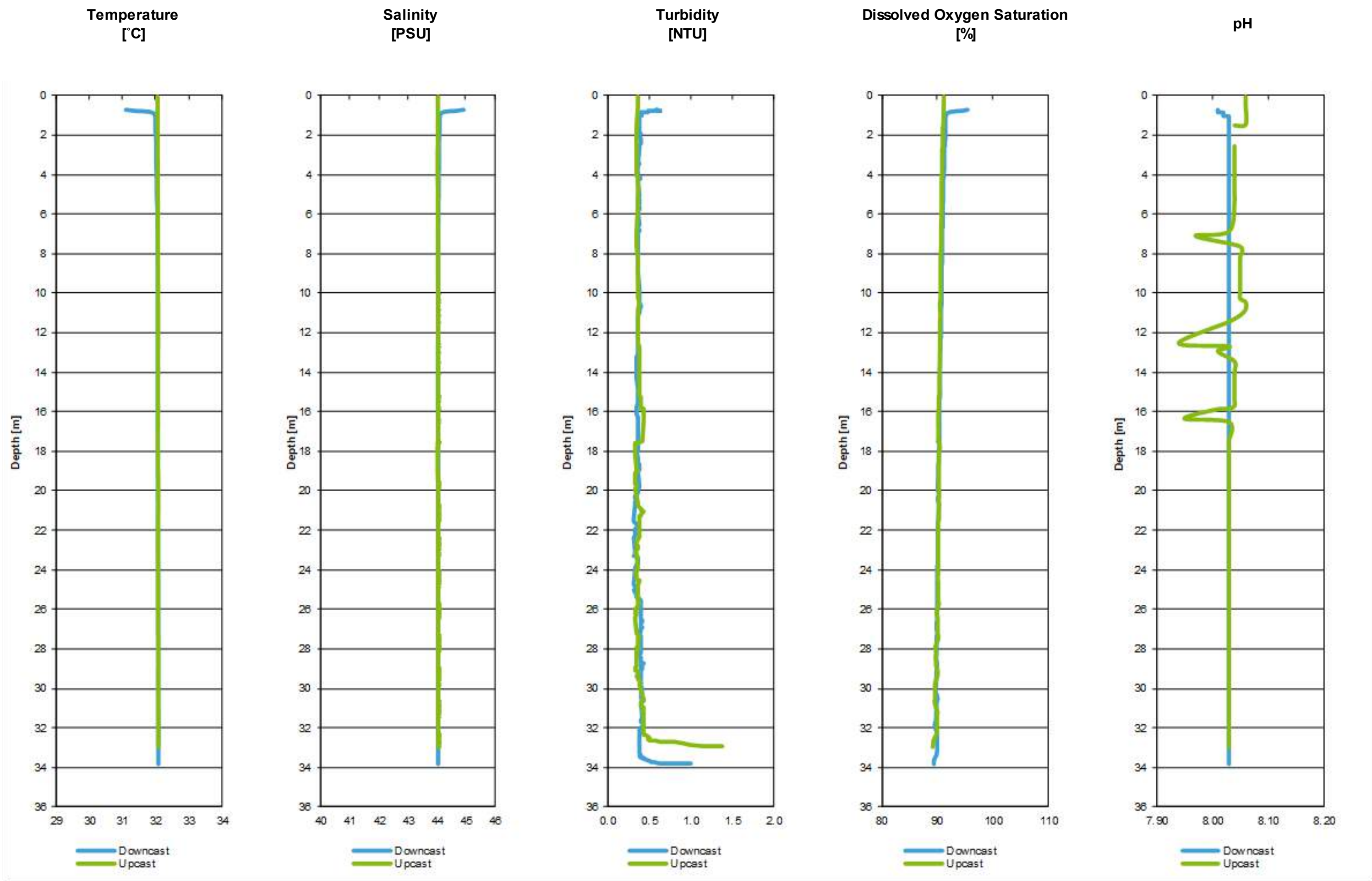

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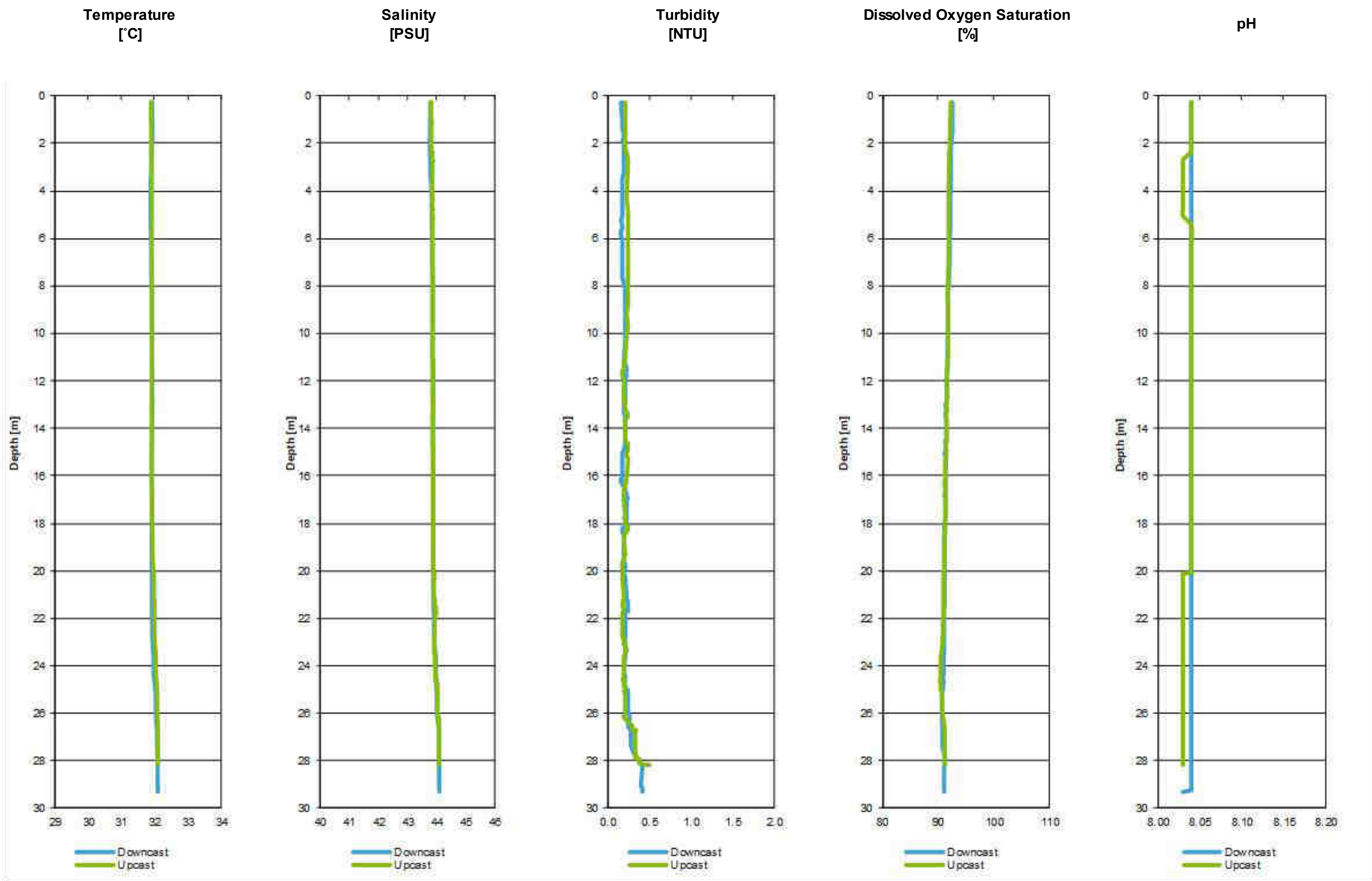

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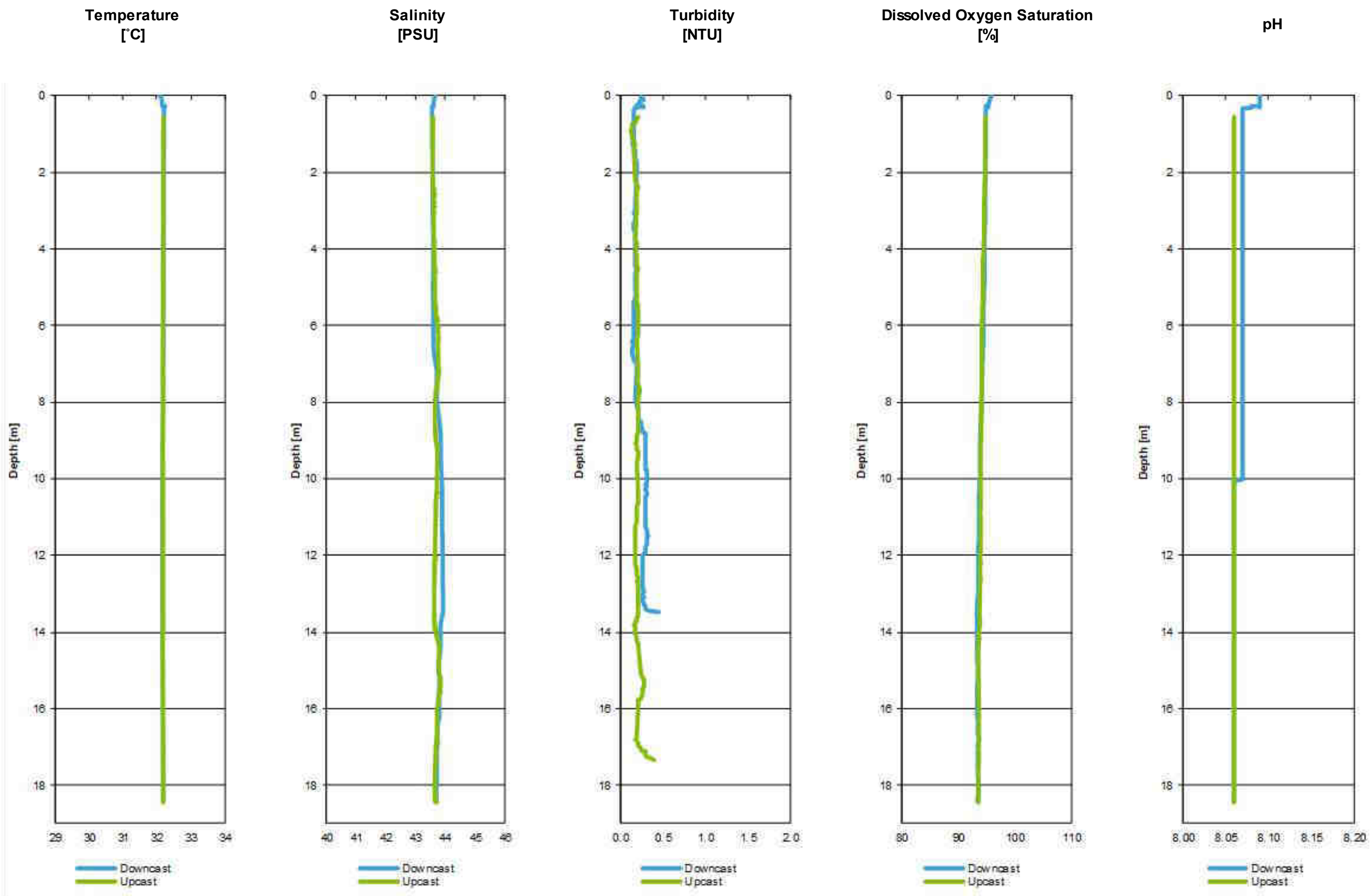

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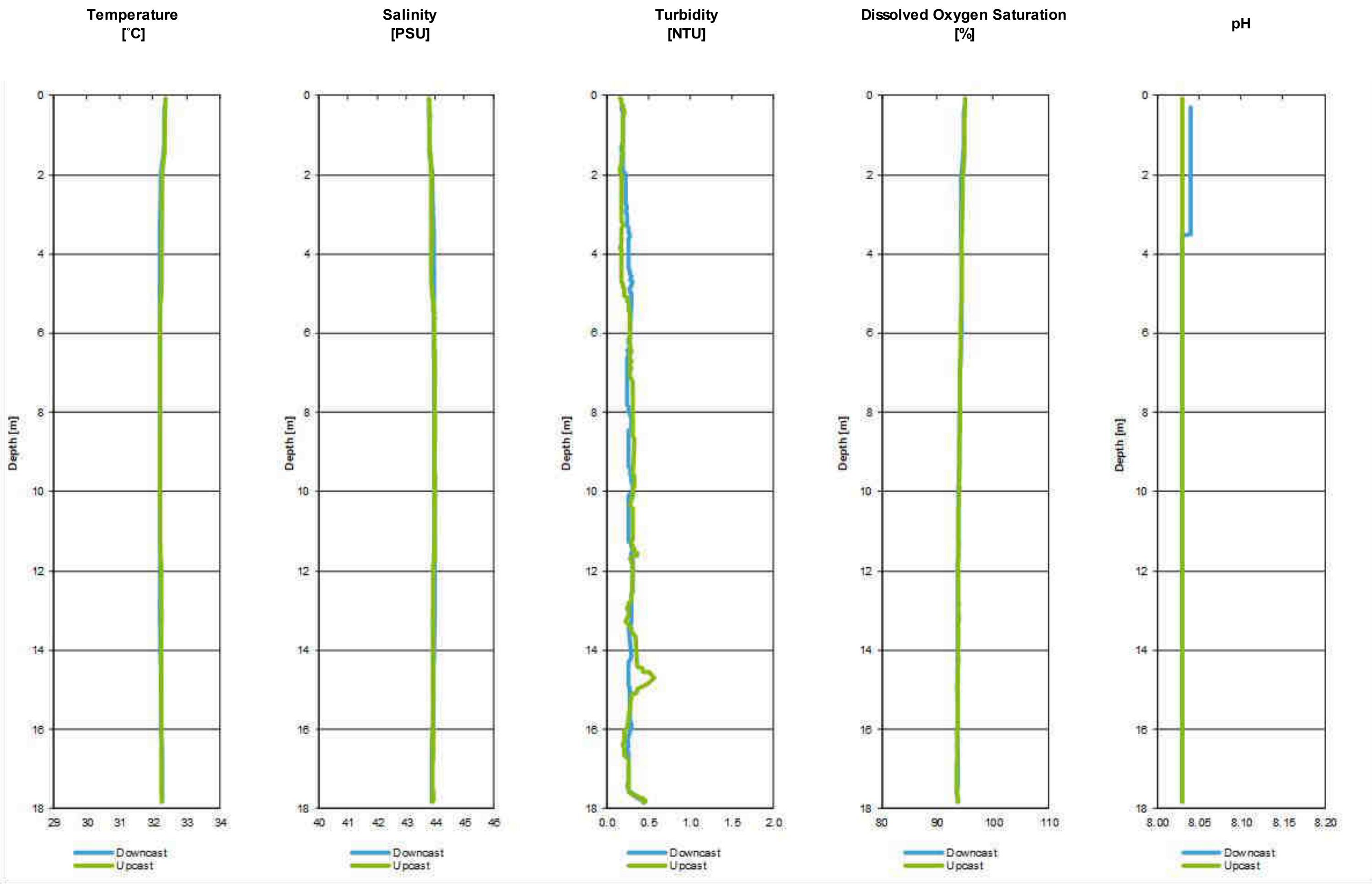

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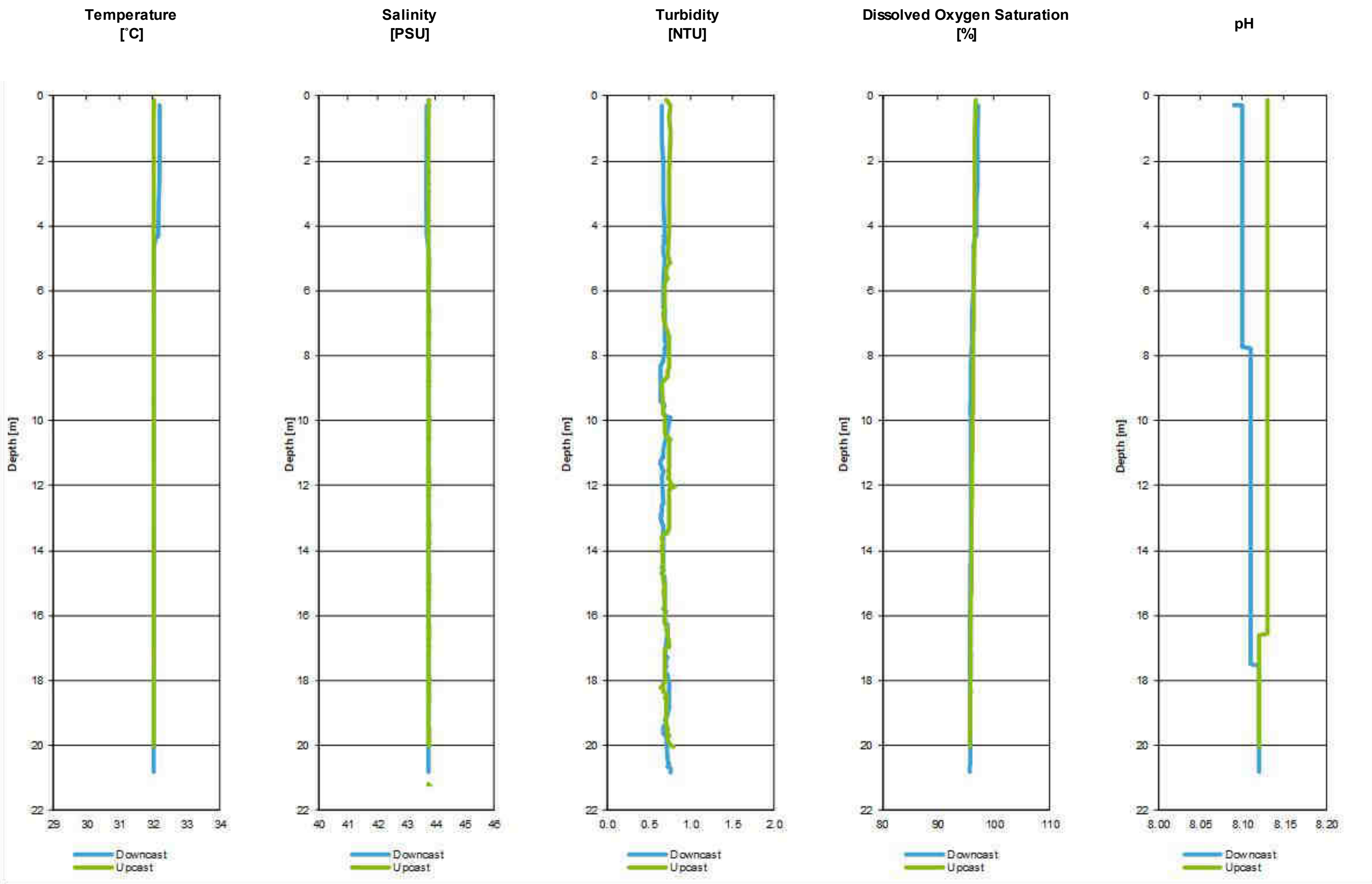

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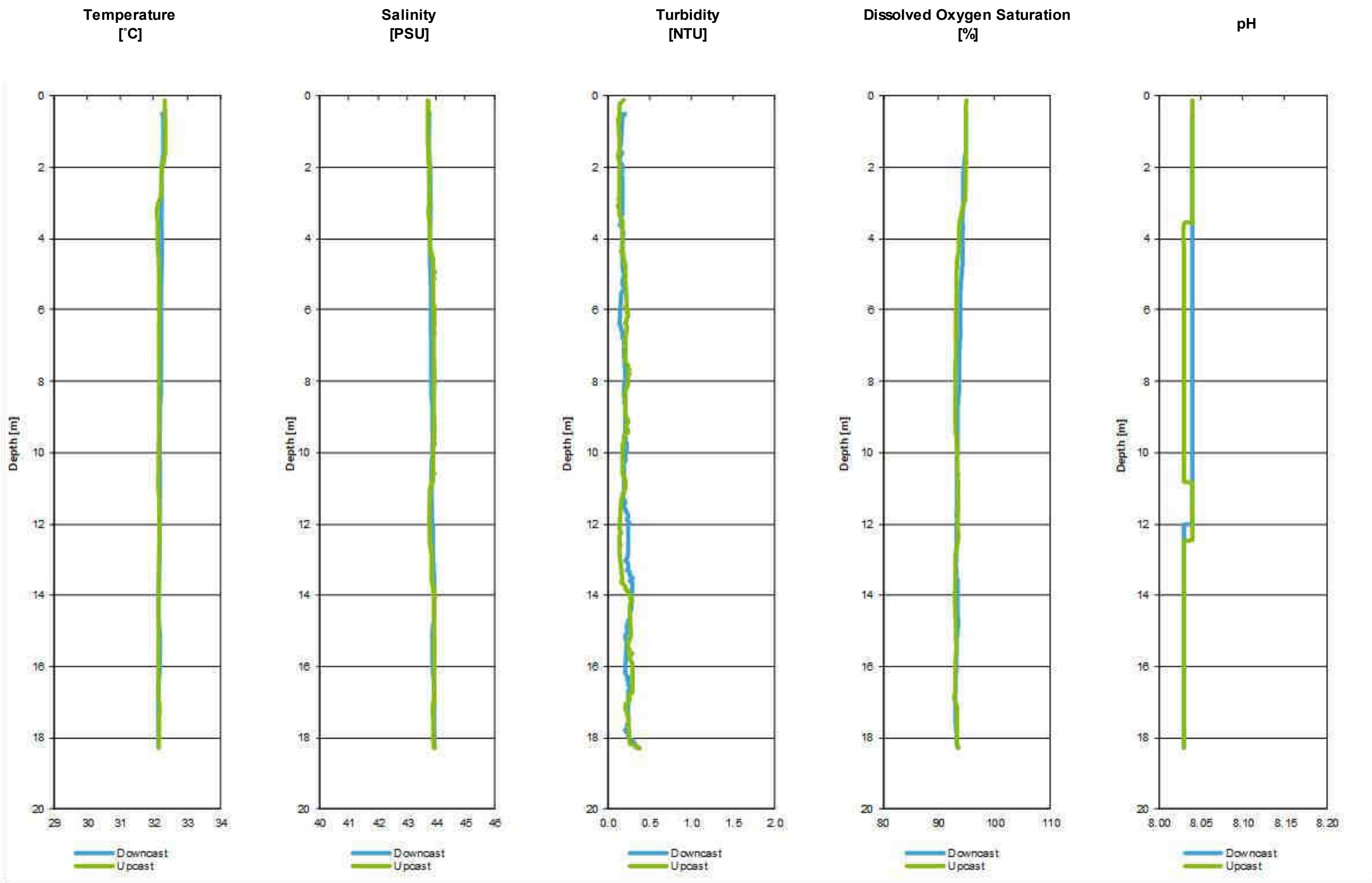

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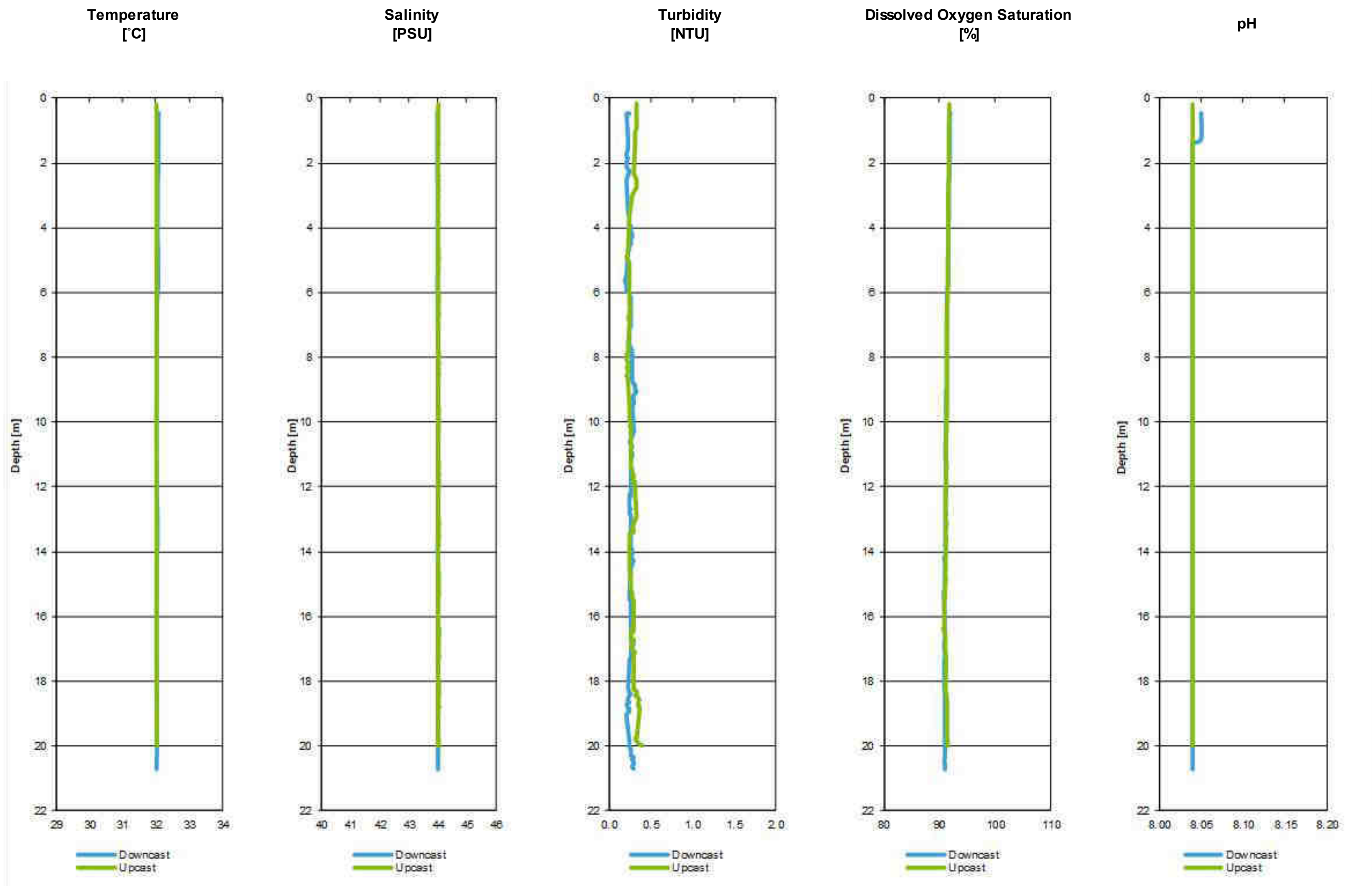

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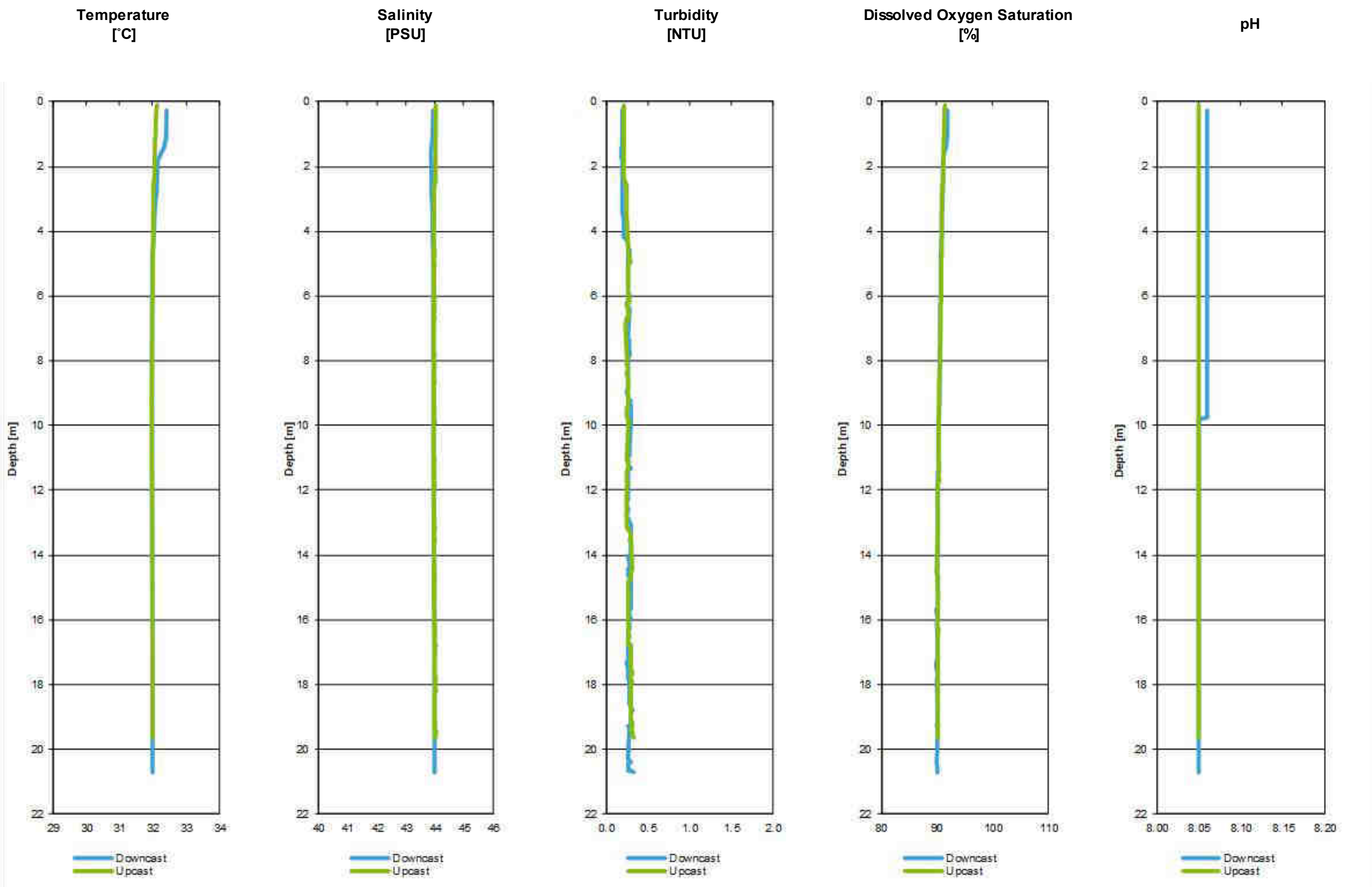

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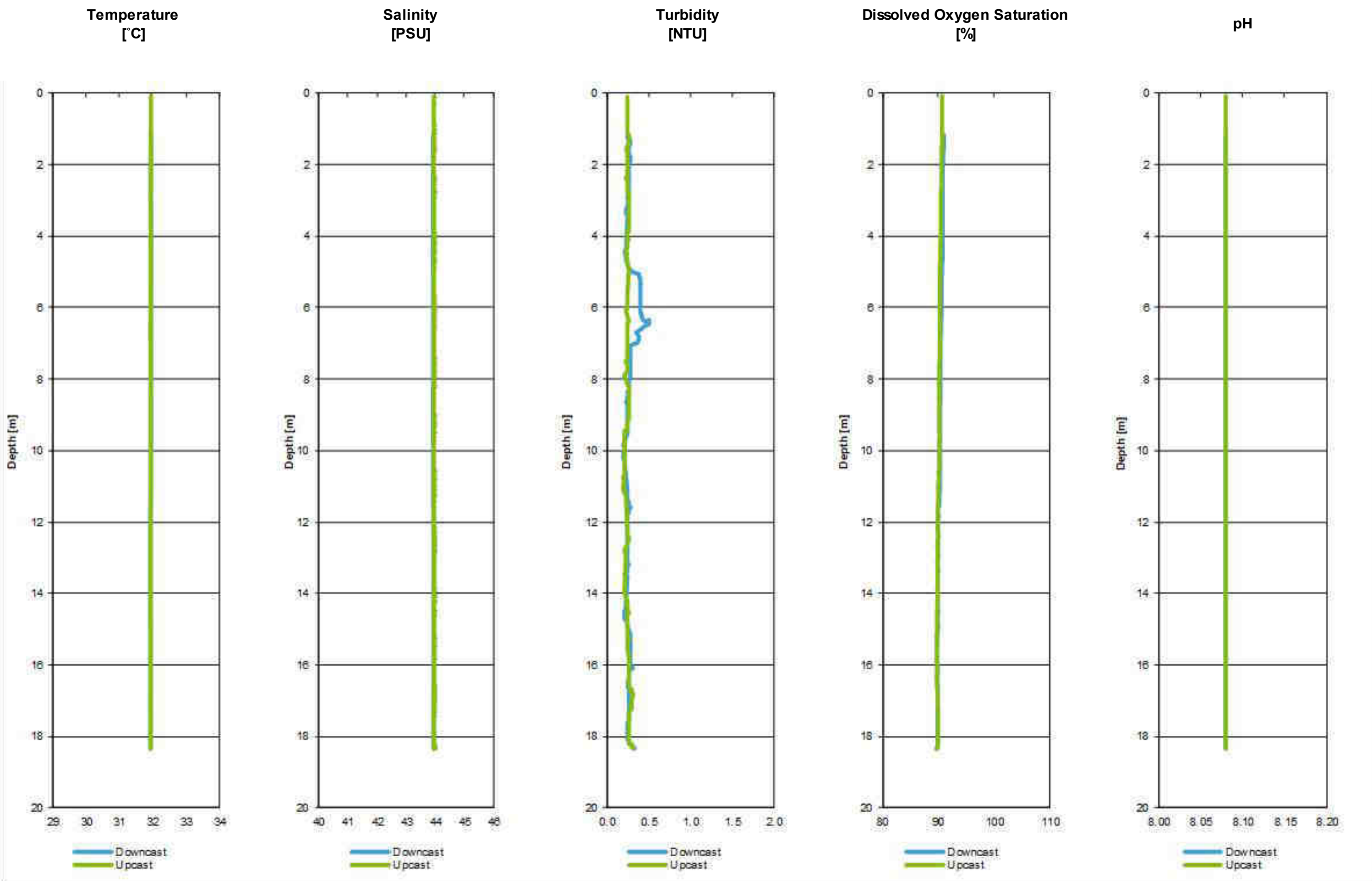

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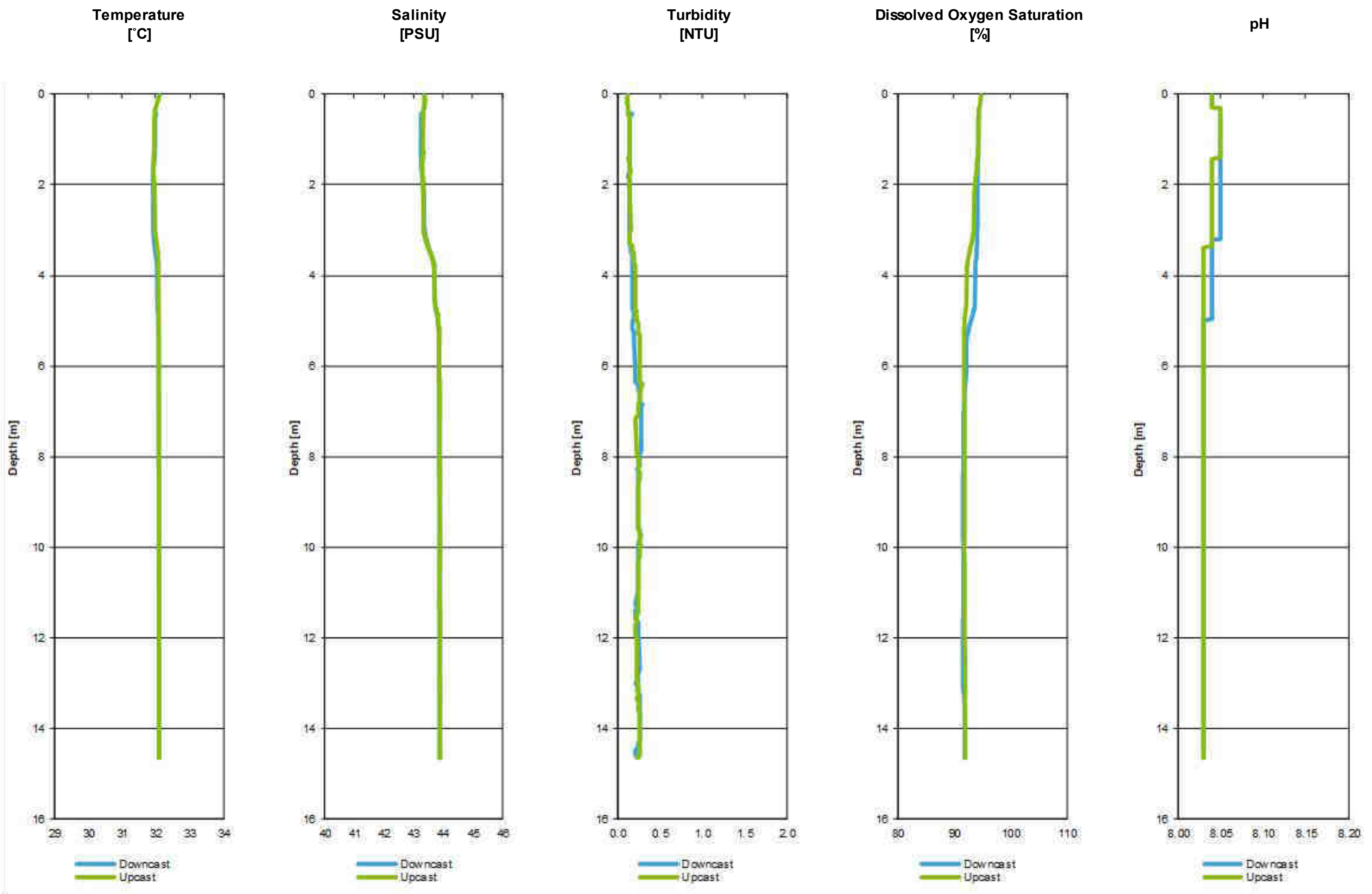

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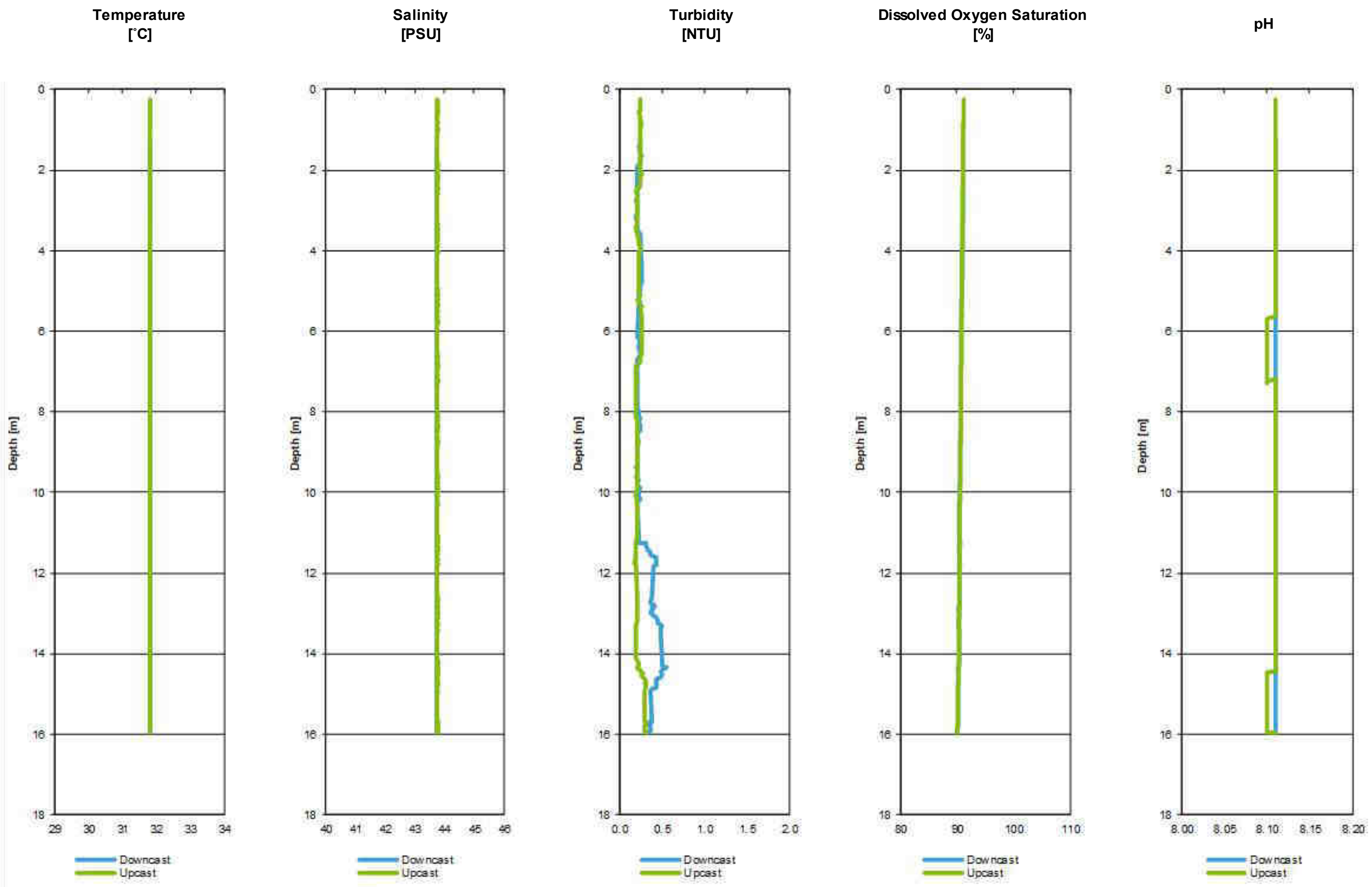

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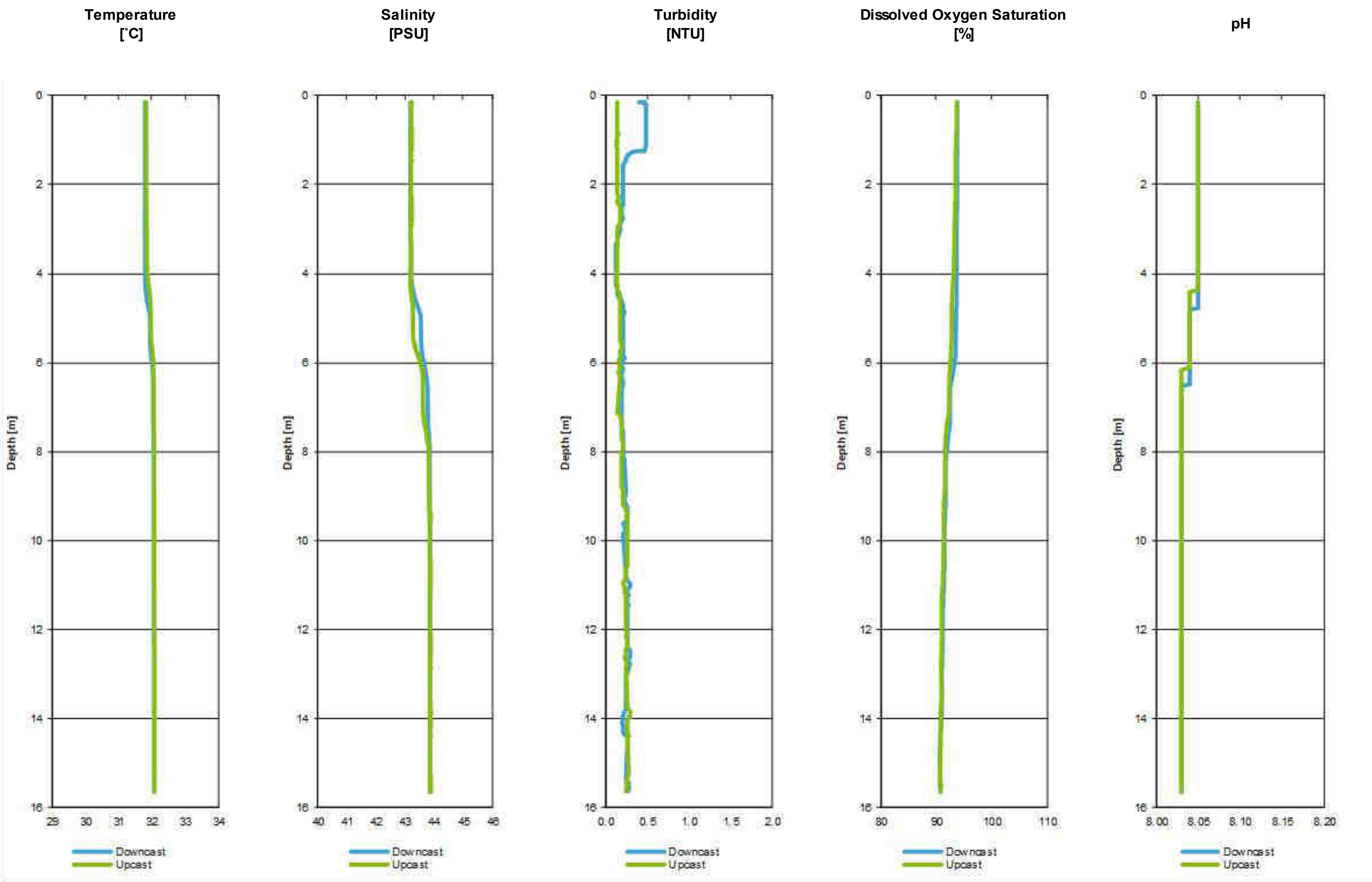

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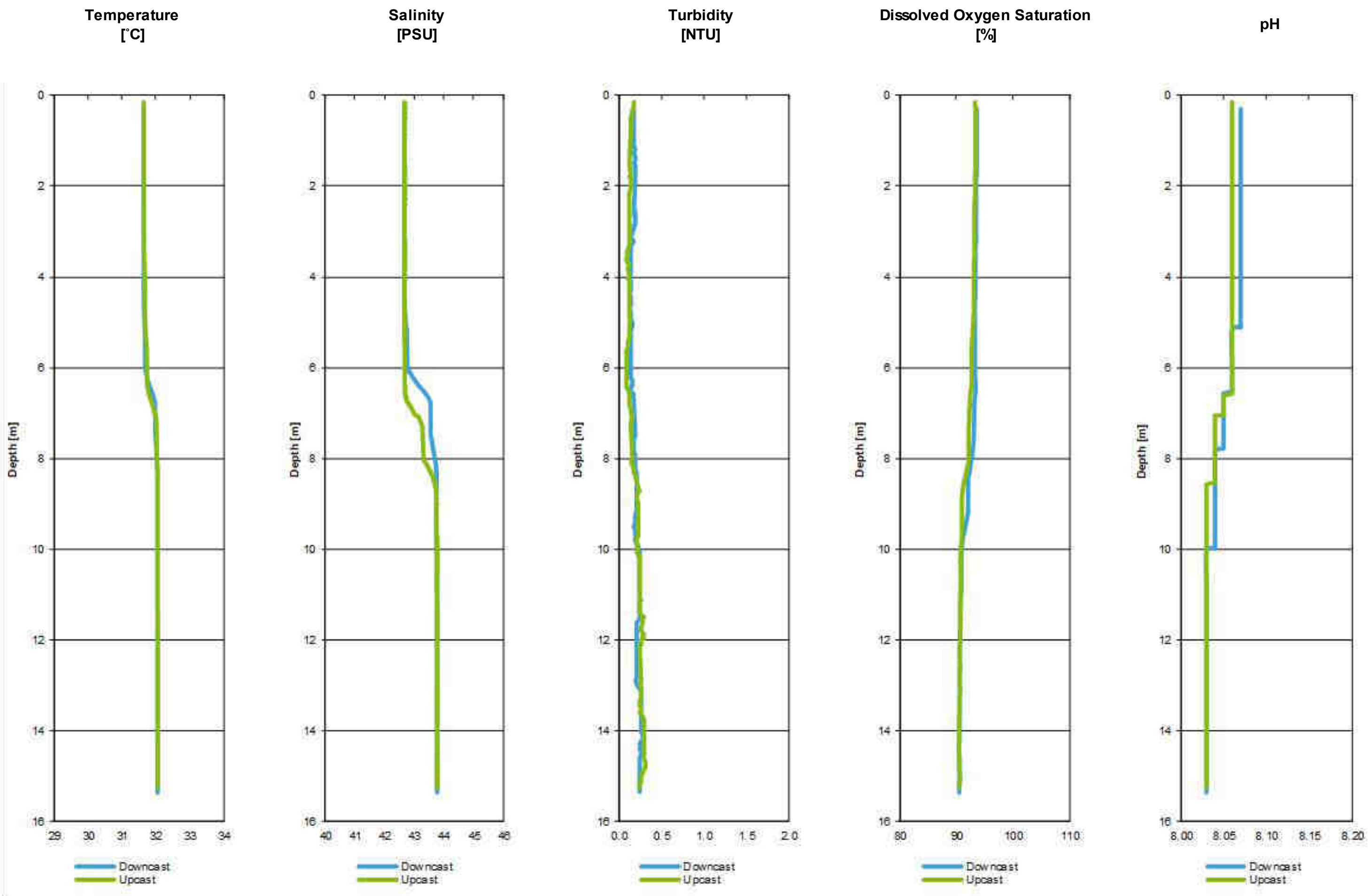

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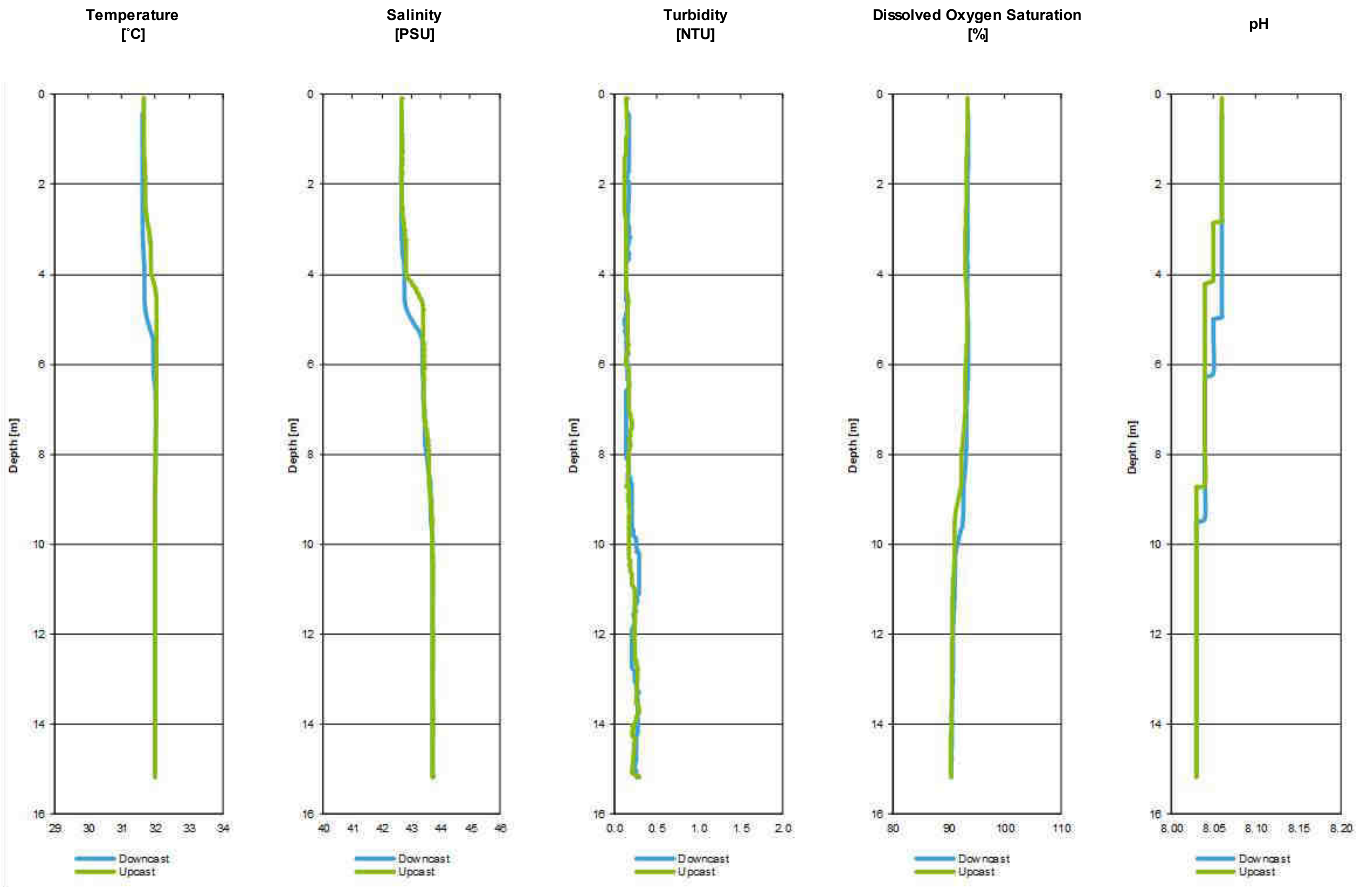

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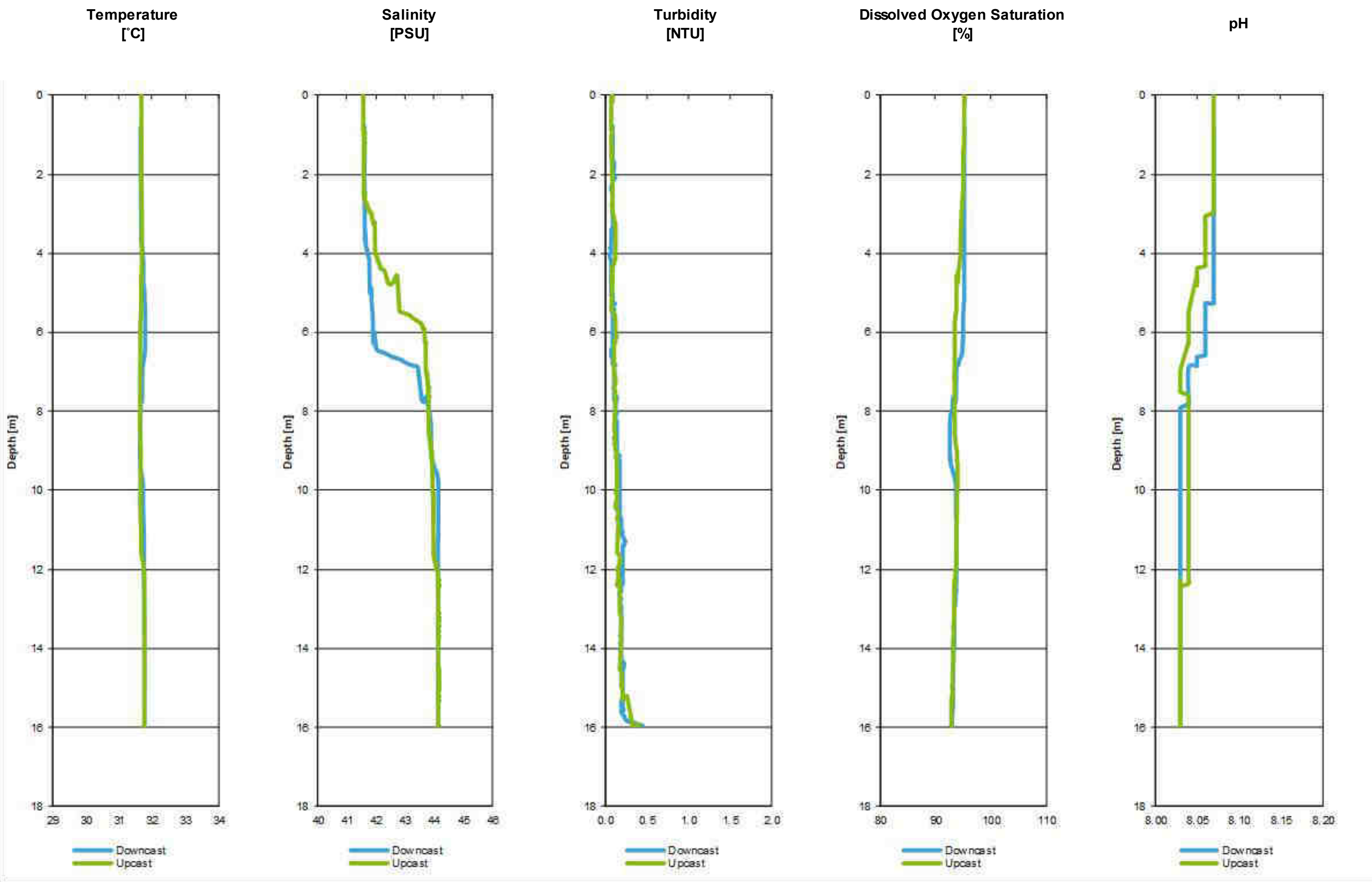

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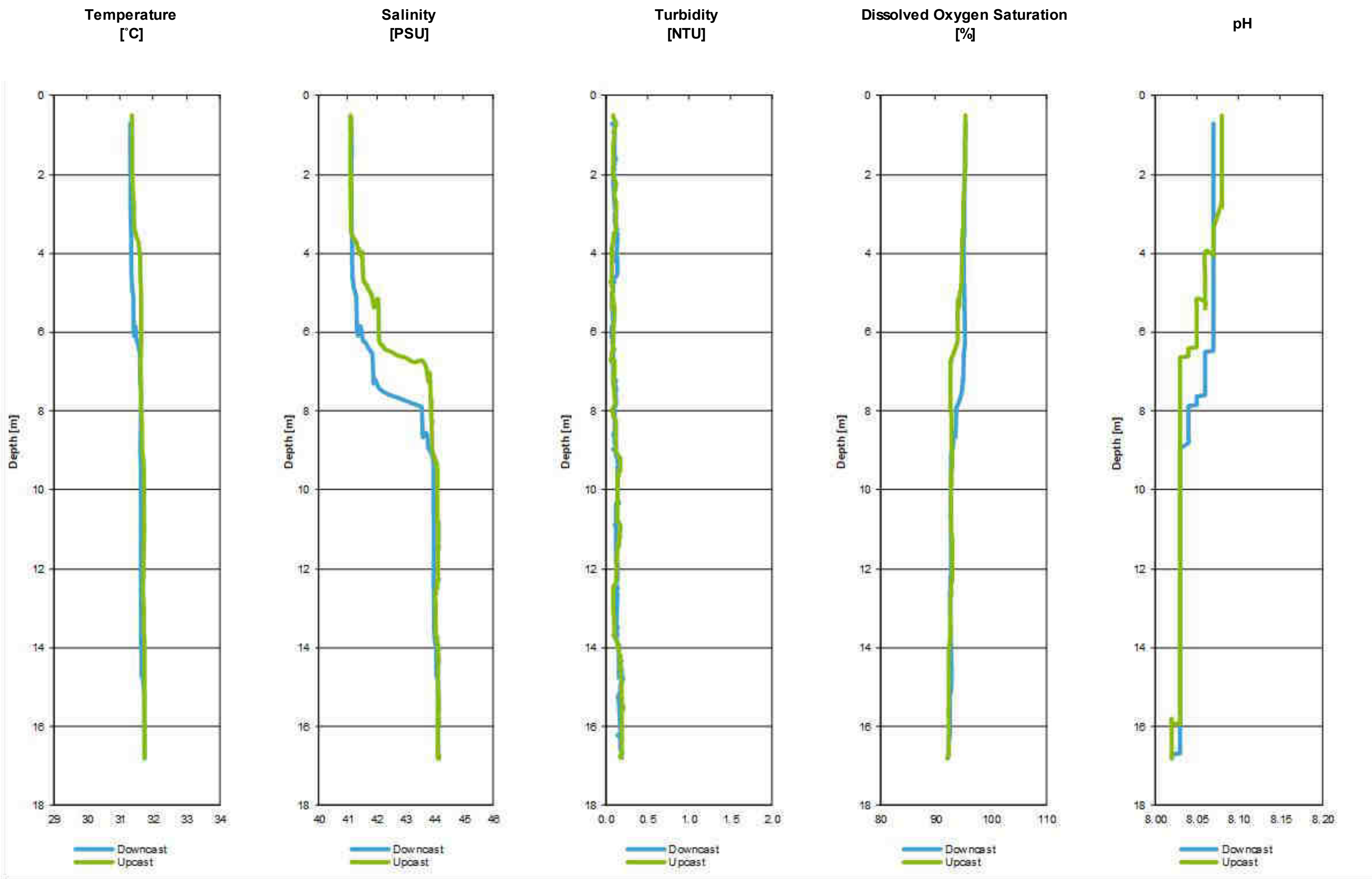

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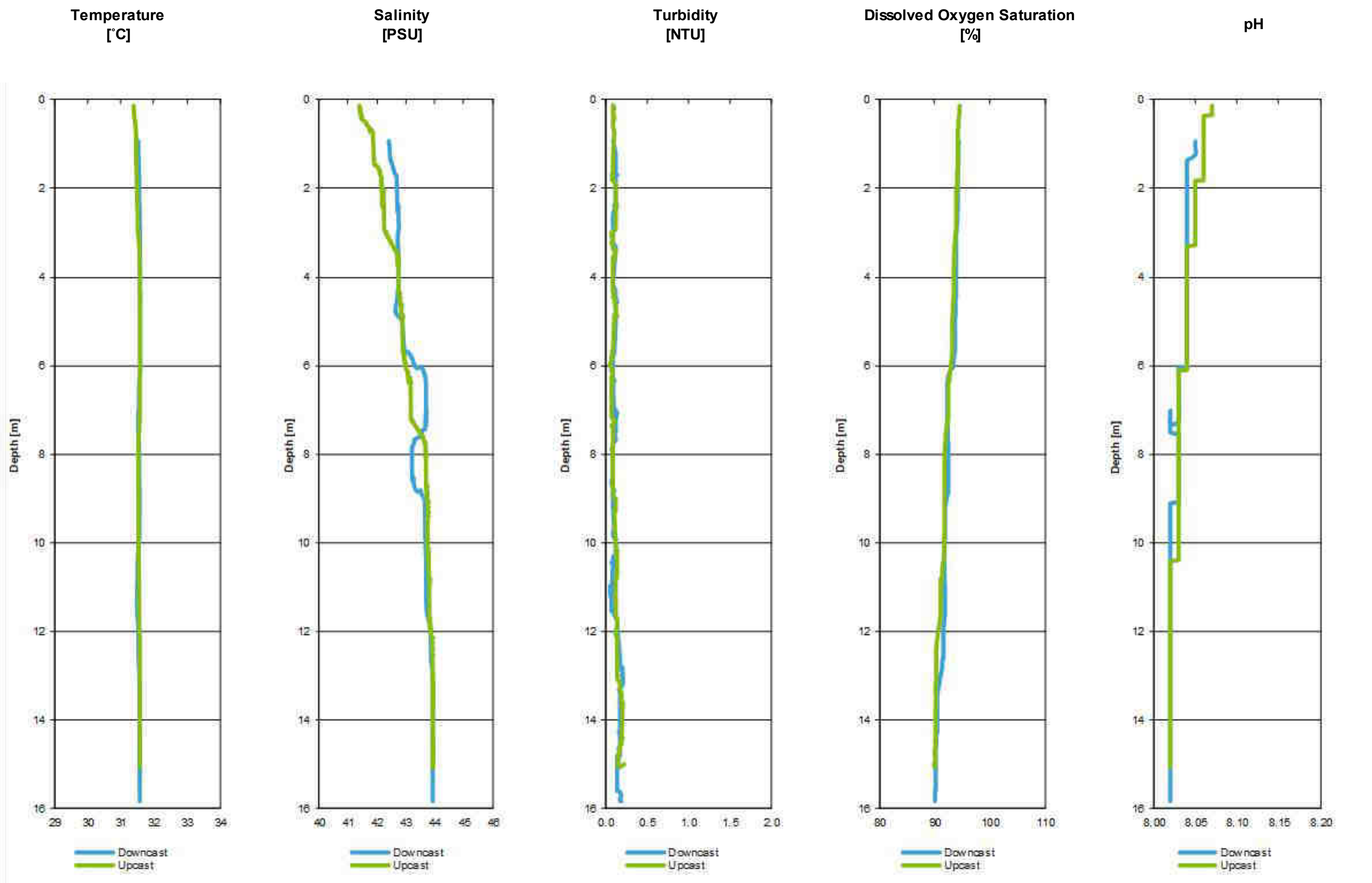

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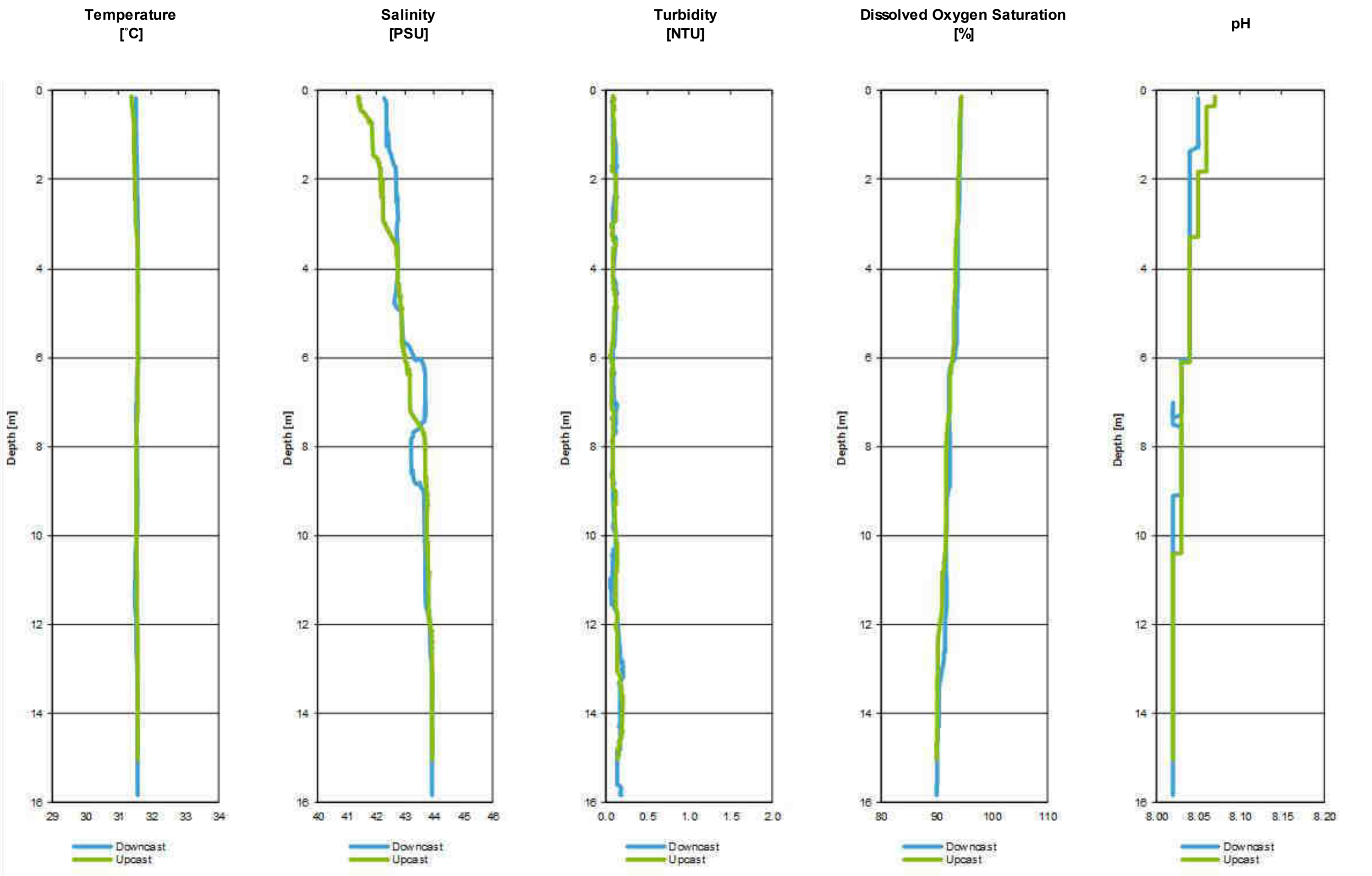

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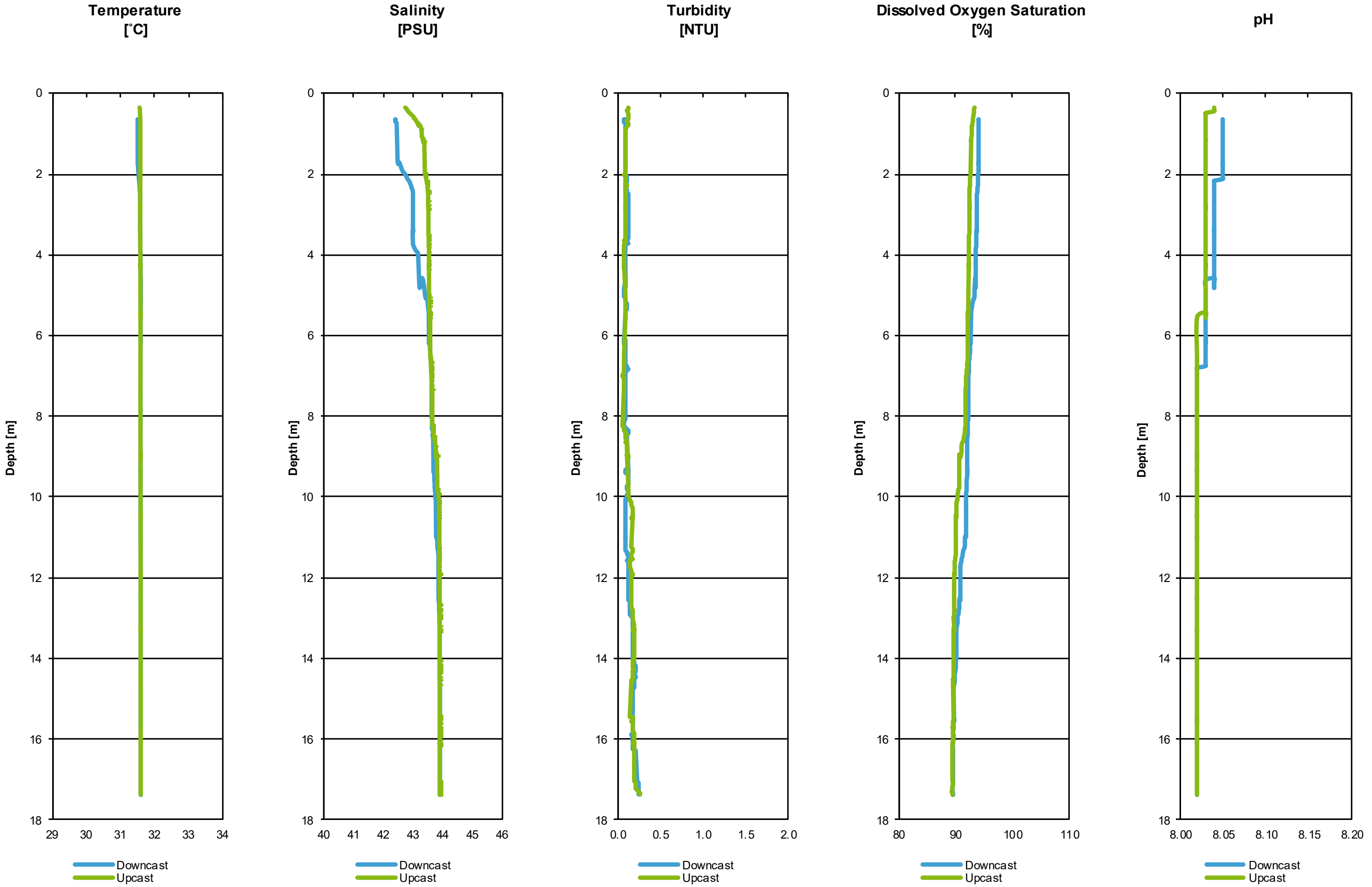

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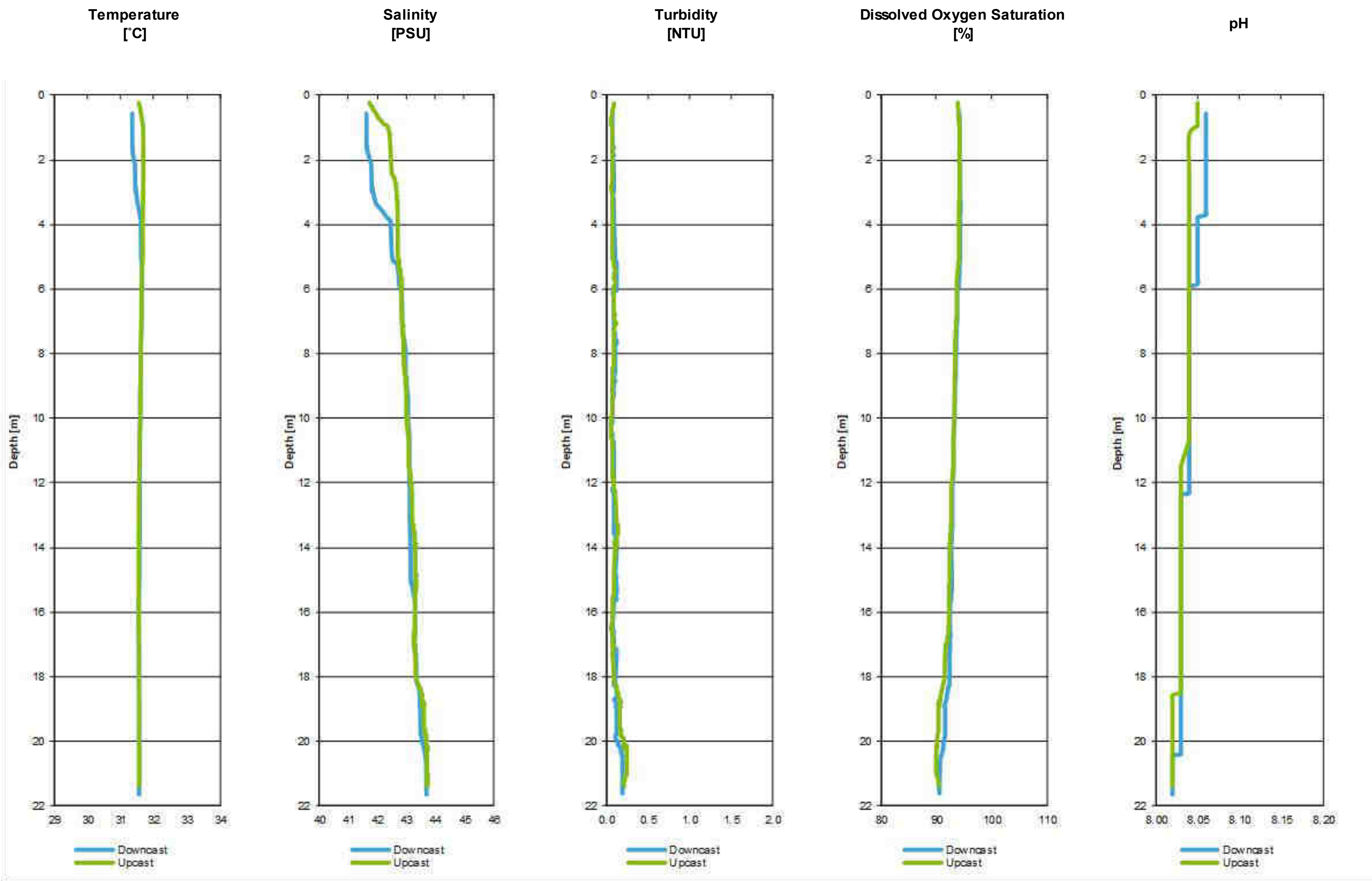

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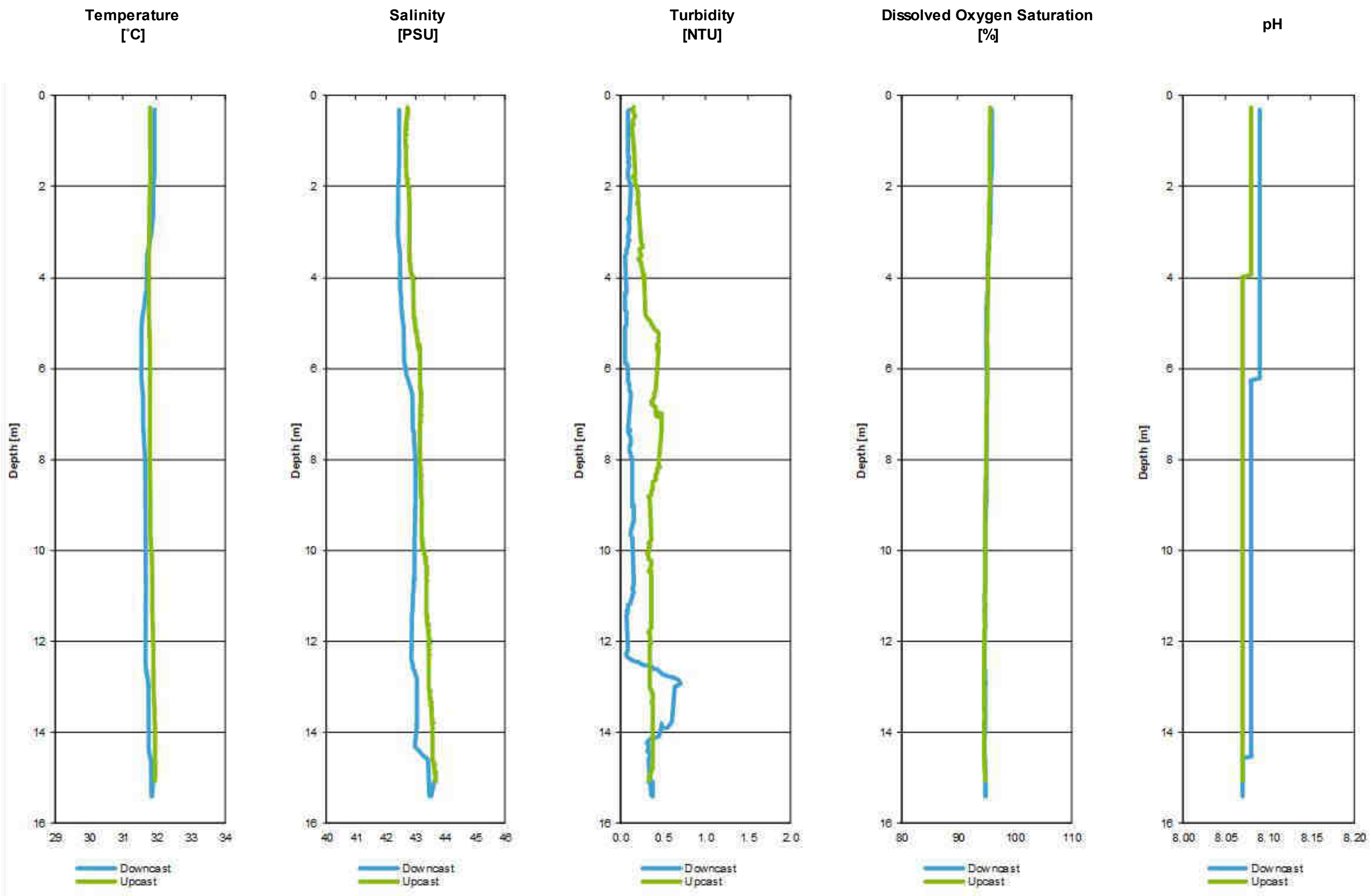

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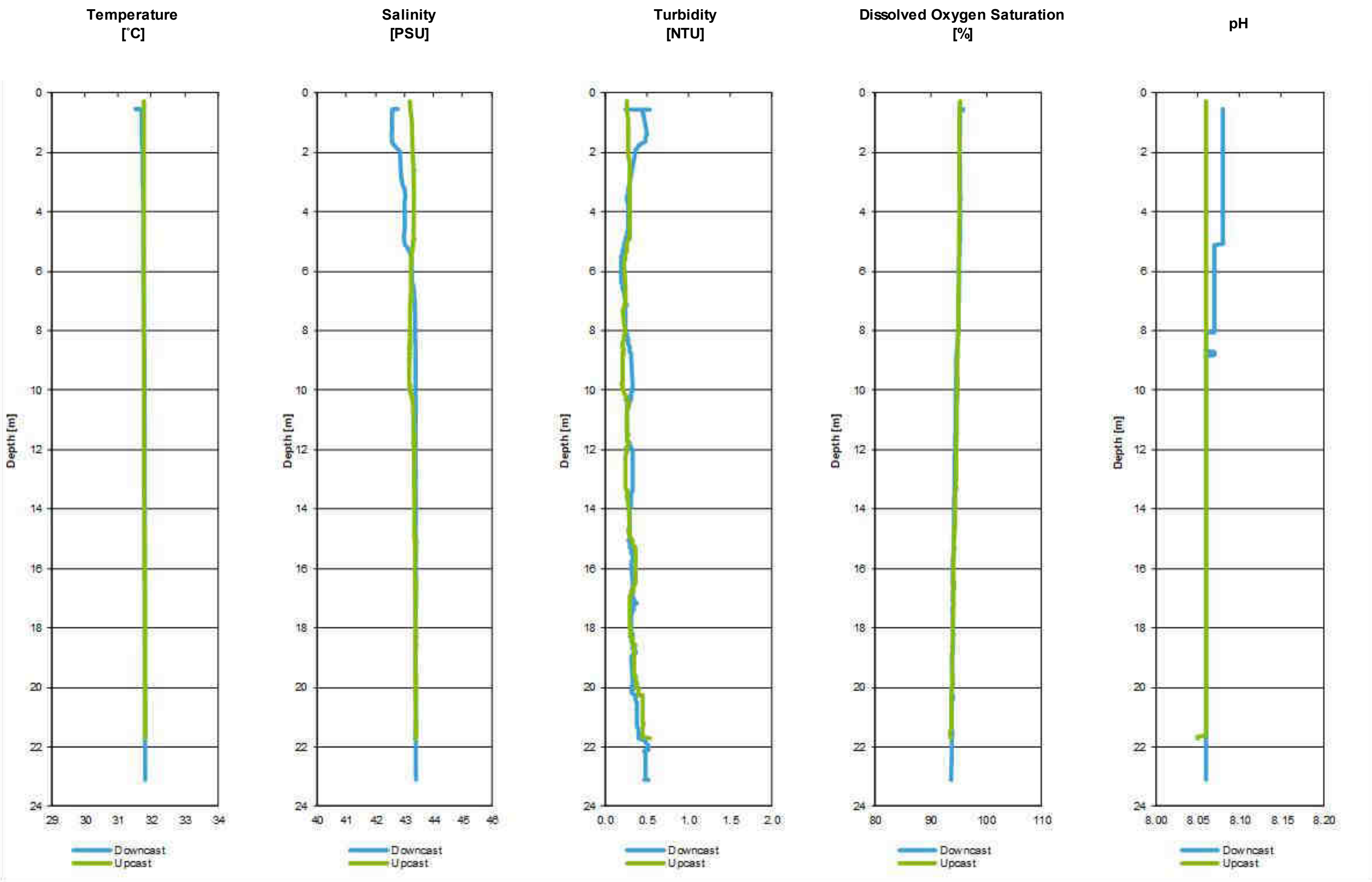

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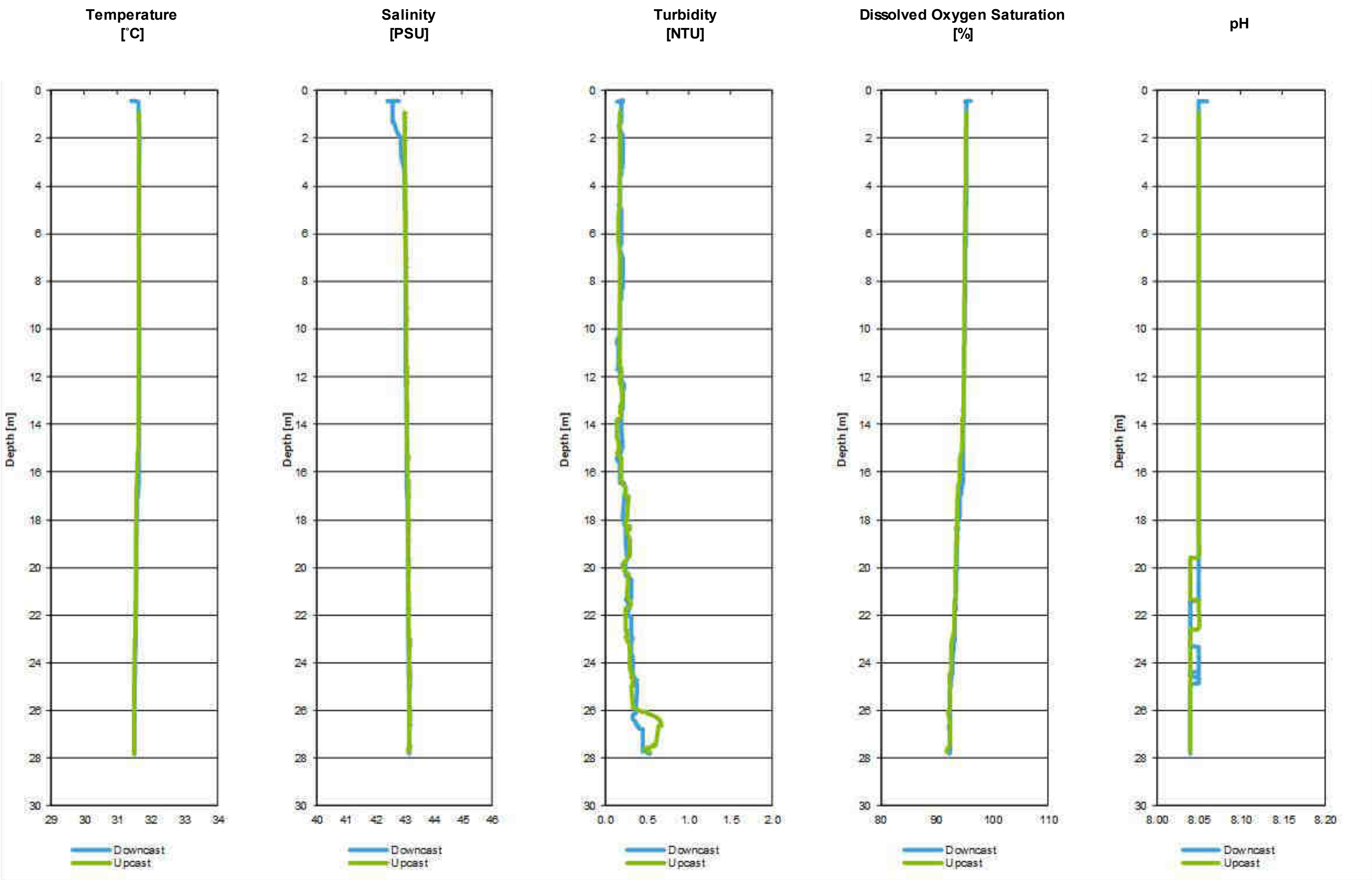

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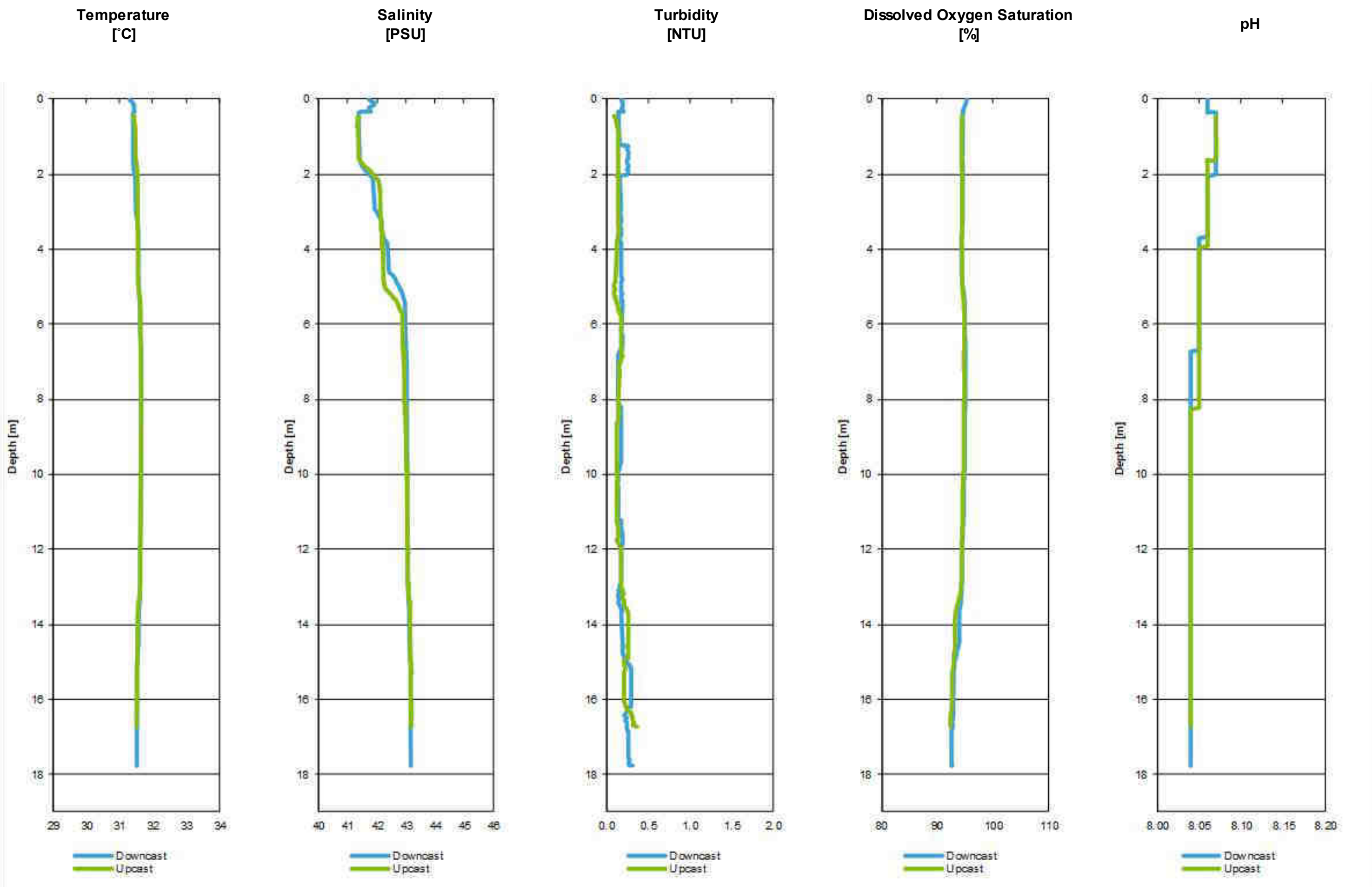

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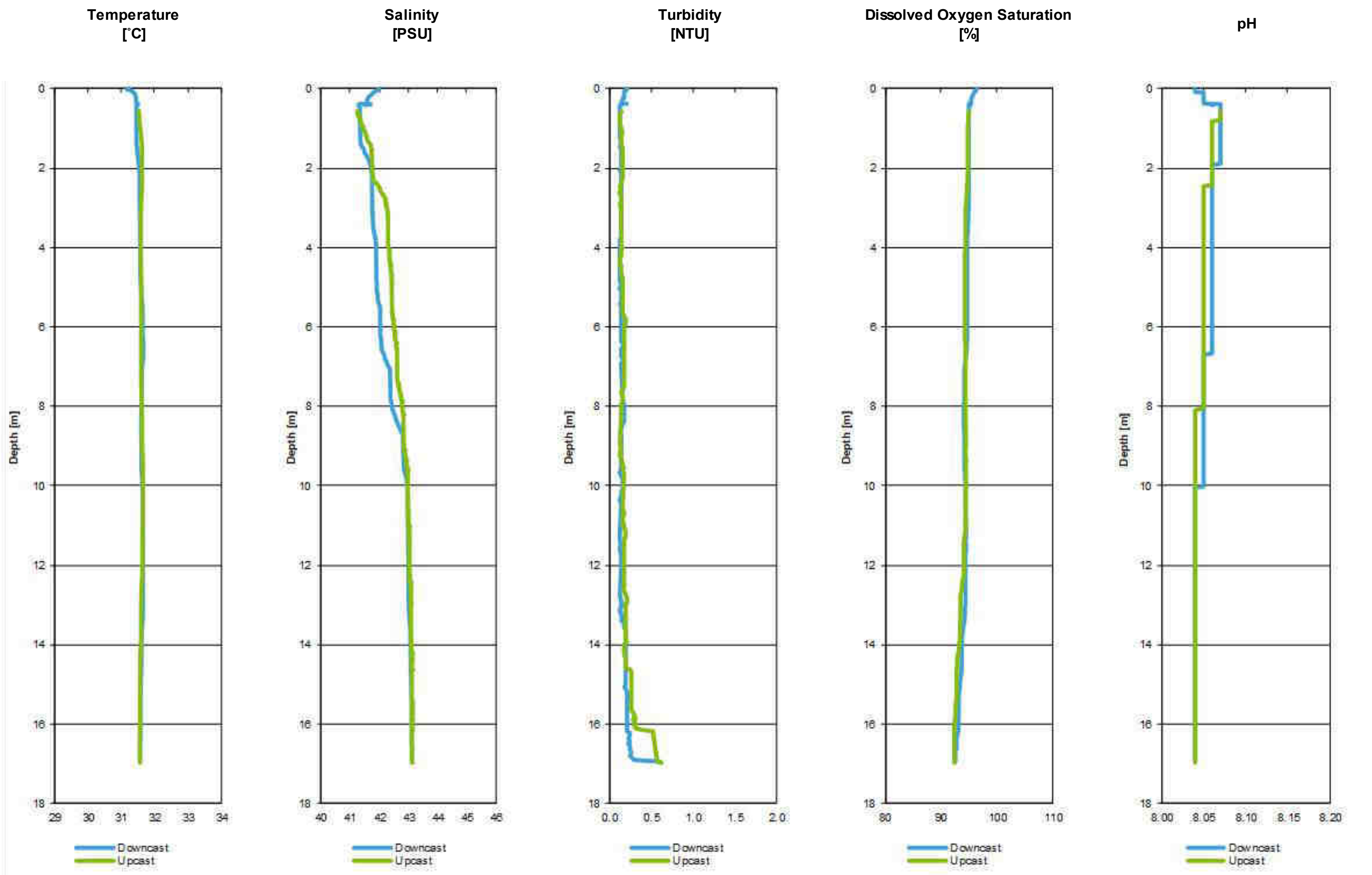

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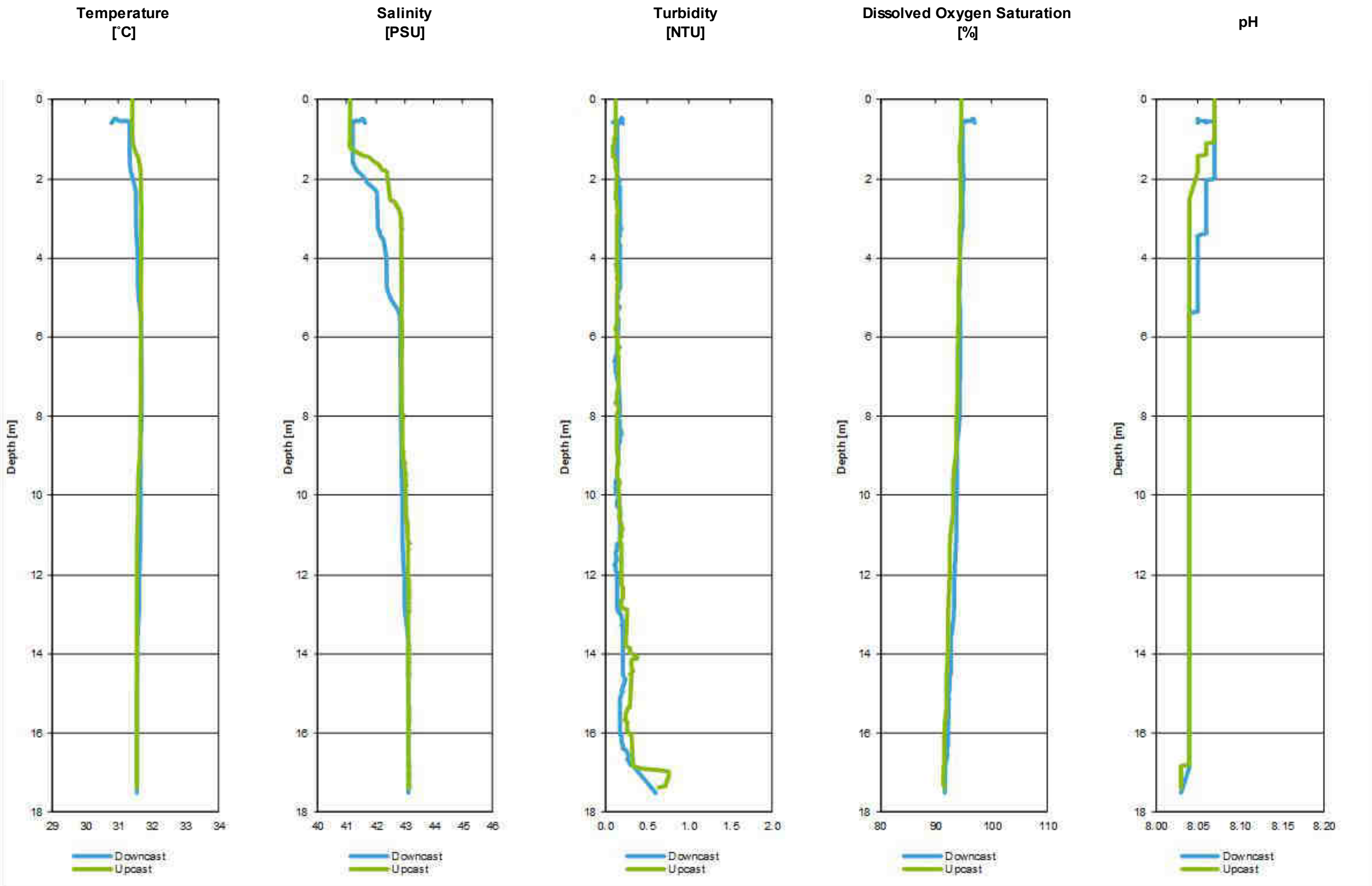

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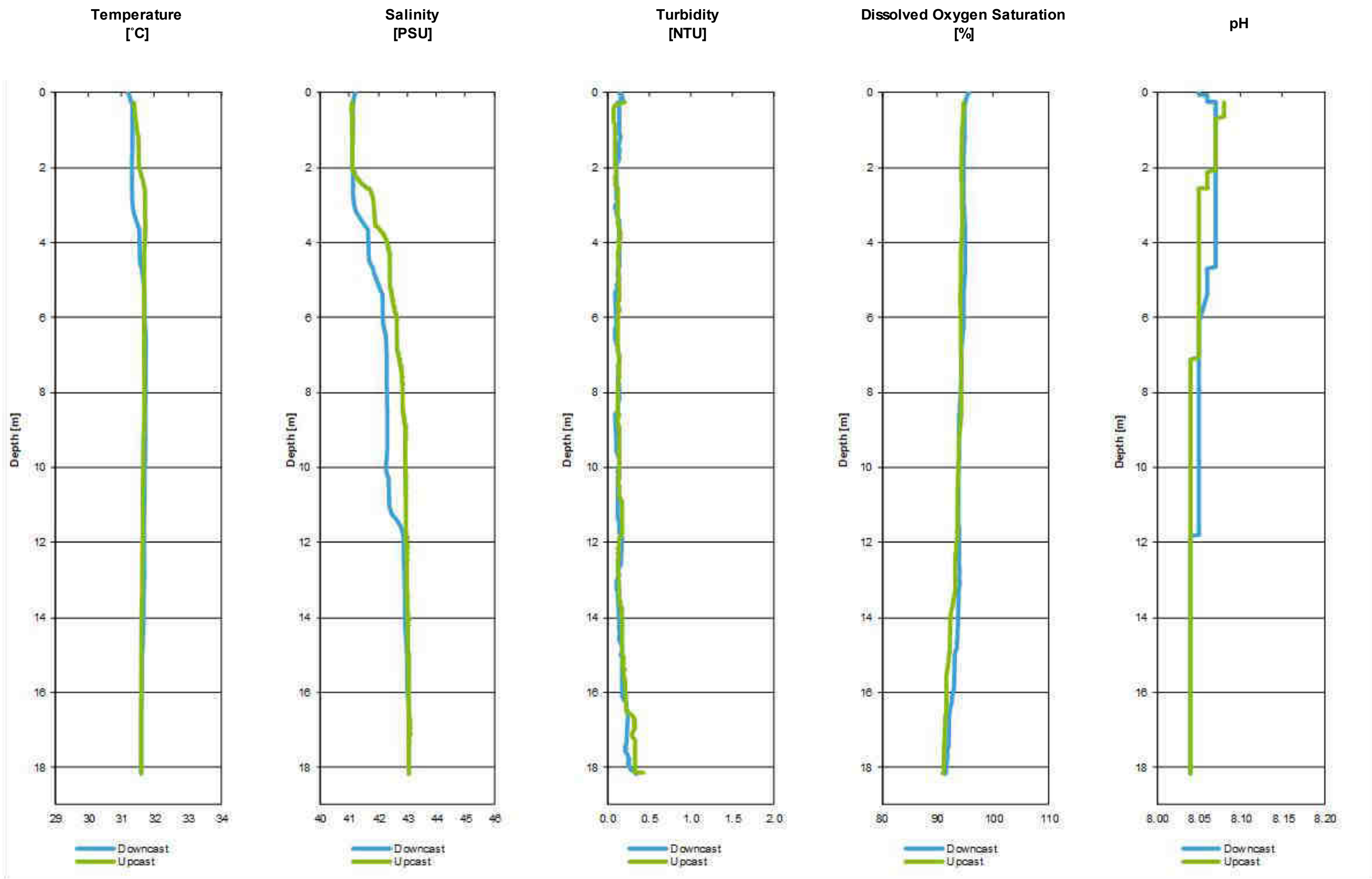

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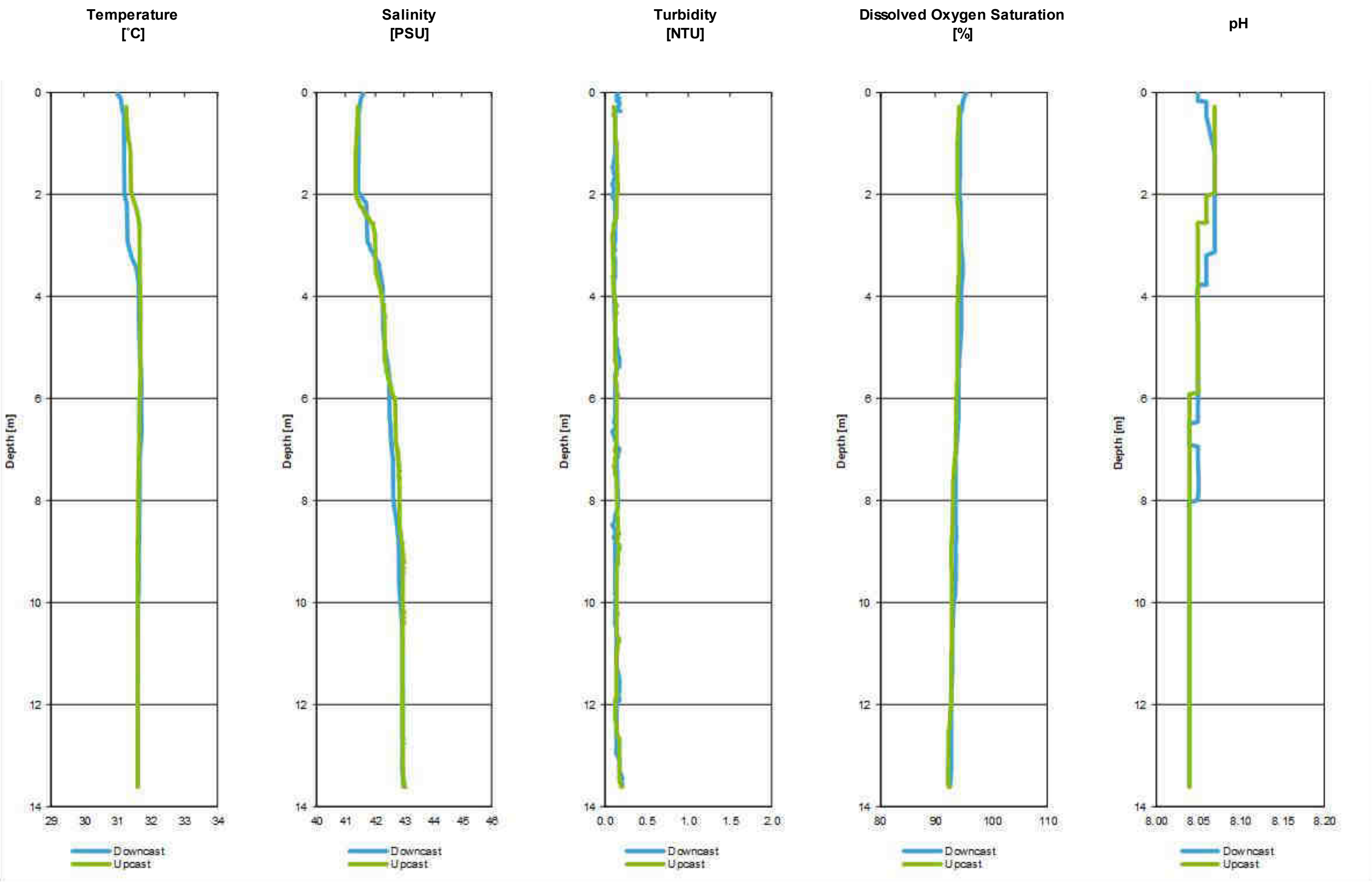

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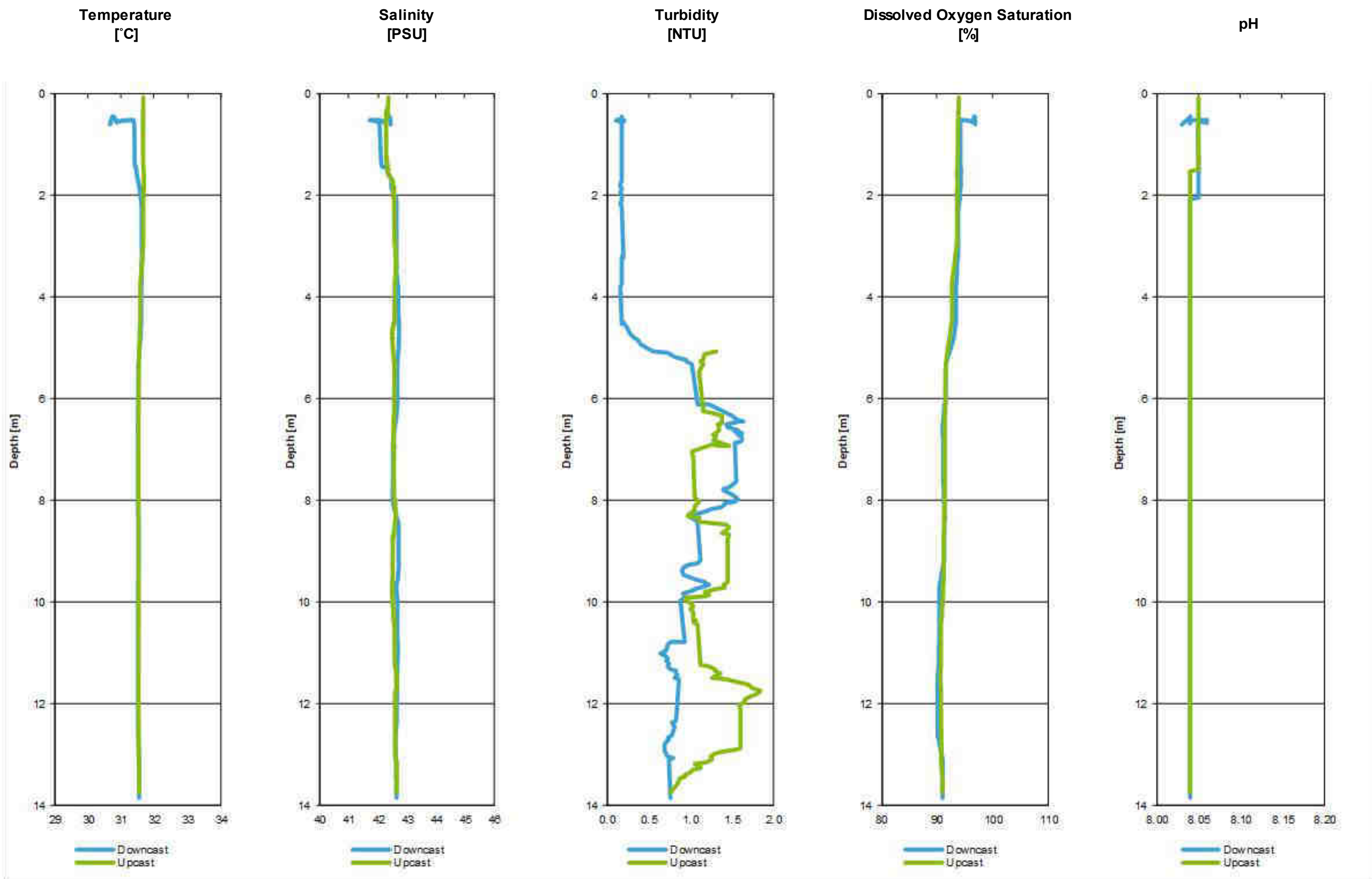
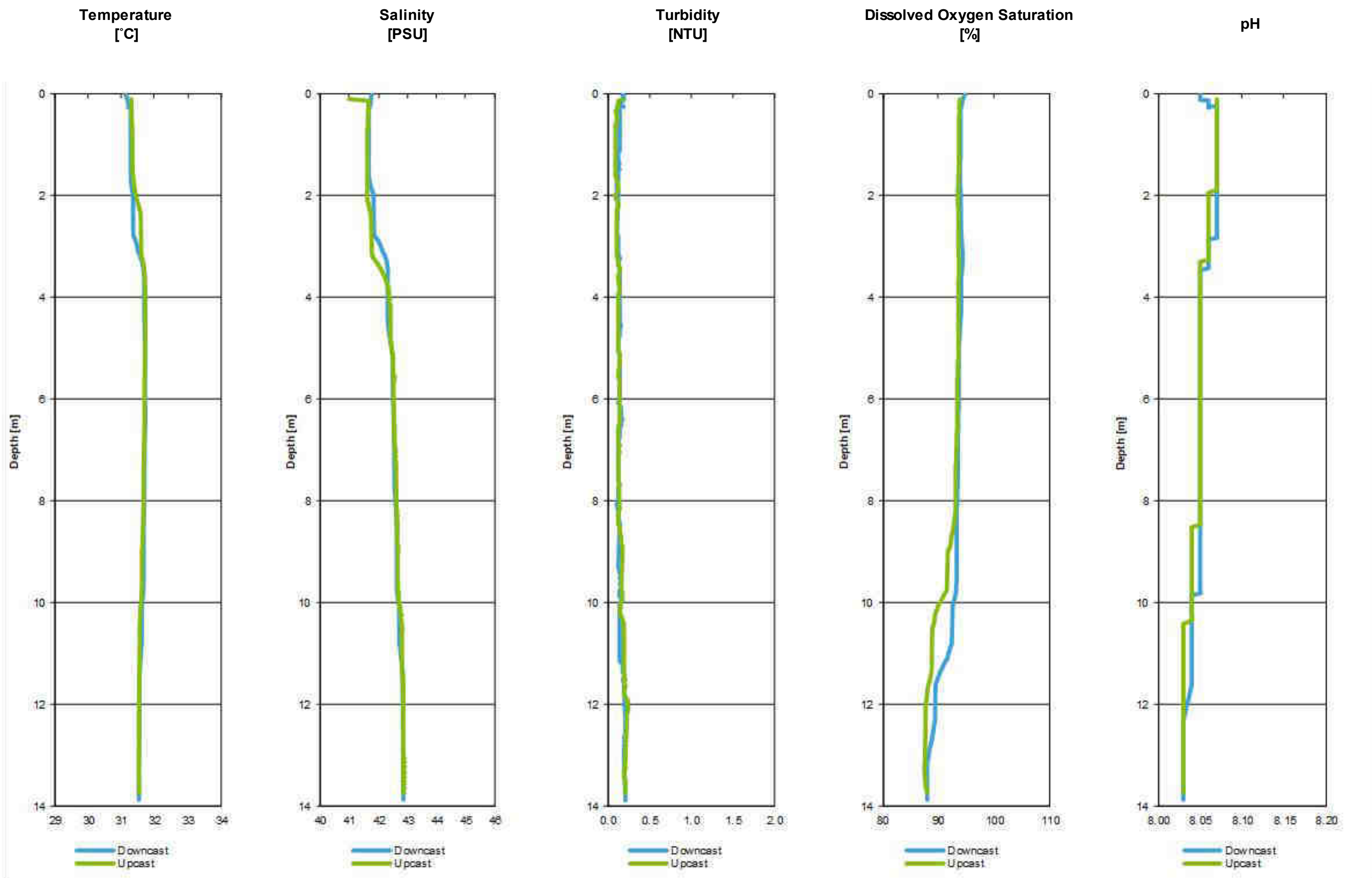


Station R2_ENV_091



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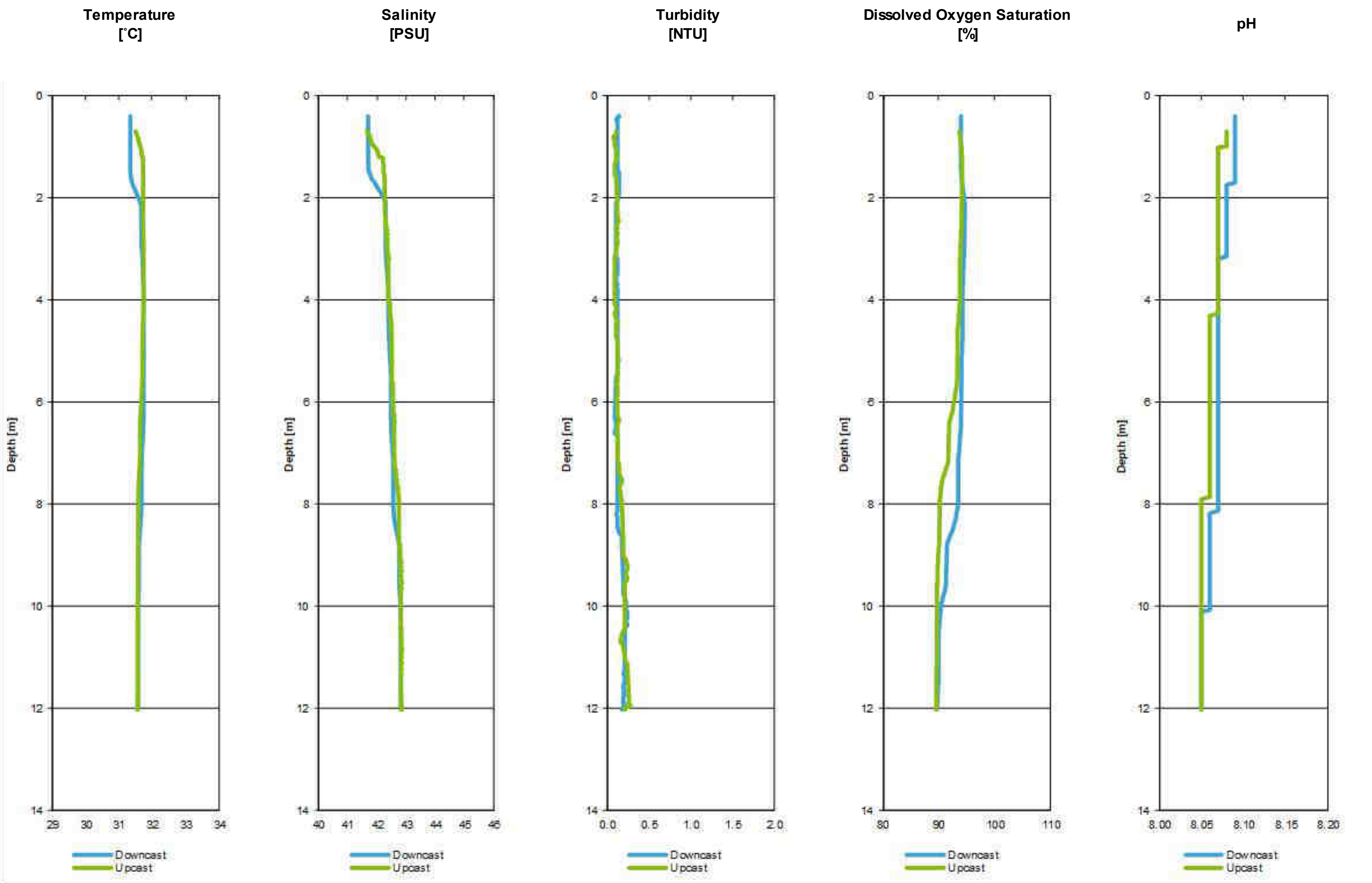

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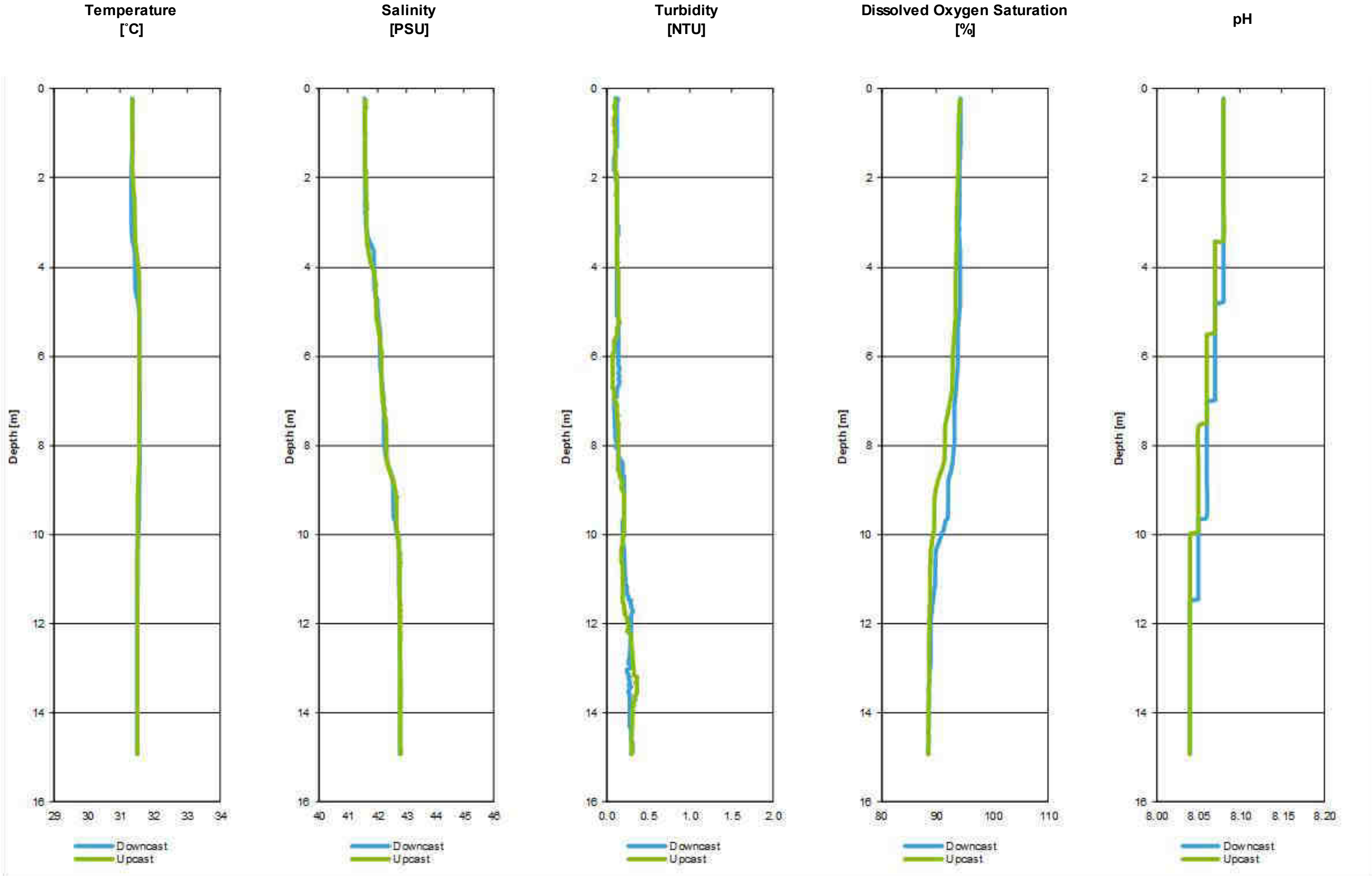

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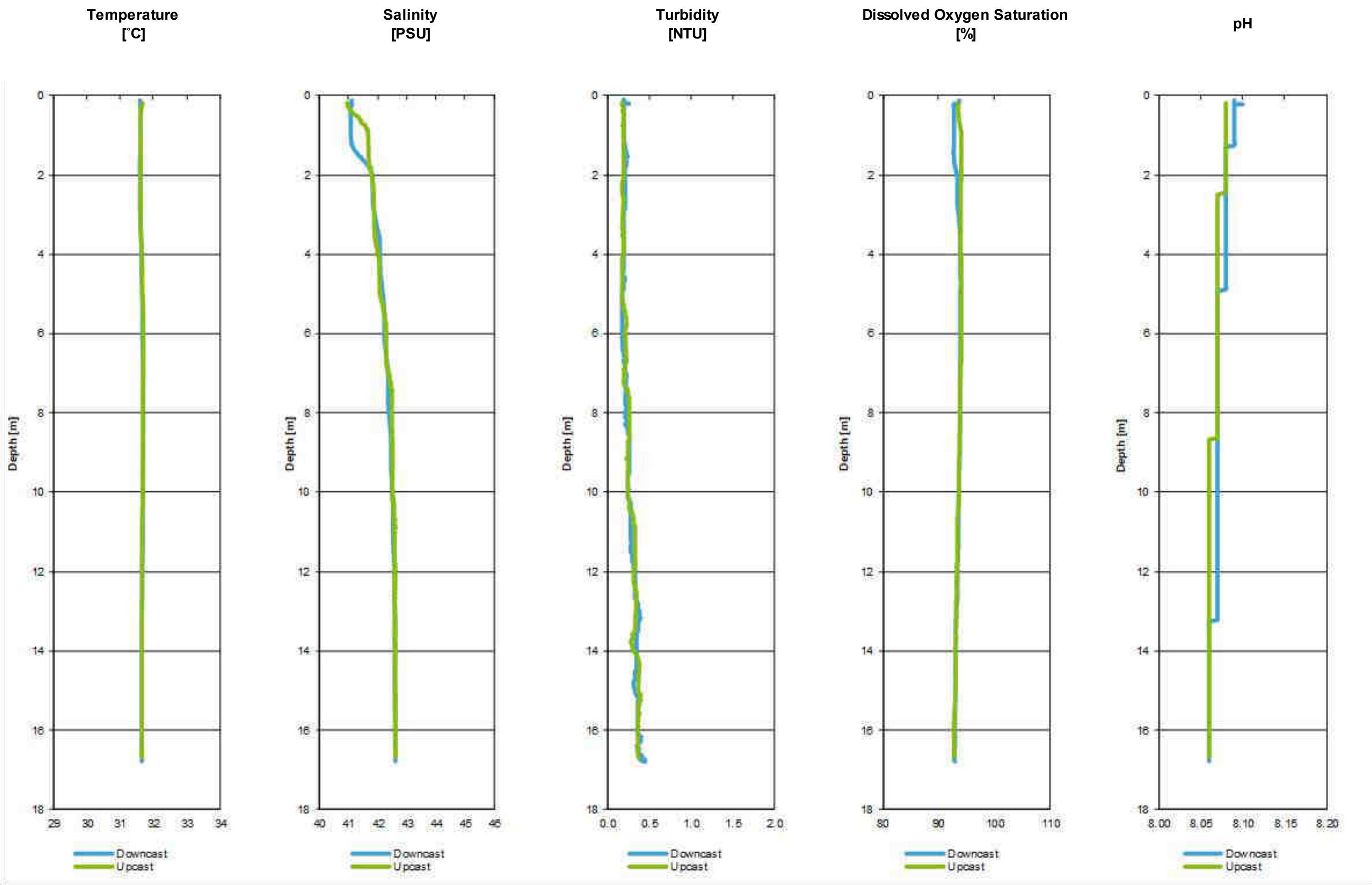

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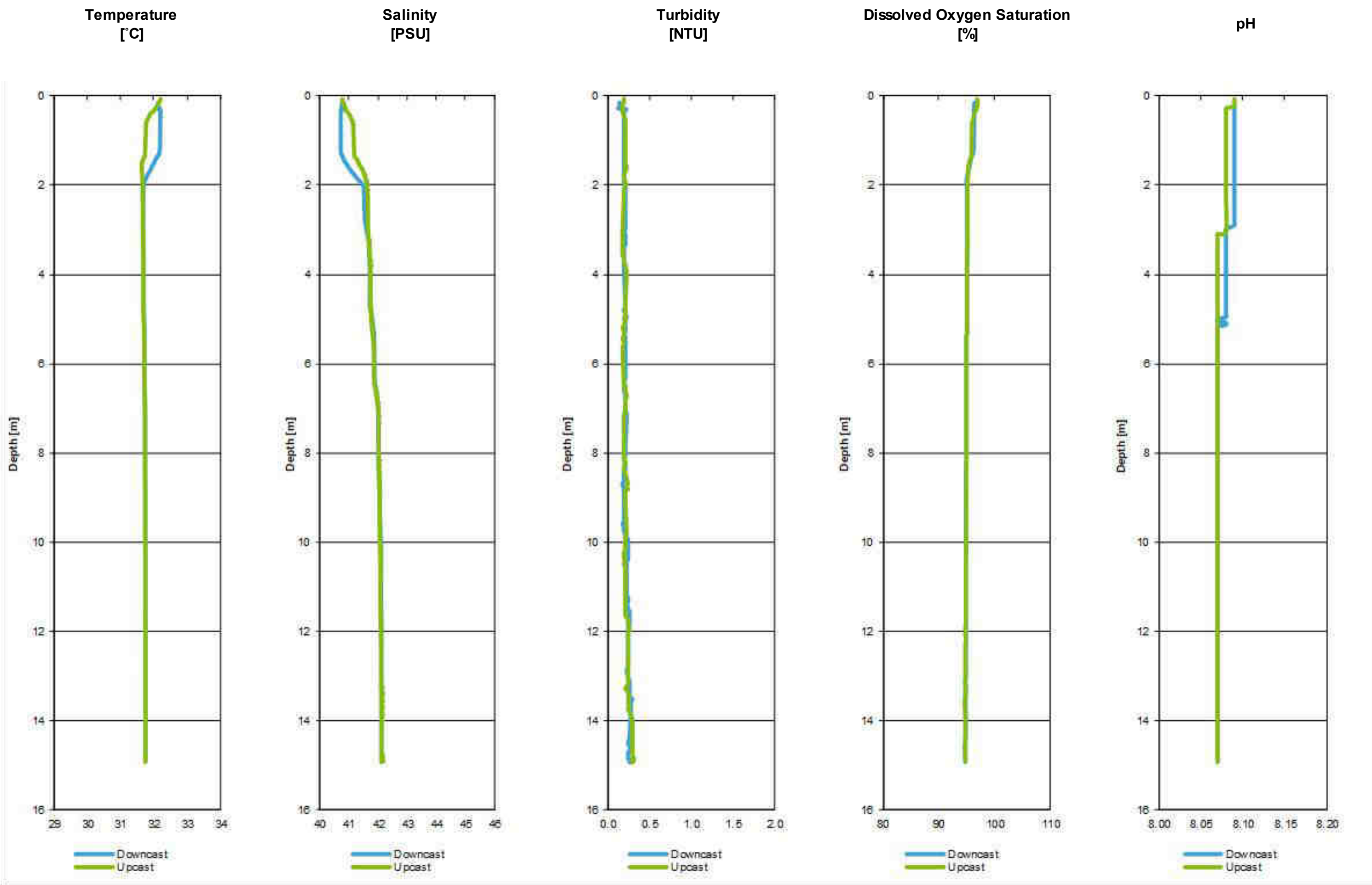

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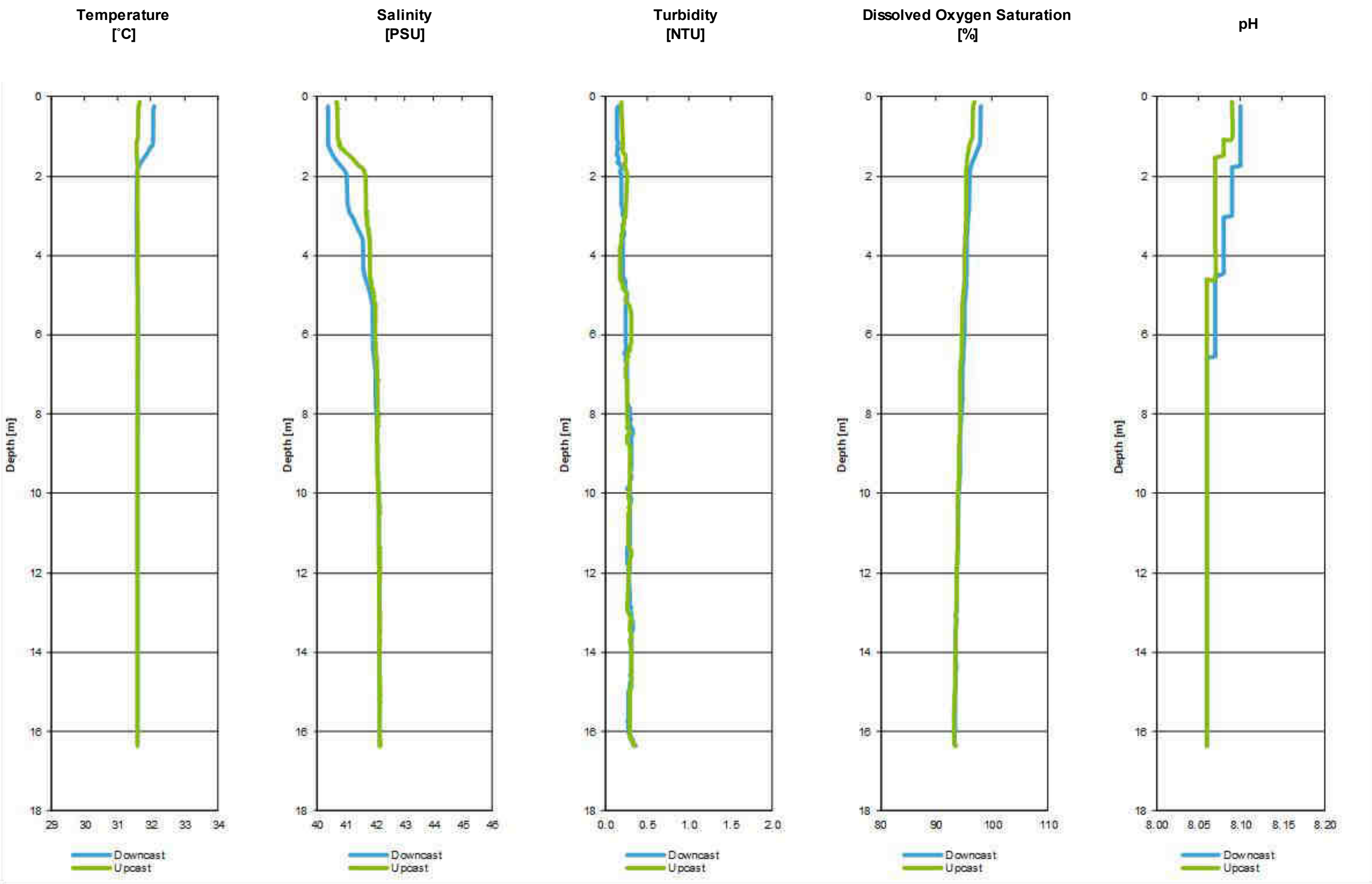

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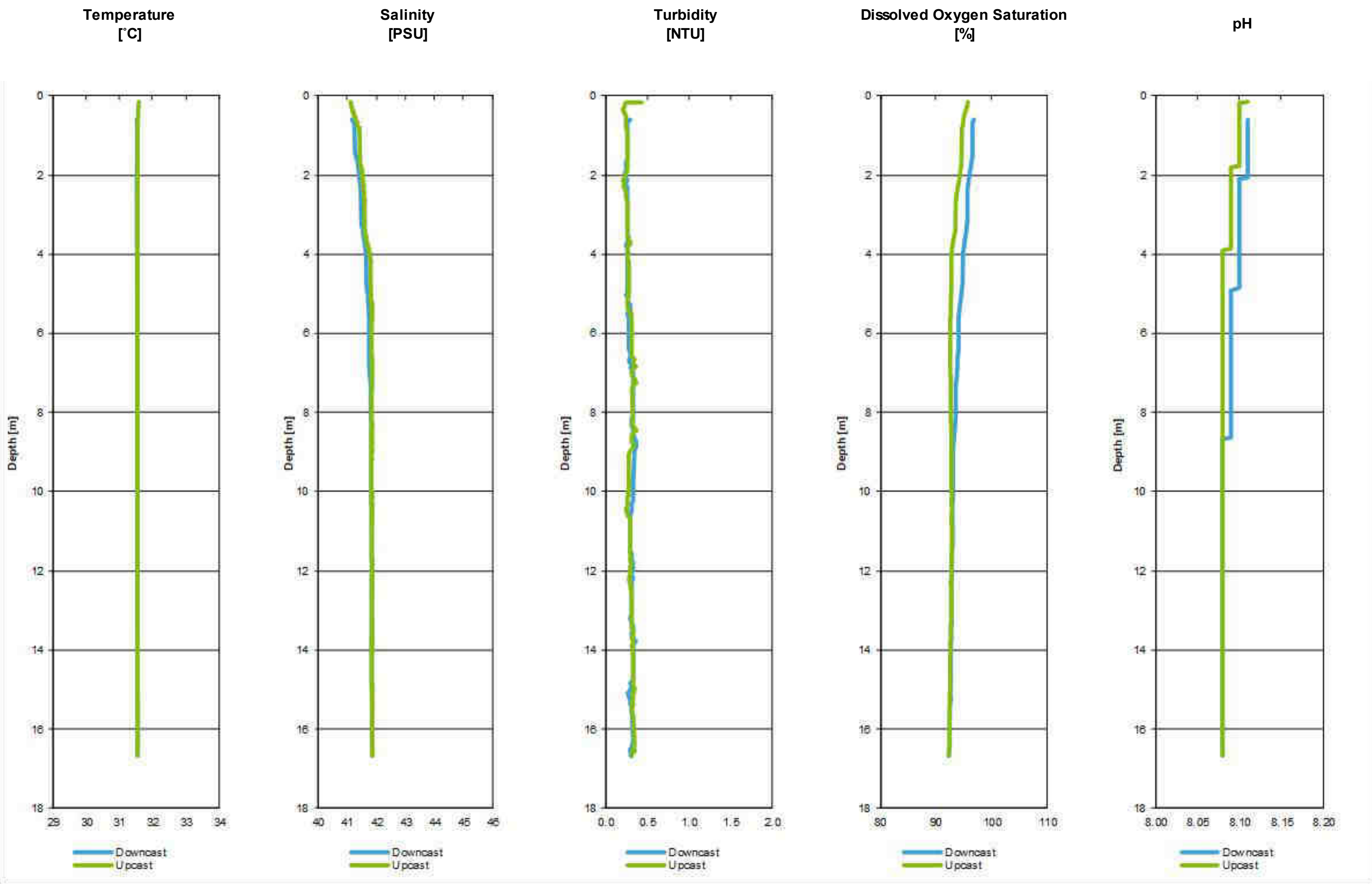

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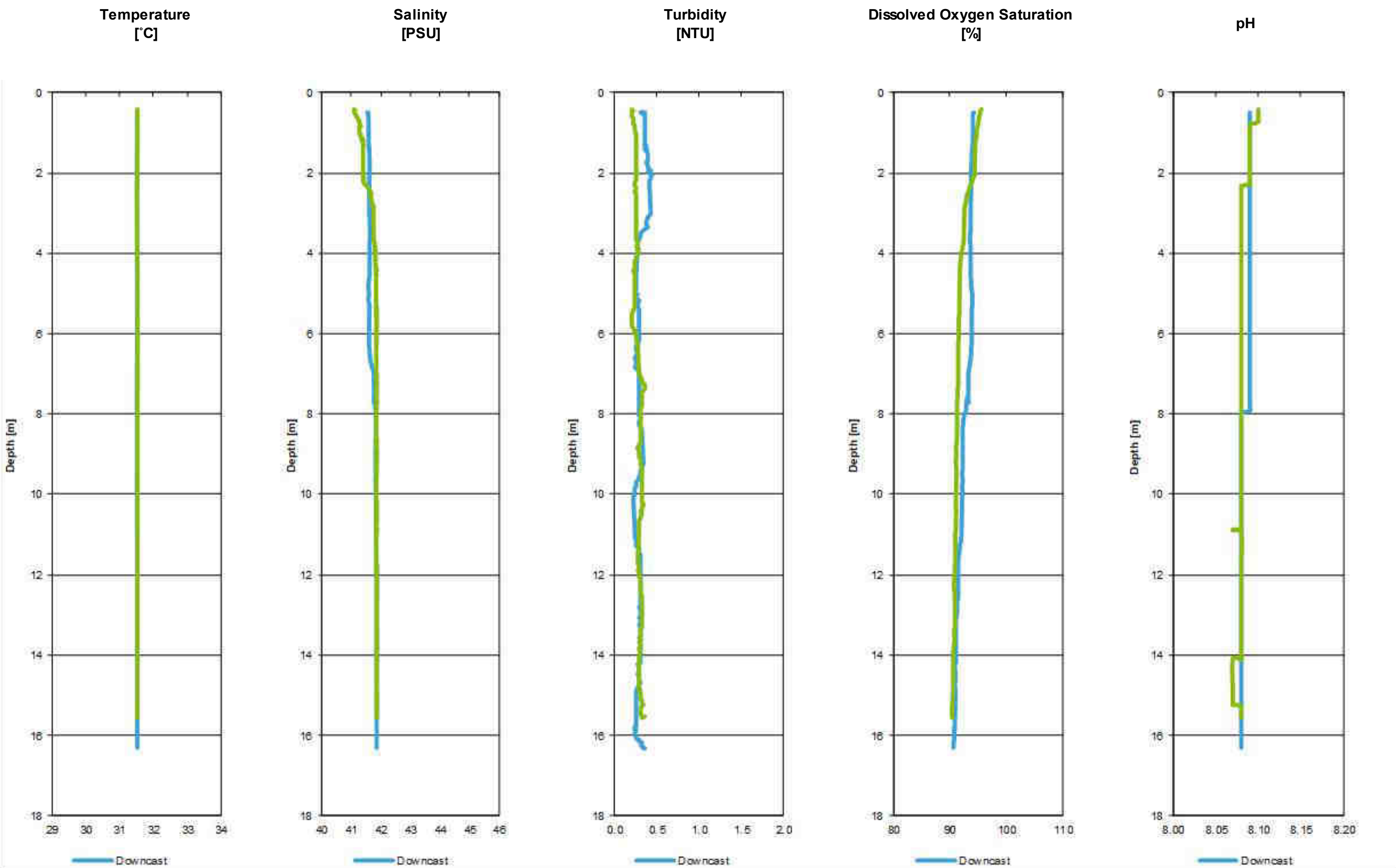

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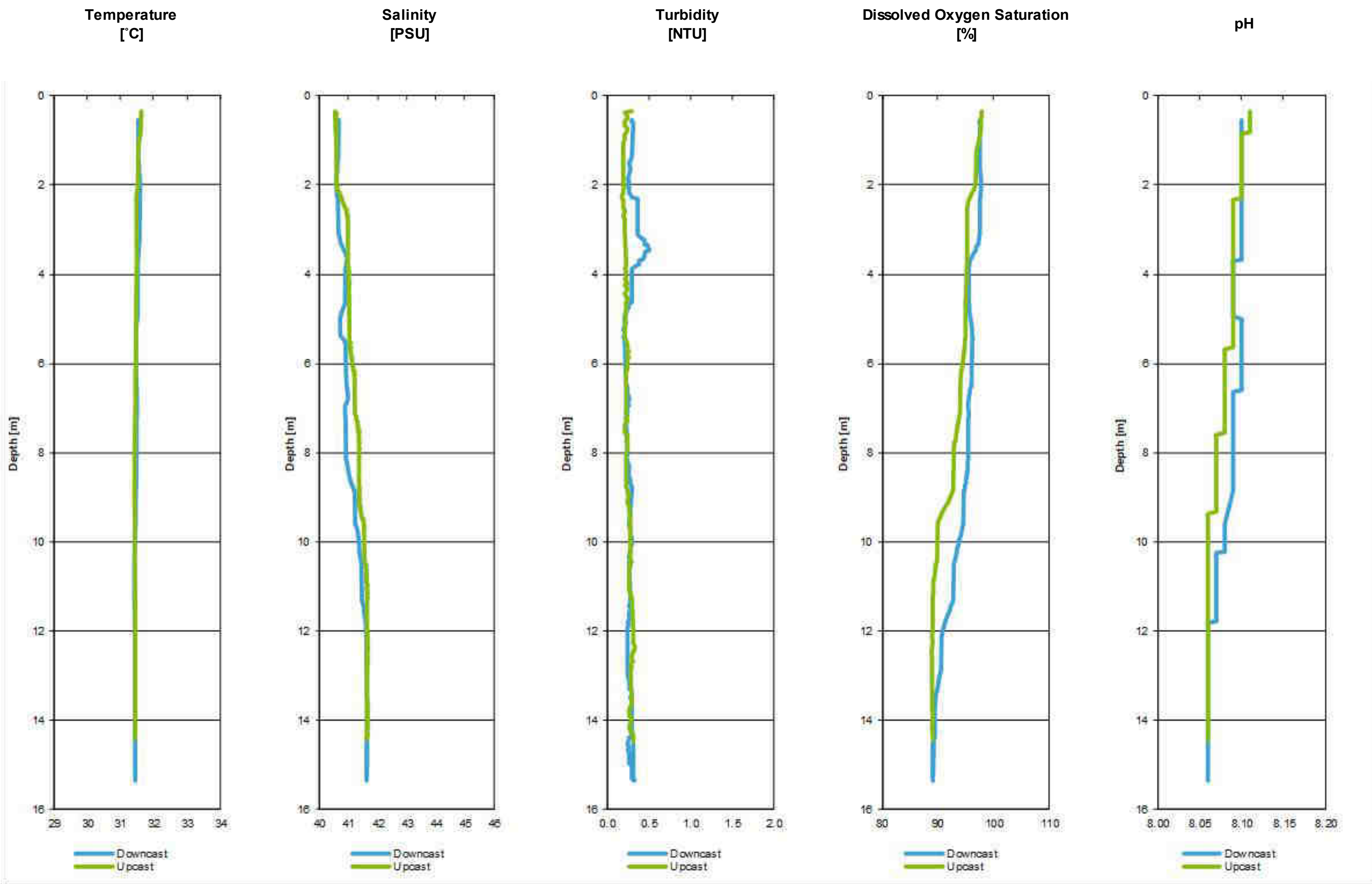

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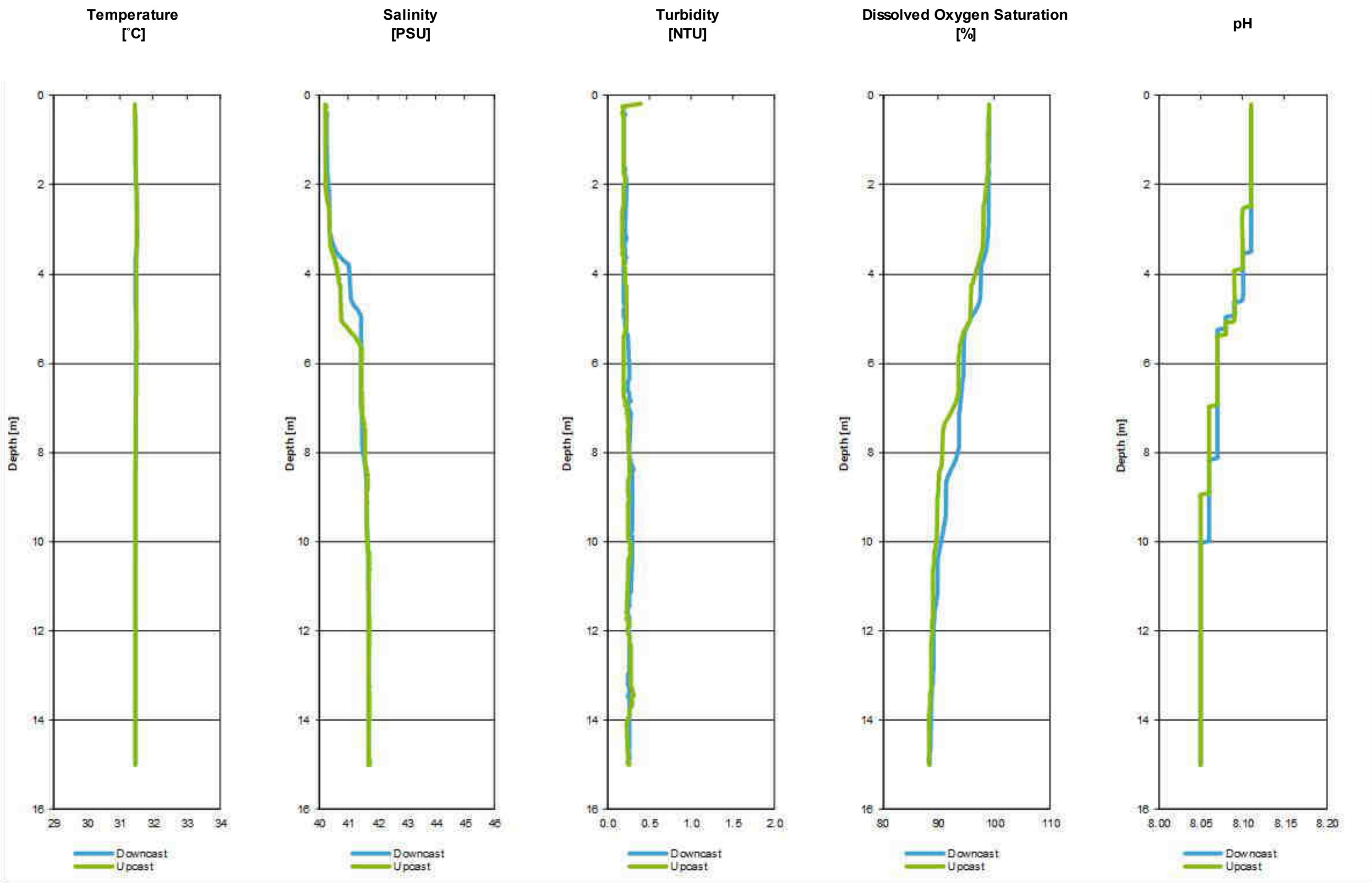
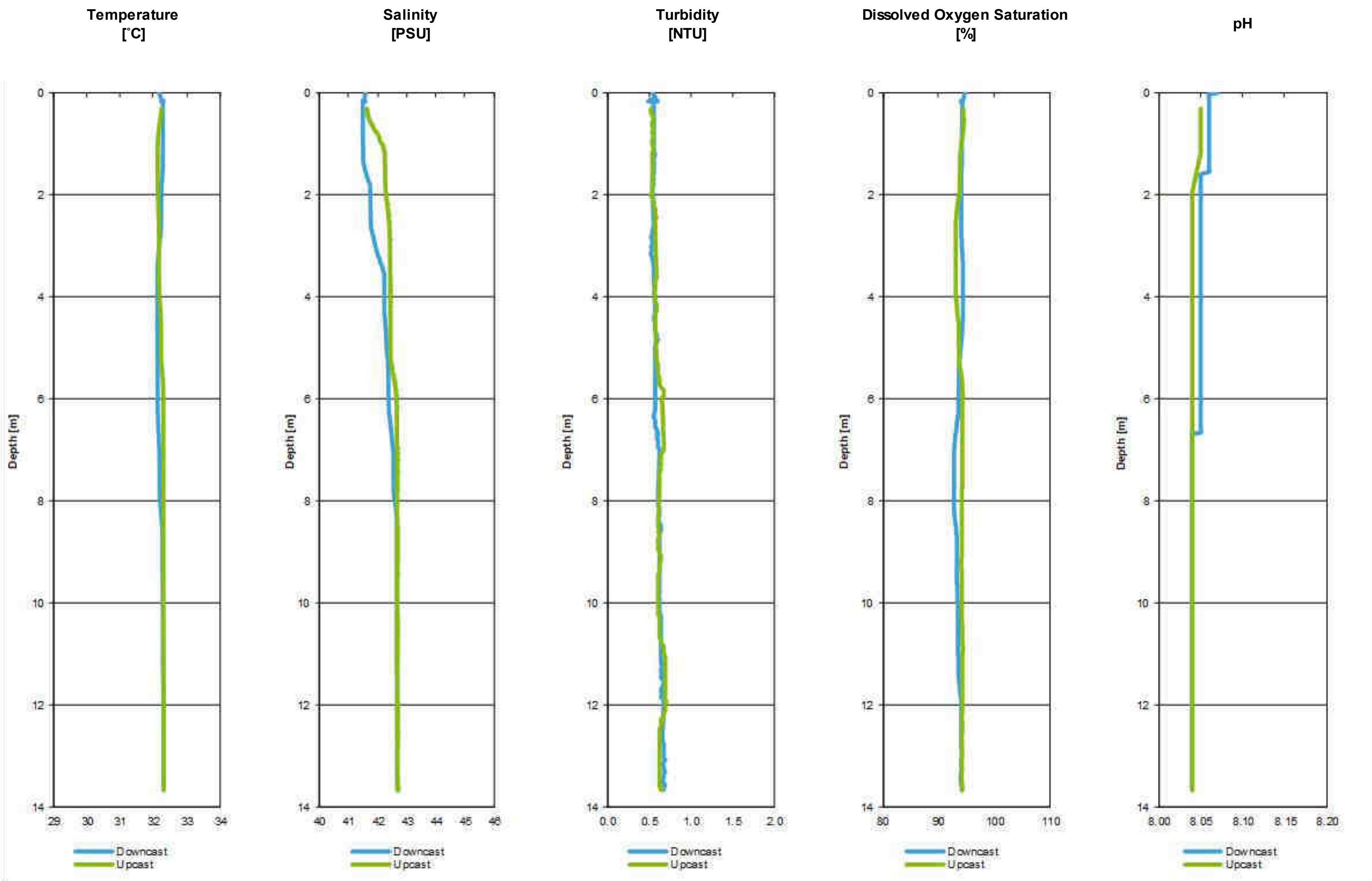


Station R2_ENV_101



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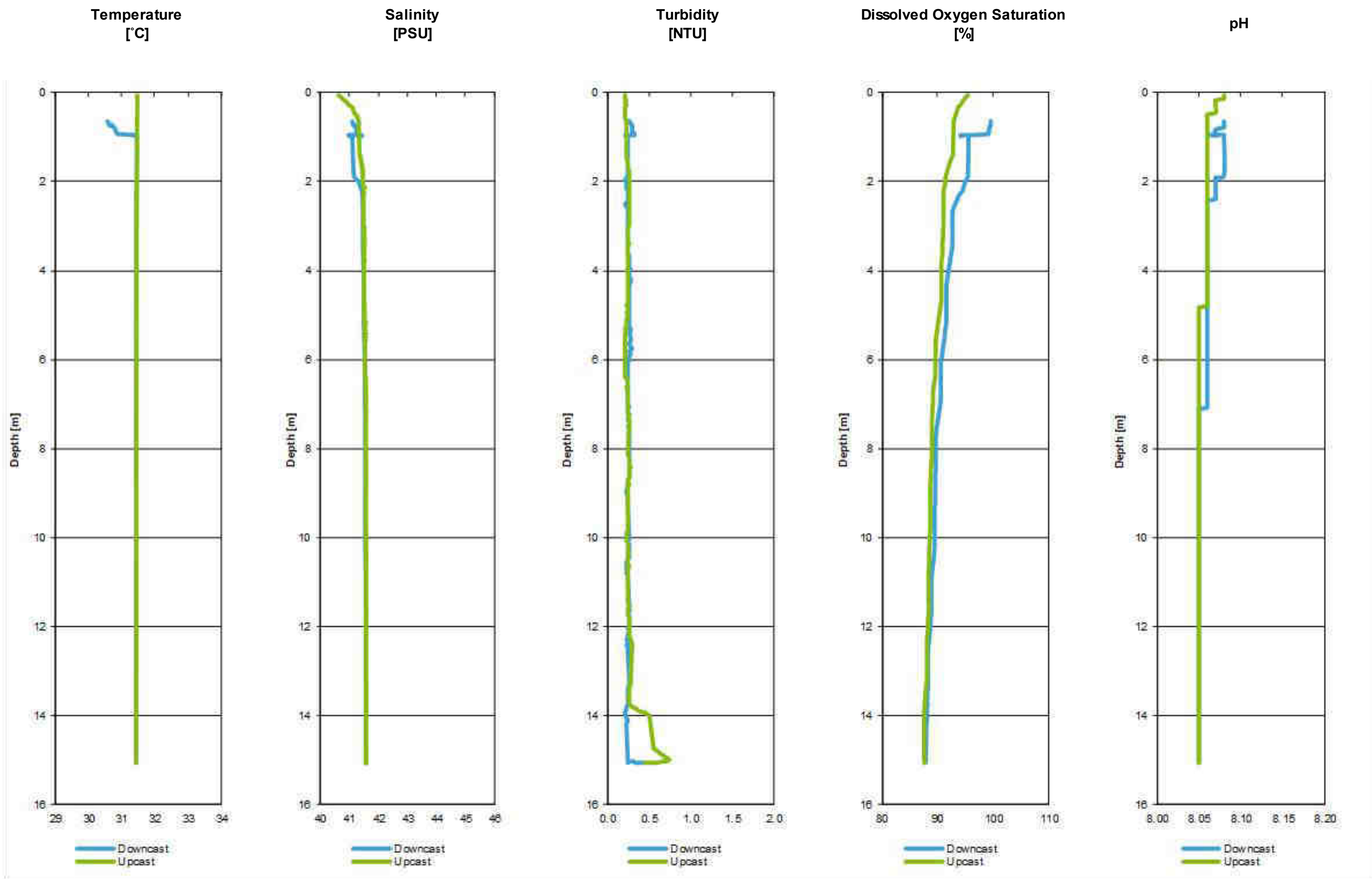

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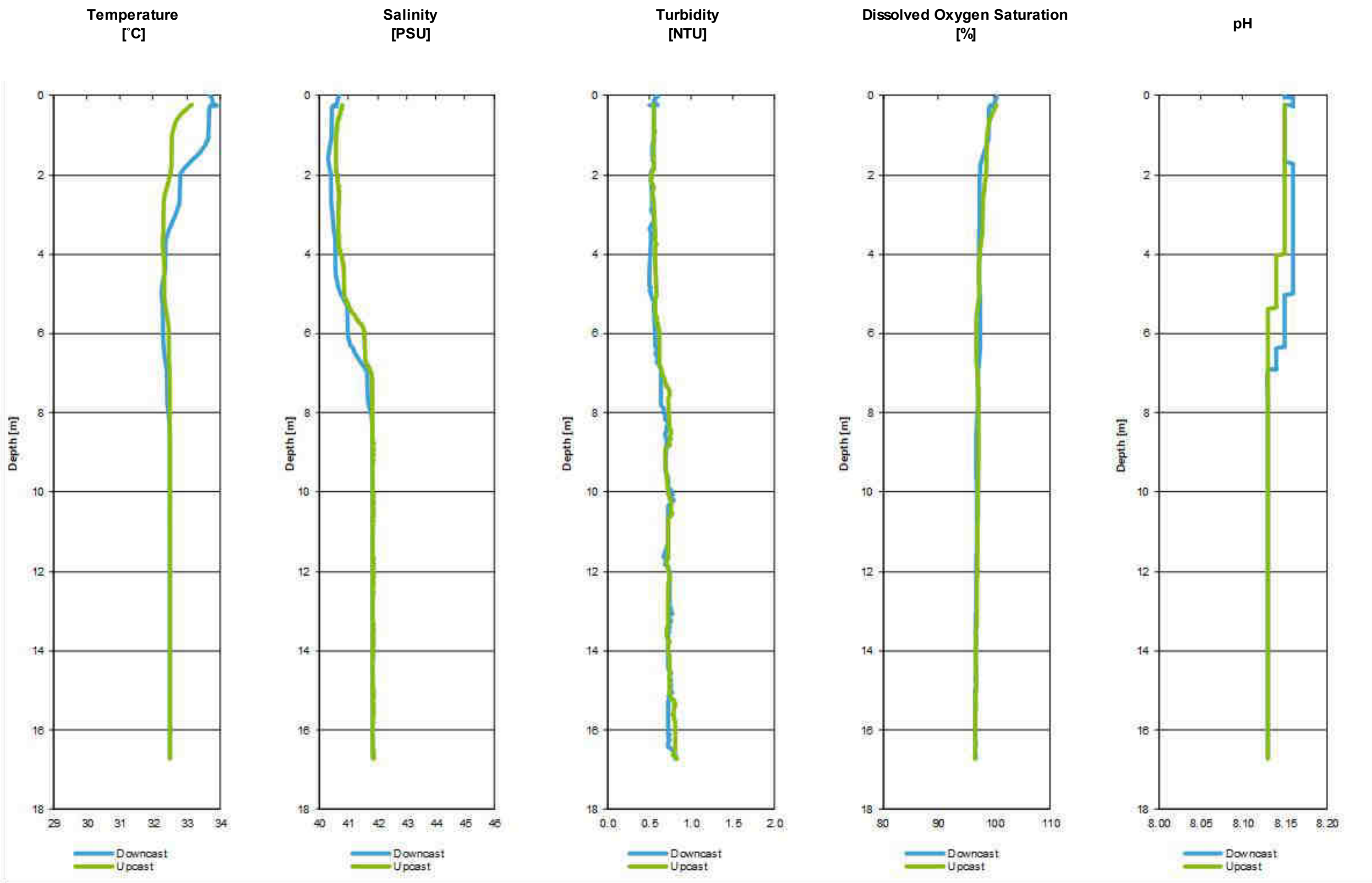

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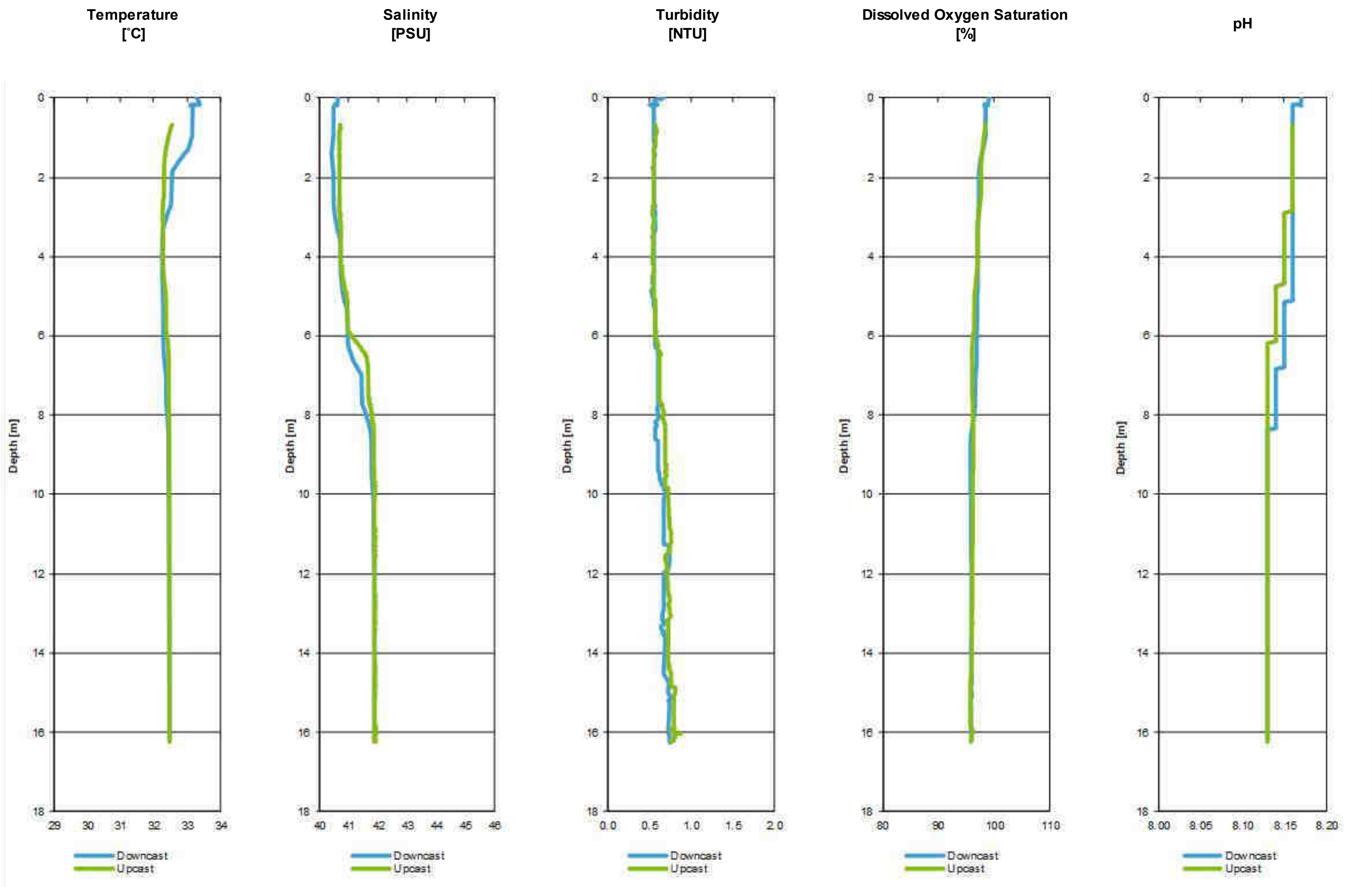

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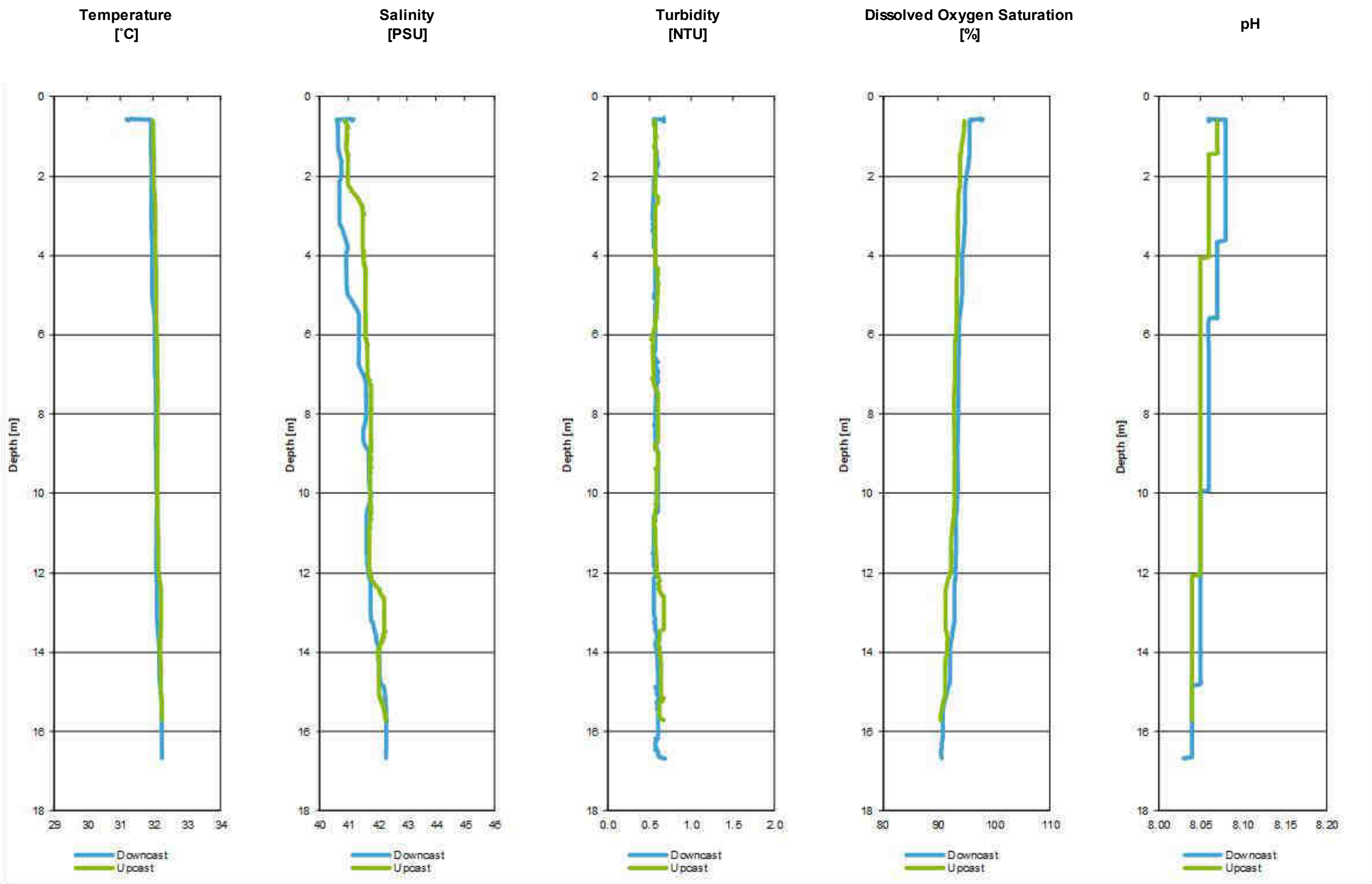
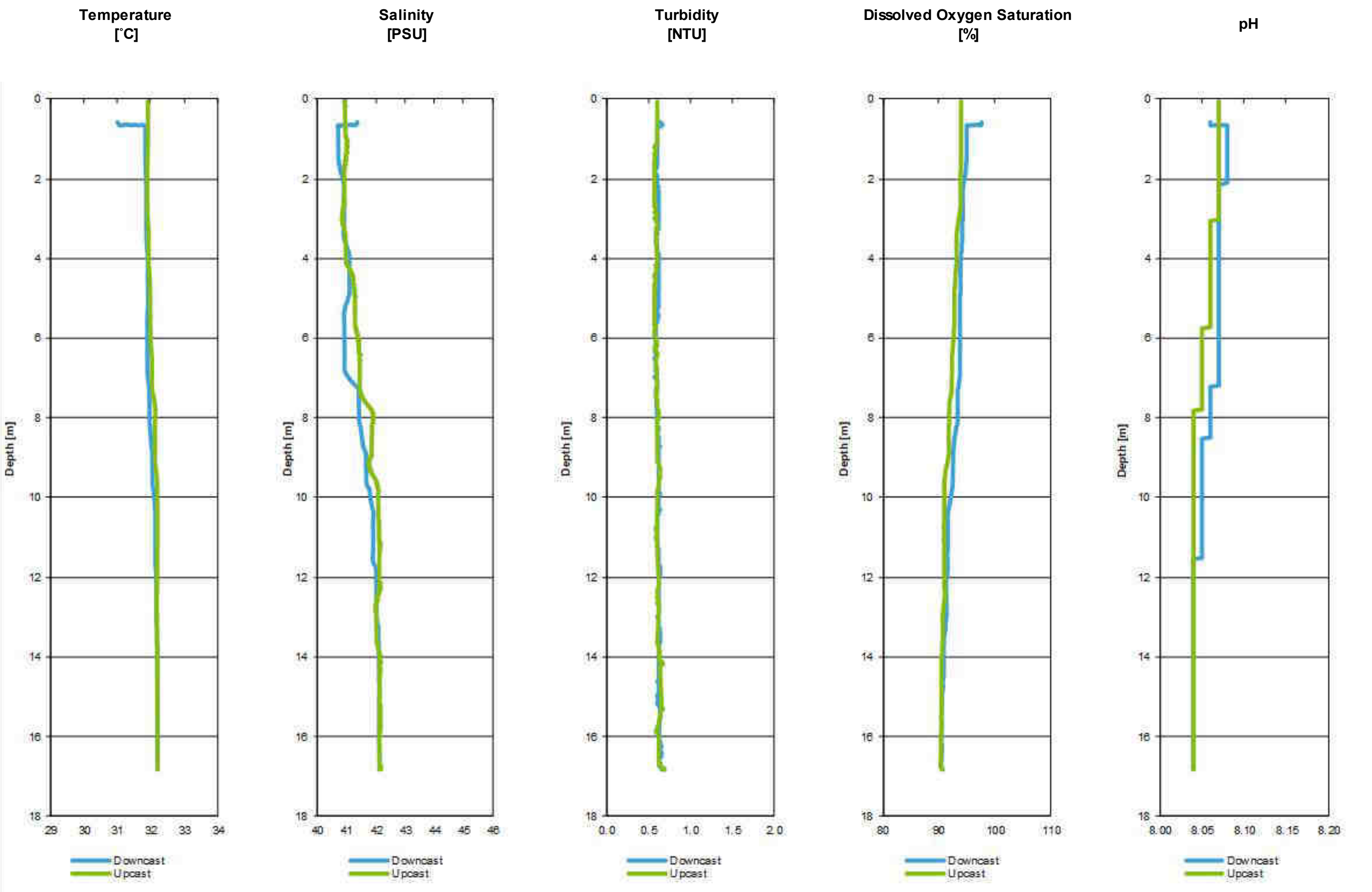
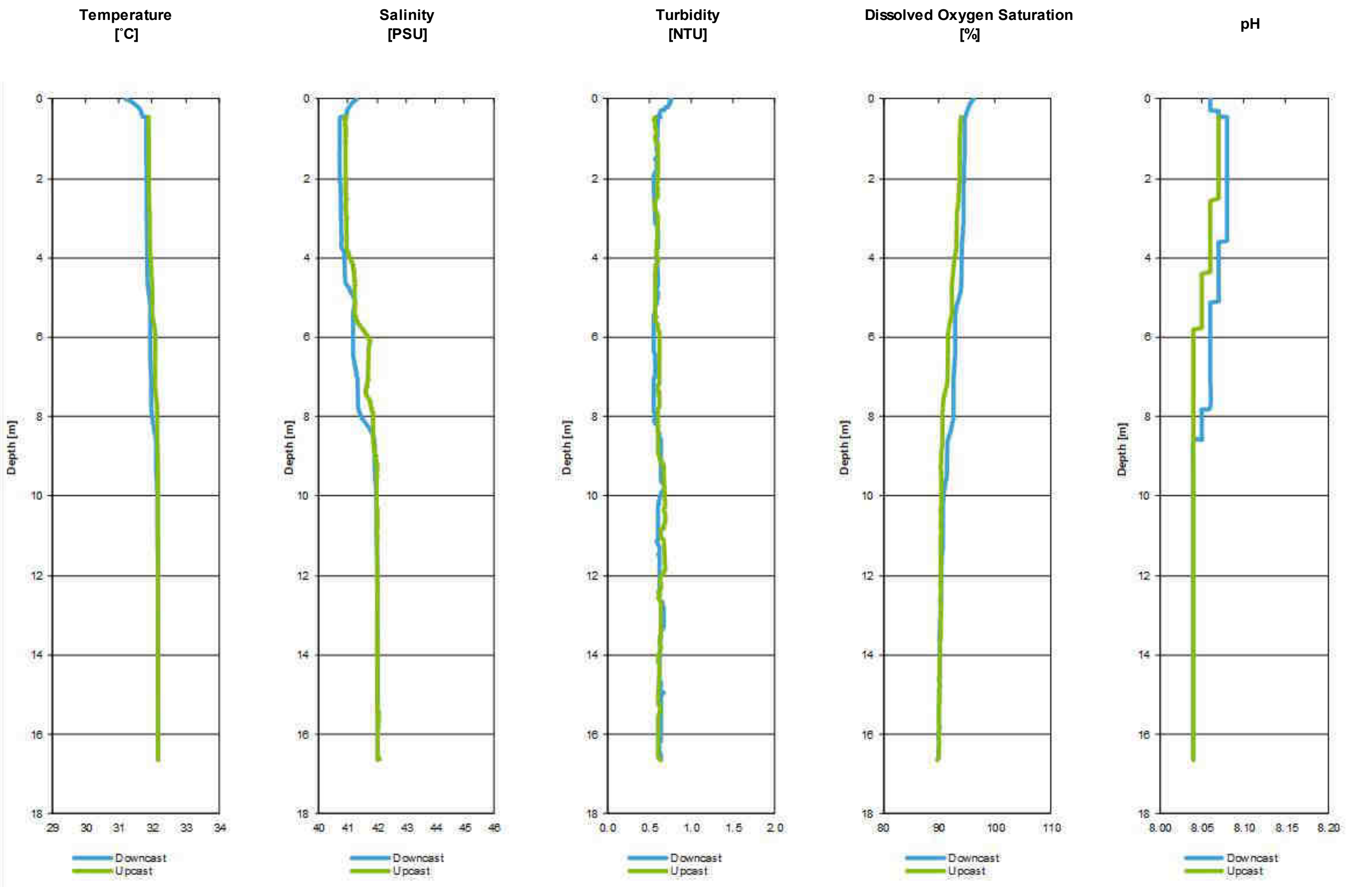


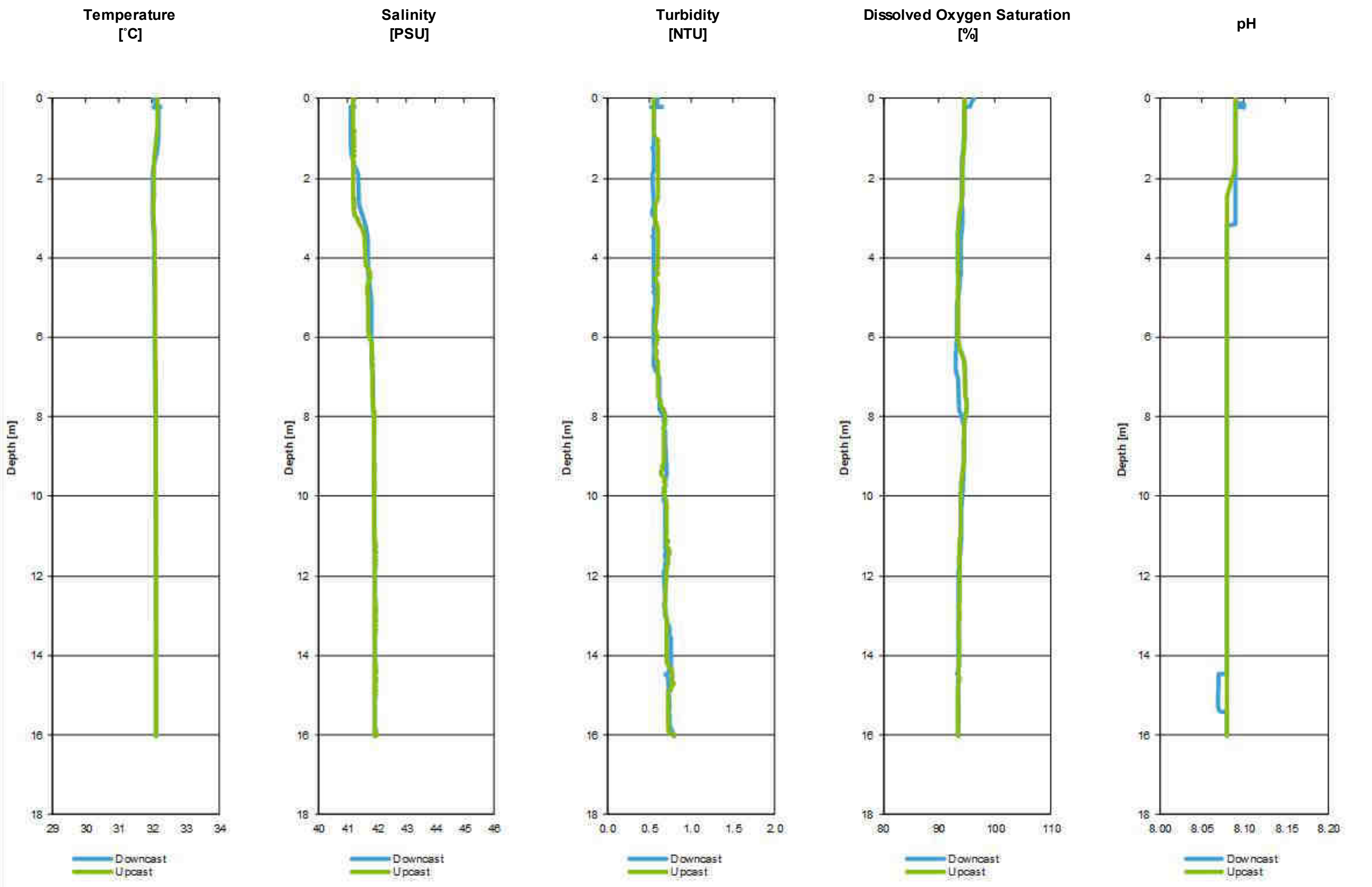
Station R2_ENV_106



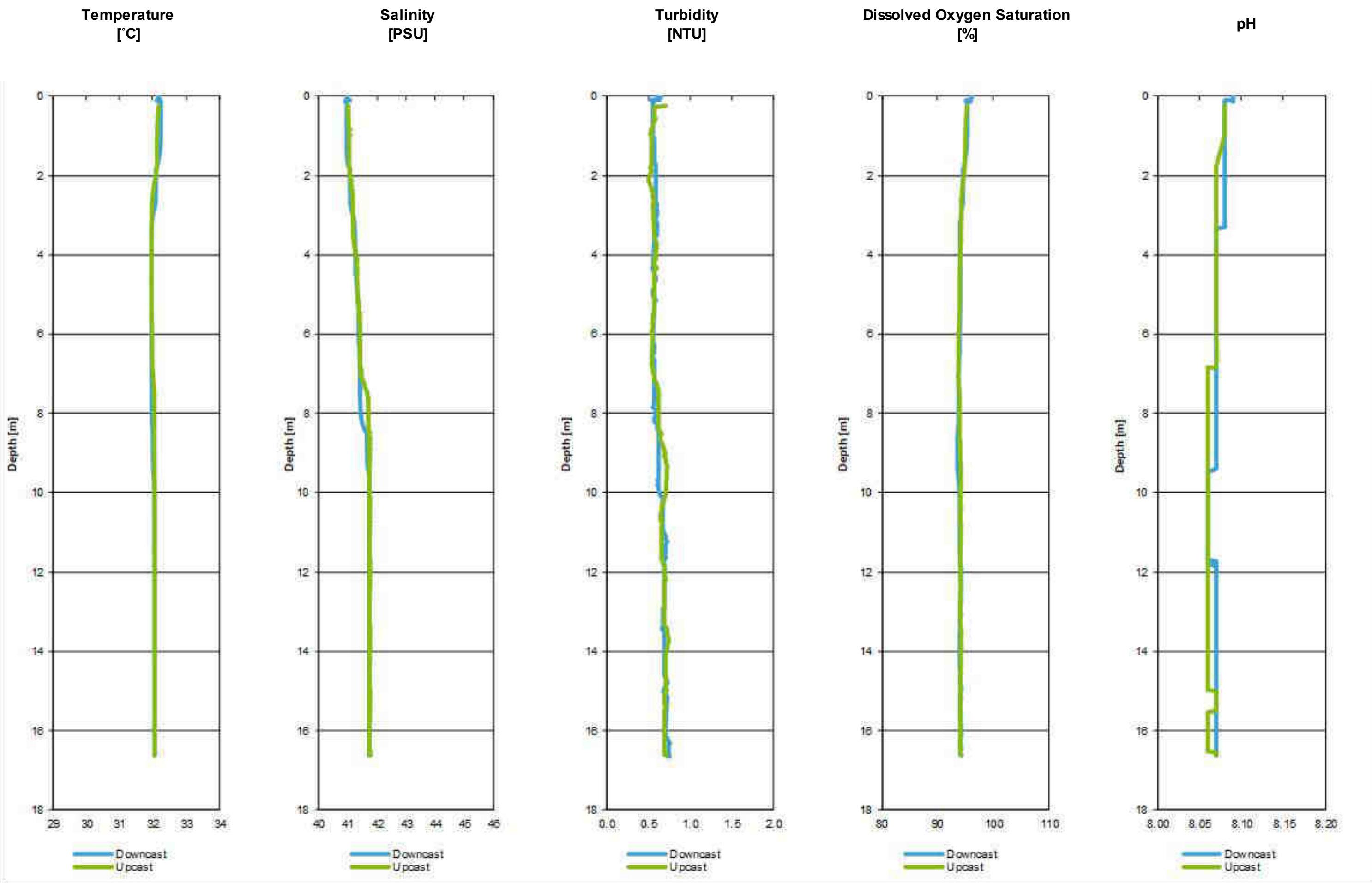
Station R2_ENV_107



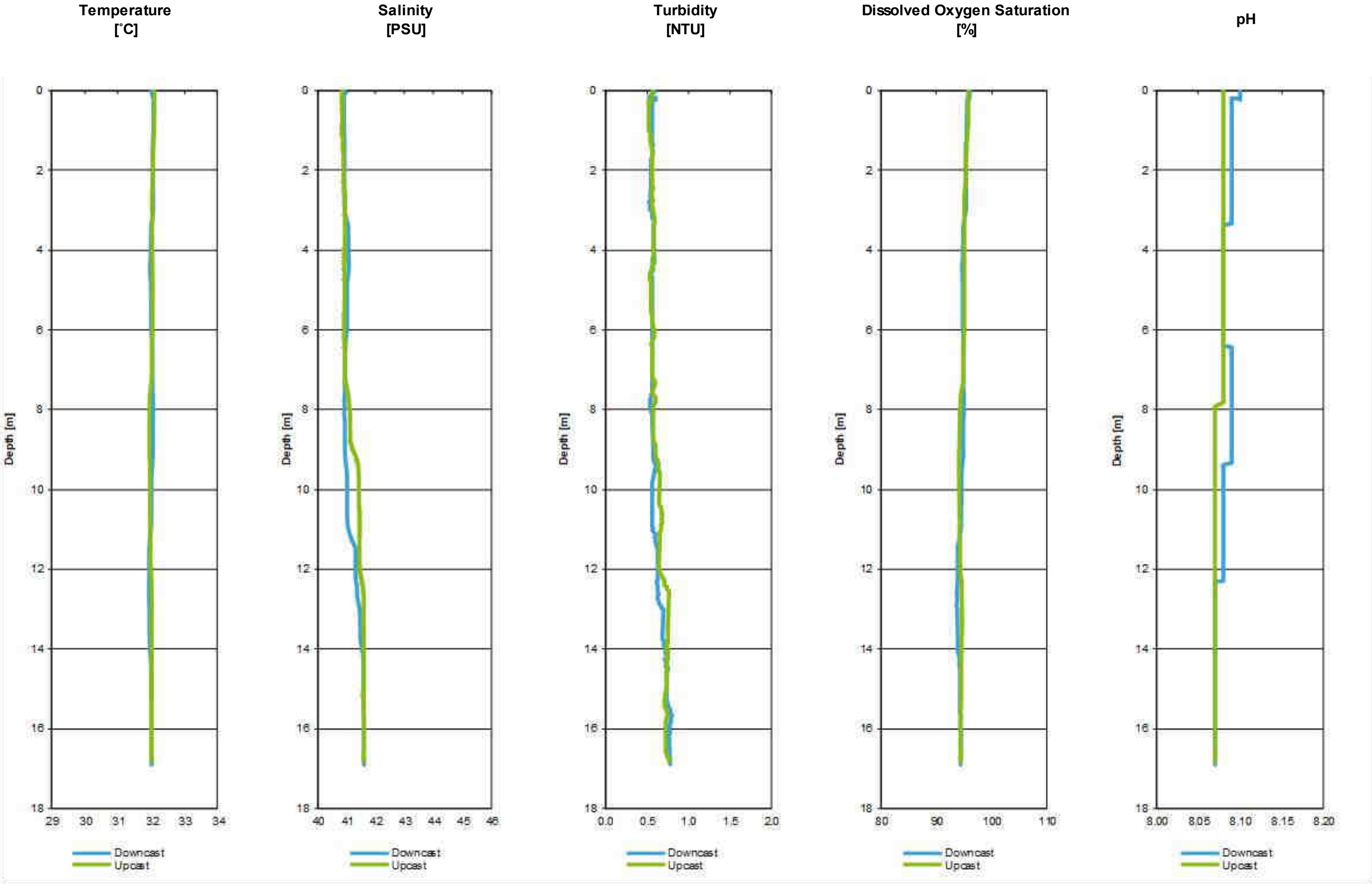
Station R2_ENV_108



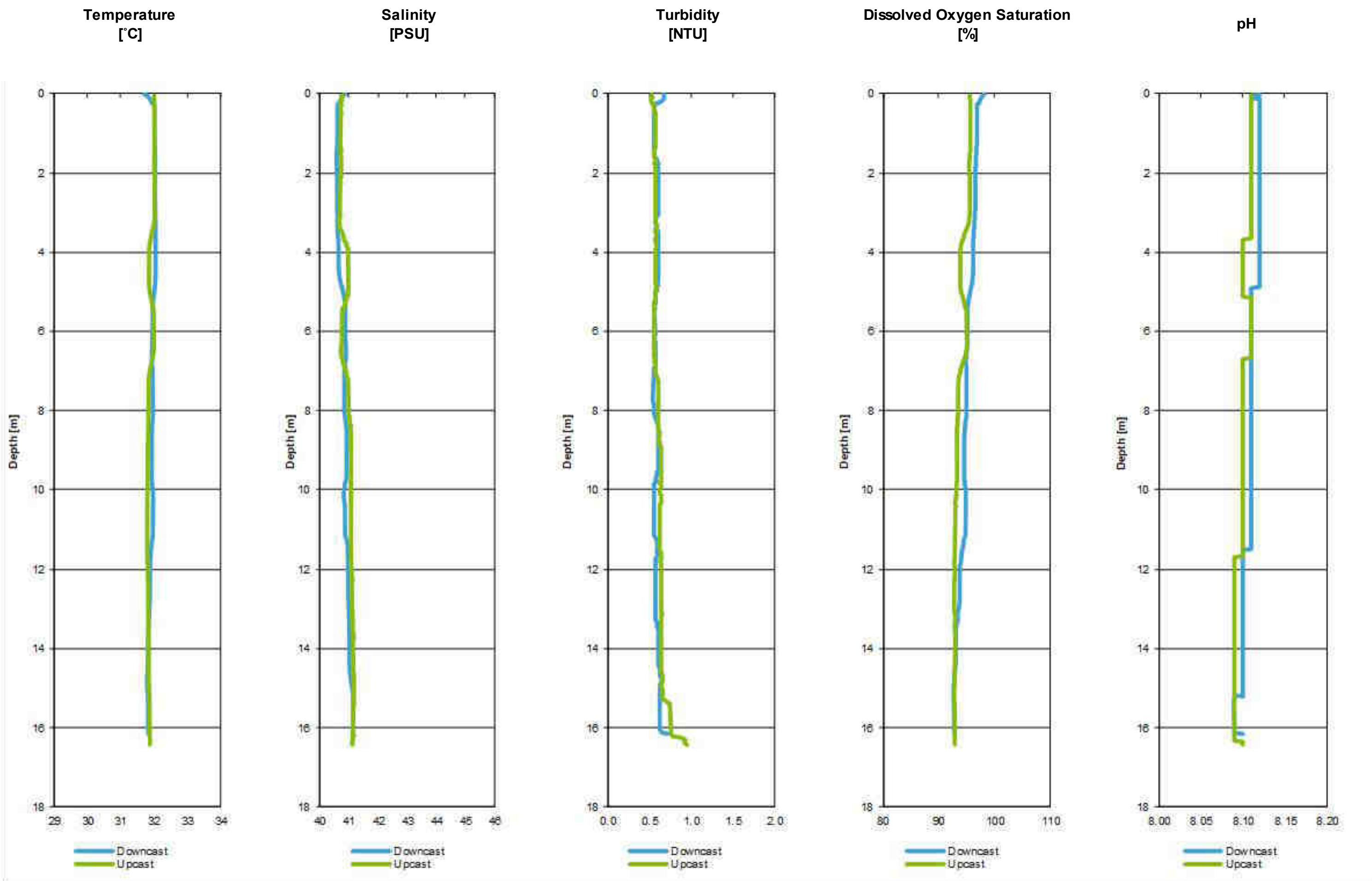
Station R2_ENV_109



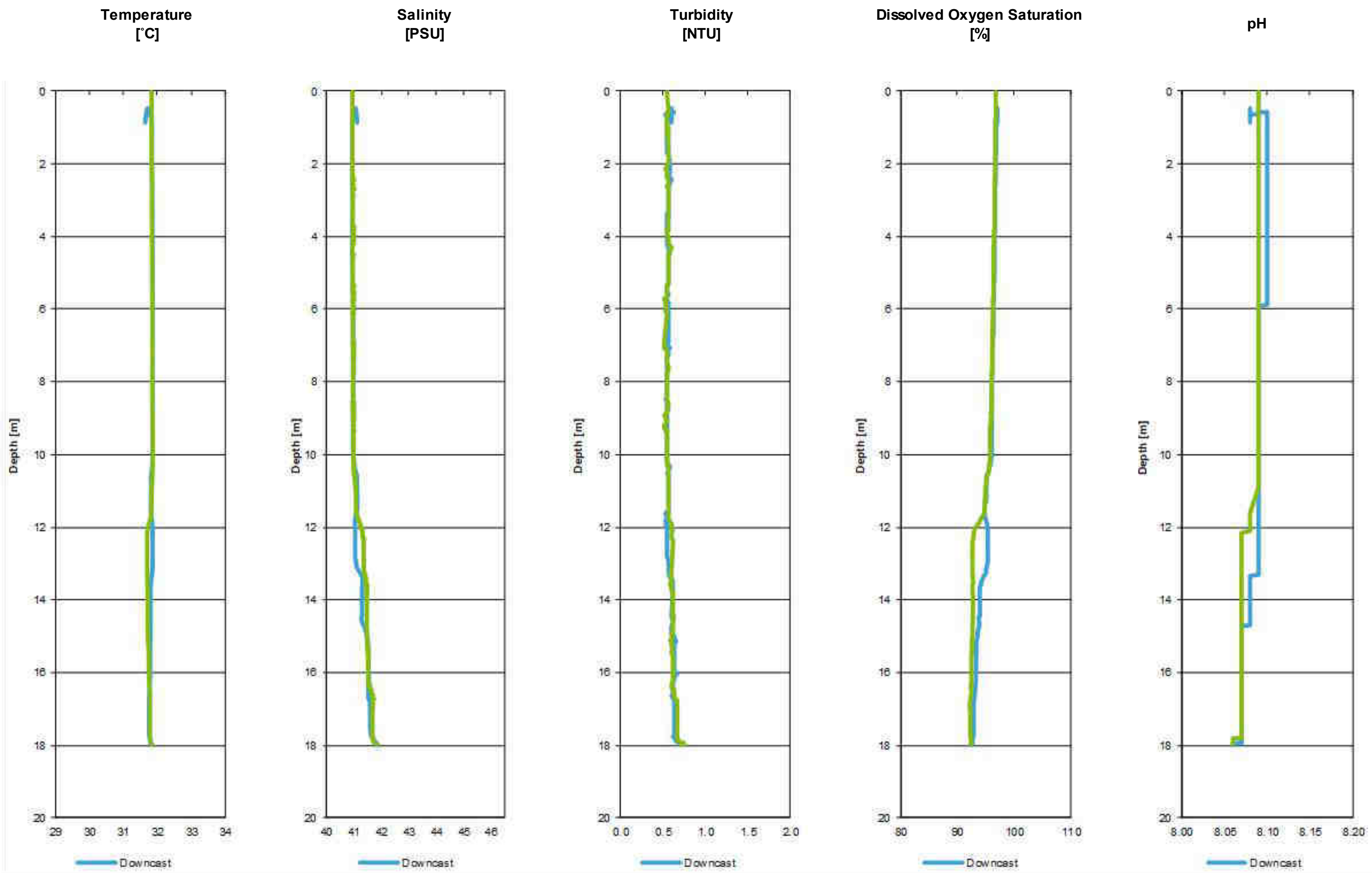
Station R2_ENV_110



Station R2_ENV_111



Station R2_ENV_112



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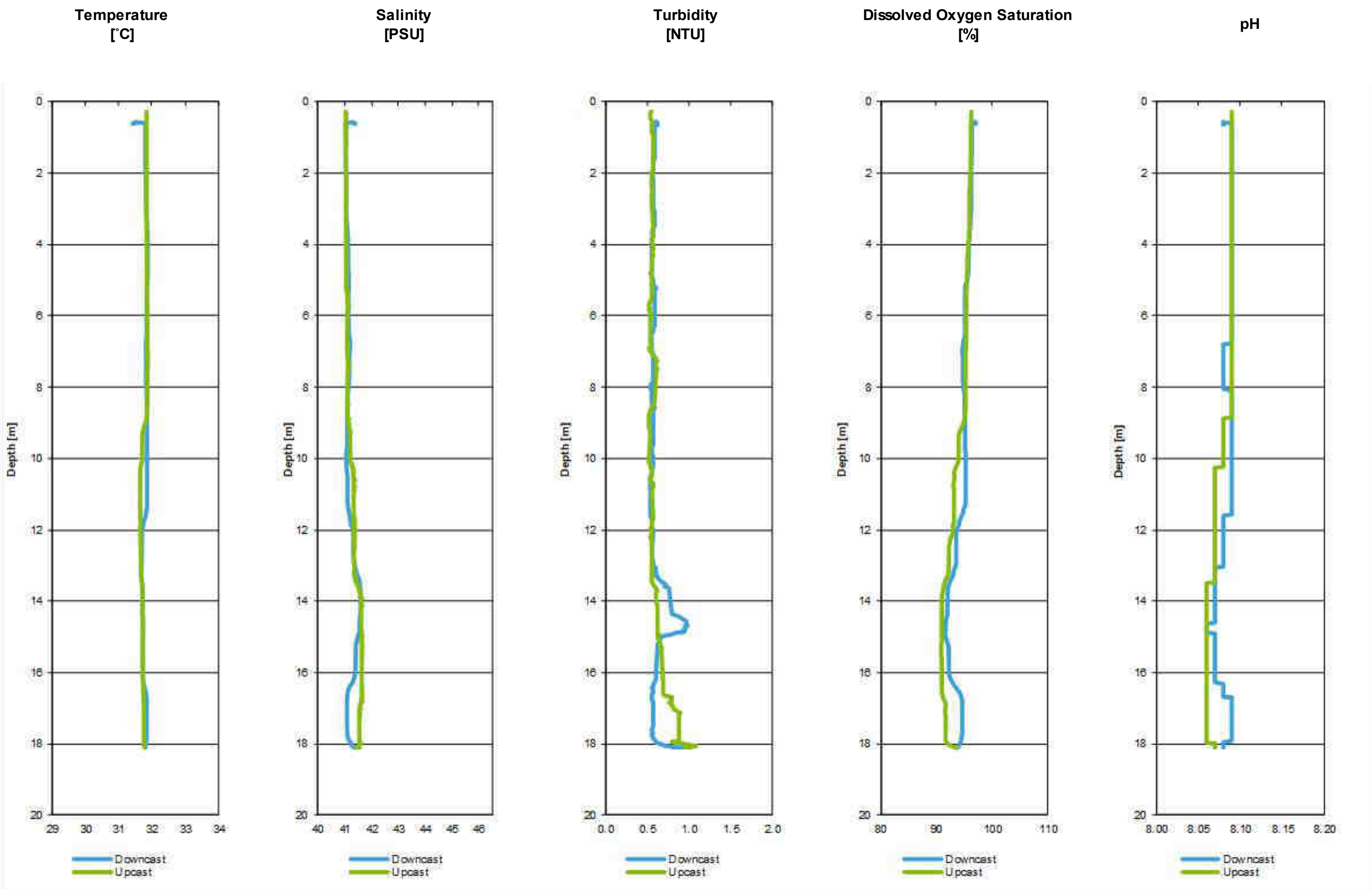

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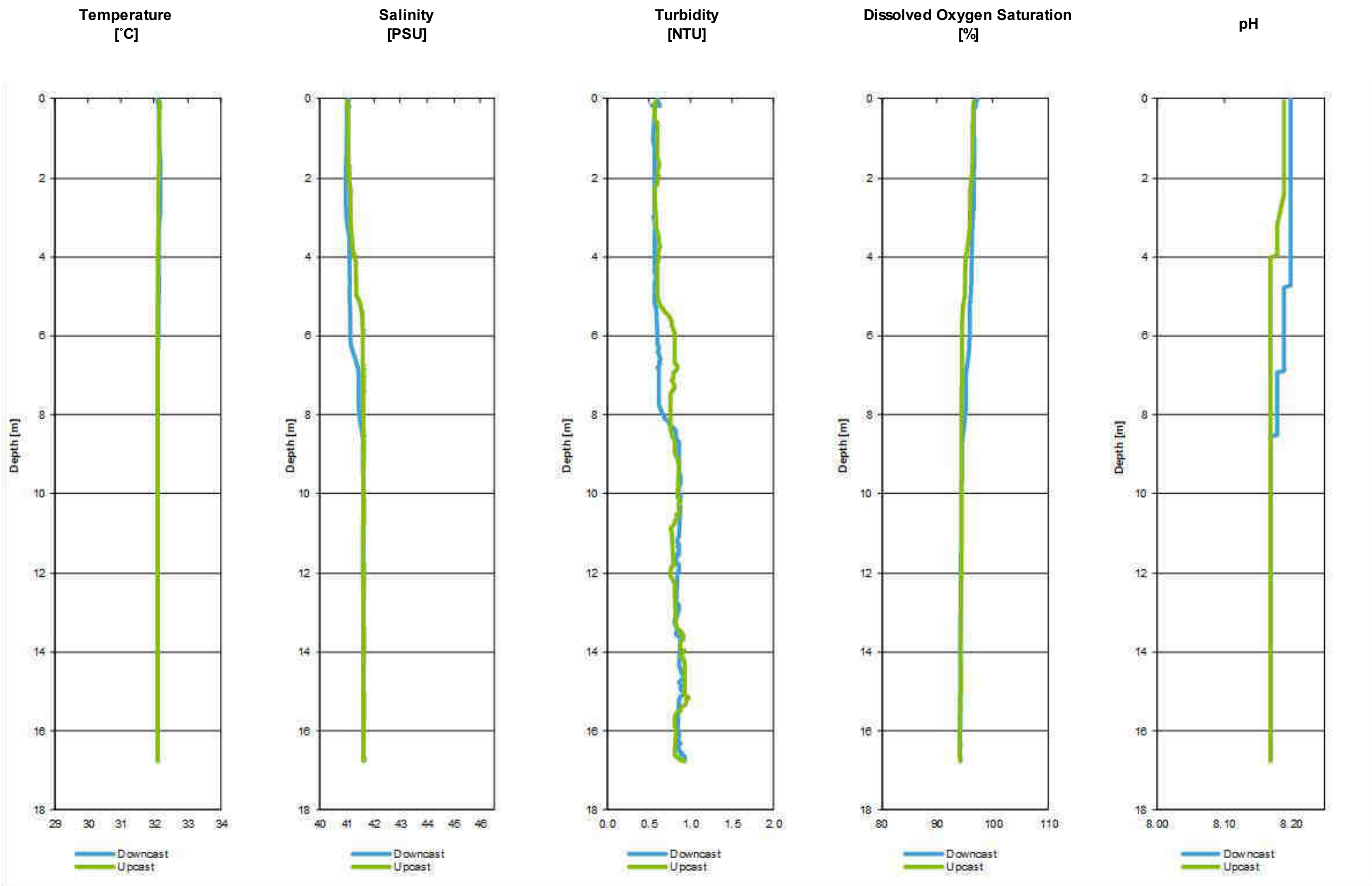
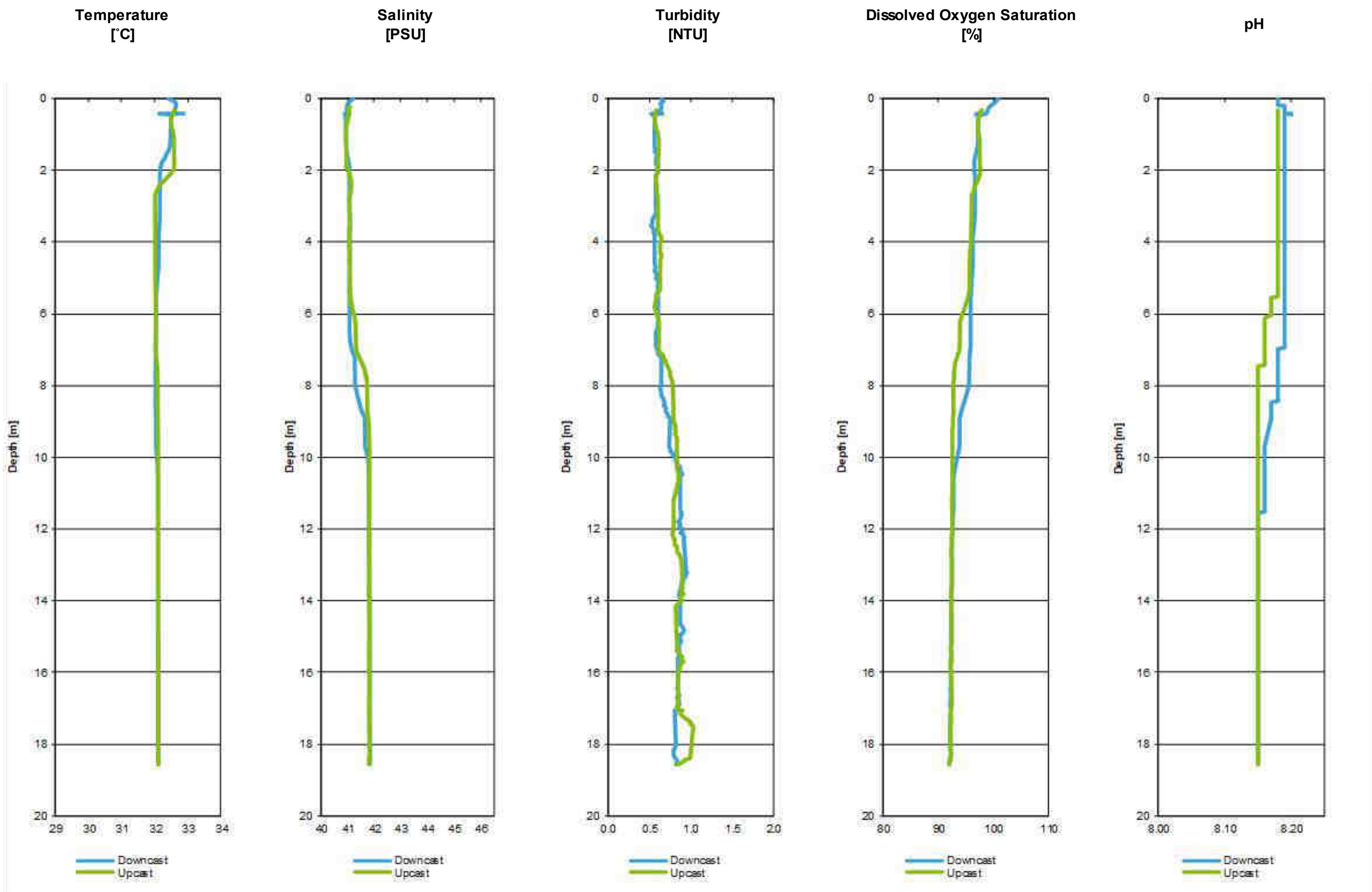
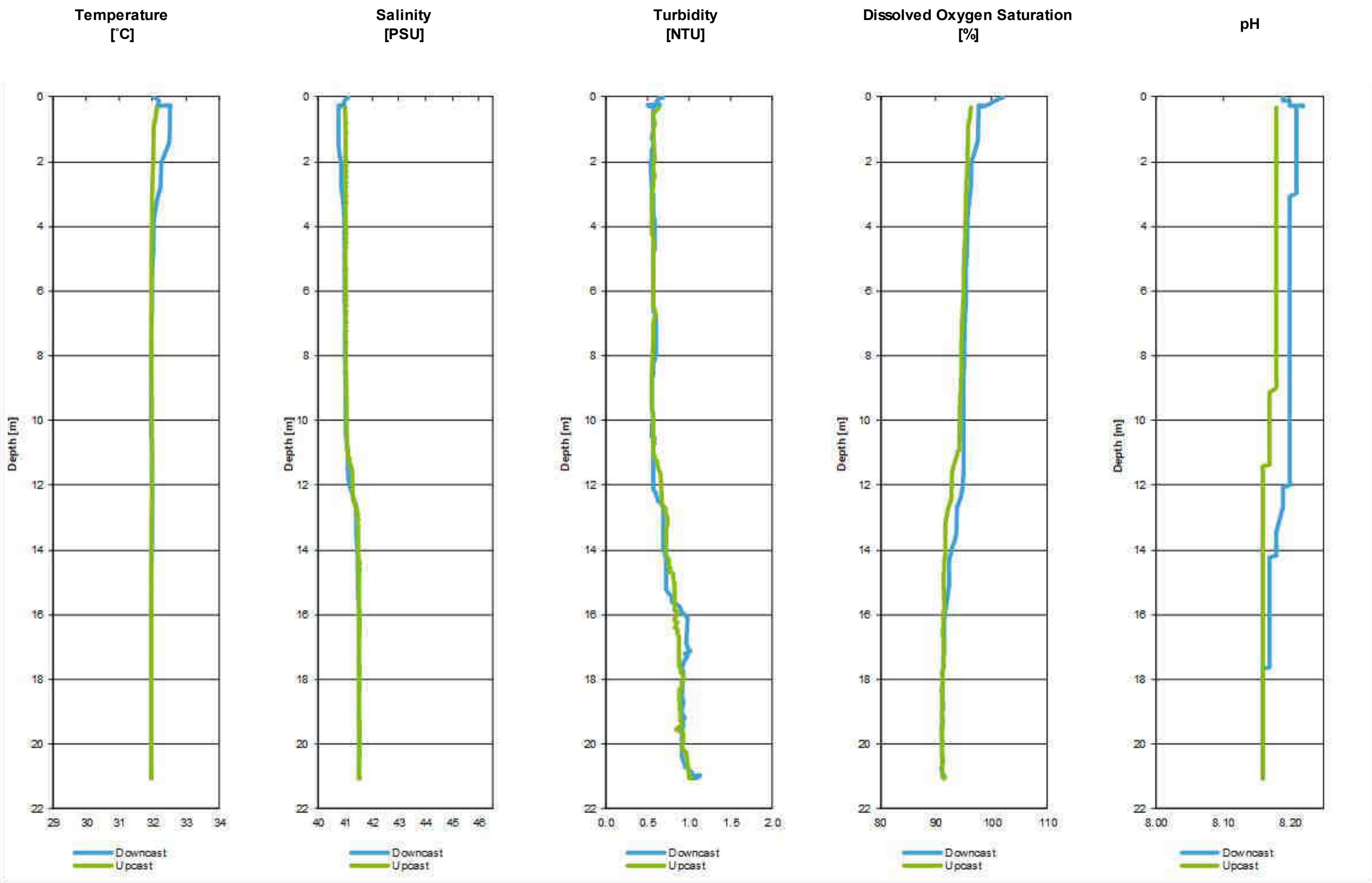


Station R2_ENV_115



Station R2_ENV_116



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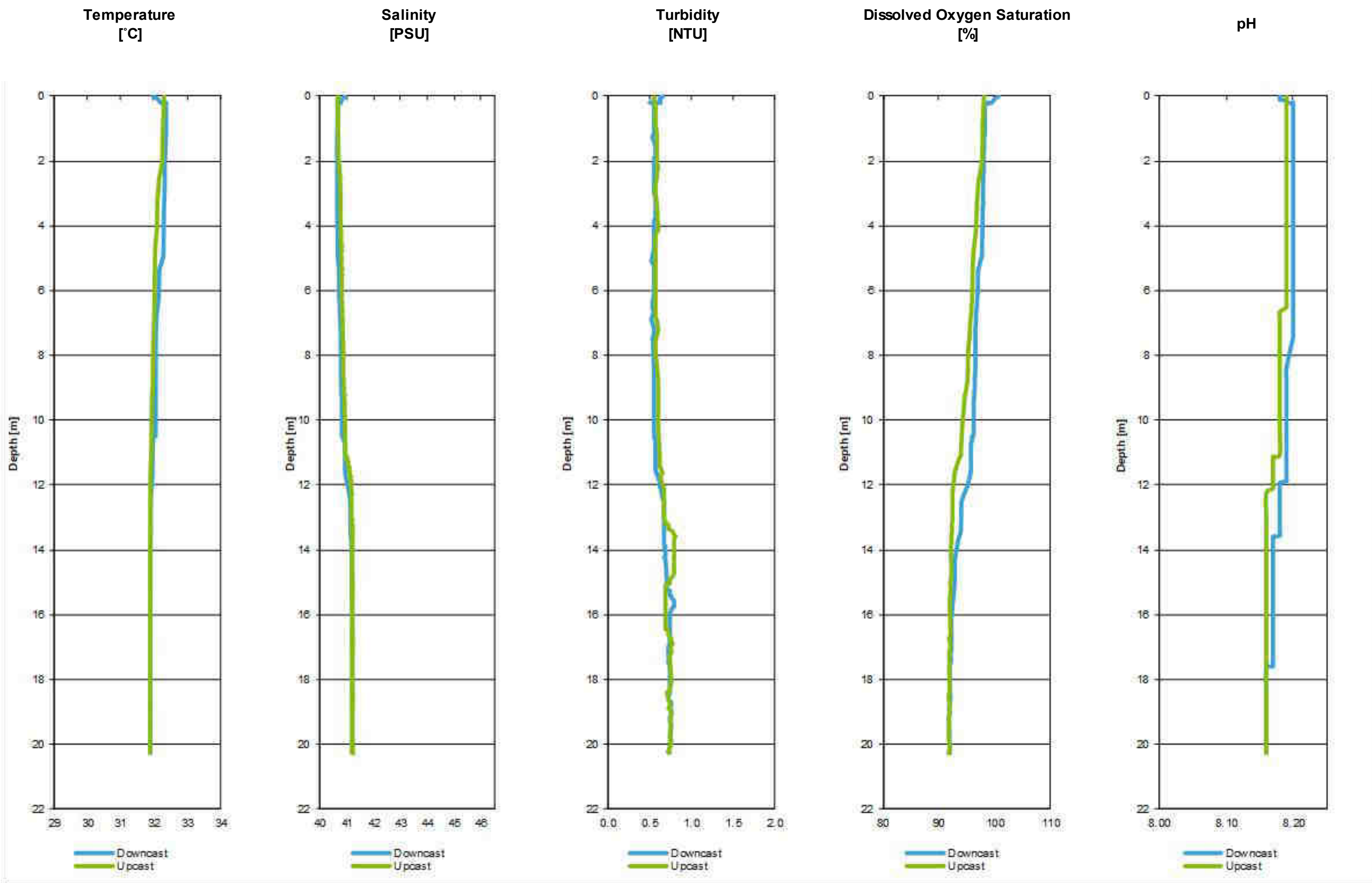
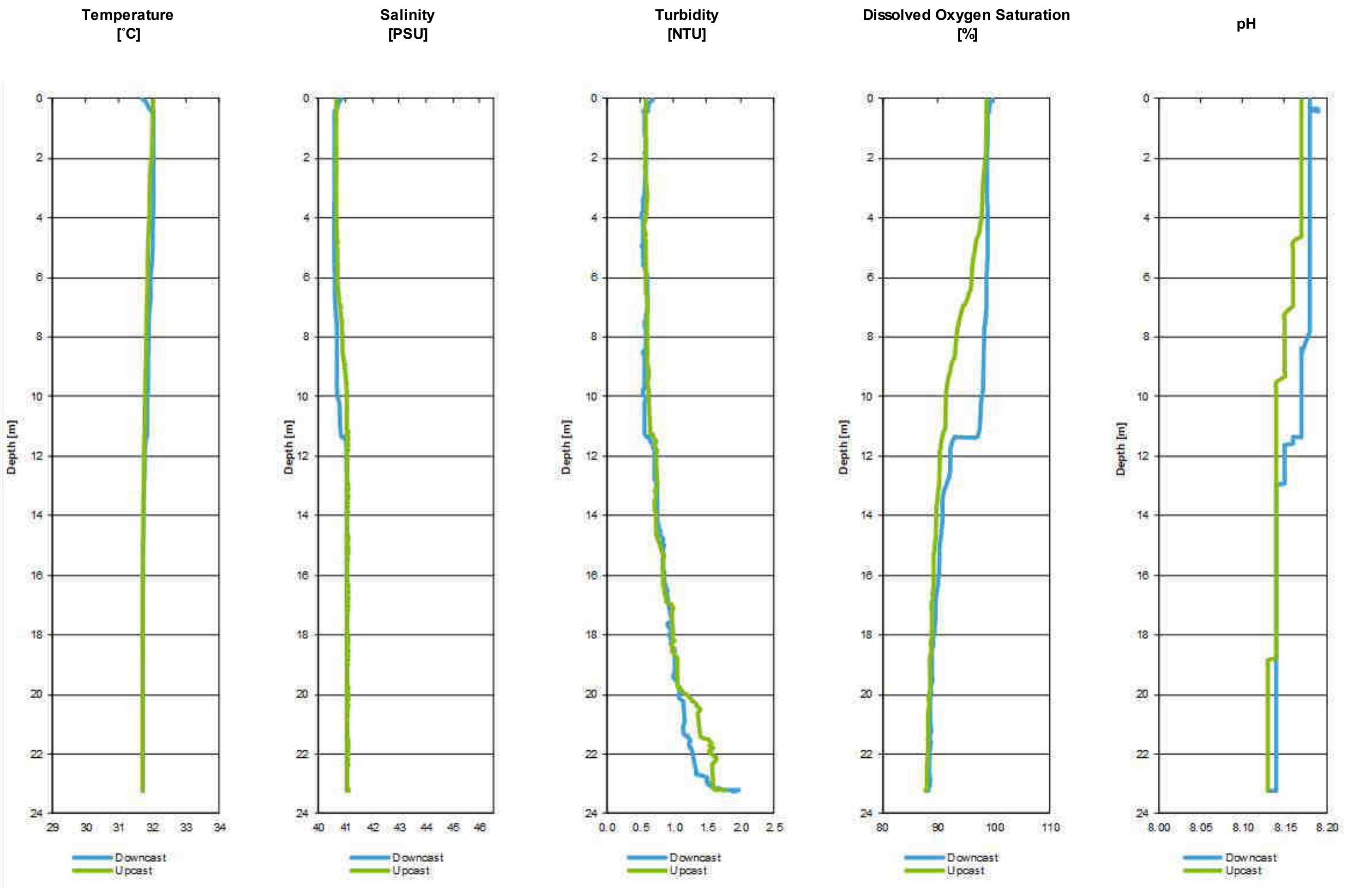
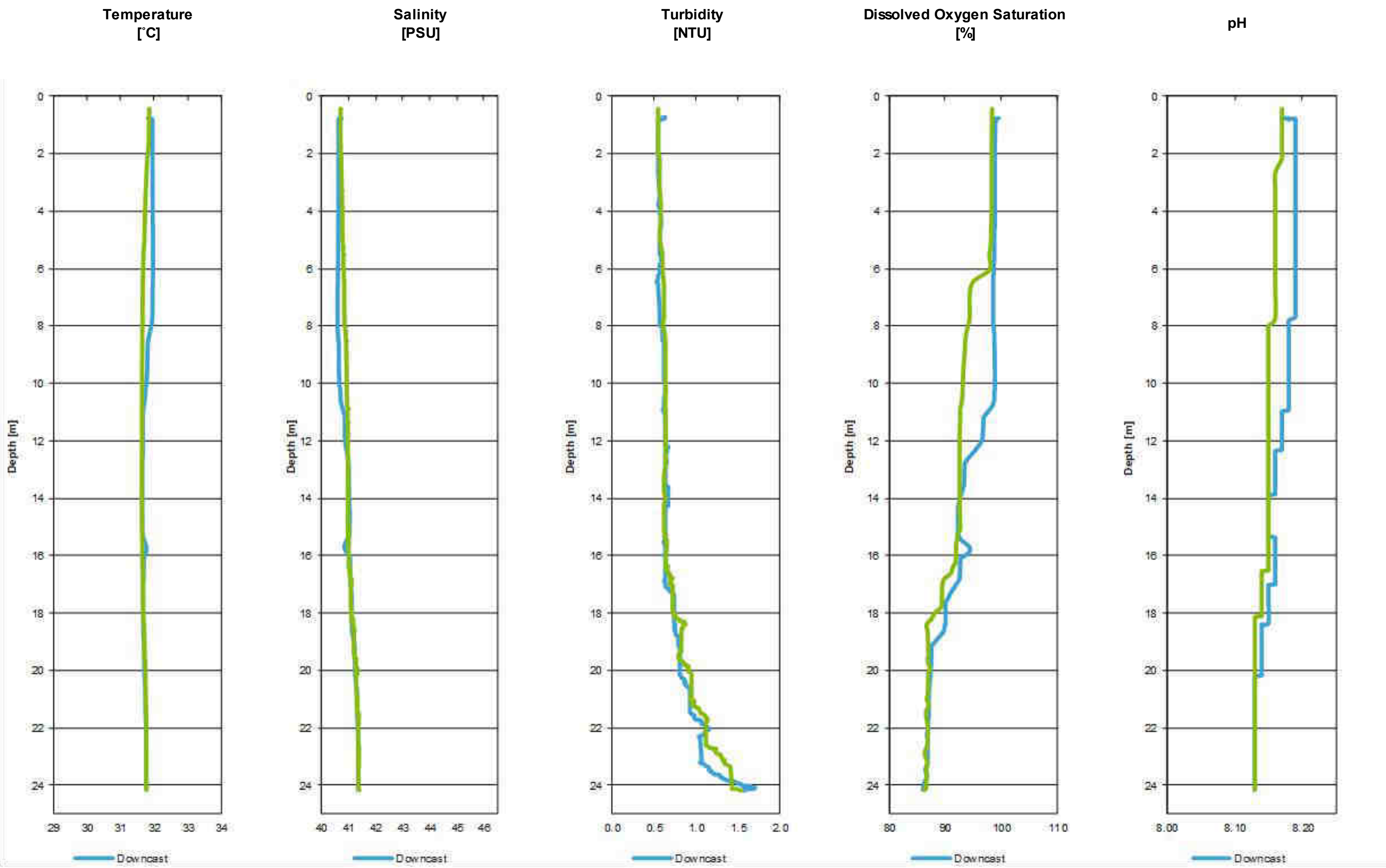


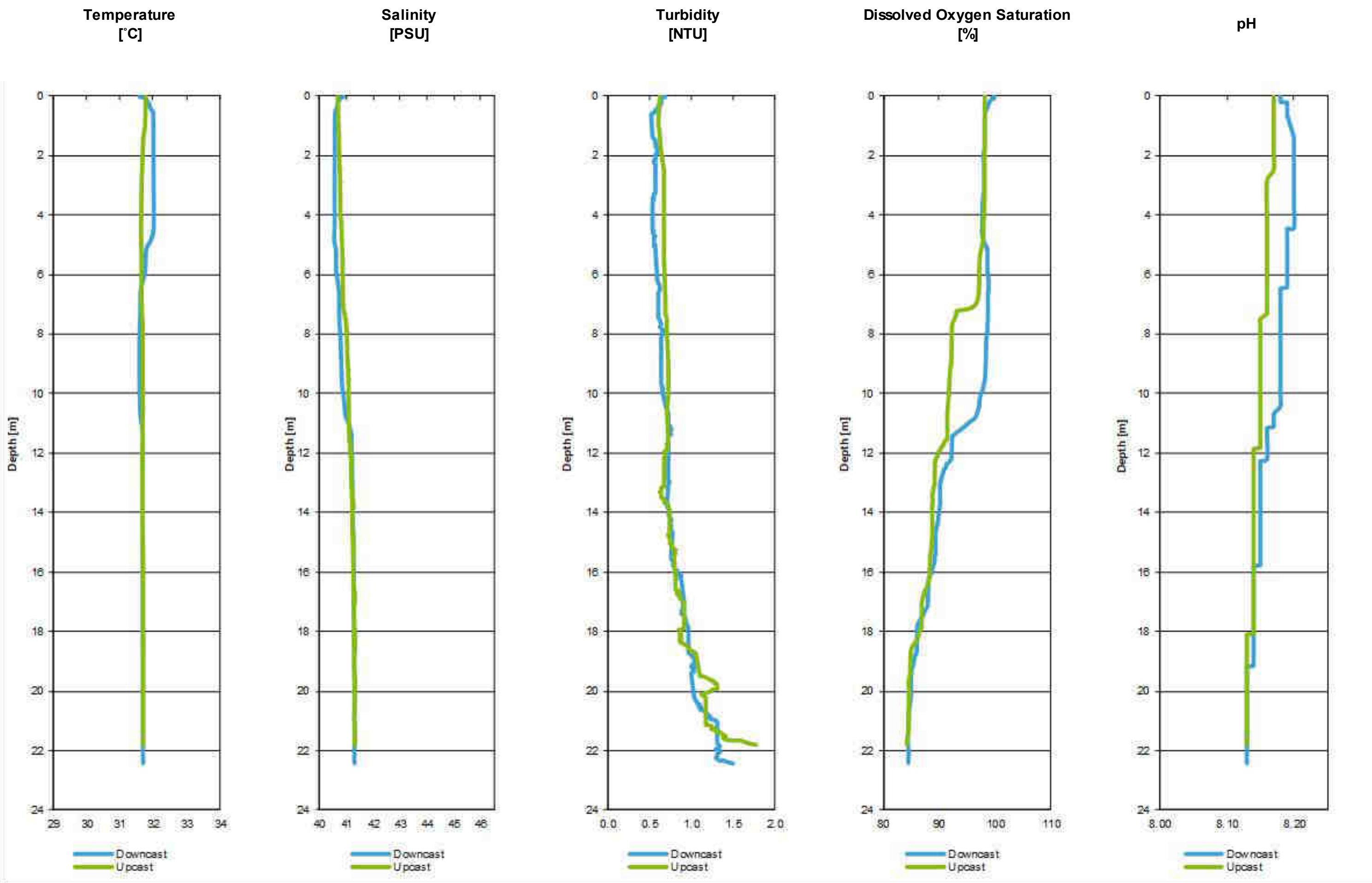
Station R2_ENV_118



Station R2_ENV_119



Station R2_ENV_120



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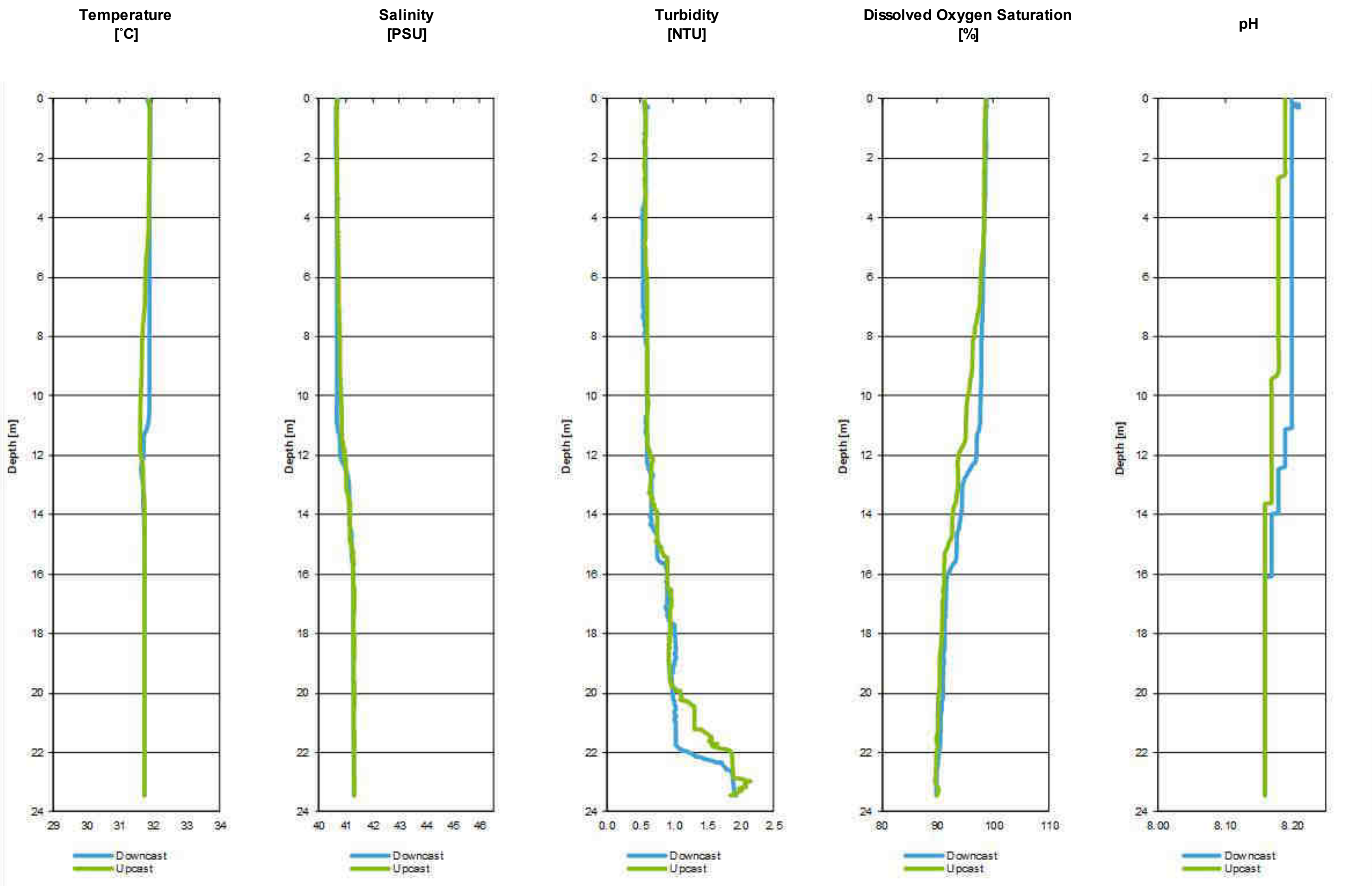
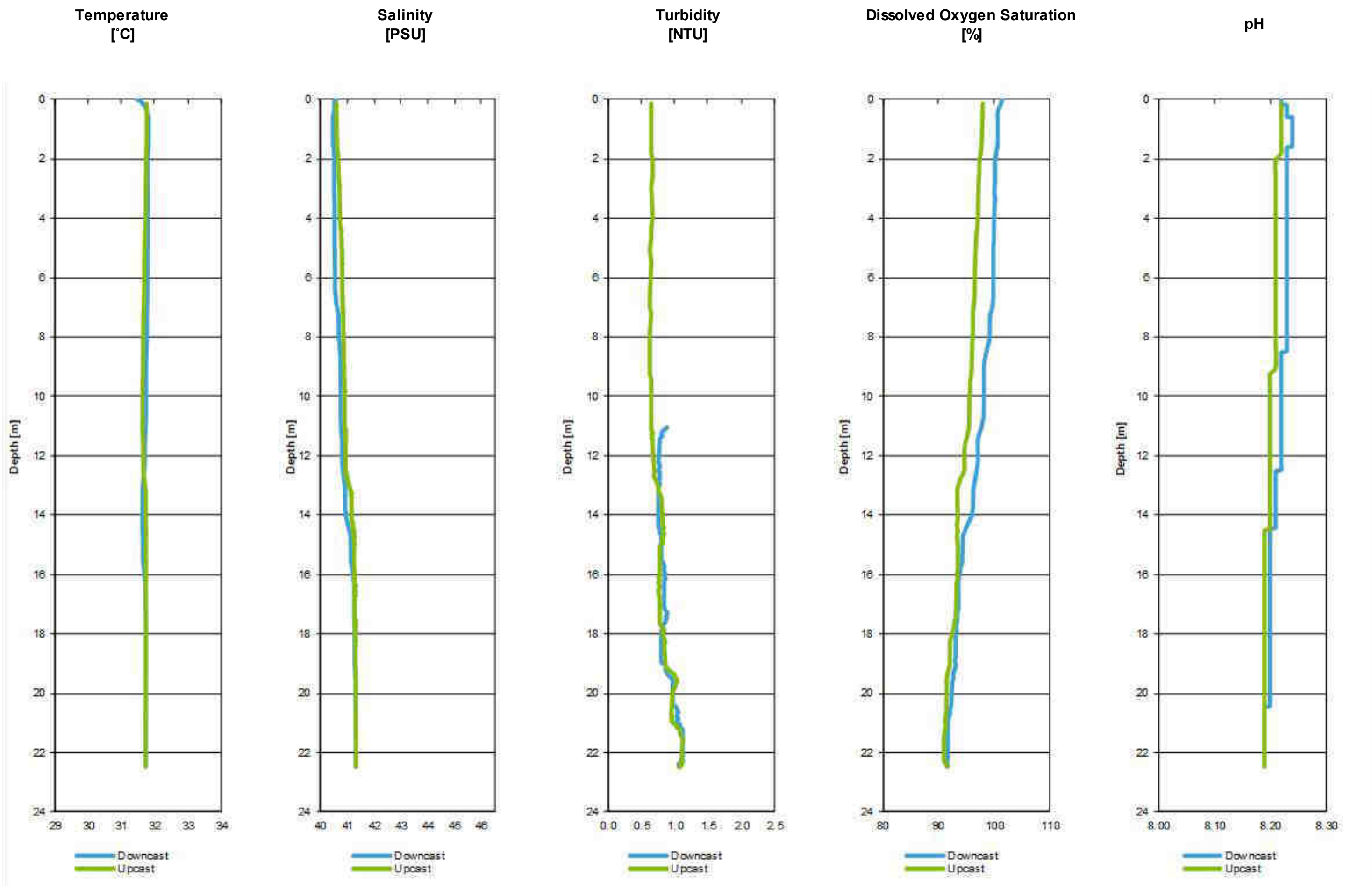


Station R2_ENV_122b



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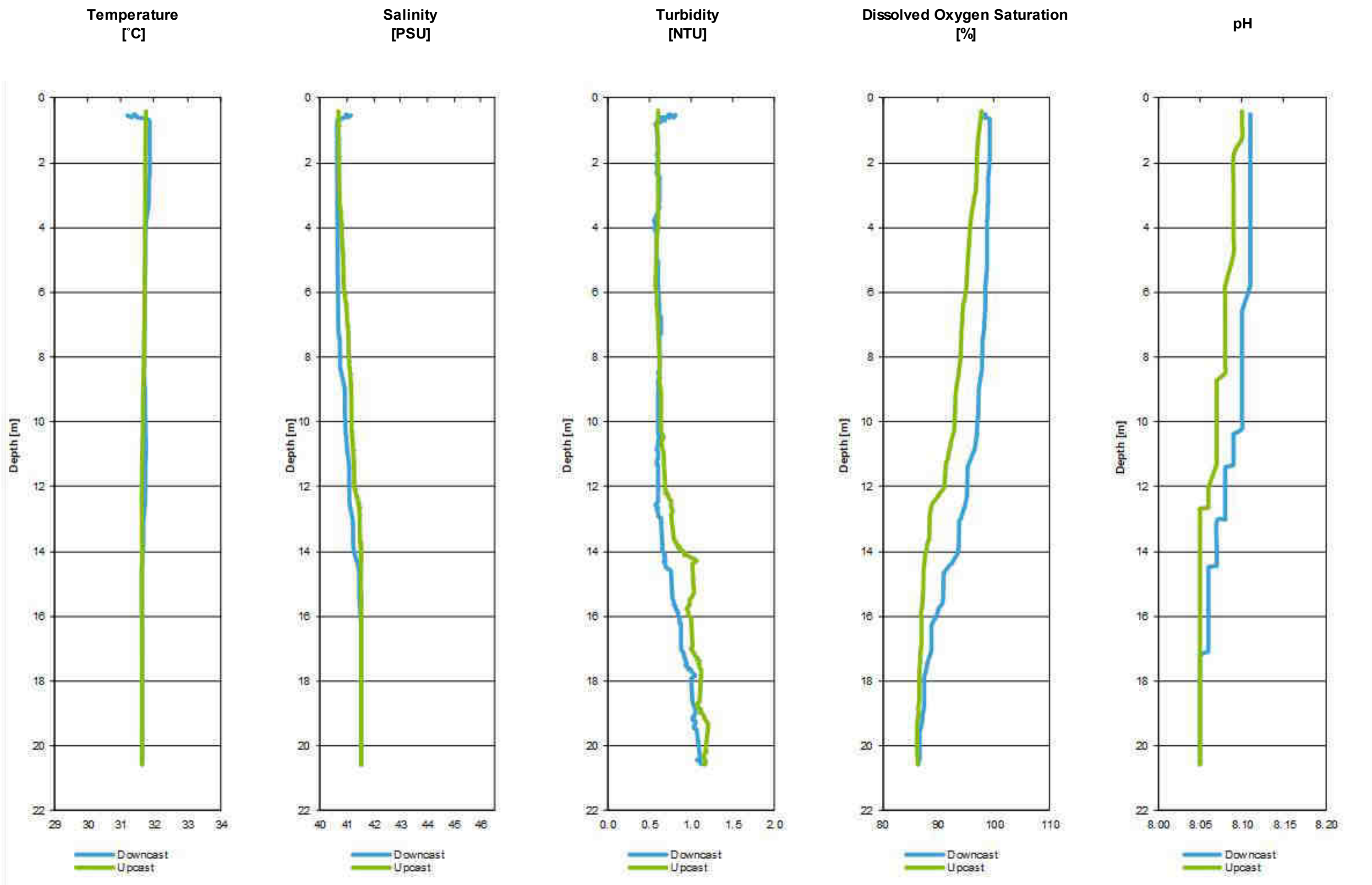
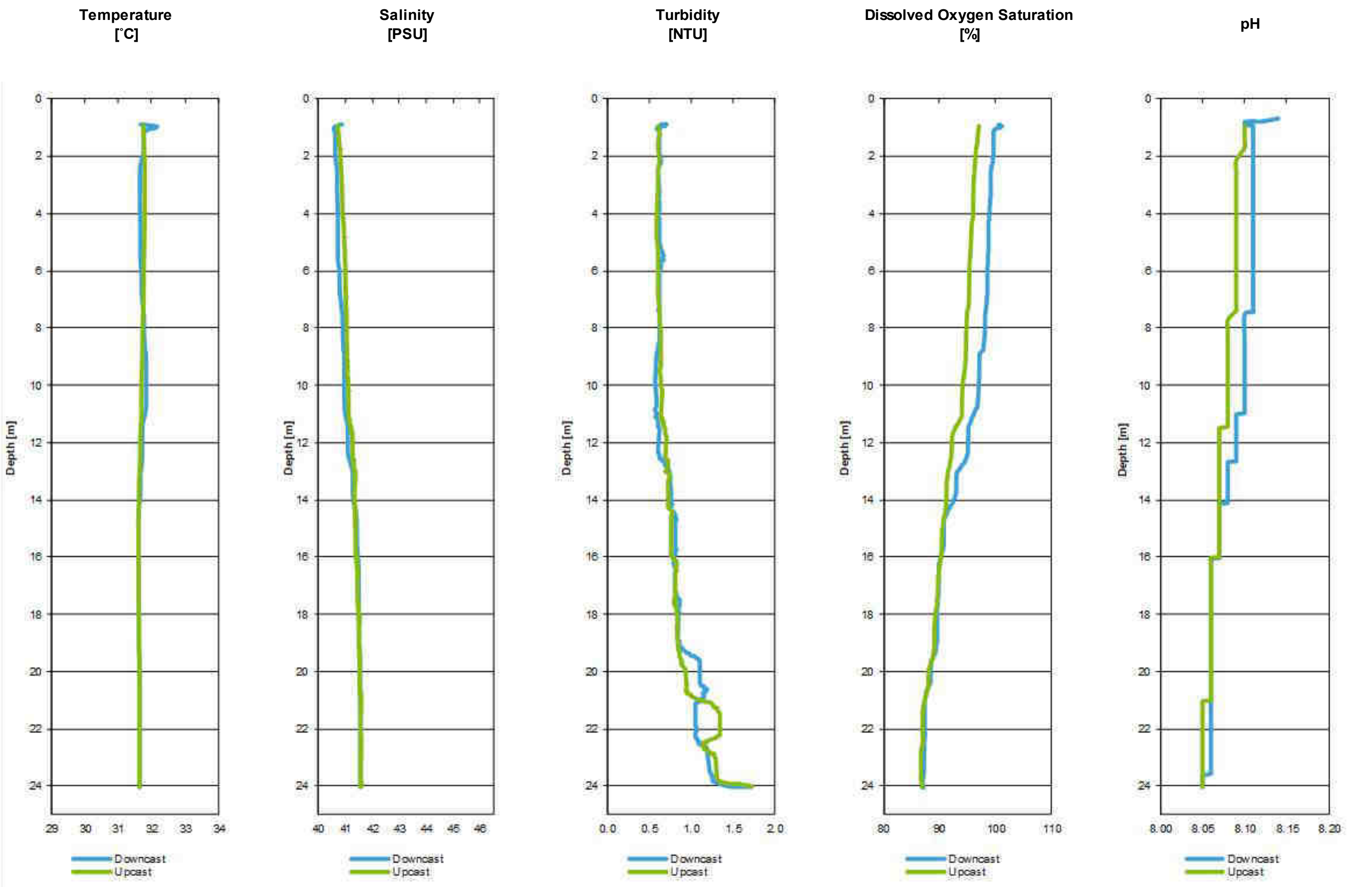


Station R2_ENV_124



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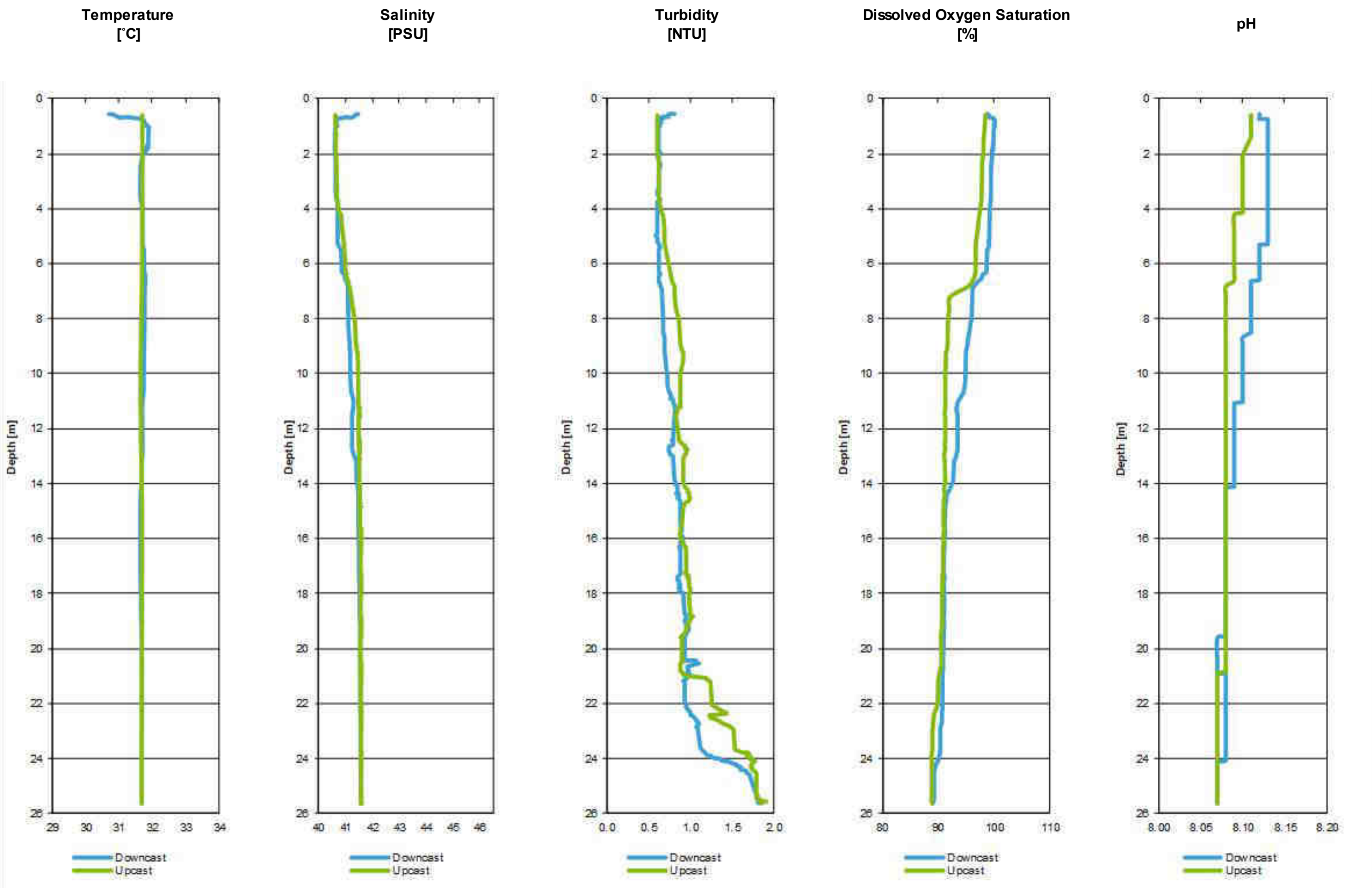
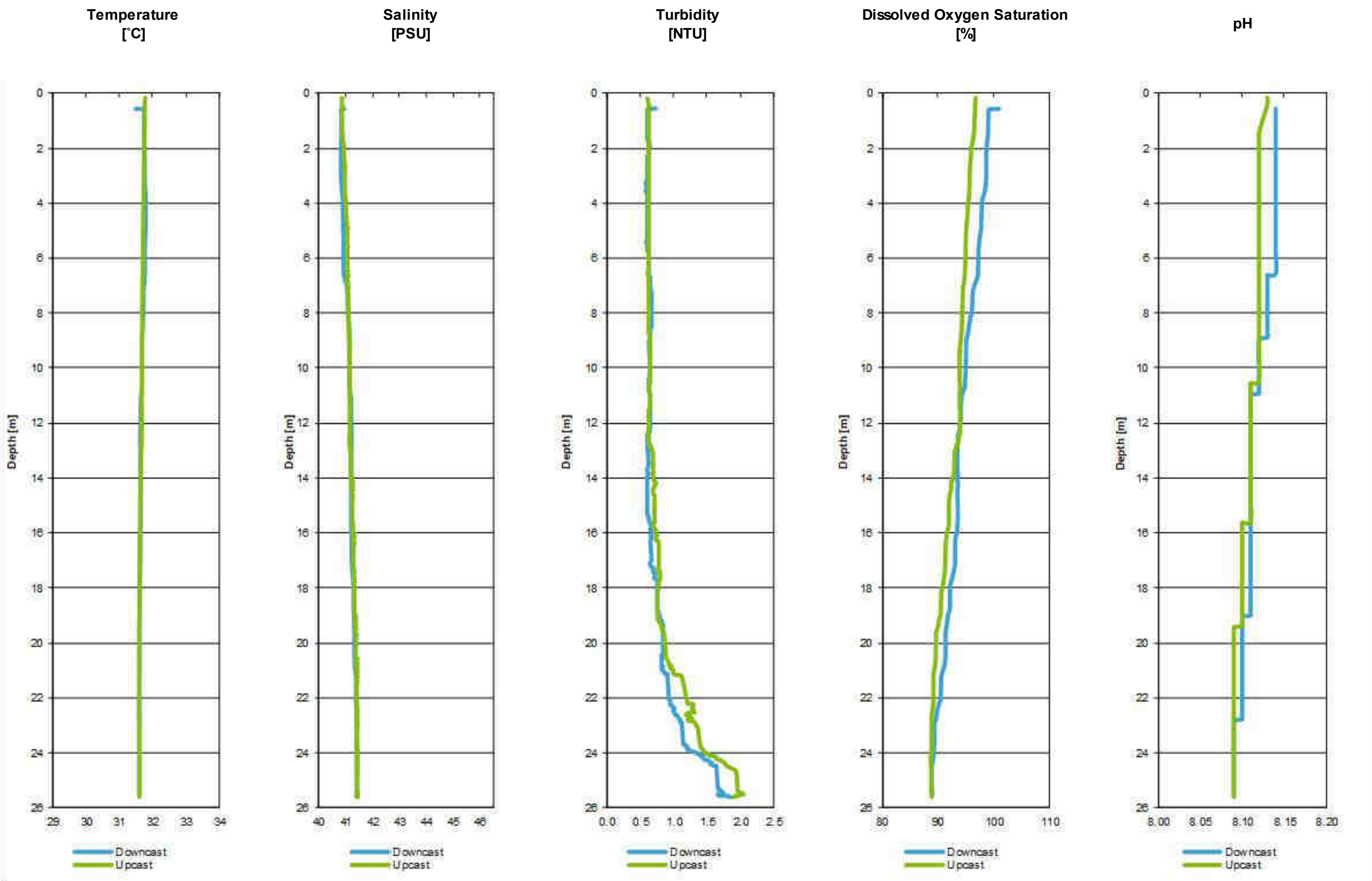
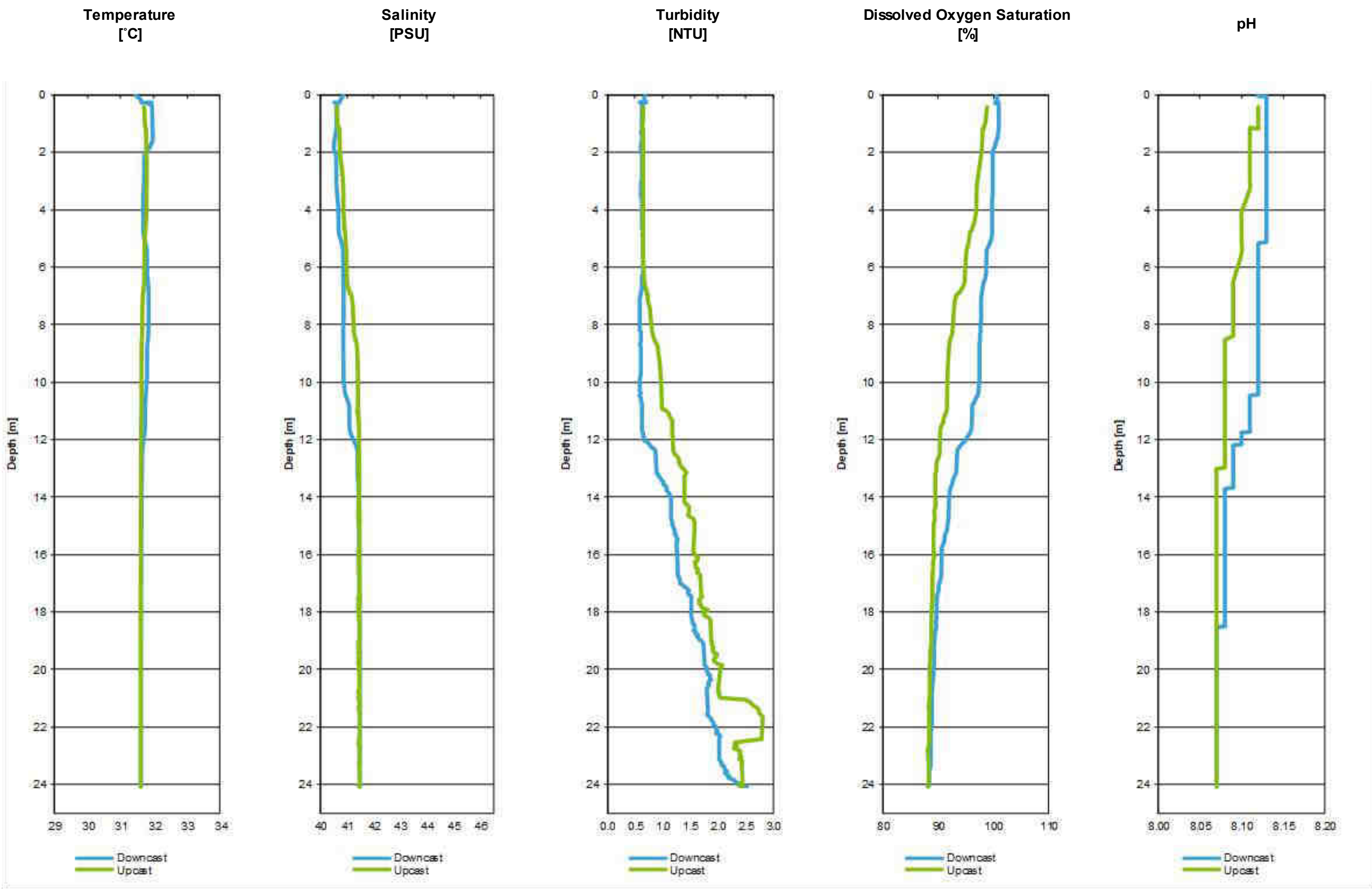


Station R2_ENV_126



Station R2_ENV_127



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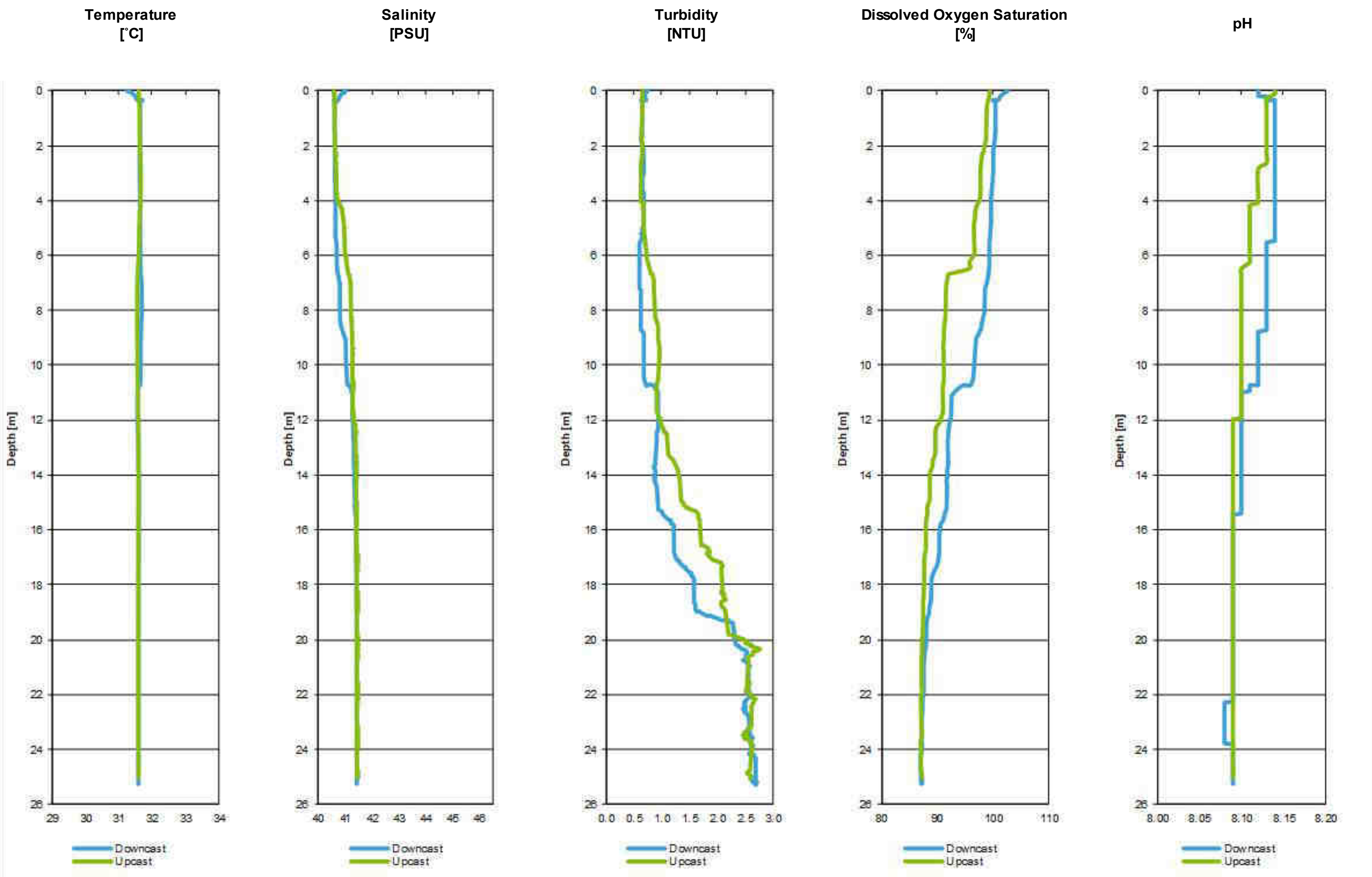

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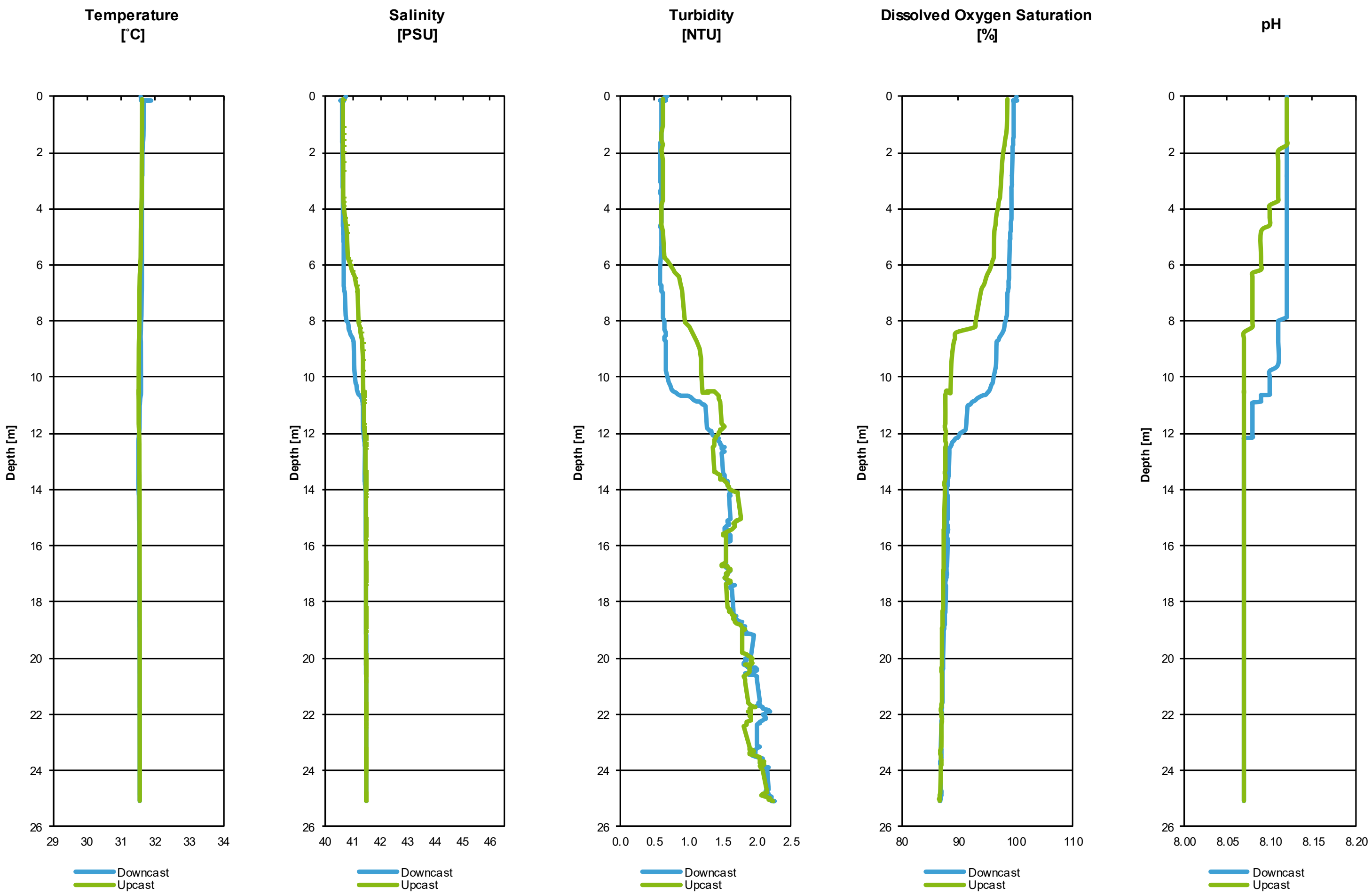

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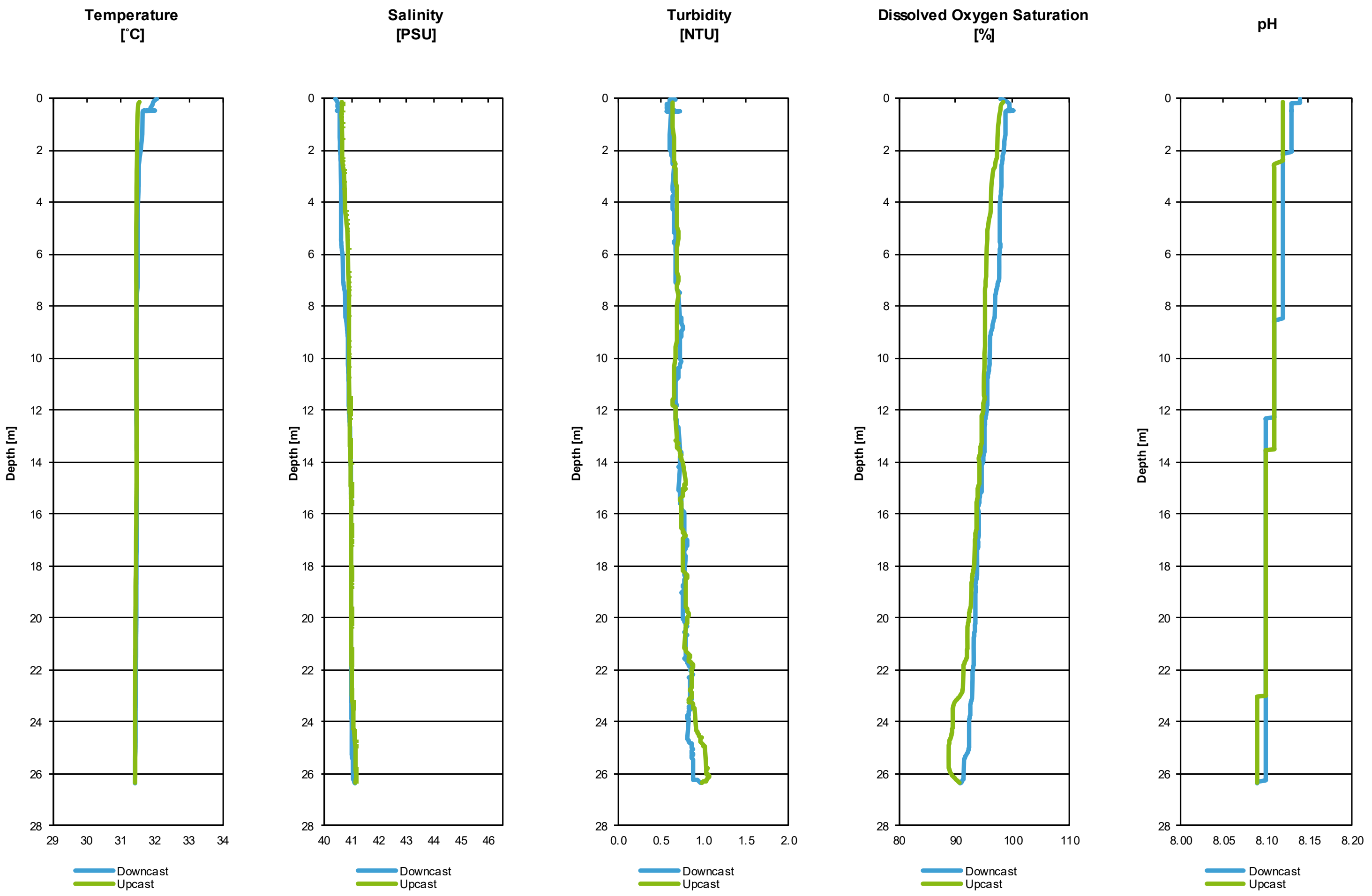

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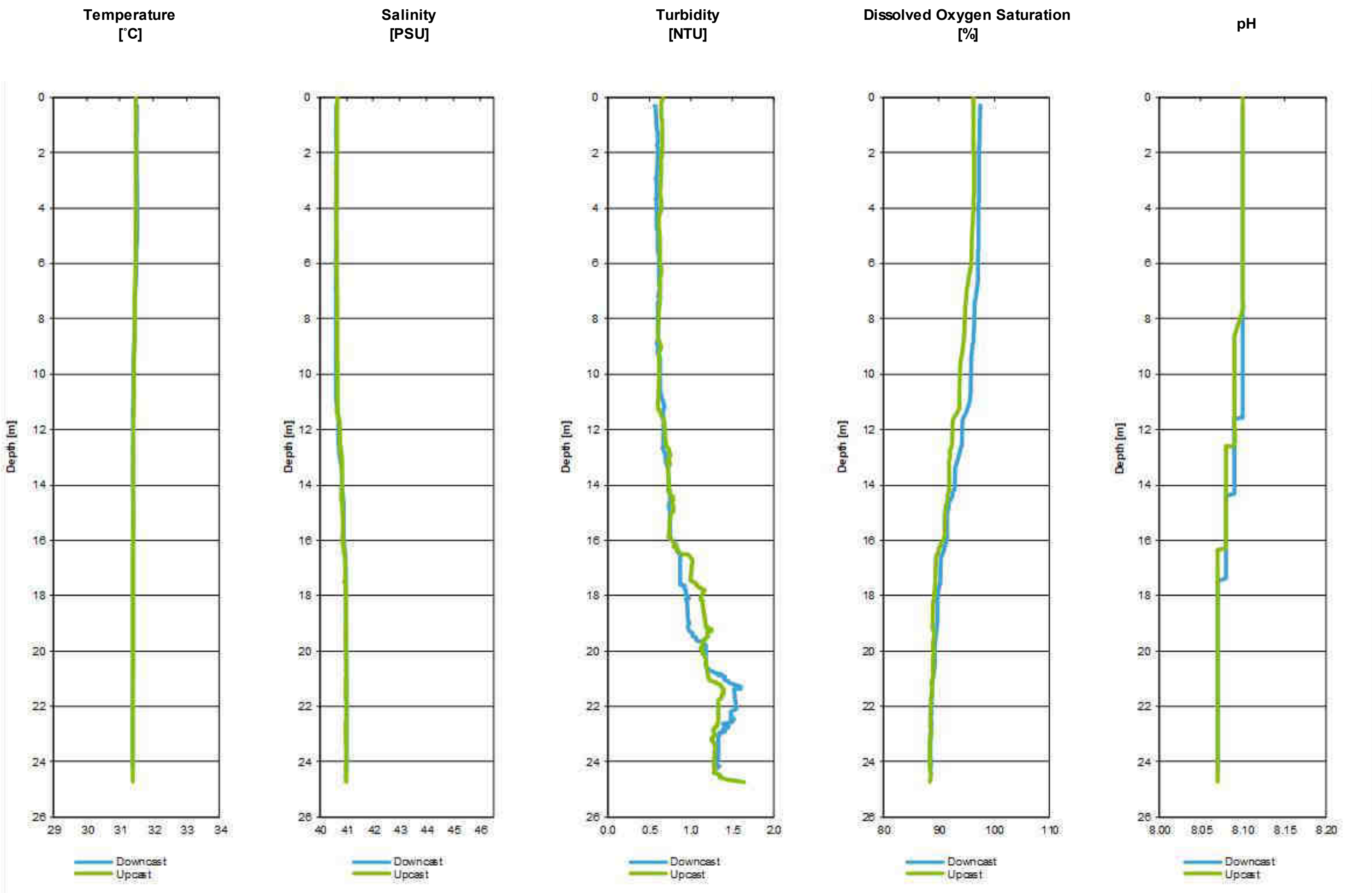

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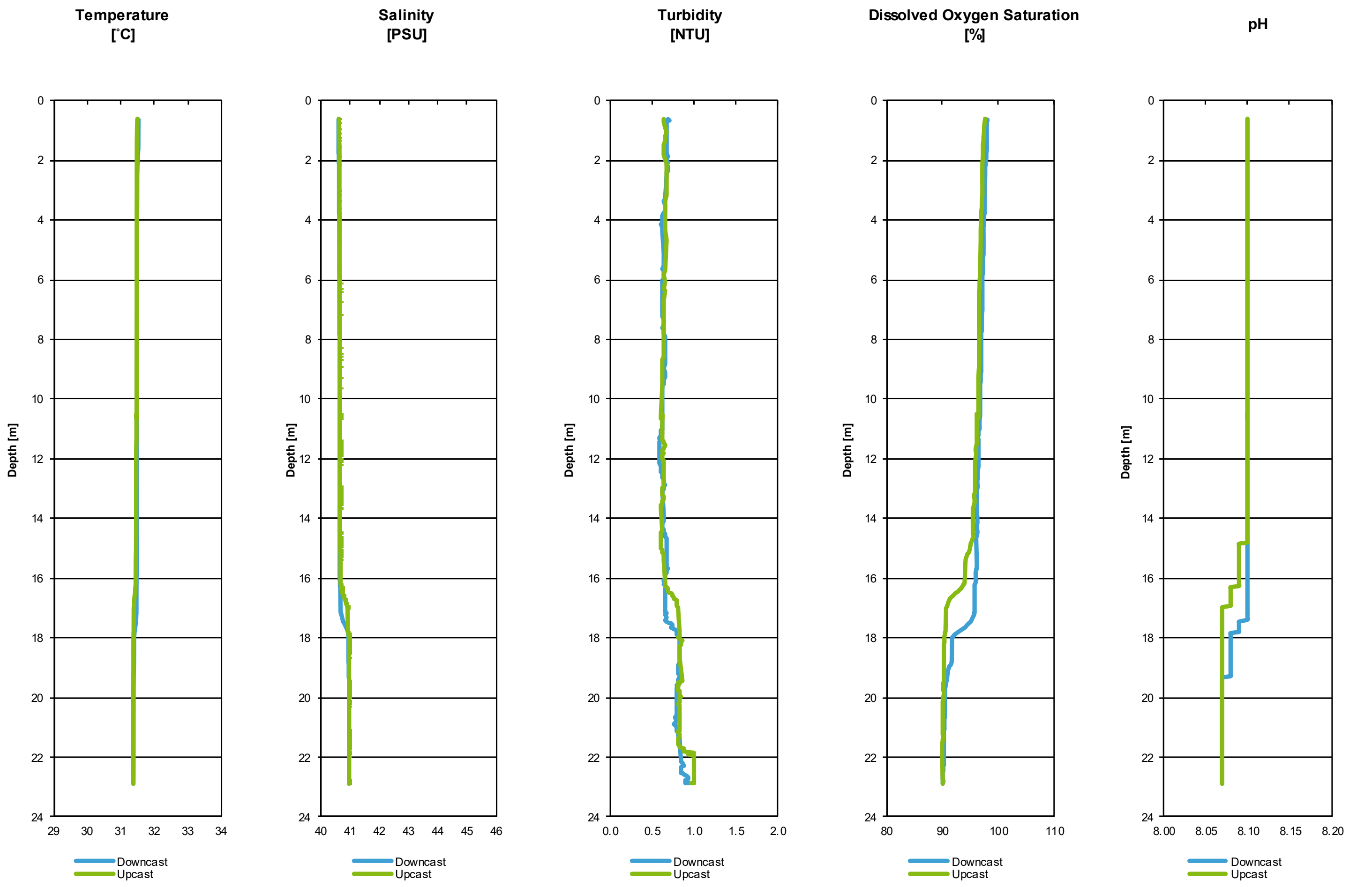

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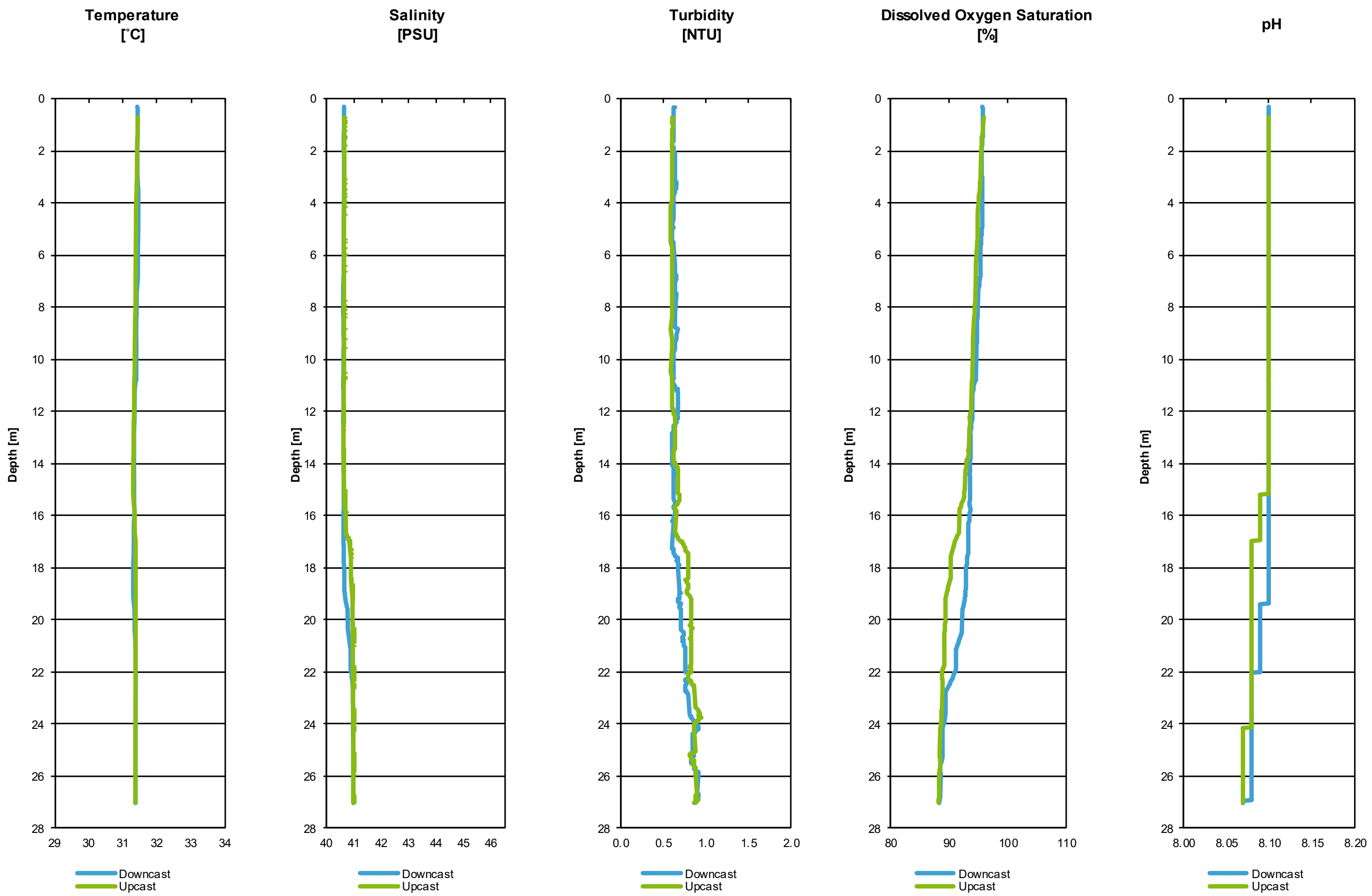

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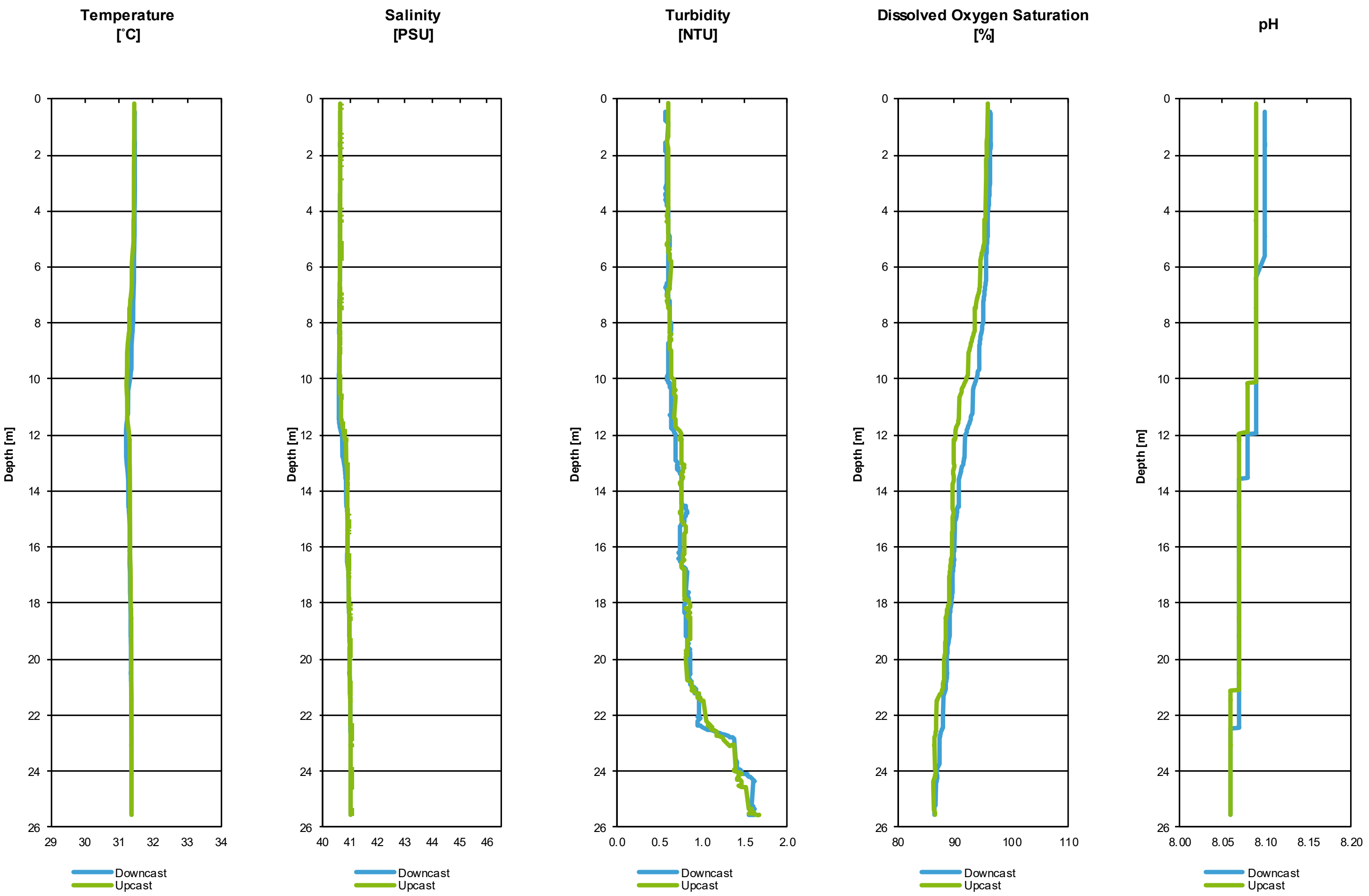

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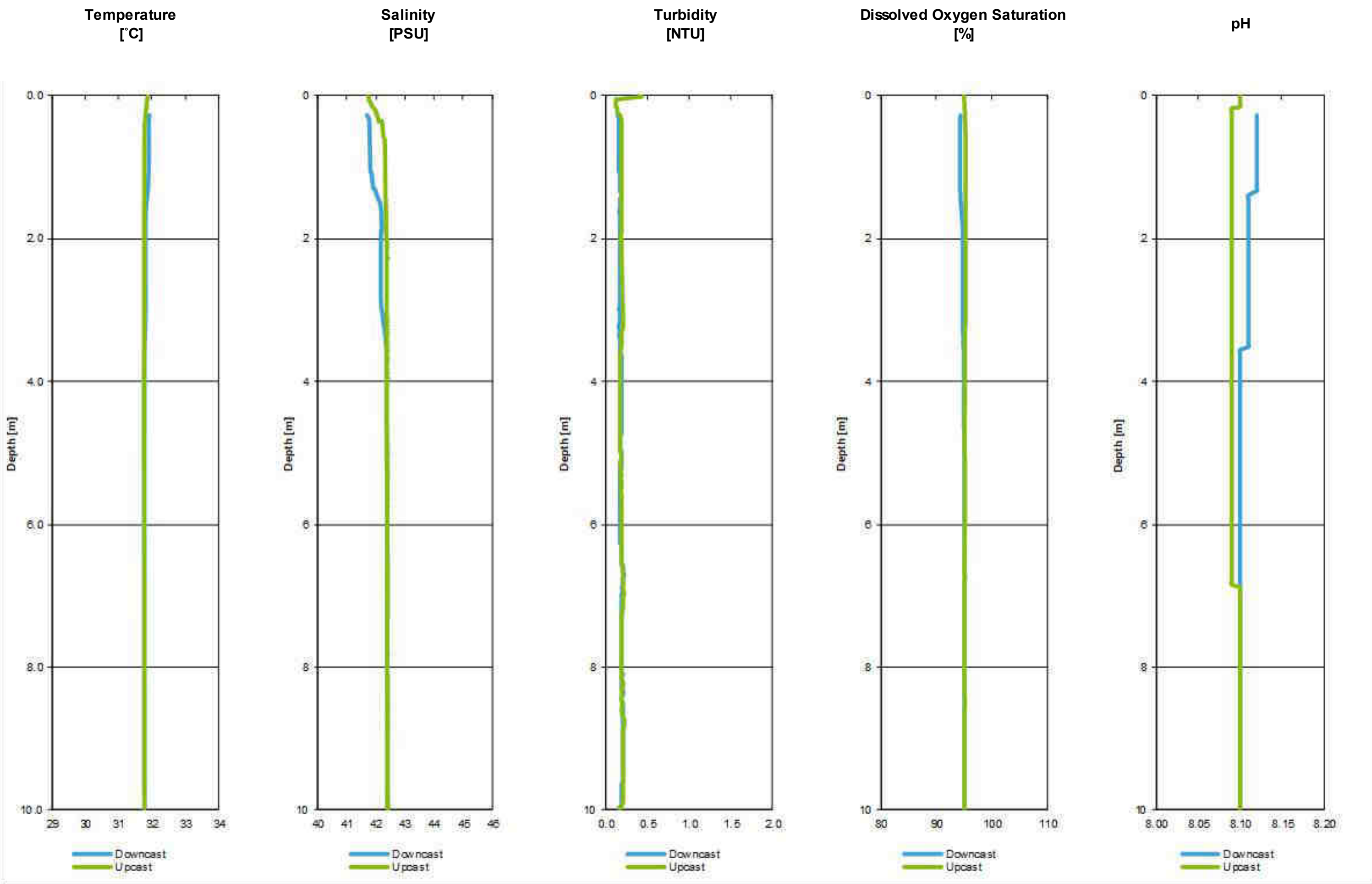


E. Inorganic Water Quality Parameters

E.1 Summary of Water Quality Parameters

Sample	Parameter																			
	pH	Total Suspended Solids [mg/L]	Total Dissolved Solids [mg/L]	Turbidity [NTU]	Nitrogen (Ammonia) [mg/L]	Ammonium [mg/L]	Sulphide [mg/L]	Total Nitrogen [mg/L]	Total Cyanide [mg/L]	Nitrate [mg/L]	Nitrite [mg/L]	Total Phosphorus [mg/L]	Orthophosphate [mg/L]	Sulphate [mg/L]	Chloride [mg/L]	Silicon* [mg/L]	Chemical Oxygen Demand [mg/L]	Total Organic Carbon [mg/L]	Biochemical Oxygen Demand [mg/L]	Total Coliform [CFU/100 mL]
R2_ENV_001-Top	8.2	< 5.0	53800	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3290	26200	< 2.8	< 5	1.5	< 2	ND
R2_ENV_001-Middle	8.2	< 5.0	53500	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3280	25900	< 2.8	< 5	1.6	< 2	ND
R2_ENV_001-Bottom	8.2	< 5.0	53800	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3290	26200	< 2.8	< 5	1.6	< 2	ND
R2_ENV_002-Top	8.2	< 5.0	52000	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3150	26200	< 2.8	< 5	1.6	< 2	ND
R2_ENV_002-Bottom	8.2	< 5.0	52400	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3190	25900	< 2.8	< 5	1.6	< 2	ND
R2_ENV_003-Top	8.2	< 5.0	51800	0.7	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3110	26200	< 2.8	< 5	1.6	< 2	ND
R2_ENV_003-Bottom	8.2	< 5.0	51800	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3140	25900	< 2.8	< 5	1.5	< 2	ND
R2_ENV_004-Top	8.2	< 5.0	51900	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3120	25900	< 2.8	< 5	1.5	< 2	ND
R2_ENV_004-Bottom	8.2	< 5.0	52100	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3220	26200	< 2.8	< 5	1.6	< 2	ND
R2_ENV_005-Top	8.2	< 5.0	51900	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3170	25900	< 2.8	< 5	1.5	< 2	ND
R2_ENV_005-Bottom	8.2	< 5.0	51700	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3230	26200	< 2.8	< 5	1.5	< 2	ND
R2_ENV_006-Top	8.2	< 5.0	52000	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3130	26200	< 2.8	< 5	1.7	< 2	ND
R2_ENV_006-Bottom	8.2	< 5.0	51800	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3180	25900	< 2.8	< 5	1.5	< 2	ND
R2_ENV_007-Top	8.2	< 5.0	51900	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3200	26200	< 2.8	< 5	1.5	< 2	ND
R2_ENV_007-Bottom	8.2	< 5.0	51800	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3160	26600	< 2.8	< 5	1.6	< 2	ND
R2_ENV_008-Top	8.2	< 5.0	53200	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3310	25900	< 2.8	< 5	1.6	< 2	ND
R2_ENV_008-Middle	8.2	< 5.0	53400	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3230	25900	< 2.8	< 5	1.5	< 2	ND
R2_ENV_008-Bottom	8.2	< 5.0	53300	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3260	26200	< 2.8	< 5	1.6	< 2	ND
R2_ENV_009-Top	8.1	< 5.0	50200	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	2980	26600	< 2.8	< 5	1.6	< 2	ND
R2_ENV_009-Middle	7.9	< 5.0	50200	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3200	26900	< 2.8	< 5	1.5	< 2	ND
R2_ENV_009-Bottom	7.9	< 5.0	50300	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3190	26900	< 2.8	< 5	1.7	< 2	ND
R2_ENV_010-Top	8.0	< 5.0	50400	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3140	26600	< 2.8	< 5	1.5	< 2	ND
R2_ENV_010-Middle	8.0	< 5.0	50400	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3520	26200	< 2.8	< 5	1.6	< 2	ND
R2_ENV_010-Bottom	8.0	< 5.0	50500	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3530	26600	< 2.8	< 5	1.7	< 2	ND
R2_ENV_011-Top	8.0	< 5.0	50100	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3450	25900	< 2.8	< 5	1.6	< 2	ND
R2_ENV_011-Middle	8.0	< 5.0	50200	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3550	26200	< 2.8	< 5	1.6	< 2	ND
R2_ENV_011-Bottom	8.1	< 5.0	50400	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3550	26200	< 2.8	< 5	1.7	< 2	ND
R2_ENV_012-Top	8.0	< 5.0	50600	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.08	< 0.016	< 0.03	< 0.060	3490	26200	< 2.8	< 5	1.6	< 2	ND
R2_ENV_012-Middle	8.1	< 5.0	50400	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3430	26200	< 2.8	< 5	1.6	< 2	ND
R2_ENV_012-Bottom	8.0	< 5.0	50200	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3520	25900	< 2.8	< 5	1.6	< 2	ND

Sample	Parameter																			
	pH	Total Suspended Solids [mg/L]	Total Dissolved Solids [mg/L]	Turbidity [NTU]	Nitrogen (Ammonia) [mg/L]	Ammonium [mg/L]	Sulphide [mg/L]	Total Nitrogen [mg/L]	Total Cyanide [mg/L]	Nitrate [mg/L]	Nitrite [mg/L]	Total Phosphorus [mg/L]	Orthophosphate [mg/L]	Sulphate [mg/L]	Chloride [mg/L]	Silicon* [mg/L]	Chemical Oxygen Demand [mg/L]	Total Organic Carbon [mg/L]	Biochemical Oxygen Demand [mg/L]	Total Coliform [CFU/100 mL]
R2_ENV_013-Top	8.0	< 5.0	50300	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3470	25900	< 2.8	< 5	1.5	< 2	ND
R2_ENV_013-Middle	8.0	< 5.0	50000	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.05	< 0.016	< 0.03	< 0.060	3490	26200	< 2.8	< 5	1.7	< 2	ND
R2_ENV_013-Bottom	8.0	< 5.0	50400	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3480	25900	< 2.8	< 5	1.7	< 2	ND
R2_ENV_014-Top	7.9	< 5.0	50200	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3160	26900	< 2.8	< 5	1.5	< 2	ND
R2_ENV_014-Middle	7.9	< 5.0	50200	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.04	< 0.016	< 0.03	< 0.060	3320	26900	< 2.8	< 5	1.5	< 2	ND
R2_ENV_014-Bottom	8.0	< 5.0	50500	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3230	26900	< 2.8	< 5	1.5	< 2	ND
R2_ENV_015-Top	8.1	< 5.0	49800	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3360	25500	< 2.8	< 5	1.6	< 2	ND
R2_ENV_015-Middle	8.0	< 5.0	50100	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3550	26200	< 2.8	< 5	1.6	< 2	ND
R2_ENV_015-Bottom	8.0	< 5.0	49900	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3540	26200	< 2.8	< 5	1.6	< 2	ND
R2_ENV_016-Top	8.0	< 5.0	50000	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3220	26600	< 2.8	< 5	1.5	< 2	ND
R2_ENV_016-Middle	7.9	< 5.0	50000	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.09	< 0.016	< 0.03	< 0.060	3260	26600	< 2.8	< 5	1.5	< 2	ND
R2_ENV_016-Bottom	8.0	< 5.0	50500	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.09	< 0.016	< 0.03	< 0.060	3230	26600	< 2.8	< 5	1.7	< 2	ND
R2_ENV_017-Top	8.0	< 5.0	49800	0.3	< 0.06	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3140	26600	< 2.8	< 5	1.6	< 2	ND
R2_ENV_017-Middle	8.1	< 5.0	50600	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3270	26900	< 2.8	< 5	1.4	< 2	ND
R2_ENV_017-Bottom	8.0	< 5.0	50400	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3300	26600	< 2.8	< 5	1.4	< 2	ND
R2_ENV_018-Top	8.0	< 5.0	49900	< 0.1	< 0.09	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3350	26900	< 2.8	< 5	1.4	< 2	ND
R2_ENV_018-Middle	8.0	< 5.0	50600	0.3	< 0.08	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3330	26900	< 2.8	< 5	1.5	< 2	ND
R2_ENV_018-Bottom	8.0	< 5.0	50300	0.7	< 0.07	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3230	26600	< 2.8	< 5	1.4	< 2	ND
R2_ENV_019-Top	8.0	< 5.0	49900	< 0.1	< 0.12	< 0.064	< 0.005	< 0.5	< 0.01	0.12	< 0.016	< 0.03	< 0.060	3100	26900	< 2.8	< 5	1.5	< 2	ND
R2_ENV_019-Middle	8.0	< 5.0	49900	< 0.1	< 0.11	< 0.064	< 0.005	< 0.5	< 0.01	0.09	< 0.016	< 0.03	< 0.060	3320	26900	< 2.8	< 5	1.5	< 2	ND
R2_ENV_019-Bottom	7.9	< 5.0	50300	0.2	< 0.10	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3350	26600	< 2.8	< 5	1.5	< 2	ND
R2_ENV_020-Top	8.1	< 5.0	49800	< 0.1	< 0.15	< 0.064	< 0.005	< 0.5	< 0.01	0.15	< 0.016	< 0.03	< 0.060	3320	26200	< 2.8	< 5	1.6	< 2	ND
R2_ENV_020-Middle	8.1	< 5.0	49900	0.3	< 0.14	< 0.064	< 0.005	< 0.5	< 0.01	0.15	< 0.016	< 0.03	< 0.060	3260	26200	< 2.8	< 5	1.5	< 2	ND
R2_ENV_020-Bottom	8.1	< 5.0	50200	0.2	< 0.13	< 0.064	< 0.005	< 0.5	< 0.01	0.14	< 0.016	< 0.03	< 0.060	3290	26600	< 2.8	< 5	1.5	< 2	ND
R2_ENV_021-Top	7.9	< 5.0	49800	< 0.1	< 0.18	< 0.064	< 0.005	< 0.5	< 0.01	0.07	< 0.016	< 0.03	< 0.060	3390	26200	< 2.8	< 5	1.5	< 2	ND
R2_ENV_021-Middle	8.0	< 5.0	49600	< 0.1	< 0.17	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3350	26200	< 2.8	< 5	1.4	< 2	ND
R2_ENV_021-Bottom	8.0	< 5.0	49800	< 0.1	< 0.16	< 0.064	< 0.005	< 0.5	< 0.01	0.05	< 0.016	< 0.03	< 0.060	3250	26600	< 2.8	< 5	1.5	< 2	ND
R2_ENV_022-Top	8.1	< 5.0	50000	< 0.1	< 0.21	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3280	26200	< 2.8	< 5	1.5	< 2	ND
R2_ENV_022-Middle	8.0	< 5.0	49600	< 0.1	< 0.20	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3290	26200	< 2.8	< 5	1.5	< 2	ND
R2_ENV_022-Bottom	8.0	< 5.0	50000	0.3	< 0.19	< 0.064	< 0.005	< 0.5	< 0.01	0.07	< 0.016	< 0.03	< 0.060	3270	26200	< 2.8	< 5	1.5	< 2	ND

Sample	Parameter																			
	pH	Total Suspended Solids [mg/L]	Total Dissolved Solids [mg/L]	Turbidity [NTU]	Nitrogen (Ammonia) [mg/L]	Ammonium [mg/L]	Sulphide [mg/L]	Total Nitrogen [mg/L]	Total Cyanide [mg/L]	Nitrate [mg/L]	Nitrite [mg/L]	Total Phosphorus [mg/L]	Orthophosphate [mg/L]	Sulphate [mg/L]	Chloride [mg/L]	Silicon* [mg/L]	Chemical Oxygen Demand [mg/L]	Total Organic Carbon [mg/L]	Biochemical Oxygen Demand [mg/L]	Total Coliform [CFU/100 mL]
R2_ENV_023-Top	8.1	< 5.0	50300	0.6	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3500	25900	< 2.8	< 5	1.5	< 2	ND
R2_ENV_023-Middle	8.0	< 5.0	50100	0.7	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3500	25900	< 2.8	< 5	1.6	< 2	ND
R2_ENV_023-Bottom	8.0	< 5.0	49700	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3370	25500	< 2.8	< 5	1.5	< 2	ND
R2_ENV_024-Top	8.0	< 5.0	49900	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3450	25200	< 2.8	< 5	1.5	< 2	ND
R2_ENV_024-Middle	8.0	< 5.0	50100	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3460	25500	< 2.8	< 5	1.5	< 2	ND
R2_ENV_024-Bottom	8.0	< 5.0	49900	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3430	25500	< 2.8	< 5	1.5	< 2	ND
R2_ENV_025-Top	8.1	< 5.0	50300	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3480	25500	< 2.8	< 5	1.8	< 2	ND
R2_ENV_025-Middle	8.1	< 5.0	49800	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3520	25200	< 2.8	< 5	1.5	< 2	ND
R2_ENV_025-Bottom	8.0	< 5.0	50200	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3440	25500	< 2.8	< 5	1.7	< 2	ND
R2_ENV_026-Top	8.0	< 5.0	50000	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3450	25200	< 2.8	< 5	1.5	< 2	ND
R2_ENV_026-Middle	8.1	< 5.0	49900	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3480	25200	< 2.8	< 5	1.7	< 2	ND
R2_ENV_026-Bottom	8.0	< 5.0	49800	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3410	25500	< 2.8	< 5	1.7	< 2	ND
R2_ENV_027-Top	8.0	< 5.0	49900	0.6	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3480	25500	< 2.8	< 5	1.7	< 2	ND
R2_ENV_027-Middle	8.0	< 5.0	50200	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.05	< 0.016	< 0.03	< 0.060	3480	25900	< 2.8	< 5	1.6	< 2	ND
R2_ENV_027-Bottom	8.0	< 5.0	49800	0.6	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3440	25200	< 2.8	< 5	1.7	< 2	ND
R2_ENV_028-Top	8.1	< 5.0	49900	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3510	25500	< 2.8	< 5	1.6	< 2	ND
R2_ENV_028-Middle	8.0	< 5.0	49800	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3520	25900	< 2.8	< 5	1.6	< 2	ND
R2_ENV_028-Bottom	8.0	< 5.0	50000	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.33	< 0.016	< 0.03	< 0.060	3580	25500	< 2.8	< 5	1.6	< 2	ND
R2_ENV_029-Top	7.9	< 5.0	50200	0.7	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3460	25500	< 2.8	< 5	1.7	< 2	ND
R2_ENV_029-Middle	8.0	< 5.0	49800	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3490	25200	< 2.8	< 5	1.6	< 2	ND
R2_ENV_029-Bottom	8.1	< 5.0	50000	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3460	25500	< 2.8	< 5	1.6	< 2	ND
R2_ENV_030-Top	8.0	< 5.0	50000	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3490	25500	< 2.8	< 5	1.7	< 2	ND
R2_ENV_030-Middle	7.9	< 5.0	49800	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3460	25200	< 2.8	< 5	1.8	< 2	ND
R2_ENV_030-Bottom	8.0	< 5.0	50200	0.7	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3440	25500	< 2.8	< 5	1.8	< 2	ND
R2_ENV_031-Top	8.0	< 5.0	49700	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3430	26600	< 2.8	< 5	1.4	< 2	ND
R2_ENV_031-Middle	8.0	< 5.0	50000	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3500	26900	< 2.8	< 5	1.5	< 2	ND
R2_ENV_031-Bottom	8.0	< 5.0	50000	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3440	26900	< 2.8	< 5	1.6	< 2	ND
R2_ENV_032-Top	8.0	< 5.0	49500	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3480	26200	< 2.8	< 5	1.4	< 2	ND
R2_ENV_032-Middle	8.0	< 5.0	49900	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3460	27300	< 2.8	< 5	1.5	< 2	ND
R2_ENV_032-Bottom	8.0	< 5.0	49700	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3490	27300	< 2.8	< 5	1.5	< 2	ND

Sample	Parameter																			
	pH	Total Suspended Solids [mg/L]	Total Dissolved Solids [mg/L]	Turbidity [NTU]	Nitrogen (Ammonia) [mg/L]	Ammonium [mg/L]	Sulphide [mg/L]	Total Nitrogen [mg/L]	Total Cyanide [mg/L]	Nitrate [mg/L]	Nitrite [mg/L]	Total Phosphorus [mg/L]	Orthophosphate [mg/L]	Sulphate [mg/L]	Chloride [mg/L]	Silicon* [mg/L]	Chemical Oxygen Demand [mg/L]	Total Organic Carbon [mg/L]	Biochemical Oxygen Demand [mg/L]	Total Coliform [CFU/100 mL]
R2_ENV_033-Top	8.1	< 5.0	49800	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3410	26600	< 2.8	< 5	1.5	< 2	ND
R2_ENV_033-Middle	8.1	< 5.0	49700	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3470	26900	< 2.8	< 5	1.5	< 2	ND
R2_ENV_033-Bottom	8.1	< 5.0	49900	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.04	< 0.016	< 0.03	< 0.060	3470	26900	< 2.8	< 5	1.5	< 2	ND
R2_ENV_034-Top	8.0	< 5.0	49700	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3430	27700	< 2.8	< 5	1.5	< 2	ND
R2_ENV_034-Middle	8.0	< 5.0	49400	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3560	27300	< 2.8	< 5	1.5	< 2	ND
R2_ENV_034-Bottom	8.0	< 5.0	49500	0.6	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.04	< 0.016	< 0.03	< 0.060	3500	27300	< 2.8	< 5	1.5	< 2	ND
R2_ENV_035-Top	8.0	< 5.0	49700	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3360	26900	< 2.8	< 5	1.4	< 2	ND
R2_ENV_035-Middle	8.0	< 5.0	49500	0.7	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3370	27300	< 2.8	< 5	1.4	< 2	ND
R2_ENV_035-Bottom	8.1	< 5.0	50000	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.07	< 0.016	< 0.03	< 0.060	3380	27000	< 2.8	< 5	1.6	< 2	ND
R2_ENV_036-Top	8.1	< 5.0	49500	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3300	26900	< 2.8	< 5	1.5	< 2	ND
R2_ENV_036-Middle	8.0	< 5.0	49600	0.7	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3290	26600	< 2.8	< 5	1.5	< 2	ND
R2_ENV_036-Bottom	8.0	< 5.0	49900	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3400	27300	< 2.8	< 5	1.5	< 2	ND
R2_ENV_037-Top	8.0	< 5.0	49500	0.6	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3390	26200	< 2.8	< 5	1.6	< 2	ND
R2_ENV_037-Middle	8.0	< 5.0	49600	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3320	26600	< 2.8	< 5	1.5	< 2	ND
R2_ENV_037-Bottom	8.0	< 5.0	49800	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3440	26900	< 2.8	< 5	1.5	< 2	ND
R2_ENV_038-Top	8.0	< 5.0	49800	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3480	26600	< 2.8	< 5	1.5	< 2	ND
R2_ENV_038-Middle	8.0	< 5.0	50100	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3300	26900	< 2.8	< 5	1.5	< 2	ND
R2_ENV_038-Bottom	8.1	< 5.0	49700	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3390	26900	< 2.8	< 5	1.5	< 2	ND
R2_ENV_039-Top	8.0	< 5.0	49900	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3380	27300	< 2.8	< 5	1.5	< 2	ND
R2_ENV_039-Middle	7.9	< 5.0	49800	0.7	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3510	26900	< 2.8	< 5	1.4	< 2	ND
R2_ENV_039-Bottom	8.0	< 5.0	49200	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3320	25900	< 2.8	< 5	1.5	< 2	ND
R2_ENV_040-Top	8.0	< 5.0	49600	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3390	26600	< 2.8	< 5	1.5	< 2	ND
R2_ENV_040-Middle	7.9	< 5.0	49600	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3320	26200	< 2.8	< 5	1.6	< 2	ND
R2_ENV_040-Bottom	8.0	< 5.0	49400	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3400	26600	< 2.8	< 5	1.5	< 2	ND
R2_ENV_041-Top	8.1	< 5.0	49500	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3220	26200	< 2.8	< 5	1.4	< 2	ND
R2_ENV_041-Middle	8.0	< 5.0	49600	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3290	26200	< 2.8	< 5	1.5	< 2	ND
R2_ENV_041-Bottom	8.0	< 5.0	49700	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3310	26600	< 2.8	< 5	1.6	< 2	ND
R2_ENV_042-Top	8.0	< 5.0	49000	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3580	26200	< 2.8	< 5	1.5	< 2	ND
R2_ENV_042-Middle	8.0	< 5.0	49600	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3460	26600	< 2.8	< 5	1.4	< 2	ND
R2_ENV_042-Bottom	8.0	< 5.0	49800	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3510	26200	< 2.8	< 5	1.4	< 2	ND

Sample	Parameter																		
	pH	Total Suspended Solids [mg/L]	Total Dissolved Solids [mg/L]	Turbidity [NTU]	Nitrogen (Ammonia) [mg/L]	Ammonium [mg/L]	Sulphide [mg/L]	Total Nitrogen [mg/L]	Total Cyanide [mg/L]	Nitrate [mg/L]	Nitrite [mg/L]	Total Phosphorus [mg/L]	Orthophosphate [mg/L]	Sulphate [mg/L]	Chloride [mg/L]	Silicon* [mg/L]	Chemical Oxygen Demand [mg/L]	Total Organic Carbon [mg/L]	Biochemical Oxygen Demand [mg/L]	Total Coliform [CFU/100 mL]
R2_ENV_043-Top	8.0	< 5.0	49600	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3500	26600	< 2.8	< 5	1.4	< 2	ND
R2_ENV_043-Middle	8.1	< 5.0	49400	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3550	26200	< 2.8	< 5	1.3	< 2	ND
R2_ENV_043-Bottom	8.1	< 5.0	49500	0.8	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3400	26900	< 2.8	< 5	1.3	< 2	ND
R2_ENV_044-Top	8.0	< 5.0	49500	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3440	26600	< 2.8	< 5	1.4	< 2	ND
R2_ENV_044-Middle	8.0	< 5.0	49300	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3420	26900	< 2.8	< 5	1.5	< 2	ND
R2_ENV_044-Bottom	7.9	< 5.0	50100	0.6	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3430	27700	< 2.8	< 5	1.5	< 2	ND
R2_ENV_045-Top	8.0	< 5.0	49500	0.6	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3380	26900	< 2.8	< 5	1.4	< 2	ND
R2_ENV_045-Middle	8.0	< 5.0	49600	0.7	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3470	27300	< 2.8	< 5	1.4	< 2	ND
R2_ENV_045-Bottom	8.1	< 5.0	50200	0.6	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.05	< 0.016	< 0.03	< 0.060	3370	27300	< 2.8	< 5	1.5	< 2	ND
R2_ENV_046-Top	8.0	< 5.0	49600	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.06	< 0.016	< 0.03	< 0.060	3320	26200	< 2.8	< 5	1.5	< 2	ND
R2_ENV_046-Middle	8.0	< 5.0	49300	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3320	26600	< 2.8	< 5	1.6	< 2	ND
R2_ENV_046-Bottom	8.0	< 5.0	49400	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3300	26600	< 2.8	< 5	1.6	< 2	ND
R2_ENV_047-Top	8.0	< 5.0	49400	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3320	26200	< 2.8	< 5	1.7	< 2	ND
R2_ENV_047-Middle	8.1	< 5.0	49500	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3300	26600	< 2.8	< 5	1.6	< 2	ND
R2_ENV_047-Bottom	8.1	< 5.0	49700	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3390	26600	< 2.8	< 5	1.5	< 2	ND
R2_ENV_048-Top	8.0	< 5.0	49200	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3280	25900	< 2.8	< 5	1.5	< 2	ND
R2_ENV_048-Middle	8.1	< 5.0	49200	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3320	26600	< 2.8	< 5	1.6	< 2	ND
R2_ENV_048-Bottom	8.1	< 5.0	49600	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3340	25900	< 2.8	< 5	1.5	< 2	ND
R2_ENV_049-Top	8.0	< 5.0	48900	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3330	26600	< 2.8	< 5	1.4	< 2	ND
R2_ENV_049-Middle	8.0	< 5.0	49900	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3570	26600	< 2.8	< 5	1.5	< 2	ND
R2_ENV_049-Bottom	8.0	< 5.0	49400	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.12	< 0.016	< 0.03	< 0.060	3390	26600	< 2.8	< 5	1.5	< 2	ND
R2_ENV_050-Top	8.0	< 5.0	49500	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.10	< 0.016	< 0.03	< 0.060	3360	25900	< 2.8	< 5	1.5	< 2	ND
R2_ENV_050-Middle	8.0	< 5.0	49400	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.14	< 0.016	< 0.03	< 0.060	3320	26600	< 2.8	< 5	1.6	< 2	ND
R2_ENV_050-Bottom	8.0	< 5.0	49600	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3330	26600	< 2.8	< 5	1.6	< 2	ND
R2_ENV_051-Top	8.0	< 5.0	49500	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3430	25900	< 2.8	< 5	1.6	< 2	ND
R2_ENV_051-Middle	8.1	< 5.0	49400	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3360	26200	< 2.8	< 5	1.7	< 2	ND
R2_ENV_051-Bottom	8.1	< 5.0	49600	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3400	26600	< 2.8	< 5	1.5	< 2	ND
R2_ENV_052-Top	8.0	< 5.0	49000	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3570	25900	< 2.8	< 5	1.5	< 2	ND
R2_ENV_052-Middle	7.9	< 5.0	49500	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3370	26200	< 2.8	< 5	1.5	< 2	ND
R2_ENV_052-Bottom	8.0	< 5.0	49600	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3400	26600	< 2.8	< 5	1.4	< 2	ND

Sample	Parameter																			
	pH	Total Suspended Solids [mg/L]	Total Dissolved Solids [mg/L]	Turbidity [NTU]	Nitrogen (Ammonia) [mg/L]	Ammonium [mg/L]	Sulphide [mg/L]	Total Nitrogen [mg/L]	Total Cyanide [mg/L]	Nitrate [mg/L]	Nitrite [mg/L]	Total Phosphorus [mg/L]	Orthophosphate [mg/L]	Sulphate [mg/L]	Chloride [mg/L]	Silicon* [mg/L]	Chemical Oxygen Demand [mg/L]	Total Organic Carbon [mg/L]	Biochemical Oxygen Demand [mg/L]	Total Coliform [CFU/100 mL]
R2_ENV_053-Top	8.0	< 5.0	49300	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3370	26600	< 2.8	< 5	1.5	< 2	ND
R2_ENV_053-Middle	8.0	< 5.0	49400	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3480	26200	< 2.8	< 5	1.6	< 2	ND
R2_ENV_053-Bottom	8.0	< 5.0	49300	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.07	< 0.016	< 0.03	< 0.060	3420	26600	< 2.8	< 5	1.5	< 2	ND
R2_ENV_054-Top	8.1	< 5.0	49100	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3290	25900	< 2.8	< 5	1.5	< 2	ND
R2_ENV_054-Middle	8.1	< 5.0	49100	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3350	26200	< 2.8	< 5	1.6	< 2	ND
R2_ENV_054-Bottom	8.0	< 5.0	49200	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3320	26600	< 2.8	< 5	1.5	< 2	ND
R2_ENV_055-Top	8.1	< 5.0	50900	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.25	< 0.016	< 0.03	< 0.060	3660	25200	< 2.8	< 5	1.6	< 2	ND
R2_ENV_055-Middle	8.1	< 5.0	49900	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.13	< 0.016	< 0.03	< 0.060	3530	24500	< 2.8	< 5	1.5	< 2	ND
R2_ENV_055-Bottom	8.0	< 5.0	50000	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.14	< 0.016	< 0.03	< 0.060	3660	24500	< 2.8	< 5	1.6	< 2	ND
R2_ENV_056-Top	8.1	< 5.0	49800	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.15	< 0.016	< 0.03	< 0.060	3660	24500	< 2.8	< 5	1.6	< 2	ND
R2_ENV_056-Middle	8.1	< 5.0	50000	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.17	< 0.016	< 0.03	< 0.060	3600	24500	< 2.8	< 5	1.7	< 2	ND
R2_ENV_056-Bottom	8.1	< 5.0	50200	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.15	< 0.016	< 0.03	< 0.060	3740	24800	< 2.8	< 5	1.7	< 2	ND
R2_ENV_057-Top	8.0	< 5.0	50000	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.23	< 0.016	< 0.03	< 0.060	3550	24500	< 2.8	< 5	1.6	< 2	ND
R2_ENV_057-Middle	8.0	< 5.0	49900	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.16	< 0.016	< 0.03	< 0.060	3740	24500	< 2.8	< 5	1.6	< 2	ND
R2_ENV_057-Bottom	8.0	< 5.0	50200	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.16	< 0.016	< 0.03	< 0.060	3690	24800	< 2.8	< 5	1.5	< 2	ND
R2_ENV_058-Top	8.0	< 5.0	50100	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.13	< 0.016	< 0.03	< 0.060	3690	24800	< 2.8	< 5	1.6	< 2	ND
R2_ENV_058-Middle	8.0	< 5.0	50000	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.30	< 0.016	< 0.03	< 0.060	3660	24800	< 2.8	< 5	1.5	< 2	ND
R2_ENV_058-Bottom	8.1	< 5.0	50200	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.15	< 0.016	< 0.03	< 0.060	3670	24500	< 2.8	< 5	1.7	< 2	ND
R2_ENV_059-Top	8.0	< 5.0	49900	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3610	24500	< 2.8	< 5	1.5	< 2	ND
R2_ENV_059-Middle	8.1	< 5.0	50100	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3500	24100	< 2.8	< 5	1.6	< 2	ND
R2_ENV_059-Bottom	8.0	< 5.0	50000	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3520	24500	< 2.8	< 5	1.5	< 2	ND
R2_ENV_060-Top	8.1	< 5.0	50100	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3600	24100	< 2.8	< 5	1.6	< 2	ND
R2_ENV_060-Middle	8.0	< 5.0	50200	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3700	24500	< 2.8	< 5	1.5	< 2	ND
R2_ENV_060-Bottom	8.0	< 5.0	50100	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3600	24100	< 2.8	< 5	1.5	< 2	ND
R2_ENV_061-Top	7.9	< 5.0	49300	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3590	26200	< 2.8	< 5	1.6	< 2	ND
R2_ENV_061-Middle	8.1	< 5.0	50100	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3620	24500	< 2.8	< 5	1.5	< 2	ND
R2_ENV_061-Bottom	8.1	< 5.0	49900	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.08	< 0.016	< 0.03	< 0.060	3660	24500	< 2.8	< 5	1.6	< 2	ND
R2_ENV_062-Top	8.0	< 5.0	49400	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3360	26200	< 2.8	< 5	1.5	< 2	ND
R2_ENV_062-Middle	8.0	< 5.0	49100	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3380	26600	< 2.8	< 5	1.5	< 2	ND
R2_ENV_062-Bottom	8.1	< 5.0	49200	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3470	26600	< 2.8	< 5	1.5	< 2	ND

Sample	Parameter																			
	pH	Total Suspended Solids [mg/L]	Total Dissolved Solids [mg/L]	Turbidity [NTU]	Nitrogen (Ammonia) [mg/L]	Ammonium [mg/L]	Sulphide [mg/L]	Total Nitrogen [mg/L]	Total Cyanide [mg/L]	Nitrate [mg/L]	Nitrite [mg/L]	Total Phosphorus [mg/L]	Orthophosphate [mg/L]	Sulphate [mg/L]	Chloride [mg/L]	Silicon* [mg/L]	Chemical Oxygen Demand [mg/L]	Total Organic Carbon [mg/L]	Biochemical Oxygen Demand [mg/L]	Total Coliform [CFU/100 mL]
R2_ENV_063-Top	8.0	< 5.0	50100	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.12	< 0.016	< 0.03	< 0.060	3730	24100	< 2.8	< 5	1.5	< 2	ND
R2_ENV_063-Middle	8.0	< 5.0	50300	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.10	< 0.016	< 0.03	< 0.060	3610	24500	< 2.8	< 5	1.6	< 2	ND
R2_ENV_063-Bottom	8.0	< 5.0	50300	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3670	24500	< 2.8	< 5	1.7	< 2	ND
R2_ENV_064-Top	8.0	< 5.0	49400	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.04	< 0.016	< 0.03	< 0.060	3310	25200	< 2.8	< 5	1.6	< 2	ND
R2_ENV_064-Middle	8.0	< 5.0	49200	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3260	25200	< 2.8	< 5	1.6	< 2	ND
R2_ENV_064-Bottom	8.1	< 5.0	49900	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.04	< 0.016	< 0.03	< 0.060	3390	25500	< 2.8	< 5	1.6	< 2	ND
R2_ENV_065-Top	8.1	< 5.0	49900	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3360	25500	< 2.8	< 5	1.5	< 2	ND
R2_ENV_065-Middle	8.1	< 5.0	49700	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.05	< 0.016	< 0.03	< 0.060	3290	25500	< 2.8	< 5	1.6	< 2	ND
R2_ENV_065-Bottom	8.0	< 5.0	49900	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3340	25500	< 2.8	< 5	1.5	< 2	ND
R2_ENV_066-Top	8.0	< 5.0	50400	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.07	< 0.016	< 0.03	< 0.060	3610	24800	< 2.8	< 5	1.6	< 2	ND
R2_ENV_066-Middle	8.0	< 5.0	50400	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3530	24800	< 2.8	< 5	1.8	< 2	ND
R2_ENV_066-Bottom	8.1	< 5.0	50600	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3660	25200	< 2.8	< 5	1.7	< 2	ND
R2_ENV_067-Top	8.1	< 5.0	49500	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3270	25500	< 2.8	< 5	1.5	< 2	ND
R2_ENV_067-Middle	8.0	< 5.0	49800	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3340	25500	< 2.8	< 5	1.5	< 2	ND
R2_ENV_067-Bottom	8.1	< 5.0	50000	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3320	25200	< 2.8	< 5	1.5	< 2	ND
R2_ENV_068-Top	8.0	< 5.0	50100	0.7	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3700	24500	< 2.8	< 5	1.6	< 2	ND
R2_ENV_068-Middle	8.0	< 5.0	50600	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.06	< 0.016	< 0.03	< 0.060	3600	25200	< 2.8	< 5	1.7	< 2	ND
R2_ENV_068-Bottom	8.0	< 5.0	50200	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3620	24500	< 2.8	< 5	1.6	< 2	ND
R2_ENV_069-Top	8.0	< 5.0	51400	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3720	25500	< 2.8	< 5	1.8	< 2	ND
R2_ENV_069-Middle	8.0	< 5.0	50000	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.10	< 0.016	< 0.03	< 0.060	3630	24100	< 2.8	< 5	1.6	< 2	ND
R2_ENV_069-Bottom	8.1	< 5.0	50400	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3650	24800	< 2.8	< 5	1.6	< 2	ND
R2_ENV_070-Top	8.0	< 5.0	50300	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3610	24500	< 2.8	< 5	1.7	< 2	ND
R2_ENV_070-Middle	8.1	< 5.0	49900	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.07	< 0.016	< 0.03	< 0.060	3540	24100	< 2.8	< 5	1.6	< 2	ND
R2_ENV_070-Bottom	8.1	< 5.0	50000	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.04	< 0.016	< 0.03	< 0.060	3620	24500	< 2.8	< 5	1.7	< 2	ND
R2_ENV_071-Top	8.0	< 5.0	49100	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.09	< 0.016	< 0.03	< 0.060	3260	25200	< 2.8	< 5	1.4	< 2	ND
R2_ENV_071-Middle	8.1	< 5.0	49600	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3280	25500	< 2.8	< 5	1.4	< 2	ND
R2_ENV_071-Bottom	8.1	< 5.0	49700	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3370	25200	< 2.8	< 5	1.5	< 2	ND
R2_ENV_072-Top	8.1	< 5.0	49800	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.07	< 0.016	< 0.03	< 0.060	3690	24100	< 2.8	< 5	1.6	< 2	ND
R2_ENV_072-Middle	8.0	< 5.0	50000	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.04	< 0.016	< 0.03	< 0.060	3740	24500	< 2.8	< 5	1.7	< 2	ND
R2_ENV_072-Bottom	8.0	< 5.0	50000	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.07	< 0.016	< 0.03	< 0.060	3420	24500	< 2.8	< 5	1.6	< 2	ND

Sample	Parameter																			
	pH	Total Suspended Solids [mg/L]	Total Dissolved Solids [mg/L]	Turbidity [NTU]	Nitrogen (Ammonia) [mg/L]	Ammonium [mg/L]	Sulphide [mg/L]	Total Nitrogen [mg/L]	Total Cyanide [mg/L]	Nitrate [mg/L]	Nitrite [mg/L]	Total Phosphorus [mg/L]	Orthophosphate [mg/L]	Sulphate [mg/L]	Chloride [mg/L]	Silicon* [mg/L]	Chemical Oxygen Demand [mg/L]	Total Organic Carbon [mg/L]	Biochemical Oxygen Demand [mg/L]	Total Coliform [CFU/100 mL]
R2_ENV_073-Top	8.0	< 5.0	49600	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3320	25200	< 2.8	< 5	1.5	< 2	ND
R2_ENV_073-Middle	8.1	< 5.0	49300	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3280	25200	< 2.8	< 5	1.5	< 2	ND
R2_ENV_073-Bottom	8.0	< 5.0	49600	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3280	24800	< 2.8	< 5	1.5	< 2	ND
R2_ENV_074-Top	8.0	< 5.0	48700	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3250	24800	< 2.8	< 5	1.4	< 2	ND
R2_ENV_074-Middle	8.1	< 5.0	49100	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.05	< 0.016	< 0.03	< 0.060	3190	25500	< 2.8	< 5	1.5	< 2	ND
R2_ENV_074-Bottom	8.0	< 5.0	49900	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3380	24800	< 2.8	< 5	1.5	< 2	ND
R2_ENV_075-Top	8.1	< 5.0	48600	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3370	24500	< 2.8	< 5	1.4	< 2	ND
R2_ENV_075-Middle	8.1	< 5.0	48500	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3180	24500	< 2.8	< 5	1.4	< 2	ND
R2_ENV_075-Bottom	8.1	< 5.0	49600	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.06	< 0.016	< 0.03	< 0.060	3340	24800	< 2.8	< 5	1.5	< 2	ND
R2_ENV_076-Top	8.1	< 5.0	47900	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3160	23800	< 2.8	< 5	1.4	< 2	ND
R2_ENV_076-Middle	8.0	< 5.0	49900	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3320	25200	< 2.8	< 5	1.5	< 2	ND
R2_ENV_076-Bottom	8.0	< 5.0	50300	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3280	25500	< 2.8	< 5	1.7	< 2	ND
R2_ENV_077-Top	8.0	< 5.0	46800	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.05	< 0.016	< 0.03	< 0.060	3120	23400	< 2.8	< 5	1.4	< 2	ND
R2_ENV_077-Middle	8.0	< 5.0	48700	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3210	24100	< 2.8	< 5	1.4	< 2	ND
R2_ENV_077-Bottom	8.0	< 5.0	50400	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3320	25500	< 2.8	< 5	1.5	< 2	ND
R2_ENV_078-Top	8.0	< 5.0	47000	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3050	23800	< 2.8	< 5	1.4	< 2	ND
R2_ENV_078-Middle	8.0	< 5.0	49500	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3460	24800	< 2.8	< 5	1.5	< 2	ND
R2_ENV_078-Bottom	8.0	< 5.0	49800	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3370	25500	< 2.8	< 5	1.5	< 2	ND
R2_ENV_079-Top	8.1	< 5.0	49500	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3250	25200	< 2.8	< 5	1.5	< 2	ND
R2_ENV_079-Middle	8.0	< 5.0	49500	0.6	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3300	24800	< 2.8	< 5	1.5	< 2	ND
R2_ENV_079-Bottom	8.1	< 5.0	48000	0.7	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3110	24500	< 2.8	< 5	1.4	< 2	ND
R2_ENV_080-Top	8.0	< 5.0	49800	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3270	25200	< 2.8	< 5	1.4	< 2	ND
R2_ENV_080-Middle	8.1	< 5.0	49100	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.08	< 0.016	< 0.03	< 0.060	3160	24800	< 2.8	< 5	1.5	< 2	ND
R2_ENV_080-Bottom	8.1	< 5.0	46800	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.05	< 0.016	< 0.03	< 0.060	3080	24100	< 2.8	< 5	1.4	< 2	ND
R2_ENV_081-Top	8.0	< 5.0	48100	0.6	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3110	24500	< 2.8	< 5	1.4	< 2	ND
R2_ENV_081-Middle	8.1	< 5.0	48700	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3290	23800	< 2.8	< 5	1.4	< 2	ND
R2_ENV_081-Bottom	8.1	< 5.0	49600	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3330	24800	< 2.8	< 5	1.4	< 2	ND
R2_ENV_082-Top	8.1	< 5.0	48400	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3280	24100	< 2.8	< 5	1.5	< 2	ND
R2_ENV_082-Middle	8.1	< 5.0	49200	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3330	24500	< 2.8	< 5	1.6	< 2	ND
R2_ENV_082-Bottom	8.1	< 5.0	49500	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3290	24800	< 2.8	< 5	1.6	< 2	ND

Sample	Parameter																			
	pH	Total Suspended Solids [mg/L]	Total Dissolved Solids [mg/L]	Turbidity [NTU]	Nitrogen (Ammonia) [mg/L]	Ammonium [mg/L]	Sulphide [mg/L]	Total Nitrogen [mg/L]	Total Cyanide [mg/L]	Nitrate [mg/L]	Nitrite [mg/L]	Total Phosphorus [mg/L]	Orthophosphate [mg/L]	Sulphate [mg/L]	Chloride [mg/L]	Silicon* [mg/L]	Chemical Oxygen Demand [mg/L]	Total Organic Carbon [mg/L]	Biochemical Oxygen Demand [mg/L]	Total Coliform [CFU/100 mL]
R2_ENV_083-Top	8.0	< 5.0	48900	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3270	24800	< 2.8	< 5	1.6	< 2	ND
R2_ENV_083-Middle	8.0	< 5.0	49300	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.12	0.017	< 0.03	< 0.060	3390	25200	< 2.8	< 5	1.5	< 2	ND
R2_ENV_083-Bottom	8.0	< 5.0	49600	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3360	25500	< 2.8	< 5	1.6	< 2	ND
R2_ENV_084-Top	8.0	< 5.0	48400	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3150	23800	< 2.8	< 5	1.3	< 2	ND
R2_ENV_084-Middle	8.1	< 5.0	49100	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3280	24100	< 2.8	< 5	1.4	< 2	ND
R2_ENV_084-Bottom	8.1	< 5.0	49000	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3350	23800	< 2.8	< 5	1.5	< 2	ND
R2_ENV_085-Top	8.0	< 5.0	48600	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3140	23400	< 2.8	< 5	1.3	< 2	ND
R2_ENV_085-Middle	8.0	< 5.0	49000	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3230	24100	< 2.8	< 5	1.3	< 2	ND
R2_ENV_085-Bottom	8.0	< 5.0	48900	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3280	24100	< 2.8	< 5	1.2	< 2	ND
R2_ENV_086-Top	8.0	< 5.0	47000	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3140	23000	< 2.8	< 5	1.2	< 2	ND
R2_ENV_086-Middle	8.0	< 5.0	48800	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3250	24100	< 2.8	< 5	1.5	< 2	ND
R2_ENV_086-Bottom	8.0	< 5.0	49100	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3240	23800	< 2.8	< 5	1.4	< 2	ND
R2_ENV_087-Top	8.0	< 5.0	47200	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.08	< 0.016	< 0.03	< 0.060	3150	23000	< 2.8	< 5	1.4	< 2	ND
R2_ENV_087-Middle	8.1	< 5.0	48800	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3250	24100	< 2.8	< 5	1.3	< 2	ND
R2_ENV_087-Bottom	8.0	< 5.0	48900	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3330	23800	< 2.8	< 5	1.4	< 2	ND
R2_ENV_088-Top	8.1	< 5.0	47000	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3080	23000	< 2.8	< 5	1.2	< 2	ND
R2_ENV_088-Middle	8.0	< 5.0	48400	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3350	23400	< 2.8	< 5	1.3	< 2	ND
R2_ENV_088-Bottom	8.0	< 5.0	49100	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3280	23800	< 2.8	< 5	1.3	< 2	ND
R2_ENV_089-Top	8.1	< 5.0	47100	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3020	23400	< 2.8	< 5	1.4	< 2	ND
R2_ENV_089-Middle	8.1	< 5.0	48700	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3250	24100	< 2.8	< 5	1.5	< 2	ND
R2_ENV_089-Bottom	8.0	< 5.0	48900	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3120	23800	< 2.8	< 5	1.4	< 2	ND
R2_ENV_090-Top	8.1	< 5.0	48500	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3130	23400	< 2.8	< 5	1.4	< 2	ND
R2_ENV_090-Middle	8.1	< 5.0	48600	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3220	23800	< 2.8	< 5	1.4	< 2	ND
R2_ENV_090-Bottom	8.1	< 5.0	48800	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3350	24100	< 2.8	< 5	1.3	< 2	ND
R2_ENV_091-Top	8.1	< 5.0	47300	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3050	24100	< 2.8	< 5	1.5	< 2	ND
R2_ENV_091-Middle	8.0	< 5.0	48300	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3100	24500	< 2.8	< 5	1.4	< 2	ND
R2_ENV_091-Bottom	8.0	< 5.0	48700	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3330	23800	< 2.8	< 5	1.4	< 2	ND
R2_ENV_092-Top	8.0	< 5.0	47600	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.06	< 0.016	< 0.03	< 0.060	3270	23400	< 2.8	< 5	1.4	< 2	ND
R2_ENV_092-Middle	8.0	< 5.0	48200	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3210	23800	< 2.8	< 5	1.5	< 2	ND
R2_ENV_092-Bottom	8.0	< 5.0	48600	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3210	24500	< 2.8	< 5	1.5	< 2	ND

Sample	Parameter																			
	pH	Total Suspended Solids [mg/L]	Total Dissolved Solids [mg/L]	Turbidity [NTU]	Nitrogen (Ammonia) [mg/L]	Ammonium [mg/L]	Sulphide [mg/L]	Total Nitrogen [mg/L]	Total Cyanide [mg/L]	Nitrate [mg/L]	Nitrite [mg/L]	Total Phosphorus [mg/L]	Orthophosphate [mg/L]	Sulphate [mg/L]	Chloride [mg/L]	Silicon* [mg/L]	Chemical Oxygen Demand [mg/L]	Total Organic Carbon [mg/L]	Biochemical Oxygen Demand [mg/L]	Total Coliform [CFU/100 mL]
R2_ENV_093-Top	8.0	< 5.0	47400	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3110	23400	< 2.8	< 5	1.4	< 2	ND
R2_ENV_093-Middle	8.0	< 5.0	48200	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3150	23800	< 2.8	< 5	1.4	< 2	ND
R2_ENV_093-Bottom	8.0	< 5.0	48700	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3170	24100	< 2.8	< 5	1.3	< 2	ND
R2_ENV_094-Top	8.0	< 5.0	46600	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3040	23400	< 2.8	< 5	1.2	< 2	ND
R2_ENV_094-Middle	8.0	< 5.0	47900	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3160	24100	< 2.8	< 5	1.2	< 2	ND
R2_ENV_094-Bottom	8.1	< 5.0	48500	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.08	< 0.016	< 0.03	< 0.060	3330	24500	< 2.8	< 5	1.4	< 2	ND
R2_ENV_095-Top	8.1	< 5.0	46300	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3020	23000	< 2.8	< 5	1.3	< 2	ND
R2_ENV_095-Middle	8.1	< 5.0	47200	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3130	23400	< 2.8	< 5	1.3	< 2	ND
R2_ENV_095-Bottom	8.1	< 5.0	47900	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3190	23800	< 2.8	< 5	1.3	< 2	ND
R2_ENV_096-Top	8.1	< 5.0	46200	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3030	22700	< 2.8	< 5	1.4	< 2	ND
R2_ENV_096-Middle	8.1	< 5.0	47300	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3130	23000	< 2.8	< 5	1.3	< 2	ND
R2_ENV_096-Bottom	8.1	< 5.0	48000	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3150	24500	< 2.8	< 5	1.3	< 2	ND
R2_ENV_097-Top	8.1	< 5.0	46900	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3110	22700	< 2.8	< 5	1.3	< 2	ND
R2_ENV_097-Middle	8.1	< 5.0	47100	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3150	23000	< 2.8	< 5	1.3	< 2	ND
R2_ENV_097-Bottom	8.1	< 5.0	47600	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3240	23000	< 2.8	< 5	1.3	< 2	ND
R2_ENV_098-Top	8.0	< 5.0	45900	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.04	< 0.016	< 0.03	< 0.060	3010	22700	< 2.8	< 5	1.4	< 2	ND
R2_ENV_098-Middle	8.0	< 5.0	47200	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3180	23000	< 2.8	< 5	1.4	< 2	ND
R2_ENV_098-Bottom	8.0	< 5.0	47500	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.05	< 0.016	< 0.03	< 0.060	3430	23000	< 2.8	< 5	1.3	< 2	ND
R2_ENV_099-Top	8.0	< 5.0	46100	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3020	22700	< 2.8	< 5	1.3	< 2	ND
R2_ENV_099-Middle	8.0	< 5.0	46600	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3050	22700	< 2.8	< 5	1.3	< 2	ND
R2_ENV_099-Bottom	8.0	< 5.0	47300	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3220	23000	< 2.8	< 5	1.3	< 2	ND
R2_ENV_100-Top	8.1	< 5.0	45900	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3160	22700	< 2.8	< 5	1.4	< 2	ND
R2_ENV_100-Middle	8.1	< 5.0	46700	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3110	23000	< 2.8	< 5	1.4	< 2	ND
R2_ENV_100-Bottom	8.1	< 5.0	47400	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3140	23000	< 2.8	< 5	1.3	< 2	ND
R2_ENV_101-Top	7.8	< 5.0	47400	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3140	25200	< 2.8	< 5	1.5	< 2	ND
R2_ENV_101-Middle	7.9	< 5.0	48100	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.09	< 0.016	< 0.03	< 0.060	3330	25200	< 2.8	< 5	1.3	< 2	ND
R2_ENV_101-Bottom	8.1	< 5.0	48200	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.05	< 0.016	< 0.03	< 0.060	3350	25500	< 2.8	< 5	1.4	< 2	ND
R2_ENV_102-Top	8.1	< 5.0	46100	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3040	22700	< 2.8	< 5	1.3	< 2	ND
R2_ENV_102-Middle	8.1	< 5.0	47300	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3120	23000	< 2.8	< 5	1.3	< 2	ND
R2_ENV_102-Bottom	8.1	< 5.0	47200	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3250	23000	< 2.8	< 5	1.3	< 2	ND

Sample	Parameter																			
	pH	Total Suspended Solids [mg/L]	Total Dissolved Solids [mg/L]	Turbidity [NTU]	Nitrogen (Ammonia) [mg/L]	Ammonium [mg/L]	Sulphide [mg/L]	Total Nitrogen [mg/L]	Total Cyanide [mg/L]	Nitrate [mg/L]	Nitrite [mg/L]	Total Phosphorus [mg/L]	Orthophosphate [mg/L]	Sulphate [mg/L]	Chloride [mg/L]	Silicon* [mg/L]	Chemical Oxygen Demand [mg/L]	Total Organic Carbon [mg/L]	Biochemical Oxygen Demand [mg/L]	Total Coliform [CFU/100 mL]
R2_ENV_103-Top	8.0	< 5.0	46400	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.09	< 0.016	< 0.03	< 0.060	3010	24100	< 2.8	< 5	1.4	< 2	ND
R2_ENV_103-Middle	8.0	< 5.0	47800	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.09	< 0.016	< 0.03	< 0.060	3150	25200	< 2.8	< 5	1.4	< 2	ND
R2_ENV_103-Bottom	8.0	< 5.0	47800	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3180	25200	< 2.8	< 5	1.5	< 2	ND
R2_ENV_104-Top	8.0	< 5.0	46300	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	2950	24100	< 2.8	< 5	1.4	< 2	ND
R2_ENV_104-Middle	8.1	< 5.0	47700	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.15	< 0.016	< 0.03	< 0.060	3090	25200	< 2.8	< 5	1.3	< 2	ND
R2_ENV_104-Bottom	8.0	< 5.0	48000	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3110	25200	< 2.8	< 5	1.4	< 2	ND
R2_ENV_105-Top	8.0	< 5.0	46100	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3200	23000	< 2.8	< 5	1.4	< 2	ND
R2_ENV_105-Middle	7.9	< 5.0	47900	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3140	23800	< 2.8	< 5	1.4	< 2	ND
R2_ENV_105-Bottom	8.0	< 5.0	48000	0.7	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3270	24100	< 2.8	< 5	1.3	< 2	ND
R2_ENV_106-Top	8.1	< 5.0	46300	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3280	23000	< 2.8	< 5	1.5	< 2	ND
R2_ENV_106-Middle	8.0	< 5.0	46900	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3180	23400	< 2.8	< 5	1.5	< 2	ND
R2_ENV_106-Bottom	8.0	< 5.0	47800	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3180	24100	< 2.8	< 5	1.4	< 2	ND
R2_ENV_107-Top	8.0	< 5.0	46100	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3160	23000	< 2.8	< 5	1.5	< 2	ND
R2_ENV_107-Middle	8.1	< 5.0	46700	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.08	< 0.016	< 0.03	< 0.060	3120	23400	< 2.8	< 5	1.6	< 2	ND
R2_ENV_107-Bottom	8.0	< 5.0	47600	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.06	< 0.016	< 0.03	< 0.060	3260	23800	< 2.8	< 5	1.4	< 2	ND
R2_ENV_108-Top	8.0	< 5.0	46700	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.10	< 0.016	< 0.03	< 0.060	3080	24800	< 2.8	< 5	1.4	< 2	ND
R2_ENV_108-Middle	8.1	< 5.0	47000	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.09	< 0.016	< 0.03	< 0.060	3170	24800	< 2.8	< 5	1.4	< 2	ND
R2_ENV_108-Bottom	8.0	< 5.0	47500	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3390	25200	< 2.8	< 5	1.4	< 2	ND
R2_ENV_109-Top	8.0	< 5.0	46800	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.07	< 0.016	< 0.03	< 0.060	2960	24800	< 2.8	< 5	1.4	< 2	ND
R2_ENV_109-Middle	8.1	< 5.0	46900	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3080	24800	< 2.8	< 5	1.4	< 2	ND
R2_ENV_109-Bottom	8.1	< 5.0	47300	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3130	25200	< 2.8	< 5	1.4	< 2	ND
R2_ENV_110-Top	8.1	< 5.0	46500	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.04	< 0.016	< 0.03	< 0.060	3100	23400	< 2.8	< 5	1.3	< 2	ND
R2_ENV_110-Middle	8.0	< 5.0	47000	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.10	< 0.016	< 0.03	< 0.060	3110	23800	< 2.8	< 5	1.2	< 2	ND
R2_ENV_110-Bottom	8.0	< 5.0	47100	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.10	< 0.016	< 0.03	< 0.060	3070	25200	< 2.8	< 5	1.3	< 2	ND
R2_ENV_111-Top	8.0	< 5.0	46100	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3120	23000	< 2.8	< 5	1.4	< 2	ND
R2_ENV_111-Middle	8.1	< 5.0	46600	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3190	23000	< 2.8	< 5	1.3	< 2	ND
R2_ENV_111-Bottom	8.1	< 5.0	46700	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3160	23400	< 2.8	< 5	1.4	< 2	ND
R2_ENV_112-Top	8.0	< 5.0	46100	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.05	< 0.016	< 0.03	< 0.060	3170	23400	< 2.8	< 5	1.4	< 2	ND
R2_ENV_112-Middle	8.0	< 5.0	46500	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.14	< 0.016	< 0.03	< 0.060	3100	23000	< 2.8	< 5	1.5	< 2	ND
R2_ENV_112-Bottom	8.0	< 5.0	46900	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3300	23400	< 2.8	< 5	1.5	< 2	ND

Sample	Parameter																			
	pH	Total Suspended Solids [mg/L]	Total Dissolved Solids [mg/L]	Turbidity [NTU]	Nitrogen (Ammonia) [mg/L]	Ammonium [mg/L]	Sulphide [mg/L]	Total Nitrogen [mg/L]	Total Cyanide [mg/L]	Nitrate [mg/L]	Nitrite [mg/L]	Total Phosphorus [mg/L]	Orthophosphate [mg/L]	Sulphate [mg/L]	Chloride [mg/L]	Silicon* [mg/L]	Chemical Oxygen Demand [mg/L]	Total Organic Carbon [mg/L]	Biochemical Oxygen Demand [mg/L]	Total Coliform [CFU/100 mL]
R2_ENV_113-Top	8.1	< 5.0	46300	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3070	23400	< 2.8	< 5	1.4	< 2	ND
R2_ENV_113-Middle	8.0	< 5.0	46100	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3090	23000	< 2.8	< 5	1.4	< 2	ND
R2_ENV_113-Bottom	7.9	< 5.0	46900	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.05	< 0.016	< 0.03	< 0.060	3190	23000	< 2.8	< 5	1.5	< 2	ND
R2_ENV_114-Top	8.0	< 5.0	46400	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.06	< 0.016	< 0.03	< 0.060	2950	24100	< 2.8	< 5	1.4	< 2	ND
R2_ENV_114-Middle	8.0	< 5.0	46800	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3050	24500	< 2.8	< 5	1.4	< 2	ND
R2_ENV_114-Bottom	8.0	< 5.0	47000	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3000	24500	< 2.8	< 5	1.3	< 2	ND
R2_ENV_115-Top	8.0	< 5.0	46000	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	2940	24100	< 2.8	< 5	1.4	< 2	ND
R2_ENV_115-Middle	8.0	< 5.0	46900	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.15	< 0.016	< 0.03	< 0.060	2980	24500	< 2.8	< 5	1.4	< 2	ND
R2_ENV_115-Bottom	8.0	< 5.0	47200	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.06	< 0.016	< 0.03	< 0.060	2980	24800	< 2.8	< 5	1.4	< 2	ND
R2_ENV_116-Top	8.0	< 5.0	46200	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	2980	24100	< 2.8	< 5	1.4	< 2	ND
R2_ENV_116-Middle	8.1	< 5.0	46600	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.04	< 0.016	< 0.03	< 0.060	3290	23800	< 2.8	< 5	1.4	< 2	ND
R2_ENV_116-Bottom	8.0	< 5.0	46900	0.6	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3330	23800	< 2.8	< 5	1.5	< 2	ND
R2_ENV_117-Top	8.1	< 5.0	45700	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.06	< 0.016	< 0.03	< 0.060	3170	23000	< 2.8	< 5	1.4	< 2	ND
R2_ENV_117-Middle	8.0	< 5.0	46100	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.07	< 0.016	< 0.03	< 0.060	3220	23400	< 2.8	< 5	1.4	< 2	ND
R2_ENV_117-Bottom	8.1	< 5.0	46600	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3180	23800	< 2.8	< 5	1.4	< 2	ND
R2_ENV_118-Top	8.0	< 5.0	47500	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3240	23000	< 2.8	< 5	1.5	< 2	ND
R2_ENV_118-Middle	8.0	< 5.0	46200	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.06	< 0.016	< 0.03	< 0.060	3260	23400	< 2.8	< 5	1.4	< 2	ND
R2_ENV_118-Bottom	8.1	< 5.0	46400	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.09	< 0.016	< 0.03	< 0.060	3180	23800	< 2.8	< 5	1.5	< 2	ND
R2_ENV_119-Top	8.1	< 5.0	45800	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.07	< 0.016	< 0.03	< 0.060	3170	23400	< 2.8	< 5	1.4	< 2	ND
R2_ENV_119-Middle	8.1	< 5.0	46000	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3260	23400	< 2.8	< 5	1.5	< 2	ND
R2_ENV_119-Bottom	8.0	< 5.0	46600	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.08	< 0.016	< 0.03	< 0.060	3300	23800	< 2.8	< 5	1.4	< 2	ND
R2_ENV_120-Top	8.0	< 5.0	46500	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3150	23400	< 2.8	< 5	1.5	< 2	ND
R2_ENV_120-Middle	8.1	< 5.0	46400	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3220	23800	< 2.8	< 5	1.6	< 2	ND
R2_ENV_120-Bottom	8.1	< 5.0	45800	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3150	23800	< 2.8	< 5	1.4	< 2	ND
R2_ENV_121-Top	8.0	< 5.0	45800	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3080	23000	< 2.8	< 5	1.3	< 2	ND
R2_ENV_121-Middle	8.1	< 5.0	46400	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3260	23400	< 2.8	< 5	1.4	< 2	ND
R2_ENV_121-Bottom	8.0	< 5.0	46600	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.05	< 0.016	< 0.03	< 0.060	3250	23800	< 2.8	< 5	1.5	< 2	ND
R2_ENV_122-Top	8.0	< 5.0	45700	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.07	< 0.016	< 0.03	< 0.060	3080	23000	< 2.8	< 5	1.4	< 2	ND
R2_ENV_122-Middle	8.1	< 5.0	46600	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3180	23400	< 2.8	< 5	1.4	< 2	ND
R2_ENV_122-Bottom	8.0	< 5.0	46700	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3160	23800	< 2.8	< 5	1.3	< 2	ND

Sample	Parameter																			
	pH	Total Suspended Solids [mg/L]	Total Dissolved Solids [mg/L]	Turbidity [NTU]	Nitrogen (Ammonia) [mg/L]	Ammonium [mg/L]	Sulphide [mg/L]	Total Nitrogen [mg/L]	Total Cyanide [mg/L]	Nitrate [mg/L]	Nitrite [mg/L]	Total Phosphorus [mg/L]	Orthophosphate [mg/L]	Sulphate [mg/L]	Chloride [mg/L]	Silicon* [mg/L]	Chemical Oxygen Demand [mg/L]	Total Organic Carbon [mg/L]	Biochemical Oxygen Demand [mg/L]	Total Coliform [CFU/100 mL]
R2_ENV_123-Top	8.0	< 5.0	46500	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3200	23000	< 2.8	< 5	1.3	< 2	ND
R2_ENV_123-Middle	8.1	< 5.0	46800	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3240	23400	< 2.8	< 5	1.4	< 2	ND
R2_ENV_123-Bottom	8.1	< 5.0	46200	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3200	23800	< 2.8	< 5	1.5	< 2	ND
R2_ENV_124-Top	8.0	< 5.0	46500	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3160	23000	< 2.8	< 5	1.4	< 2	ND
R2_ENV_124-Middle	8.1	< 5.0	46400	0.6	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3090	23400	< 2.8	< 5	1.4	< 2	ND
R2_ENV_124-Bottom	8.1	< 5.0	47000	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3240	23800	< 2.8	< 5	1.5	< 2	ND
R2_ENV_125-Top	8.0	< 5.0	46200	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3220	23000	< 2.8	< 5	1.4	< 2	ND
R2_ENV_125-Middle	8.0	< 5.0	46600	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3160	23800	< 2.8	< 5	1.5	< 2	ND
R2_ENV_125-Bottom	8.0	< 5.0	47000	0.9	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3160	23800	< 2.8	< 5	1.5	< 2	ND
R2_ENV_126-Top	8.0	< 5.0	45600	0.8	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3150	23400	< 2.8	< 5	1.5	< 2	ND
R2_ENV_126-Middle	8.1	< 5.0	45800	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.05	< 0.016	< 0.03	< 0.060	3070	23000	< 2.8	< 5	1.4	< 2	ND
R2_ENV_126-Bottom	8.0	< 5.0	46400	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3160	23400	< 2.8	< 5	1.4	< 2	ND
R2_ENV_127-Top	8.0	< 5.0	45900	0.7	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.04	< 0.016	< 0.03	< 0.060	3170	23400	< 2.8	< 5	1.4	< 2	ND
R2_ENV_127-Middle	8.1	< 5.0	46500	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.08	< 0.016	< 0.03	< 0.060	3240	23400	< 2.8	< 5	1.4	< 2	ND
R2_ENV_127-Bottom	8.1	< 5.0	46800	0.8	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.05	< 0.016	< 0.03	< 0.060	3250	23800	< 2.8	< 5	1.4	< 2	ND
R2_ENV_128-Top	8.1	< 5.0	46000	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3140	23000	< 2.8	< 5	1.5	< 2	ND
R2_ENV_128-Middle	8.0	< 5.0	46600	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.07	< 0.016	< 0.03	< 0.060	3220	23400	< 2.8	< 5	1.4	< 2	ND
R2_ENV_128-Bottom	8.1	< 5.0	46700	0.9	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3200	23800	< 2.8	< 5	1.5	< 2	ND
R2_ENV_129-Top	8.1	< 5.0	46000	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3180	23000	< 2.8	< 5	1.5	< 2	ND
R2_ENV_129-Middle	8.1	< 5.0	46900	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3220	23800	< 2.8	< 5	1.4	< 2	ND
R2_ENV_129-Bottom	8.1	< 5.0	46800	0.8	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3180	23800	< 2.8	< 5	1.4	< 2	ND
R2_ENV_130-Top	8.0	< 5.0	45700	0.8	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3090	23800	< 2.8	< 5	1.5	< 2	ND
R2_ENV_130-Middle	8.1	< 5.0	46000	0.6	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3090	23400	< 2.8	< 5	1.5	< 2	ND
R2_ENV_130-Bottom	8.0	< 5.0	46600	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.07	< 0.016	< 0.03	< 0.060	3060	23400	< 2.8	< 5	1.5	< 2	ND
R2_ENV_131-Top	8.1	< 5.0	45700	0.5	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.10	< 0.016	< 0.03	< 0.060	3080	23000	< 2.8	< 5	1.3	< 2	ND
R2_ENV_131-Middle	8.1	< 5.0	46000	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3110	23400	< 2.8	< 5	1.3	< 2	ND
R2_ENV_131-Bottom	8.1	< 5.0	46300	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3120	23800	< 2.8	< 5	1.4	< 2	ND
R2_ENV_132-Top	8.0	< 5.0	45700	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3100	23000	< 2.8	< 5	1.4	< 2	ND
R2_ENV_132-Middle	8.0	< 5.0	45800	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3040	23000	< 2.8	< 5	1.4	< 2	ND
R2_ENV_132-Bottom	8.0	< 5.0	46000	0.6	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3130	23400	< 2.8	< 5	1.4	< 2	ND

Sample	Parameter																			
	pH	Total Suspended Solids [mg/L]	Total Dissolved Solids [mg/L]	Turbidity [NTU]	Nitrogen (Ammonia) [mg/L]	Ammonium [mg/L]	Sulphide [mg/L]	Total Nitrogen [mg/L]	Total Cyanide [mg/L]	Nitrate [mg/L]	Nitrite [mg/L]	Total Phosphorus [mg/L]	Orthophosphate [mg/L]	Sulphate [mg/L]	Chloride [mg/L]	Silicon* [mg/L]	Chemical Oxygen Demand [mg/L]	Total Organic Carbon [mg/L]	Biochemical Oxygen Demand [mg/L]	Total Coliform [CFU/100 mL]
R2_ENV_133-Top	8.1	< 5.0	45700	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3230	23000	< 2.8	< 5	1.4	< 2	ND
R2_ENV_133-Middle	8.1	< 5.0	45800	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3220	23000	< 2.8	< 5	1.4	< 2	ND
R2_ENV_133-Bottom	8.0	< 5.0	46100	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.12	< 0.016	< 0.03	< 0.060	3070	23400	< 2.8	< 5	1.3	< 2	ND
R2_ENV_134-Top	8.0	< 5.0	45700	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.04	< 0.016	< 0.03	< 0.060	3060	23000	< 2.8	< 5	1.5	< 2	ND
R2_ENV_134-Middle	8.0	< 5.0	46100	< 0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.16	< 0.016	< 0.03	< 0.060	3090	23400	< 2.8	< 5	1.4	< 2	ND
R2_ENV_134-Bottom	8.0	< 5.0	46100	0.4	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	0.07	< 0.016	< 0.03	< 0.060	3130	23400	< 2.8	< 5	1.4	< 2	ND
R2_ENV_REF-Top	8.0	< 5.0	47400	0.1	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3170	23000	< 2.8	< 5	1.8	< 2	ND
R2_ENV_REF-Middle	8.0	< 5.0	48000	0.2	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3110	24100	< 2.8	< 5	1.5	< 2	ND
R2_ENV_REF-Bottom	8.1	< 5.0	48000	0.3	< 0.05	< 0.064	< 0.005	< 0.5	< 0.01	< 0.04	< 0.016	< 0.03	< 0.060	3190	24100	< 2.8	< 5	1.4	< 2	ND
Minimum	**7.8**	**< 5.0**	**45600**	**< 0.1**	**< 0.05**	**< 0.064**	**< 0.005**	**< 0.5**	**< 0.01**	**< 0.04**	**< 0.016**	< 0.03	**< 0.060**	**2940**	**22700**	**< 2.8**	**< 5**	**1.2**	**< 2**	**ND**
Maximum	**8.2**	**< 5.0**	**53800**	**0.9**	**< 0.05**	**< 0.064**	**< 0.005**	**< 0.5**	**< 0.01**	**0.33**	**0.017**	< 0.03	**< 0.060**	**3740**	**27700**	**< 2.8**	**< 5**	**1.8**	**< 2**	**ND**
Mean	**8.0**	-	**48800**	**0.2**	-	-	-	-	-	-	-	-	-	**3300**	**25000**	-	-	**1.5**	-	-
Standard Deviation	**0.06**	-	**1710**	**0.19**	-	-	-	-	-	-	-	-	-	**176**	**1340**	-	-	**0.12**	-	-
RSD [%]	**< 1**	-	**4**	**79**	-	-	-	-	-	-	-	-	-	**5**	**5**	-	-	**8**	-	-
Water Standards (QCC, 2017)																				
General use areas	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	35
Marine protected areas	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	35
US EPA Saltwater Quality Standards (US EPA, 2018)																				
CMC	-	-	-	-	-	-	-	-	0.001†	-	-	-	-	-	-	-	-	-	-	-
CCC	6.5 – 8.5	-	-	-	-	-	-	-	0.001†	-	-	-	-	-	-	-	-	-	-	-

Notes

For statistical evaluation, results < MRV were treated as absolute values determined by MRV/2 pH measured at 20 °C

NTU = Nephelometric Turbidity Units

ND = Not detected

QCC = Abu Dhabi Quality and Conformity Council

CMC = Criterion maximum concentration

MRV = Minimum reporting value

* = Silicon as SiO_2

= This recommended water quality criterion is expressed as mg free cyanide (as CN)/L

CFU/100 mL = Coliform forming units per 100 mL

RSD = Relative standard deviation

CCC = Criterion continuous concentration

US EPA = United States Environment Protection Agency

Key:	Below Water Standards	Above Water Standard for General Use Areas	Above Water Standard Marine Protected Areas

F. Water Column Hydrocarbons

F.1 Summary of Water Column Hydrocarbon Content Analysis

Summary of Water Column Hydrocarbon Content Analysis				
Sample	VPH (C_5-C_{10})*	EPH (C_{10}-C_{40})*	Dissolved and Emulsified Oil†	Free Oil‡
R2_ENV_001-Top	< 7	< 10	< 10	< 0.01
R2_ENV_001-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_001-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_002-Top	< 7	< 10	< 10	< 0.01
R2_ENV_002-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_003-Top	< 7	< 10	< 10	< 0.01
R2_ENV_003-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_004-Top	< 7	< 10	< 10	< 0.01
R2_ENV_004-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_005-Top	< 7	< 10	< 10	< 0.01
R2_ENV_005-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_006-Top	< 7	< 10	< 10	< 0.01
R2_ENV_006-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_007-Top	< 7	< 10	< 10	< 0.01
R2_ENV_007-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_008-Top	< 7	< 10	< 10	< 0.01
R2_ENV_008-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_008-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_009-Top	< 7	< 10	< 10	< 0.01
R2_ENV_009-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_009-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_010-Top	< 7	< 10	< 10	< 0.01
R2_ENV_010-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_010-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_011-Top	< 7	< 10	< 10	< 0.01
R2_ENV_011-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_011-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_012-Top	< 7	< 10	< 10	< 0.01
R2_ENV_012-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_012-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_013-Top	< 7	< 10	< 10	< 0.01

Summary of Water Column Hydrocarbon Content Analysis				
Sample	VPH (C_5-C_{10})*	EPH (C_{10}-C_{40})*	Dissolved and Emulsified Oil†	Free Oil‡
R2_ENV_013-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_013-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_014-Top	< 7	< 10	< 10	< 0.01
R2_ENV_014-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_014-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_015-Top	< 7	< 10	< 10	< 0.01
R2_ENV_015-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_015-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_016-Top	< 7	< 10	< 10	< 0.01
R2_ENV_016-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_016-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_017-Top	< 7	< 10	< 10	< 0.01
R2_ENV_017-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_017-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_018-Top	< 7	< 10	< 10	< 0.01
R2_ENV_018-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_018-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_019-Top	< 7	< 10	< 10	< 0.01
R2_ENV_019-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_019-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_020-Top	< 7	< 10	< 10	< 0.01
R2_ENV_020-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_020-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_021-Top	< 7	< 10	< 10	< 0.01
R2_ENV_021-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_021-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_022-Top	< 7	< 10	< 10	< 0.01
R2_ENV_022-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_022-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_023-Top	< 7	< 10	< 10	< 0.01
R2_ENV_023-Middle	< 7	< 10	< 10	< 0.01

Summary of Water Column Hydrocarbon Content Analysis				
Sample	VPH (C_5-C_{10})*	EPH (C_{10}-C_{40})*	Dissolved and Emulsified Oil†	Free Oil‡
R2_ENV_023-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_024-Top	< 7	< 10	< 10	< 0.01
R2_ENV_024-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_024-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_025-Top	< 7	< 10	< 10	< 0.01
R2_ENV_025-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_025-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_026-Top	< 7	< 10	< 10	< 0.01
R2_ENV_026-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_026-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_027-Top	< 7	< 10	< 10	< 0.01
R2_ENV_027-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_027-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_028-Top	< 7	< 10	< 10	< 0.01
R2_ENV_028-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_028-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_029-Top	< 7	< 10	< 10	< 0.01
R2_ENV_029-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_029-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_030-Top	< 7	< 10	< 10	< 0.01
R2_ENV_030-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_030-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_031-Top	< 7	< 10	< 10	< 0.01
R2_ENV_031-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_031-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_032-Top	< 7	< 10	< 10	< 0.01
R2_ENV_032-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_032-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_033-Top	< 7	< 10	< 10	< 0.01
R2_ENV_033-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_033-Bottom	< 7	< 10	< 10	< 0.01

Summary of Water Column Hydrocarbon Content Analysis				
Sample	VPH (C_5-C_{10})*	EPH (C_{10}-C_{40})*	Dissolved and Emulsified Oil†	Free Oil‡
R2_ENV_034-Top	< 7	< 10	< 10	< 0.01
R2_ENV_034-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_034-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_035-Top	< 7	230	< 10	< 0.01
R2_ENV_035-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_035-Bottom	< 7	17	< 10	< 0.01
R2_ENV_036-Top	< 7	< 10	< 10	< 0.01
R2_ENV_036-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_036-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_037-Top	< 7	< 10	< 10	< 0.01
R2_ENV_037-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_037-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_038-Top	< 7	< 10	< 10	< 0.01
R2_ENV_038-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_038-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_039-Top	< 7	< 10	< 10	< 0.01
R2_ENV_039-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_039-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_040-Top	< 7	< 10	< 10	< 0.01
R2_ENV_040-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_040-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_041-Top	< 7	< 10	< 10	< 0.01
R2_ENV_041-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_041-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_042-Top	< 7	< 10	< 10	< 0.01
R2_ENV_042-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_042-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_043-Top	< 7	< 10	< 10	< 0.01
R2_ENV_043-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_043-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_044-Top	< 7	< 10	< 10	< 0.01

Summary of Water Column Hydrocarbon Content Analysis				
Sample	VPH (C_5-C_{10})*	EPH (C_{10}-C_{40})*	Dissolved and Emulsified Oil†	Free Oil‡
R2_ENV_044-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_044-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_045-Top	< 7	< 10	< 10	< 0.01
R2_ENV_045-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_045-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_046-Top	< 7	< 10	< 10	< 0.01
R2_ENV_046-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_046-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_047-Top	< 7	< 10	< 10	< 0.01
R2_ENV_047-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_047-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_048-Top	< 7	< 10	< 10	< 0.01
R2_ENV_048-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_048-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_049-Top	< 7	< 10	< 10	< 0.01
R2_ENV_049-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_049-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_050-Top	< 7	< 10	< 10	< 0.01
R2_ENV_050-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_050-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_051-Top	< 7	< 10	< 10	< 0.01
R2_ENV_051-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_051-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_052-Top	< 7	< 10	< 10	< 0.01
R2_ENV_052-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_052-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_053-Top	< 7	< 10	< 10	< 0.01
R2_ENV_053-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_053-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_054-Top	< 7	< 10	< 10	< 0.01
R2_ENV_054-Middle	< 7	< 10	< 10	< 0.01

Summary of Water Column Hydrocarbon Content Analysis				
Sample	VPH (C_5-C_{10})*	EPH (C_{10}-C_{40})*	Dissolved and Emulsified Oil†	Free Oil‡
R2_ENV_054-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_055-Top	< 7	< 10	< 10	< 0.01
R2_ENV_055-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_055-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_056-Top	< 7	< 10	< 10	< 0.01
R2_ENV_056-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_056-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_057-Top	< 7	< 10	< 10	< 0.01
R2_ENV_057-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_057-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_058-Top	< 7	< 10	< 10	< 0.01
R2_ENV_058-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_058-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_059-Top	< 7	< 10	< 10	< 0.01
R2_ENV_059-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_059-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_060-Top	< 7	< 10	< 10	< 0.01
R2_ENV_060-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_060-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_061-Top	< 7	< 10	< 10	< 0.01
R2_ENV_061-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_061-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_062-Top	< 7	< 10	< 10	< 0.01
R2_ENV_062-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_062-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_063-Top	< 7	< 10	< 10	< 0.01
R2_ENV_063-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_063-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_064-Top	< 7	< 10	< 10	< 0.01
R2_ENV_064-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_064-Bottom	< 7	< 10	< 10	< 0.01

Summary of Water Column Hydrocarbon Content Analysis				
Sample	VPH (C_5-C_{10})*	EPH (C_{10}-C_{40})*	Dissolved and Emulsified Oil†	Free Oil‡
R2_ENV_065-Top	< 7	< 10	< 10	< 0.01
R2_ENV_065-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_065-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_066-Top	< 7	< 10	< 10	< 0.01
R2_ENV_066-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_066-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_067-Top	< 7	< 10	< 10	< 0.01
R2_ENV_067-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_067-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_068-Top	< 7	< 10	< 10	< 0.01
R2_ENV_068-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_068-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_069-Top	< 7	< 10	< 10	< 0.01
R2_ENV_069-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_069-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_070-Top	< 7	< 10	< 10	< 0.01
R2_ENV_070-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_070-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_071-Top	< 7	< 10	< 10	< 0.01
R2_ENV_071-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_071-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_072-Top	< 7	< 10	< 10	< 0.01
R2_ENV_072-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_072-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_073-Top	< 7	< 10	< 10	< 0.01
R2_ENV_073-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_073-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_074-Top	< 7	< 10	< 10	< 0.01
R2_ENV_074-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_074-Bottom	< 7	85	< 10	< 0.01
R2_ENV_075-Top	< 7	< 10	< 10	< 0.01

Summary of Water Column Hydrocarbon Content Analysis				
Sample	VPH (C_5-C_{10})*	EPH (C_{10}-C_{40})*	Dissolved and Emulsified Oil†	Free Oil‡
R2_ENV_075-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_075-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_076-Top	< 7	< 10	< 10	< 0.01
R2_ENV_076-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_076-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_077-Top	< 7	< 10	< 10	< 0.01
R2_ENV_077-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_077-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_078-Top	< 7	< 10	< 10	< 0.01
R2_ENV_078-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_078-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_079-Top	< 7	< 10	< 10	< 0.01
R2_ENV_079-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_079-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_080-Top	< 7	< 10	< 10	< 0.01
R2_ENV_080-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_080-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_081-Top	< 7	< 10	< 10	< 0.01
R2_ENV_081-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_081-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_082-Top	< 7	< 10	< 10	< 0.01
R2_ENV_082-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_082-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_083-Top	< 7	< 10	< 10	< 0.01
R2_ENV_083-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_083-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_084-Top	< 7	< 10	< 10	< 0.01
R2_ENV_084-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_084-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_085-Top	< 7	< 10	< 10	< 0.01
R2_ENV_085-Middle	< 7	< 10	< 10	< 0.01

Summary of Water Column Hydrocarbon Content Analysis				
Sample	VPH (C_5-C_{10})*	EPH (C_{10}-C_{40})*	Dissolved and Emulsified Oil†	Free Oil‡
R2_ENV_085-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_086-Top	< 7	< 10	< 10	< 0.01
R2_ENV_086-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_086-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_087-Top	< 7	< 10	< 10	< 0.01
R2_ENV_087-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_087-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_088-Top	< 7	< 10	< 10	< 0.01
R2_ENV_088-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_088-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_089-Top	< 7	< 10	< 10	< 0.01
R2_ENV_089-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_089-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_090-Top	< 7	< 10	< 10	< 0.01
R2_ENV_090-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_090-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_091-Top	< 7	< 10	< 10	< 0.01
R2_ENV_091-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_091-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_092-Top	< 7	< 10	< 10	< 0.01
R2_ENV_092-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_092-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_093-Top	< 7	< 10	< 10	< 0.01
R2_ENV_093-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_093-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_094-Top	< 7	< 10	< 10	< 0.01
R2_ENV_094-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_094-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_095-Top	< 7	< 10	< 10	< 0.01
R2_ENV_095-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_095-Bottom	< 7	< 10	< 10	< 0.01

Summary of Water Column Hydrocarbon Content Analysis				
Sample	VPH (C_5-C_{10})*	EPH (C_{10}-C_{40})*	Dissolved and Emulsified Oil†	Free Oil‡
R2_ENV_096-Top	< 7	< 10	< 10	< 0.01
R2_ENV_096-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_096-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_097-Top	< 7	< 10	< 10	< 0.01
R2_ENV_097-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_097-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_098-Top	< 7	< 10	< 10	< 0.01
R2_ENV_098-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_098-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_099-Top	< 7	< 10	< 10	< 0.01
R2_ENV_099-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_099-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_100-Top	< 7	< 10	< 10	< 0.01
R2_ENV_100-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_100-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_101-Top	< 7	< 10	< 10	< 0.01
R2_ENV_101-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_101-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_102-Top	< 7	< 10	< 10	< 0.01
R2_ENV_102-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_102-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_103-Top	< 7	39	< 10	< 0.01
R2_ENV_103-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_103-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_104-Top	< 7	< 10	< 10	< 0.01
R2_ENV_104-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_104-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_105-Top	< 7	< 10	< 10	< 0.01
R2_ENV_105-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_105-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_106-Top	< 7	< 10	< 10	< 0.01

Summary of Water Column Hydrocarbon Content Analysis				
Sample	VPH (C_5-C_{10})*	EPH (C_{10}-C_{40})*	Dissolved and Emulsified Oil†	Free Oil‡
R2_ENV_106-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_106-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_107-Top	< 7	< 10	< 10	< 0.01
R2_ENV_107-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_107-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_108-Top	< 7	< 10	< 10	< 0.01
R2_ENV_108-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_108-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_109-Top	< 7	< 10	< 10	< 0.01
R2_ENV_109-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_109-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_110-Top	< 7	< 10	< 10	< 0.01
R2_ENV_110-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_110-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_111-Top	< 7	< 10	< 10	< 0.01
R2_ENV_111-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_111-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_112-Top	< 7	< 10	< 10	< 0.01
R2_ENV_112-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_112-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_113-Top	< 7	< 10	< 10	< 0.01
R2_ENV_113-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_113-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_114-Top	< 7	< 10	< 10	< 0.01
R2_ENV_114-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_114-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_115-Top	< 7	< 10	< 10	< 0.01
R2_ENV_115-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_115-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_116-Top	< 7	< 10	< 10	< 0.01
R2_ENV_116-Middle	< 7	< 10	< 10	< 0.01

Summary of Water Column Hydrocarbon Content Analysis				
Sample	VPH (C_5-C_{10})*	EPH (C_{10}-C_{40})*	Dissolved and Emulsified Oil†	Free Oil‡
R2_ENV_116-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_117-Top	< 7	< 10	< 10	< 0.01
R2_ENV_117-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_117-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_118-Top	< 7	< 10	< 10	< 0.01
R2_ENV_118-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_118-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_119-Top	< 7	< 10	< 10	< 0.01
R2_ENV_119-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_119-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_120-Top	< 7	< 10	< 10	< 0.01
R2_ENV_120-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_120-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_121-Top	< 7	< 10	< 10	< 0.01
R2_ENV_121-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_121-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_122-Top	< 7	< 10	< 10	< 0.01
R2_ENV_122-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_122-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_123-Top	< 7	< 10	< 10	< 0.01
R2_ENV_123-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_123-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_124-Top	< 7	< 10	< 10	< 0.01
R2_ENV_124-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_124-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_125-Top	< 7	< 10	< 10	< 0.01
R2_ENV_125-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_125-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_126-Top	< 7	< 10	< 10	< 0.01
R2_ENV_126-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_126-Bottom	< 7	< 10	< 10	< 0.01

Summary of Water Column Hydrocarbon Content Analysis				
Sample	VPH (C_5-C_{10})*	EPH (C_{10}-C_{40})*	Dissolved and Emulsified Oil†	Free Oil‡
R2_ENV_127-Top	< 7	< 10	< 10	< 0.01
R2_ENV_127-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_127-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_128-Top	< 7	< 10	< 10	< 0.01
R2_ENV_128-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_128-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_129-Top	< 7	< 10	< 10	< 0.01
R2_ENV_129-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_129-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_130-Top	< 7	< 10	< 10	< 0.01
R2_ENV_130-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_130-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_131-Top	< 7	< 10	< 10	< 0.01
R2_ENV_131-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_131-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_132-Top	< 7	< 10	< 10	< 0.01
R2_ENV_132-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_132-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_133-Top	< 7	< 10	< 10	< 0.01
R2_ENV_133-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_133-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_134-Top	< 7	< 10	< 10	< 0.01
R2_ENV_134-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_134-Bottom	< 7	< 10	< 10	< 0.01
R2_ENV_REF-Top	< 7	< 10	< 10	< 0.01
R2_ENV_REF-Middle	< 7	< 10	< 10	< 0.01
R2_ENV_REF-Bottom	< 7	< 10	< 10	< 0.01
Minimum	**< 7**	**< 10**	**< 10**	**< 0.01**
Maximum	**< 7**	**230**	**< 10**	**< 0.01**
Water Standards (QCC, 2017)				
General use areas	**-**	**7.0#**	**-**	**-**

Summary of Water Column Hydrocarbon Content Analysis				
Sample	VPH (C_5-C_{10})*	EPH (C_{10}-C_{40})*	Dissolved and Emulsified Oil†	Free Oil‡
Marine protected areas	-	7.0#	-	-

Notes

VPH = Volatile petroleum hydrocarbons
EPH = Extractable petroleum hydrocarbons
QCC = Abu Dhabi Quality and Conformity Council
* = Data expressed as µg/L

= n-Alkane range not specified

Key:	Below Water Standards	Above Water Standard for General Use Areas	Above Water Standard for Marine Protected Areas

F.2 Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content																
Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R2_ENV_001-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_001-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_001-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_002-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_002-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_003-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_003-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_004-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_004-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_005-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_005-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_006-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_006-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	0.02
R2_ENV_007-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content

Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R2_ENV_007-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_008-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.01	< 0.01	< 0.02	< 0.01	0.14
R2_ENV_008-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_008-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_009-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_009-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_009-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	0.01	< 0.01
R2_ENV_010-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_010-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_010-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_011-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_011-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_011-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_012-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content

Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R2_ENV_012-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_012-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_013-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_013-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_013-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_014-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_014-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_014-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_015-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_015-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_015-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_016-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_016-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_016-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content																
Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R2_ENV_017-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_017-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_017-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_018-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_018-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_018-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_019-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_019-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_019-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_020-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_020-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_020-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_021-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_021-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content

Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R2_ENV_021-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_022-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_022-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_022-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_023-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_023-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_023-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_024-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_024-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_024-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_025-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_025-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_025-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_026-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content

Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R2_ENV_026-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_026-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_027-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_027-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_027-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_028-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_028-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_028-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_029-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_029-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_029-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_030-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_030-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_030-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R2_ENV_031-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_031-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_031-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_032-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_032-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_032-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_033-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_033-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_033-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_034-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_034-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_034-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_035-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_035-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content

Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R2_ENV_035-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_036-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_036-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_036-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_037-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_037-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_037-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_038-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_038-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_038-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_039-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_039-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_039-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_040-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content																
Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R2_ENV_040-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_040-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_041-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_041-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_041-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_042-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_042-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_042-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_043-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_043-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_043-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_044-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_044-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_044-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content

Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R2_ENV_045-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_045-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_045-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_046-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_046-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_046-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_047-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_047-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_047-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_048-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_048-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_048-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_049-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_049-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content

Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R2_ENV_049-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_050-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_050-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_050-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_051-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_051-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_051-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_052-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_052-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_052-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_053-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_053-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_053-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_054-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content

Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R2_ENV_054-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_054-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_055-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_055-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_055-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_056-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_056-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_056-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_057-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_057-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_057-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_058-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_058-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	0.01	< 0.01
R2_ENV_058-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content																
Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R2_ENV_059-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_059-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_059-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_060-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_060-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_060-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_061-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_061-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_061-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_062-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_062-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_062-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_063-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_063-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content																
Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R2_ENV_063-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_064-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_064-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_064-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_065-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_065-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_065-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_066-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_066-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_066-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_067-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_067-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_067-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_068-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content

Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R2_ENV_068-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_068-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_069-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_069-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_069-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_070-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_070-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_070-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_071-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_071-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_071-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_072-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_072-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_072-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content																
Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R2_ENV_073-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_073-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_073-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_074-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_074-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_074-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_075-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_075-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_075-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_076-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_076-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_076-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_077-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_077-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content																
Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R2_ENV_077-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_078-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_078-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_078-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_079-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_079-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_079-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_080-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_080-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_080-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_081-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_081-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_081-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_082-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content																
Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R2_ENV_082-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_082-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_083-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_083-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_083-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_084-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_084-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_084-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_085-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_085-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_085-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_086-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_086-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_086-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content

Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R2_ENV_087-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_087-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_087-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_088-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_088-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_088-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_089-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_089-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_089-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_090-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_090-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_090-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_091-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_091-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content

Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R2_ENV_091-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_092-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_092-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_092-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_093-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_093-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_093-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_094-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_094-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_094-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_095-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_095-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_095-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_096-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content

Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R2_ENV_096-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_096-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_097-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_097-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_097-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_098-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_098-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_098-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_099-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_099-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_099-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_100-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_100-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_100-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content																
Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R2_ENV_101-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_101-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_101-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_102-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_102-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_102-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_103-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_103-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_103-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_104-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_104-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_104-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_105-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_105-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content

Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R2_ENV_105-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_106-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_106-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_106-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_107-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_107-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_107-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_108-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_108-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_108-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_109-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_109-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_109-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_110-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content																
Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R2_ENV_110-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_110-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_111-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_111-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_111-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_112-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	0.01	< 0.01
R2_ENV_112-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_112-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_113-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_113-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_113-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_114-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_114-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_114-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content

Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R2_ENV_115-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_115-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_115-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_116-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_116-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_116-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_117-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_117-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_117-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_118-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_118-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_118-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_119-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_119-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content

Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R2_ENV_119-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_120-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_120-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_120-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_121-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_121-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_121-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_122-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_122-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_122-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_123-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_123-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_123-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_124-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content																
Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R2_ENV_124-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_124-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_125-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_125-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_125-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_126-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_126-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_126-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_127-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_127-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_127-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_128-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_128-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_128-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content

Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R2_ENV_129-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_129-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_129-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_130-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_130-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_130-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_131-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_131-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_131-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_132-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_132-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_132-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_133-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_133-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Summary of Water Column Polycyclic Aromatic Hydrocarbon (PAH) Content

Sample	PAH															
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
R2_ENV_133-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_134-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_134-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_134-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_REF-Top	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_REF-Middle	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
R2_ENV_REF-Bottom	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
Minimum	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.02**	**< 0.01**	**< 0.01**
Maximum	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**0.02**	**< 0.01**	**< 0.01**	**< 0.02**	**0.02**	**0.14**

Notes

Concentrations expressed as µg/L of water

PAH = Polycyclic aromatic hydrocarbon

F.3 Summary of Water Column Benzene, Toluene, Ethylbenzene and Xylene (BTEX) Concentrations

Summary of Water Column Benzene, Toluene, Ethylbenzene and Xylene (BTEX) Concentrations					
Sample	Benzene [µg/L]	Toluene [µg/L]	Ethylbenzene [µg/L]	m&p-Xylene [µg/L]	o-Xylene [µg/L]
R2_ENV_001-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_001-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_001-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_002-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_002-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_003-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_003-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_004-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_004-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_005-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_005-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_006-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_006-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_007-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_007-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_008-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_008-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_008-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_009-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_009-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_009-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_010-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_010-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_010-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_011-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_011-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_011-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_012-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_012-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_012-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_013-Top	< 7	< 7	< 7	< 14	< 7

Summary of Water Column Benzene, Toluene, Ethylbenzene and Xylene (BTEX) Concentrations					
Sample	Benzene [µg/L]	Toluene [µg/L]	Ethylbenzene [µg/L]	m&p-Xylene [µg/L]	o-Xylene [µg/L]
R2_ENV_013-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_013-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_014-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_014-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_014-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_015-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_015-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_015-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_016-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_016-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_016-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_017-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_017-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_017-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_018-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_018-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_018-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_019-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_019-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_019-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_020-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_020-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_020-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_021-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_021-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_021-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_022-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_022-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_022-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_023-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_023-Middle	< 7	< 7	< 7	< 14	< 7

Summary of Water Column Benzene, Toluene, Ethylbenzene and Xylene (BTEX) Concentrations					
Sample	Benzene [µg/L]	Toluene [µg/L]	Ethylbenzene [µg/L]	m&p-Xylene [µg/L]	o-Xylene [µg/L]
R2_ENV_023-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_024-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_024-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_024-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_025-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_025-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_025-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_026-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_026-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_026-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_027-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_027-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_027-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_028-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_028-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_028-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_029-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_029-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_029-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_030-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_030-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_030-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_031-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_031-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_031-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_032-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_032-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_032-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_033-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_033-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_033-Bottom	< 7	< 7	< 7	< 14	< 7

Summary of Water Column Benzene, Toluene, Ethylbenzene and Xylene (BTEX) Concentrations					
Sample	Benzene [µg/L]	Toluene [µg/L]	Ethylbenzene [µg/L]	m&p-Xylene [µg/L]	o-Xylene [µg/L]
R2_ENV_034-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_034-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_034-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_035-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_035-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_035-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_036-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_036-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_036-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_037-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_037-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_037-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_038-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_038-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_038-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_039-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_039-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_039-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_040-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_040-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_040-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_041-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_041-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_041-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_042-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_042-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_042-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_043-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_043-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_043-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_044-Top	< 7	< 7	< 7	< 14	< 7

Summary of Water Column Benzene, Toluene, Ethylbenzene and Xylene (BTEX) Concentrations					
Sample	Benzene [µg/L]	Toluene [µg/L]	Ethylbenzene [µg/L]	m&p-Xylene [µg/L]	o-Xylene [µg/L]
R2_ENV_044-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_044-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_045-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_045-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_045-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_046-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_046-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_046-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_047-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_047-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_047-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_048-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_048-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_048-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_049-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_049-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_049-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_050-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_050-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_050-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_051-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_051-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_051-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_052-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_052-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_052-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_053-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_053-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_053-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_054-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_054-Middle	< 7	< 7	< 7	< 14	< 7

Summary of Water Column Benzene, Toluene, Ethylbenzene and Xylene (BTEX) Concentrations					
Sample	Benzene [µg/L]	Toluene [µg/L]	Ethylbenzene [µg/L]	m&p-Xylene [µg/L]	o-Xylene [µg/L]
R2_ENV_054-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_055-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_055-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_055-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_056-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_056-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_056-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_057-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_057-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_057-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_058-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_058-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_058-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_059-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_059-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_059-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_060-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_060-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_060-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_061-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_061-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_061-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_062-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_062-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_062-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_063-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_063-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_063-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_064-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_064-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_064-Bottom	< 7	< 7	< 7	< 14	< 7

Summary of Water Column Benzene, Toluene, Ethylbenzene and Xylene (BTEX) Concentrations

Sample	Benzene [µg/L]	Toluene [µg/L]	Ethylbenzene [µg/L]	m&p-Xylene [µg/L]	o-Xylene [µg/L]
R2_ENV_065-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_065-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_065-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_066-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_066-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_066-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_067-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_067-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_067-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_068-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_068-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_068-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_069-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_069-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_069-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_070-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_070-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_070-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_071-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_071-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_071-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_072-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_072-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_072-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_073-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_073-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_073-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_074-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_074-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_074-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_075-Top	< 7	< 7	< 7	< 14	< 7

Summary of Water Column Benzene, Toluene, Ethylbenzene and Xylene (BTEX) Concentrations					
Sample	Benzene [µg/L]	Toluene [µg/L]	Ethylbenzene [µg/L]	m&p-Xylene [µg/L]	o-Xylene [µg/L]
R2_ENV_075-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_075-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_076-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_076-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_076-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_077-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_077-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_077-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_078-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_078-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_078-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_079-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_079-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_079-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_080-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_080-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_080-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_081-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_081-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_081-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_082-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_082-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_082-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_083-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_083-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_083-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_084-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_084-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_084-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_085-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_085-Middle	< 7	< 7	< 7	< 14	< 7

Summary of Water Column Benzene, Toluene, Ethylbenzene and Xylene (BTEX) Concentrations					
Sample	Benzene [µg/L]	Toluene [µg/L]	Ethylbenzene [µg/L]	m&p-Xylene [µg/L]	o-Xylene [µg/L]
R2_ENV_085-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_086-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_086-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_086-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_087-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_087-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_087-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_088-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_088-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_088-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_089-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_089-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_089-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_090-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_090-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_090-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_091-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_091-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_091-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_092-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_092-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_092-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_093-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_093-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_093-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_094-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_094-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_094-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_095-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_095-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_095-Bottom	< 7	< 7	< 7	< 14	< 7

Summary of Water Column Benzene, Toluene, Ethylbenzene and Xylene (BTEX) Concentrations					
Sample	Benzene [µg/L]	Toluene [µg/L]	Ethylbenzene [µg/L]	m&p-Xylene [µg/L]	o-Xylene [µg/L]
R2_ENV_096-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_096-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_096-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_097-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_097-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_097-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_098-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_098-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_098-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_099-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_099-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_099-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_100-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_100-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_100-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_101-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_101-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_101-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_102-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_102-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_102-Bottom	< 7	< 7	< 7	< 14	< 7
R2-ENV_103-Top	< 7	< 7	< 7	< 14	< 7
R2-ENV_103-Middle	< 7	< 7	< 7	< 14	< 7
R2-ENV_103-Bottom	< 7	< 7	< 7	< 14	< 7
R2-ENV_104-Top	< 7	< 7	< 7	< 14	< 7
R2-ENV_104-Middle	< 7	< 7	< 7	< 14	< 7
R2-ENV_104-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_105-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_105-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_105-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_106-Top	< 7	< 7	< 7	< 14	< 7

Summary of Water Column Benzene, Toluene, Ethylbenzene and Xylene (BTEX) Concentrations					
Sample	Benzene [µg/L]	Toluene [µg/L]	Ethylbenzene [µg/L]	m&p-Xylene [µg/L]	o-Xylene [µg/L]
R2_ENV_106-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_106-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_107-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_107-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_107-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_108-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_108-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_108-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_109-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_109-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_109-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_110-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_110-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_110-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_111-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_111-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_111-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_112-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_112-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_112-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_113-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_113-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_113-Bottom	< 7	< 7	< 7	< 14	< 7
R2-ENV_114-Top	< 7	< 7	< 7	< 14	< 7
R2-ENV_114-Middle	< 7	< 7	< 7	< 14	< 7
R2-ENV_114-Bottom	< 7	< 7	< 7	< 14	< 7
R2-ENV_115-Top	< 7	< 7	< 7	< 14	< 7
R2-ENV_115-Middle	< 7	< 7	< 7	< 14	< 7
R2-ENV_115-Bottom	< 7	< 7	< 7	< 14	< 7
R2-ENV_116-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_116-Middle	< 7	< 7	< 7	< 14	< 7

Summary of Water Column Benzene, Toluene, Ethylbenzene and Xylene (BTEX) Concentrations					
Sample	Benzene [µg/L]	Toluene [µg/L]	Ethylbenzene [µg/L]	m&p-Xylene [µg/L]	o-Xylene [µg/L]
R2_ENV_116-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_117-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_117-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_117-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_118-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_118-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_118-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_119-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_119-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_119-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_120-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_120-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_120-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_121-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_121-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_121-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_122-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_122-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_122-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_123-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_123-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_123-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_124-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_124-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_124-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_125-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_125-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_125-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_126-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_126-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_126-Bottom	< 7	< 7	< 7	< 14	< 7

Summary of Water Column Benzene, Toluene, Ethylbenzene and Xylene (BTEX) Concentrations					
Sample	Benzene [µg/L]	Toluene [µg/L]	Ethylbenzene [µg/L]	m&p-Xylene [µg/L]	o-Xylene [µg/L]
R2_ENV_127-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_127-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_127-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_128-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_128-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_128-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_129-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_129-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_129-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_130-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_130-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_130-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_131-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_131-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_131-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_132-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_132-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_132-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_133-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_133-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_133-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_134-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_134-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_134-Bottom	< 7	< 7	< 7	< 14	< 7
R2_ENV_REF-Top	< 7	< 7	< 7	< 14	< 7
R2_ENV_REF-Middle	< 7	< 7	< 7	< 14	< 7
R2_ENV_REF-Bottom	< 7	< 7	< 7	< 14	< 7
Minimum	**< 7**	**< 7**	**< 7**	**< 14**	**< 7**
Maximum	**< 7**	**< 7**	**< 7**	**< 14**	**< 7**

Summary of Water Column Benzene, Toluene, Ethylbenzene and Xylene (BTEX) Concentrations					
Sample	Benzene [µg/L]	Toluene [µg/L]	Ethylbenzene [µg/L]	m&p-Xylene [µg/L]	o-Xylene [µg/L]
CCME Marine Long Term Water Quality Guidelines for the Protection of Aquatic Life (CCME, 2020)					
CCME Limit	110	215	25	-	-
Notes Concentrations expressed as µg/L of water m&p-Xylene = m-Xylene and p-Xylene					
Key:	Below CCME Guideline		Above CCME Guideline		

F.4 Summary of Water Column Phenol Concentrations

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R2_ENV_001-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_001-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_001-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_002-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_002-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_003-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_003-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_004-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_004-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_005-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_005-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_006-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_006-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_007-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R2_ENV_007-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_008-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_008-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_008-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_009-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_009-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_009-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_010-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_010-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_010-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_011-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_011-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_011-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_012-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R2_ENV_012-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_012-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_013-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_013-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_013-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_014-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_014-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_014-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_015-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_015-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_015-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_016-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_016-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_016-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R2_ENV_017-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_017-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_017-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_018-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_018-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_018-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_019-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_019-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_019-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_020-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_020-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_020-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_021-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_021-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations																
Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R2_ENV_021-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_022-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_022-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_022-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_023-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_023-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_023-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_024-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_024-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_024-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_025-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_025-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_025-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_026-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R2_ENV_026-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_026-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_027-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_027-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_027-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_028-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_028-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_028-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_029-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_029-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_029-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_030-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_030-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_030-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R2_ENV_031-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_031-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_031-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_032-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_032-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_032-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_033-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_033-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_033-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_034-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_034-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_034-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_035-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_035-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R2_ENV_035-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_036-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_036-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_036-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_037-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_037-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_037-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_038-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_038-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_038-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_039-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_039-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_039-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_040-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R2_ENV_040-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_040-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_041-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_041-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_041-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_042-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_042-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_042-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_043-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_043-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_043-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_044-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_044-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_044-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R2_ENV_045-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_045-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_045-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_046-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_046-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_046-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_047-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_047-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_047-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_048-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_048-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_048-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_049-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_049-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R2_ENV_049-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_050-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_050-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_050-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_051-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_051-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_051-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_052-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_052-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_052-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_053-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_053-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_053-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_054-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations																
Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R2_ENV_054-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_054-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_055-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_055-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_055-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_056-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_056-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_056-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_057-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_057-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_057-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_058-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_058-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_058-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R2_ENV_059-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_059-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_059-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_060-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_060-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_060-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_061-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_061-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_061-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_062-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_062-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_062-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_063-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_063-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations																
Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R2_ENV_063-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_064-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_064-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_064-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_065-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_065-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_065-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_066-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_066-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_066-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_067-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_067-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_067-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_068-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R2_ENV_068-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_068-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_069-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_069-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_069-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_070-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_070-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_070-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_071-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_071-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_071-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_072-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_072-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_072-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R2_ENV_073-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_073-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_073-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_074-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_074-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_074-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_075-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_075-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_075-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_076-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_076-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_076-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_077-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_077-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R2_ENV_077-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_078-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_078-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_078-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_079-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_079-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_079-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_080-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_080-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_080-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_081-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_081-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_081-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_082-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R2_ENV_082-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_082-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_083-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_083-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_083-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_084-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_084-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_084-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_085-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_085-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_085-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_086-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_086-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_086-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R2_ENV_087-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_087-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_087-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_088-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_088-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_088-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_089-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_089-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_089-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_090-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_090-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_090-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_091-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_091-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R2_ENV_091-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_092-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_092-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_092-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_093-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_093-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_093-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_094-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_094-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_094-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_095-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_095-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_095-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_096-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R2_ENV_096-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_096-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_097-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_097-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_097-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_098-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_098-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_098-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_099-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_099-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_099-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_100-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_100-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_100-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R2_ENV_101-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_101-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_101-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_102-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_102-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_102-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2-ENV_103-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2-ENV_103-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2-ENV_103-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2-ENV_104-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2-ENV_104-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2-ENV_104-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_105-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_105-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R2_ENV_105-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_106-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_106-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_106-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_107-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_107-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_107-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_108-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_108-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_108-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_109-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_109-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_109-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_110-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R2_ENV_110-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_110-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_111-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_111-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_111-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_112-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_112-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_112-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_113-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_113-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_113-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2-ENV_114-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2-ENV_114-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2-ENV_114-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R2-ENV_115-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2-ENV_115-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2-ENV_115-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2-ENV_116-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_116-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_116-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_117-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_117-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_117-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_118-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_118-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_118-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_119-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_119-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R2_ENV_119-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_120-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_120-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_120-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_121-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_121-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_121-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_122-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_122-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_122-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_123-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_123-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_123-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_124-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R2_ENV_124-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_124-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_125-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_125-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_125-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_126-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_126-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_126-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_127-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_127-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_127-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_128-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_128-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_128-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations																
Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R2_ENV_129-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_129-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_129-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_130-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_130-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_130-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_131-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_131-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_131-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_132-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_132-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_132-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_133-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_133-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Summary of Water Column Phenol Concentrations

Sample	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4-Chloro-3-methylphenol	4-Methylphenol	4-Nitrophenol	Pentachlorophenol	2,3,4,6-Tetrachlorophenol	2,3,5,6-Tetrachlorophenol	2,6-Dichlorophenol	3-Methylphenol	Phenol
R2_ENV_133-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_134-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_134-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_134-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_REF-Top	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_REF-Middle	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
R2_ENV_REF-Bottom	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
Minimum	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5
Maximum	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.5

Notes
Concentrations expressed in µg/L

G. Water Column Major and Trace Elements

G.1 Summary of Water Column Major and Trace Element Analysis

Summary of Water Column Major and Trace Element Analysis												
Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
R2_ENV_001-Top	< 0.005	0.0023	< 0.0005	0.0069	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0010	< 0.0002	0.0035	< 0.010
R2_ENV_001-Middle	< 0.005	0.0027	< 0.0005	0.0066	< 0.0001	0.0005	< 0.0003	< 0.02	< 0.0010	0.0006	0.0039	< 0.010
R2_ENV_001-Bottom	< 0.005	0.0031	< 0.0005	0.0061	0.0002	0.0004	< 0.0003	< 0.02	< 0.0010	< 0.0002	0.0039	< 0.010
R2_ENV_002-Top	< 0.005	0.0025	< 0.0005	< 0.0005	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0031	0.005
R2_ENV_002-Bottom	< 0.005	0.0026	< 0.0005	< 0.0005	< 0.0001	< 0.0001	< 0.0003	0.03	< 0.0001	< 0.0002	0.0032	0.002
R2_ENV_003-Top	0.033	0.0024	< 0.0005	< 0.0005	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0027	0.015
R2_ENV_003-Bottom	0.007	0.0026	< 0.0005	< 0.0005	< 0.0001	< 0.0001	0.0003	< 0.02	< 0.0001	0.0004	0.0031	0.007
R2_ENV_004-Top	0.020	0.0030	< 0.0005	< 0.0005	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0003	0.0029	0.004
R2_ENV_004-Bottom	0.013	0.0029	< 0.0005	< 0.0005	< 0.0001	< 0.0001	0.0210	< 0.02	< 0.0001	0.0011	0.0028	0.021
R2_ENV_005-Top	0.017	0.0029	< 0.0005	< 0.0005	0.0001	< 0.0001	< 0.0003	0.20	< 0.0001	< 0.0002	0.0030	0.002
R2_ENV_005-Bottom	0.014	0.0029	< 0.0005	< 0.0005	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0029	0.006
R2_ENV_006-Top	0.012	0.0036	< 0.0005	< 0.0005	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0029	0.003
R2_ENV_006-Bottom	0.016	0.0029	< 0.0005	< 0.0005	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0028	0.010
R2_ENV_007-Top	0.016	0.0027	< 0.0005	< 0.0005	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0030	0.005
R2_ENV_007-Bottom	0.006	0.0028	< 0.0005	< 0.0005	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0029	0.015
R2_ENV_008-Top	< 0.005	0.0026	< 0.0005	0.005	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0010	0.0004	0.0036	< 0.010
R2_ENV_008-Middle	< 0.005	0.0022	< 0.0005	0.0047	0.0001	< 0.0001	< 0.0003	0.04	< 0.0010	< 0.0002	0.0033	0.076
R2_ENV_008-Bottom	< 0.005	0.0034	< 0.0005	0.0050	< 0.0001	0.0004	0.0012	< 0.02	< 0.0010	< 0.0002	0.0036	< 0.010
R2_ENV_009-Top	< 0.005	0.0026	< 0.0005	0.0068	< 0.0001	< 0.0001	< 0.0003	0.21	< 0.0001	< 0.0002	0.0020	0.006

Summary of Water Column Major and Trace Element Analysis												
Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
R2_ENV_009-Middle	< 0.005	0.0029	< 0.0005	0.183	< 0.0001	< 0.0001	< 0.0003	0.11	< 0.0001	< 0.0002	0.0023	< 0.002
R2_ENV_009-Bottom	< 0.005	0.0027	< 0.0005	0.0467	< 0.0001	0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	< 0.002
R2_ENV_010-Top	0.006	0.0035	< 0.0005	0.0063	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0025	< 0.002
R2_ENV_010-Middle	< 0.005	0.0017	< 0.0005	0.0034	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0019	< 0.002
R2_ENV_010-Bottom	< 0.005	0.0013	< 0.0005	0.0036	< 0.0001	0.0007	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	0.004
R2_ENV_011-Top	< 0.005	0.0013	< 0.0005	0.0040	< 0.0001	0.0007	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0017	0.007
R2_ENV_011-Middle	< 0.005	0.0019	< 0.0005	0.0034	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0019	0.005
R2_ENV_011-Bottom	< 0.005	0.0020	< 0.0005	0.0035	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.003
R2_ENV_012-Top	< 0.005	0.0020	< 0.0005	0.0032	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	0.006
R2_ENV_012-Middle	< 0.005	0.0017	< 0.0005	0.0034	< 0.0001	0.0007	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.008
R2_ENV_012-Bottom	< 0.005	0.0027	< 0.0005	0.0034	< 0.0001	0.0007	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.011
R2_ENV_013-Top	< 0.005	0.0020	< 0.0005	0.0032	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	< 0.002
R2_ENV_013-Middle	< 0.005	0.0019	< 0.0005	0.0036	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	< 0.002
R2_ENV_013-Bottom	< 0.005	0.0014	< 0.0005	0.0031	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0018	0.004
R2_ENV_014-Top	< 0.005	0.0029	< 0.0005	0.0059	< 0.0001	0.0005	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	< 0.002
R2_ENV_014-Middle	< 0.005	0.0030	< 0.0005	0.0065	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	< 0.002
R2_ENV_014-Bottom	< 0.005	0.0033	< 0.0005	0.0064	< 0.0001	0.0006	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	< 0.002
R2_ENV_015-Top	< 0.005	0.0021	< 0.0005	0.0030	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0020	< 0.002
R2_ENV_015-Middle	< 0.005	0.0020	< 0.0005	0.0035	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	< 0.002

Summary of Water Column Major and Trace Element Analysis												
Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
R2_ENV_015-Bottom	< 0.005	0.0018	< 0.0005	0.0044	< 0.0001	0.0009	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0018	0.003
R2_ENV_016-Top	< 0.005	0.0034	< 0.0005	0.0055	< 0.0001	0.0003	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0024	< 0.002
R2_ENV_016-Middle	< 0.005	0.0025	< 0.0005	0.0058	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	< 0.002
R2_ENV_016-Bottom	< 0.005	0.0025	< 0.0005	0.0074	< 0.0001	0.0002	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0024	< 0.002
R2_ENV_017-Top	0.005	0.0032	< 0.0005	0.0040	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0024	< 0.002
R2_ENV_017-Middle	0.007	0.0029	< 0.0005	0.0055	< 0.0001	0.0004	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	< 0.002
R2_ENV_017-Bottom	< 0.005	0.0027	< 0.0005	0.0069	< 0.0001	0.0002	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.014
R2_ENV_018-Top	< 0.005	0.0035	< 0.0005	0.0058	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0027	0.005
R2_ENV_018-Middle	< 0.005	0.0038	< 0.0005	0.0060	< 0.0001	0.0002	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0025	< 0.002
R2_ENV_018-Bottom	0.013	0.0043	< 0.0005	0.0067	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0026	0.006
R2_ENV_019-Top	< 0.005	0.0028	< 0.0005	0.0054	< 0.0001	0.0007	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0026	0.005
R2_ENV_019-Middle	< 0.005	0.0028	< 0.0005	0.0061	< 0.0001	0.0003	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0030	0.007
R2_ENV_019-Bottom	0.015	0.0033	< 0.0005	0.0074	< 0.0001	0.0005	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0026	0.003
R2_ENV_020-Top	0.013	0.0029	< 0.0005	0.0062	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0024	< 0.002
R2_ENV_020-Middle	< 0.005	0.0034	< 0.0005	0.0071	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0025	< 0.002
R2_ENV_020-Bottom	< 0.005	0.0033	< 0.0005	0.0065	< 0.0001	0.0002	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.010
R2_ENV_021-Top	< 0.005	0.0029	< 0.0005	0.0061	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	0.005
R2_ENV_021-Middle	< 0.005	0.0026	< 0.0005	0.0060	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.012
R2_ENV_021-Bottom	< 0.005	0.0032	< 0.0005	0.0067	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	< 0.002

Summary of Water Column Major and Trace Element Analysis												
Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
R2_ENV_022-Top	< 0.005	0.0030	< 0.0005	0.0060	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0019	0.016
R2_ENV_022-Middle	< 0.005	0.0024	< 0.0005	0.0060	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	< 0.002
R2_ENV_022-Bottom	< 0.005	0.0033	< 0.0005	0.0057	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	< 0.002
R2_ENV_023-Top	< 0.005	0.0021	< 0.0005	0.0032	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0018	< 0.002
R2_ENV_023-Middle	< 0.005	0.0016	< 0.0005	0.0037	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0020	< 0.002
R2_ENV_023-Bottom	< 0.005	0.0017	< 0.0005	0.0033	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0020	< 0.002
R2_ENV_024-Top	< 0.005	0.0012	< 0.0005	0.0034	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	0.003
R2_ENV_024-Middle	< 0.005	0.0015	< 0.0005	0.0033	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0019	0.005
R2_ENV_024-Bottom	< 0.005	0.0017	< 0.0005	0.0039	< 0.0001	0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0020	< 0.002
R2_ENV_025-Top	< 0.005	0.0020	< 0.0005	0.0037	< 0.0001	0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0017	0.020
R2_ENV_025-Middle	< 0.005	0.0025	< 0.0005	0.0030	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0018	0.002
R2_ENV_025-Bottom	< 0.005	0.0018	< 0.0005	0.0029	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	0.004
R2_ENV_026-Top	< 0.005	0.0027	< 0.0005	0.0029	< 0.0001	0.0002	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0020	0.005
R2_ENV_026-Middle	< 0.005	0.0022	< 0.0005	0.0031	< 0.0001	0.0002	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0020	< 0.002
R2_ENV_026-Bottom	< 0.005	0.0018	< 0.0005	0.0036	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0016	0.007
R2_ENV_027-Top	< 0.005	0.0011	< 0.0005	0.0025	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0018	0.011
R2_ENV_027-Middle	< 0.005	0.0018	< 0.0005	0.0031	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0018	0.008
R2_ENV_027-Bottom	< 0.005	0.0013	< 0.0005	0.0033	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0017	< 0.002
R2_ENV_028-Top	< 0.005	0.0018	< 0.0005	0.0029	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0019	0.004

Summary of Water Column Major and Trace Element Analysis												
Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
R2_ENV_028-Middle	< 0.005	0.0018	< 0.0005	0.0029	< 0.0001	0.0002	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	< 0.002
R2_ENV_028-Bottom	< 0.005	0.0026	< 0.0005	0.0041	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	< 0.002
R2_ENV_029-Top	< 0.005	0.0016	< 0.0005	0.0031	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0018	0.007
R2_ENV_029-Middle	< 0.005	0.0022	< 0.0005	0.0033	< 0.0001	0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0020	< 0.002
R2_ENV_029-Bottom	< 0.005	0.0017	< 0.0005	0.0039	< 0.0001	0.0008	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0020	0.016
R2_ENV_030-Top	< 0.005	0.0016	< 0.0005	0.0033	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	< 0.002
R2_ENV_030-Middle	< 0.005	0.0016	< 0.0005	0.0033	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0020	0.003
R2_ENV_030-Bottom	< 0.005	0.0024	< 0.0005	0.0042	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0020	< 0.002
R2_ENV_031-Top	< 0.005	0.0014	< 0.0005	0.0039	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0024	0.013
R2_ENV_031-Middle	< 0.005	0.0018	< 0.0005	0.0037	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0025	0.008
R2_ENV_031-Bottom	< 0.005	0.0016	< 0.0005	0.0043	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.006
R2_ENV_032-Top	< 0.005	0.0019	< 0.0005	0.0038	< 0.0001	0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0028	0.011
R2_ENV_032-Middle	< 0.005	0.0015	< 0.0005	0.0039	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0029	0.050
R2_ENV_032-Bottom	< 0.005	0.0025	< 0.0005	0.0041	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.020
R2_ENV_033-Top	< 0.005	0.0017	< 0.0005	0.0041	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0028	0.007
R2_ENV_033-Middle	< 0.005	0.0021	< 0.0005	0.0042	< 0.0001	0.0003	< 0.0003	0.02	< 0.0001	< 0.0002	0.0024	0.016
R2_ENV_033-Bottom	< 0.005	0.0022	< 0.0005	0.0044	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0026	0.015
R2_ENV_034-Top	< 0.005	0.0020	< 0.0005	0.0044	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0026	0.009
R2_ENV_034-Middle	< 0.005	0.0020	< 0.0005	0.0042	< 0.0001	0.0008	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	0.007

Summary of Water Column Major and Trace Element Analysis												
Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
R2_ENV_034-Bottom	< 0.005	< 0.0005	< 0.0005	0.0040	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	0.003
R2_ENV_035-Top	< 0.005	0.0015	< 0.0005	0.0042	< 0.0001	0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	0.013
R2_ENV_035-Middle	< 0.005	0.0019	< 0.0005	0.0043	< 0.0001	0.0002	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	0.005
R2_ENV_035-Bottom	< 0.005	0.0016	< 0.0005	0.0043	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.018
R2_ENV_036-Top	< 0.005	0.0016	< 0.0005	0.0046	< 0.0001	0.0002	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	0.007
R2_ENV_036-Middle	< 0.005	0.0014	< 0.0005	0.0043	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.012
R2_ENV_036-Bottom	< 0.005	0.0016	< 0.0005	0.0044	< 0.0001	0.0002	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.005
R2_ENV_037-Top	< 0.005	0.0012	< 0.0005	0.0043	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0024	< 0.002
R2_ENV_037-Middle	< 0.005	0.0013	< 0.0005	0.0039	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.004
R2_ENV_037-Bottom	< 0.005	0.0021	< 0.0005	0.0049	< 0.0001	0.0006	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	0.011
R2_ENV_038-Top	< 0.005	0.0016	< 0.0005	0.0040	< 0.0001	0.0009	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	0.017
R2_ENV_038-Middle	< 0.005	0.0020	< 0.0005	0.0043	< 0.0001	0.0005	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	0.003
R2_ENV_038-Bottom	< 0.005	0.0015	< 0.0005	0.0045	< 0.0001	0.0005	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	0.003
R2_ENV_039-Top	< 0.005	0.0015	< 0.0005	0.0041	< 0.0001	0.0004	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0024	0.004
R2_ENV_039-Middle	0.050	0.0019	< 0.0005	0.0042	< 0.0001	0.0006	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	0.004
R2_ENV_039-Bottom	< 0.005	0.0033	< 0.0005	0.0046	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0025	0.007
R2_ENV_040-Top	< 0.005	0.0027	< 0.0005	0.0040	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	0.004
R2_ENV_040-Middle	0.018	0.0024	< 0.0005	0.0047	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	< 0.002
R2_ENV_040-Bottom	< 0.005	0.0025	< 0.0005	0.0046	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0020	< 0.002

Summary of Water Column Major and Trace Element Analysis												
Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
R2_ENV_041-Top	< 0.005	0.0021	< 0.0005	0.0040	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	< 0.002
R2_ENV_041-Middle	< 0.005	0.0032	< 0.0005	0.0041	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	< 0.002
R2_ENV_041-Bottom	< 0.005	0.0023	< 0.0005	0.0050	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	< 0.002
R2_ENV_042-Top	< 0.005	0.0018	< 0.0005	0.0030	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0019	0.008
R2_ENV_042-Middle	< 0.005	0.0019	< 0.0005	0.0038	< 0.0001	0.0009	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	0.015
R2_ENV_042-Bottom	< 0.005	0.0023	< 0.0005	0.0052	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	0.007
R2_ENV_043-Top	< 0.005	0.0018	< 0.0005	0.0045	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.004
R2_ENV_043-Middle	0.019	0.0020	< 0.0005	0.0047	< 0.0001	0.0010	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.003
R2_ENV_043-Bottom	< 0.005	0.0020	< 0.0005	0.0050	< 0.0001	0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0024	0.009
R2_ENV_044-Top	< 0.005	0.0024	< 0.0005	0.0043	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0024	0.007
R2_ENV_044-Middle	< 0.005	0.0023	< 0.0005	0.0040	< 0.0001	0.0009	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0025	0.005
R2_ENV_044-Bottom	< 0.005	0.0024	< 0.0005	0.0041	< 0.0001	0.0011	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0024	0.009
R2_ENV_045-Top	< 0.005	0.0015	< 0.0005	0.0047	< 0.0001	0.0003	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0025	0.033
R2_ENV_045-Middle	< 0.005	0.0019	< 0.0005	0.0045	< 0.0001	0.0002	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.004
R2_ENV_045-Bottom	< 0.005	0.0022	< 0.0005	0.0049	< 0.0001	0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.005
R2_ENV_046-Top	< 0.005	0.0028	< 0.0005	0.0039	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	< 0.002
R2_ENV_046-Middle	< 0.005	0.0031	< 0.0005	0.0042	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0025	< 0.002
R2_ENV_046-Bottom	< 0.005	0.0024	< 0.0005	0.0043	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	< 0.002
R2_ENV_047-Top	< 0.005	0.0023	< 0.0005	0.0036	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0024	< 0.002

Summary of Water Column Major and Trace Element Analysis												
Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
R2_ENV_047-Middle	< 0.005	0.0026	< 0.0005	0.0045	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	< 0.002
R2_ENV_047-Bottom	< 0.005	0.0019	< 0.0005	0.0044	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	0.002
R2_ENV_048-Top	< 0.005	0.0025	< 0.0005	0.0031	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0024	0.003
R2_ENV_048-Middle	< 0.005	0.0027	< 0.0005	0.0041	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0024	< 0.002
R2_ENV_048-Bottom	< 0.005	0.0019	< 0.0005	0.0049	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	< 0.002
R2_ENV_049-Top	< 0.005	0.0018	< 0.0005	0.0033	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.004
R2_ENV_049-Middle	< 0.005	0.0030	< 0.0005	0.0051	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	< 0.002
R2_ENV_049-Bottom	< 0.005	0.0030	< 0.0005	0.0048	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0024	< 0.002
R2_ENV_050-Top	< 0.005	0.0020	< 0.0005	0.0038	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	< 0.002
R2_ENV_050-Middle	< 0.005	0.0026	< 0.0005	0.0047	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	< 0.002
R2_ENV_050-Bottom	< 0.005	0.0026	< 0.0005	0.0050	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	< 0.002
R2_ENV_051-Top	< 0.005	0.0023	< 0.0005	0.0041	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	< 0.002
R2_ENV_051-Middle	< 0.005	0.0022	< 0.0005	0.0048	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	< 0.002
R2_ENV_051-Bottom	< 0.005	0.0032	< 0.0005	0.0050	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	< 0.002
R2_ENV_052-Top	< 0.005	0.0012	< 0.0005	0.0037	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0018	0.002
R2_ENV_052-Middle	0.007	0.0038	< 0.0005	0.0034	< 0.0001	0.0026	< 0.0003	0.02	< 0.0001	< 0.0002	0.0034	0.004
R2_ENV_052-Bottom	0.010	0.0048	< 0.0005	0.0033	< 0.0001	0.0014	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0033	< 0.002
R2_ENV_053-Top	< 0.005	0.0042	< 0.0005	0.0044	< 0.0001	0.0015	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0030	0.004
R2_ENV_053-Middle	0.005	0.0046	< 0.0005	0.0044	< 0.0001	0.0017	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0032	< 0.002

Summary of Water Column Major and Trace Element Analysis												
Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
R2_ENV_053-Bottom	< 0.005	0.0034	< 0.0005	0.0038	< 0.0001	0.0003	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0026	< 0.002
R2_ENV_054-Top	0.006	0.0033	< 0.0005	0.0035	< 0.0001	0.0012	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0028	0.003
R2_ENV_054-Middle	< 0.005	0.0044	< 0.0005	0.0042	< 0.0001	0.0010	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0028	< 0.002
R2_ENV_054-Bottom	< 0.005	0.0039	< 0.0005	0.0037	< 0.0001	0.0011	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0024	< 0.002
R2_ENV_055-Top	< 0.005	0.0023	< 0.0005	0.0061	< 0.0001	0.0014	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0029	0.011
R2_ENV_055-Middle	< 0.005	0.0022	< 0.0005	0.0059	< 0.0001	0.0009	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0027	0.025
R2_ENV_055-Bottom	< 0.005	0.0022	< 0.0005	0.0056	< 0.0001	0.0009	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0026	0.007
R2_ENV_056-Top	0.049	0.0022	< 0.0005	0.0054	< 0.0001	0.0011	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0027	0.020
R2_ENV_056-Middle	< 0.005	0.0024	< 0.0005	0.0058	< 0.0001	0.0003	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0026	0.010
R2_ENV_056-Bottom	< 0.005	0.0025	< 0.0005	0.0049	< 0.0001	0.0008	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0029	0.016
R2_ENV_057-Top	< 0.005	0.0030	< 0.0005	0.0060	< 0.0001	0.0014	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0029	0.018
R2_ENV_057-Middle	< 0.005	0.0031	< 0.0005	0.0061	< 0.0001	0.0020	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0025	0.010
R2_ENV_057-Bottom	< 0.005	0.0032	< 0.0005	0.0047	< 0.0001	0.0027	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0025	0.015
R2_ENV_058-Top	< 0.005	0.0018	< 0.0005	0.0056	< 0.0001	0.0012	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0028	0.022
R2_ENV_058-Middle	< 0.005	0.0017	< 0.0005	0.0061	< 0.0001	0.0017	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	0.006
R2_ENV_058-Bottom	< 0.005	0.0024	< 0.0005	0.0052	< 0.0001	0.0010	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0025	< 0.002
R2_ENV_059-Top	< 0.005	0.0019	< 0.0005	0.0057	< 0.0001	0.0017	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0027	0.008
R2_ENV_059-Middle	< 0.005	0.0023	< 0.0005	0.0057	< 0.0001	0.0017	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0025	< 0.002
R2_ENV_059-Bottom	< 0.005	0.0029	< 0.0005	0.0058	< 0.0001	0.0023	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0026	0.014

Summary of Water Column Major and Trace Element Analysis												
Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
R2_ENV_060-Top	< 0.005	0.0028	< 0.0005	0.0064	< 0.0001	0.0009	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0026	0.026
R2_ENV_060-Middle	< 0.005	0.0021	< 0.0005	0.0058	< 0.0001	0.0017	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0025	0.009
R2_ENV_060-Bottom	< 0.005	0.0026	< 0.0005	0.0055	< 0.0001	0.0017	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0024	< 0.002
R2_ENV_061-Top	< 0.005	0.0036	< 0.0005	0.0040	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0025	0.032
R2_ENV_061-Middle	< 0.005	0.0030	< 0.0005	0.0050	< 0.0001	0.0009	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	< 0.002
R2_ENV_061-Bottom	< 0.005	0.0017	< 0.0005	0.0057	< 0.0001	0.0019	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0026	0.019
R2_ENV_062-Top	< 0.005	0.0037	< 0.0005	0.0040	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.004
R2_ENV_062-Middle	0.006	0.0035	< 0.0005	0.0037	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.004
R2_ENV_062-Bottom	< 0.005	0.0030	< 0.0005	0.0044	< 0.0001	0.0007	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0028	0.012
R2_ENV_063-Top	< 0.005	0.0031	< 0.0005	0.0052	< 0.0001	0.0021	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0028	0.010
R2_ENV_063-Middle	< 0.005	0.0022	< 0.0005	0.0052	< 0.0001	0.0020	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0028	0.010
R2_ENV_063-Bottom	< 0.005	0.0020	< 0.0005	0.0062	< 0.0001	0.0011	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0024	0.026
R2_ENV_064-Top	< 0.005	< 0.0005	< 0.0005	0.0015	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0015	< 0.002
R2_ENV_064-Middle	< 0.005	< 0.0005	< 0.0005	0.0050	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0016	< 0.002
R2_ENV_064-Bottom	< 0.005	< 0.0005	< 0.0005	0.0014	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0014	< 0.002
R2_ENV_065-Top	< 0.005	< 0.0005	< 0.0005	0.0020	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0015	< 0.002
R2_ENV_065-Middle	< 0.005	< 0.0005	< 0.0005	0.0010	< 0.0001	0.0005	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0016	< 0.002
R2_ENV_065-Bottom	< 0.005	< 0.0005	< 0.0005	0.0022	< 0.0001	0.0012	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	< 0.002
R2_ENV_066-Top	< 0.005	0.0024	< 0.0005	0.0064	< 0.0001	0.0009	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0030	0.011

Summary of Water Column Major and Trace Element Analysis												
Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
R2_ENV_066-Middle	< 0.005	0.0027	< 0.0005	0.0058	< 0.0001	0.0005	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	0.005
R2_ENV_066-Bottom	< 0.005	0.0019	< 0.0005	0.0053	< 0.0001	0.0007	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	0.010
R2_ENV_067-Top	< 0.005	0.0005	< 0.0005	0.0018	< 0.0001	0.0035	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	< 0.002
R2_ENV_067-Middle	< 0.005	0.0009	< 0.0005	0.0022	< 0.0001	0.0057	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	< 0.002
R2_ENV_067-Bottom	< 0.005	0.0009	< 0.0005	0.0015	< 0.0001	0.0040	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0020	< 0.002
R2_ENV_068-Top	< 0.005	0.0030	< 0.0005	0.0062	< 0.0001	0.0017	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	0.009
R2_ENV_068-Middle	< 0.005	0.0029	< 0.0005	0.0056	< 0.0001	0.0007	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.006
R2_ENV_068-Bottom	< 0.005	0.0031	< 0.0005	0.0050	< 0.0001	0.0020	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0028	0.006
R2_ENV_069-Top	< 0.005	0.0027	< 0.0005	0.0054	< 0.0001	0.0020	< 0.0003	< 0.02	< 0.0001	0.0004	0.0028	0.006
R2_ENV_069-Middle	< 0.005	0.0025	< 0.0005	0.0055	< 0.0001	0.0006	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0026	0.003
R2_ENV_069-Bottom	< 0.005	0.0026	< 0.0005	0.0049	< 0.0001	0.0018	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.008
R2_ENV_070-Top	< 0.005	0.0021	< 0.0005	0.0055	< 0.0001	0.0015	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.011
R2_ENV_070-Middle	< 0.005	0.0026	< 0.0005	0.0054	< 0.0001	0.0011	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0025	0.007
R2_ENV_070-Bottom	< 0.005	0.0029	< 0.0005	0.0056	< 0.0001	0.0020	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0025	0.009
R2_ENV_071-Top	< 0.005	< 0.0005	< 0.0005	0.0015	< 0.0001	0.0050	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	< 0.002
R2_ENV_071-Middle	< 0.005	0.0007	< 0.0005	0.0012	< 0.0001	0.0036	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0017	< 0.002
R2_ENV_071-Bottom	< 0.005	0.0006	< 0.0005	0.0018	< 0.0001	0.0057	< 0.0003	0.02	< 0.0001	< 0.0002	0.0018	< 0.002
R2_ENV_072-Top	< 0.005	0.0025	< 0.0005	0.0054	< 0.0001	0.0016	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0025	< 0.002
R2_ENV_072-Middle	< 0.005	0.0022	< 0.0005	0.0055	< 0.0001	0.0019	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0025	< 0.002

Summary of Water Column Major and Trace Element Analysis												
Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
R2_ENV_072-Bottom	< 0.005	0.0026	< 0.0005	0.0046	< 0.0001	0.0015	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.007
R2_ENV_073-Top	0.009	0.0006	< 0.0005	0.0013	< 0.0001	0.0053	< 0.0003	0.02	< 0.0001	< 0.0002	0.0014	< 0.002
R2_ENV_073-Middle	< 0.005	0.0006	< 0.0005	0.0019	< 0.0001	0.0065	< 0.0003	0.02	< 0.0001	< 0.0002	0.0015	< 0.002
R2_ENV_073-Bottom	< 0.005	< 0.0005	< 0.0005	0.0015	< 0.0001	0.0071	< 0.0003	0.03	< 0.0001	< 0.0002	0.0015	0.015
R2_ENV_074-Top	< 0.005	< 0.0005	< 0.0005	0.0006	< 0.0001	0.0080	< 0.0003	0.03	< 0.0001	< 0.0002	0.0015	< 0.002
R2_ENV_074-Middle	< 0.005	0.0006	< 0.0005	0.0019	< 0.0001	0.0094	< 0.0003	0.03	< 0.0001	< 0.0002	0.0016	< 0.002
R2_ENV_074-Bottom	< 0.005	< 0.0005	< 0.0005	0.0031	< 0.0001	0.0090	< 0.0003	0.06	< 0.0001	< 0.0002	0.0018	< 0.002
R2_ENV_075-Top	< 0.005	0.0006	< 0.0005	0.0015	< 0.0001	0.0103	< 0.0003	0.08	< 0.0001	< 0.0002	0.0015	< 0.002
R2_ENV_075-Middle	< 0.005	< 0.0005	< 0.0005	0.0016	< 0.0001	0.0130	< 0.0003	0.04	< 0.0001	< 0.0002	0.0019	< 0.002
R2_ENV_075-Bottom	< 0.005	0.0005	< 0.0005	0.0024	< 0.0001	0.0126	< 0.0003	0.05	< 0.0001	< 0.0002	0.0020	< 0.002
R2_ENV_076-Top	< 0.005	0.0006	< 0.0005	0.0006	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0015	< 0.002
R2_ENV_076-Middle	< 0.005	0.0009	< 0.0005	0.0020	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0020	< 0.002
R2_ENV_076-Bottom	< 0.005	0.0010	< 0.0005	0.0019	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0024	< 0.002
R2_ENV_077-Top	< 0.005	< 0.0005	< 0.0005	0.0015	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0014	0.021
R2_ENV_077-Middle	< 0.005	0.0006	< 0.0005	0.0008	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0016	< 0.002
R2_ENV_077-Bottom	< 0.005	0.0007	< 0.0005	0.0021	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0016	< 0.002
R2_ENV_078-Top	< 0.005	< 0.0005	< 0.0005	0.0009	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0020	0.050
R2_ENV_078-Middle	< 0.005	0.0007	< 0.0005	0.0015	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0025	< 0.002
R2_ENV_078-Bottom	< 0.005	0.0005	< 0.0005	0.0025	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0030	< 0.002

Summary of Water Column Major and Trace Element Analysis												
Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
R2_ENV_079-Top	0.006	< 0.0005	< 0.0005	0.0023	< 0.0001	< 0.0001	0.0127	< 0.02	< 0.0001	< 0.0002	0.0020	0.007
R2_ENV_079-Middle	< 0.005	0.0006	< 0.0005	0.0014	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	< 0.002
R2_ENV_079-Bottom	< 0.005	< 0.0005	< 0.0005	0.0025	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	< 0.002
R2_ENV_080-Top	< 0.005	< 0.0005	< 0.0005	< 0.0005	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	< 0.002
R2_ENV_080-Middle	0.010	< 0.0005	< 0.0005	0.0018	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	< 0.002
R2_ENV_080-Bottom	< 0.005	0.0007	< 0.0005	0.0019	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	< 0.002
R2_ENV_081-Top	< 0.005	< 0.0005	< 0.0005	0.0043	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0007	< 0.002
R2_ENV_081-Middle	< 0.005	0.0010	< 0.0005	0.0015	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0026	< 0.002
R2_ENV_081-Bottom	< 0.005	0.0010	< 0.0005	0.0015	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	< 0.002
R2_ENV_082-Top	< 0.005	0.0006	< 0.0005	0.0015	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0026	< 0.002
R2_ENV_082-Middle	< 0.005	0.0017	< 0.0005	0.0041	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0025	< 0.002
R2_ENV_082-Bottom	< 0.005	0.0016	< 0.0005	0.0019	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0026	< 0.002
R2_ENV_083-Top	0.090	0.0021	< 0.0005	0.0041	< 0.0001	< 0.0001	0.0044	0.09	< 0.0001	< 0.0002	0.0026	0.012
R2_ENV_083-Middle	0.022	0.0021	< 0.0005	0.0027	< 0.0001	< 0.0001	0.0029	0.03	< 0.0001	< 0.0002	0.0028	< 0.002
R2_ENV_083-Bottom	0.060	0.0017	< 0.0005	0.0028	< 0.0001	< 0.0001	0.0012	< 0.02	< 0.0001	< 0.0002	0.0026	0.010
R2_ENV_084-Top	< 0.005	< 0.0005	< 0.0005	0.0052	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0006	0.001
R2_ENV_084-Middle	< 0.005	0.0022	< 0.0005	0.0015	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0028	< 0.002
R2_ENV_084-Bottom	< 0.005	0.0020	< 0.0005	0.0028	< 0.0001	< 0.0001	0.0035	< 0.02	< 0.0001	< 0.0002	0.0026	< 0.002
R2_ENV_085-Top	< 0.005	< 0.0005	< 0.0005	0.0053	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0007	< 0.002

Summary of Water Column Major and Trace Element Analysis

Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
R2_ENV_085-Middle	< 0.005	< 0.0005	< 0.0005	0.0056	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0008	< 0.002
R2_ENV_085-Bottom	< 0.005	< 0.0005	< 0.0005	0.0060	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0006	< 0.002
R2_ENV_086-Top	< 0.005	< 0.0005	< 0.0005	0.0046	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0007	< 0.002
R2_ENV_086-Middle	< 0.005	< 0.0005	< 0.0005	0.0054	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0007	< 0.002
R2_ENV_086-Bottom	< 0.005	< 0.0005	< 0.0005	0.0063	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0006	< 0.002
R2_ENV_087-Top	< 0.005	< 0.0005	< 0.0005	0.0049	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0006	< 0.002
R2_ENV_087-Middle	< 0.005	< 0.0005	< 0.0005	0.0053	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0007	< 0.002
R2_ENV_087-Bottom	< 0.005	< 0.0005	< 0.0005	0.0046	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0007	< 0.002
R2_ENV_088-Top	< 0.005	< 0.0005	< 0.0005	0.0045	0.0004	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0002	< 0.002
R2_ENV_088-Middle	< 0.005	< 0.0005	< 0.0005	0.0056	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0007	< 0.002
R2_ENV_088-Bottom	< 0.005	< 0.0005	< 0.0005	0.0057	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0007	< 0.002
R2_ENV_089-Top	< 0.005	< 0.0005	< 0.0005	0.0043	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0005	< 0.002
R2_ENV_089-Middle	< 0.005	< 0.0005	< 0.0005	0.0055	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0006	< 0.002
R2_ENV_089-Bottom	< 0.005	< 0.0005	< 0.0005	0.0062	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0011	< 0.002
R2_ENV_090-Top	< 0.005	< 0.0005	< 0.0005	0.0050	< 0.0001	0.0010	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0011	0.034
R2_ENV_090-Middle	< 0.005	< 0.0005	< 0.0005	0.0048	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0006	< 0.002
R2_ENV_090-Bottom	< 0.005	< 0.0005	< 0.0005	0.0051	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0003	< 0.002
R2_ENV_091-Top	< 0.005	< 0.0005	< 0.0005	0.0052	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0006	0.009
R2_ENV_091-Middle	< 0.005	< 0.0005	< 0.0005	0.0059	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0009	< 0.002

Summary of Water Column Major and Trace Element Analysis												
Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
R2_ENV_091-Bottom	< 0.005	< 0.0005	< 0.0005	0.0055	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0009	< 0.002
R2_ENV_092-Top	< 0.005	< 0.0005	< 0.0005	0.0059	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0008	< 0.002
R2_ENV_092-Middle	< 0.005	< 0.0005	< 0.0005	0.0046	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0008	< 0.002
R2_ENV_092-Bottom	< 0.005	< 0.0005	< 0.0005	0.0063	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0008	< 0.002
R2_ENV_093-Top	< 0.005	< 0.0005	< 0.0005	0.0046	< 0.0001	0.0009	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0006	< 0.002
R2_ENV_093-Middle	< 0.005	< 0.0005	< 0.0005	0.0053	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0009	0.005
R2_ENV_093-Bottom	< 0.005	< 0.0005	< 0.0005	0.0065	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0010	0.015
R2_ENV_094-Top	< 0.005	< 0.0005	< 0.0005	0.0047	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0009	< 0.002
R2_ENV_094-Middle	< 0.005	< 0.0005	< 0.0005	0.0051	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0009	< 0.002
R2_ENV_094-Bottom	< 0.005	< 0.0005	< 0.0005	0.0051	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0007	< 0.002
R2_ENV_095-Top	< 0.005	< 0.0005	< 0.0005	0.0043	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0007	< 0.002
R2_ENV_095-Middle	0.030	< 0.0005	< 0.0005	0.0108	0.0002	< 0.0001	0.0006	0.05	< 0.0001	0.0016	0.0008	0.130
R2_ENV_095-Bottom	< 0.005	< 0.0005	< 0.0005	0.0050	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0007	< 0.002
R2_ENV_096-Top	< 0.005	< 0.0005	< 0.0005	< 0.0005	< 0.0001	0.0265	< 0.0003	0.10	< 0.0001	< 0.0002	0.0014	< 0.002
R2_ENV_096-Middle	< 0.005	< 0.0005	< 0.0005	0.0018	< 0.0001	0.0227	< 0.0003	0.11	< 0.0001	< 0.0002	0.0012	< 0.002
R2_ENV_096-Bottom	< 0.005	< 0.0005	< 0.0005	0.0050	< 0.0001	< 0.0001	< 0.0003	0.01	< 0.0001	< 0.0002	0.0014	< 0.002
R2_ENV_097-Top	< 0.005	0.0005	< 0.0005	0.0009	< 0.0001	0.0258	< 0.0003	0.10	< 0.0001	< 0.0002	0.0016	< 0.002
R2_ENV_097-Middle	< 0.005	0.0007	< 0.0005	0.0012	< 0.0001	0.0283	< 0.0003	0.11	< 0.0001	< 0.0002	0.0020	< 0.002
R2_ENV_097-Bottom	< 0.005	< 0.0005	< 0.0005	0.0017	< 0.0001	0.0280	< 0.0003	0.11	< 0.0001	< 0.0002	0.0015	< 0.002

Summary of Water Column Major and Trace Element Analysis												
Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
R2_ENV_098-Top	0.009	< 0.0005	< 0.0005	0.0008	< 0.0001	0.0235	< 0.0003	0.11	< 0.0001	< 0.0002	0.0017	< 0.002
R2_ENV_098-Middle	< 0.005	0.0005	< 0.0005	0.0014	< 0.0001	0.0254	< 0.0003	0.10	< 0.0001	< 0.0002	0.0016	< 0.002
R2_ENV_098-Bottom	< 0.005	0.0006	< 0.0005	0.0014	< 0.0001	0.0284	< 0.0003	0.11	< 0.0001	< 0.0002	0.0017	< 0.002
R2_ENV_099-Top	< 0.005	< 0.0005	< 0.0005	< 0.0005	< 0.0001	0.0202	< 0.0003	0.08	< 0.0001	< 0.0002	0.0018	< 0.002
R2_ENV_099-Middle	< 0.005	< 0.0005	< 0.0005	0.0013	< 0.0001	0.0207	< 0.0003	0.08	< 0.0001	< 0.0002	0.0017	< 0.002
R2_ENV_099-Bottom	< 0.005	< 0.0005	< 0.0005	0.0019	< 0.0001	0.0225	< 0.0003	0.08	< 0.0001	< 0.0002	0.0016	< 0.002
R2_ENV_100-Top	< 0.005	< 0.0005	< 0.0005	< 0.0005	< 0.0001	0.0174	< 0.0003	0.06	< 0.0001	< 0.0002	0.0017	< 0.002
R2_ENV_100-Middle	< 0.005	< 0.0005	< 0.0005	0.0011	< 0.0001	0.0177	< 0.0003	0.07	< 0.0001	0.0017	0.0015	< 0.002
R2_ENV_100-Bottom	< 0.005	< 0.0005	< 0.0005	0.0016	< 0.0001	0.0188	< 0.0003	0.07	< 0.0001	< 0.0002	0.0016	< 0.002
R2_ENV_101-Top	< 0.005	0.0030	< 0.0005	0.0053	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0016	< 0.002
R2_ENV_101-Middle	< 0.005	0.0021	< 0.0005	0.0062	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0017	< 0.002
R2_ENV_101-Bottom	< 0.005	0.0021	< 0.0005	0.0059	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	< 0.002
R2_ENV_102-Top	< 0.005	0.0005	< 0.0005	0.0018	< 0.0001	0.0126	< 0.0003	0.06	< 0.0001	< 0.0002	0.0017	< 0.002
R2_ENV_102-Middle	< 0.005	0.0006	< 0.0005	0.0016	< 0.0001	0.0140	< 0.0003	0.06	< 0.0001	< 0.0002	0.0016	< 0.002
R2_ENV_102-Bottom	< 0.005	< 0.0005	< 0.0005	0.0018	< 0.0001	0.0156	< 0.0003	0.06	< 0.0001	< 0.0002	0.0017	< 0.002
R2_ENV_103-Top	< 0.005	0.0020	< 0.0005	0.0053	< 0.0001	0.0015	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0013	0.005
R2_ENV_103-Middle	< 0.005	0.0027	< 0.0005	0.0063	< 0.0001	0.0020	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0015	0.003
R2_ENV_103-Bottom	< 0.005	0.0028	< 0.0005	0.0062	< 0.0001	0.0016	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0016	0.005
R2_ENV_104-Top	< 0.005	0.0029	< 0.0005	0.0052	< 0.0001	0.0017	< 0.0003	0.02	< 0.0001	< 0.0002	0.0014	0.005

Summary of Water Column Major and Trace Element Analysis												
Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
R2_ENV_104-Middle	< 0.005	0.0034	< 0.0005	0.0062	< 0.0001	0.0015	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0016	0.003
R2_ENV_104-Bottom	< 0.005	0.0028	< 0.0005	0.0059	< 0.0001	0.0015	< 0.0003	0.02	< 0.0001	< 0.0002	0.0015	0.007
R2_ENV_105-Top	< 0.005	0.0015	< 0.0005	0.0032	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0018	0.002
R2_ENV_105-Middle	< 0.005	0.0014	< 0.0005	0.0035	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0019	< 0.002
R2_ENV_105-Bottom	< 0.005	0.0013	< 0.0005	0.0040	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0016	< 0.002
R2_ENV_106-Top	< 0.005	0.0013	< 0.0005	0.0031	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0017	0.023
R2_ENV_106-Middle	0.018	0.0009	< 0.0005	0.0036	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	0.007
R2_ENV_106-Bottom	< 0.005	0.0014	< 0.0005	0.0043	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0019	0.003
R2_ENV_107-Top	< 0.005	0.0009	< 0.0005	0.0031	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0016	0.007
R2_ENV_107-Middle	< 0.005	0.0014	< 0.0005	0.0032	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0017	< 0.002
R2_ENV_107-Bottom	< 0.005	0.0014	< 0.0005	0.0046	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0019	< 0.002
R2_ENV_108-Top	< 0.005	0.0017	< 0.0005	0.0048	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0015	< 0.002
R2_ENV_108-Middle	< 0.005	0.0017	< 0.0005	0.0066	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	0.0004	0.0016	< 0.002
R2_ENV_108-Bottom	< 0.005	0.0027	< 0.0005	0.0064	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0017	< 0.002
R2_ENV_109-Top	< 0.005	0.0015	< 0.0005	0.0054	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0017	< 0.002
R2_ENV_109-Middle	< 0.005	0.0019	< 0.0005	0.0058	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0016	0.002
R2_ENV_109-Bottom	< 0.005	0.0025	< 0.0005	0.0063	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0015	0.002
R2_ENV_110-Top	< 0.005	0.0017	< 0.0005	0.0033	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0019	0.042
R2_ENV_110-Middle	0.010	0.0014	< 0.0005	0.0043	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	< 0.002

Summary of Water Column Major and Trace Element Analysis												
Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
R2_ENV_110-Bottom	< 0.005	0.0018	< 0.0005	0.0061	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0016	< 0.002
R2_ENV_111-Top	< 0.005	0.0018	< 0.0005	0.0024	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0019	< 0.002
R2_ENV_111-Middle	< 0.005	0.0019	< 0.0005	0.0039	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	< 0.002
R2_ENV_111-Bottom	< 0.005	0.0011	< 0.0005	0.0036	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0016	< 0.002
R2_ENV_112-Top	< 0.005	< 0.0005	< 0.0005	0.0028	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0019	< 0.002
R2_ENV_112-Middle	< 0.005	0.0016	< 0.0005	0.0028	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0020	< 0.002
R2_ENV_112-Bottom	< 0.005	0.0016	< 0.0005	0.0042	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	< 0.002
R2_ENV_113-Top	< 0.005	0.0011	< 0.0005	0.0028	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0019	< 0.002
R2_ENV_113-Middle	< 0.005	0.0015	< 0.0005	0.0035	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0019	0.005
R2_ENV_113-Bottom	< 0.005	0.0018	< 0.0005	0.0036	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0019	0.005
R2_ENV_114-Top	< 0.005	0.0023	< 0.0005	0.0051	< 0.0001	0.0037	< 0.0003	0.02	< 0.0001	< 0.0002	0.0020	0.009
R2_ENV_114-Middle	< 0.005	0.0028	< 0.0005	0.0054	0.0001	0.0037	< 0.0003	0.03	< 0.0001	< 0.0002	0.0020	0.003
R2_ENV_114-Bottom	< 0.005	0.0031	< 0.0005	0.0057	< 0.0001	0.0039	< 0.0003	0.03	< 0.0001	< 0.0002	0.0019	0.007
R2_ENV_115-Top	< 0.005	0.0018	< 0.0005	0.0053	< 0.0001	0.0025	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0016	0.012
R2_ENV_115-Middle	< 0.005	0.0027	< 0.0005	0.0052	< 0.0001	0.0030	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0019	0.005
R2_ENV_115-Bottom	< 0.005	0.0026	< 0.0005	0.0061	< 0.0001	0.0040	< 0.0003	0.03	< 0.0001	< 0.0002	0.0020	0.006
R2_ENV_116-Top	0.020	0.0022	< 0.0005	0.0054	< 0.0001	0.0033	< 0.0003	0.03	< 0.0001	< 0.0002	0.0017	0.013
R2_ENV_116-Middle	< 0.005	0.0027	< 0.0005	0.0052	< 0.0001	0.0021	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	0.004
R2_ENV_116-Bottom	< 0.005	0.0025	< 0.0005	0.0042	< 0.0001	0.0009	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.008

Summary of Water Column Major and Trace Element Analysis												
Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
R2_ENV_117-Top	< 0.005	0.0026	< 0.0005	0.0047	< 0.0001	0.0005	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0025	0.004
R2_ENV_117-Middle	< 0.005	0.0028	< 0.0005	0.0049	< 0.0001	0.0024	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0025	0.010
R2_ENV_117-Bottom	< 0.005	0.0022	< 0.0005	0.0040	< 0.0001	0.0015	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0025	0.005
R2_ENV_118-Top	< 0.005	0.0020	< 0.0005	0.0046	< 0.0001	0.0015	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	0.008
R2_ENV_118-Middle	< 0.005	0.0021	< 0.0005	0.0066	< 0.0001	0.0015	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0019	0.007
R2_ENV_118-Bottom	< 0.005	0.0028	< 0.0005	0.0040	< 0.0001	0.0009	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.008
R2_ENV_119-Top	< 0.005	0.0025	< 0.0005	0.0036	< 0.0001	0.0008	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.003
R2_ENV_119-Middle	< 0.005	0.0032	< 0.0005	0.0060	< 0.0001	0.0009	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0020	0.008
R2_ENV_119-Bottom	< 0.005	0.0022	< 0.0005	0.0036	< 0.0001	0.0013	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0020	0.004
R2_ENV_120-Top	< 0.005	0.0018	< 0.0005	0.0043	< 0.0001	0.0016	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	0.002
R2_ENV_120-Middle	< 0.005	0.0029	< 0.0005	0.0075	< 0.0001	0.0019	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	0.003
R2_ENV_120-Bottom	< 0.005	0.0014	< 0.0005	0.0038	< 0.0001	0.0005	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.003
R2_ENV_121-Top	< 0.005	0.0026	< 0.0005	0.0046	< 0.0001	0.0015	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0020	0.004
R2_ENV_121-Middle	< 0.005	0.0019	< 0.0005	0.0054	< 0.0001	0.0012	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.011
R2_ENV_121-Bottom	0.006	0.0020	< 0.0005	0.0041	< 0.0001	0.0012	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	0.046
R2_ENV_122-Top	< 0.005	0.0025	< 0.0005	0.0045	< 0.0001	0.0009	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0020	0.038
R2_ENV_122-Middle	< 0.005	0.0025	< 0.0005	0.0052	< 0.0001	0.0009	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	0.015
R2_ENV_122-Bottom	0.014	0.0015	< 0.0005	0.0052	< 0.0001	0.0005	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	0.006
R2_ENV_123-Top	< 0.005	0.0022	< 0.0005	0.0039	< 0.0001	0.0008	< 0.0003	< 0.02	< 0.0001	0.0011	0.0023	0.003

Summary of Water Column Major and Trace Element Analysis												
Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
R2_ENV_123-Middle	< 0.005	0.0015	< 0.0005	0.0045	< 0.0001	0.0009	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.002
R2_ENV_123-Bottom	< 0.005	0.0024	< 0.0005	0.0051	< 0.0001	0.0003	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.006
R2_ENV_124-Top	< 0.005	0.0027	< 0.0005	0.0035	< 0.0001	0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0019	0.006
R2_ENV_124-Middle	< 0.005	0.0029	< 0.0005	0.0049	< 0.0001	0.0010	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0024	0.004
R2_ENV_124-Bottom	< 0.005	0.0026	< 0.0005	0.0061	< 0.0001	0.0016	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	< 0.002
R2_ENV_125-Top	< 0.005	0.0025	< 0.0005	0.0039	< 0.0001	0.0014	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	0.002
R2_ENV_125-Middle	0.008	0.0033	< 0.0005	0.0043	< 0.0001	0.0006	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	0.009
R2_ENV_125-Bottom	< 0.005	0.0021	< 0.0005	0.0052	< 0.0001	0.0013	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	< 0.002
R2_ENV_126-Top	< 0.005	0.0011	< 0.0005	0.0025	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0019	0.009
R2_ENV_126-Middle	< 0.005	0.0017	< 0.0005	0.0026	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0017	0.006
R2_ENV_126-Bottom	< 0.005	0.0009	< 0.0005	0.0043	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	0.006
R2_ENV_127-Top	< 0.005	0.0020	< 0.0005	0.0038	< 0.0001	0.0009	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0025	< 0.002
R2_ENV_127-Middle	0.069	0.0015	< 0.0005	0.0041	< 0.0001	0.0004	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0019	< 0.002
R2_ENV_127-Bottom	< 0.005	0.0025	< 0.0005	0.0047	< 0.0001	0.0009	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	< 0.002
R2_ENV_128-Top	< 0.005	0.0024	< 0.0005	0.0032	< 0.0001	0.0011	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	< 0.002
R2_ENV_128-Middle	< 0.005	0.0025	< 0.0005	0.0057	< 0.0001	0.0008	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0020	< 0.002
R2_ENV_128-Bottom	< 0.005	0.0019	< 0.0005	0.0054	< 0.0001	0.0019	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0023	0.008
R2_ENV_129-Top	< 0.005	0.0013	< 0.0005	0.0037	< 0.0001	0.0010	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0022	< 0.002
R2_ENV_129-Middle	< 0.005	0.0027	< 0.0005	0.0048	< 0.0001	0.0007	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0021	< 0.002

Summary of Water Column Major and Trace Element Analysis												
Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
R2_ENV_129-Bottom	0.013	0.0030	< 0.0005	0.0063	0.0008	0.0007	< 0.0003	< 0.02	< 0.0001	0.0005	0.0035	< 0.002
R2_ENV_130-Top	< 0.005	0.0013	< 0.0005	0.0029	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0015	0.008
R2_ENV_130-Middle	0.009	0.0011	< 0.0005	0.0040	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0020	0.008
R2_ENV_130-Bottom	< 0.005	0.0016	< 0.0005	0.0043	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0020	0.003
R2_ENV_131-Top	< 0.005	0.0010	< 0.0005	0.0039	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0019	< 0.002
R2_ENV_131-Middle	< 0.005	0.0012	< 0.0005	0.0031	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0019	< 0.002
R2_ENV_131-Bottom	< 0.005	0.0014	< 0.0005	0.0043	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0020	0.004
R2_ENV_132-Top	< 0.005	0.0011	< 0.0005	0.0032	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0019	0.006
R2_ENV_132-Middle	< 0.005	0.0013	< 0.0005	0.0034	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0018	0.017
R2_ENV_132-Bottom	< 0.005	< 0.0005	< 0.0005	0.0031	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0018	0.013
R2_ENV_133-Top	0.019	0.0009	< 0.0005	0.0033	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0018	0.004
R2_ENV_133-Middle	< 0.005	0.0013	< 0.0005	0.0028	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0015	< 0.002
R2_ENV_133-Bottom	0.005	0.0013	< 0.0005	0.0040	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0020	0.003
R2_ENV_134-Top	< 0.005	0.0012	< 0.0005	0.0025	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0019	0.004
R2_ENV_134-Middle	< 0.005	0.0012	< 0.0005	0.0031	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0019	0.003
R2_ENV_134-Bottom	< 0.005	0.0016	< 0.0005	0.0041	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0019	0.008
R2_ENV_REF-Top	< 0.005	< 0.0005	< 0.0005	0.0049	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0013	0.004
R2_ENV_REF-Middle	< 0.005	< 0.0005	< 0.0005	0.0052	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0007	< 0.002
R2_ENV_REF-Bottom	< 0.005	< 0.0005	< 0.0005	0.0051	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0006	< 0.002

Summary of Water Column Major and Trace Element Analysis

Sample	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Pb	V	Zn
Minimum	< 0.005	< 0.0005	< 0.0005	< 0.0005	< 0.0001	< 0.0001	< 0.0003	< 0.02	< 0.0001	< 0.0002	0.0002	< 0.002
Maximum	0.090	0.0048	< 0.0005	0.1830	0.0008	0.0283	0.0210	0.21	< 0.0001	0.0017	0.0039	0.130
Mean	-	0.0018	-	0.0046	-	-	-	-	-	-	0.0020	0.006
Standard Deviation	-	0.0103	-	0.00935	-	-	-	-	-	-	0.00061	0.0101
RSD [%]	-	57	-	202	-	-	-	-	-	-	30	176
Water Standards (QCC, 2017)												
General use areas	-	-	-	-	0.0007	0.0002	0.0030	-	0.0001	0.0022	-	0.015
Marine protected areas	-	-	-	-	0.0003	0.0002	0.0030	-	0.0001	0.0022	-	0.015
US EPA Saltwater Quality Standards (US EPA, 2020)												
CCC	-	0.036	-	-	0.0079	0.050*	0.0031	-	0.00094	0.0056	-	0.081
CMC	-	0.069	0.0019	-	0.033	1.100*	0.0048	-	0.0018	0.140	-	0.090

Notes
Concentrations expressed in mg/L
For statistical evaluation, results < MRV were treated as absolute values determined by MRV/2
Al = Aluminium As = Arsenic Ag = Silver Ba = Barium Cd = Cadmium Cr = Chromium Cu = Copper Fe = Iron
Hg = Mercury Pb = Lead V = Vanadium Zn = Zinc
RSD = Relative standard deviation CCC = Criterion continuous concentration
QCC = Abu Dhabi Quality and Conformity Council CMC = Criterion maximum concentration
US EPA = United States Environmental Protection Agency MRV = Minimum reporting value
* = Standards based on the most toxic oxidation state (chromium VI). Data for current survey is total chromium

Key:	Below Water Standards	Above Water Standard for General Use Areas	Above Water Standard for Marine Protected Areas	Above CCC	Above CMC

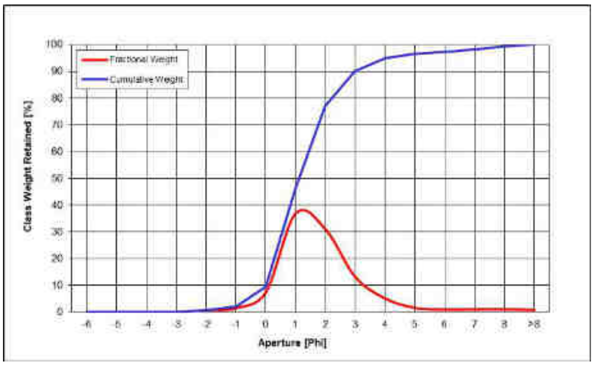
H. Sediment Characteristics

H.1 Sediment Particle Size and Grab Sample Photographs

STATION R2_ENV_009

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.7	0.7
2000.0	-1	1.4	2.1
1000.0	0	7.3	9.4
500.0	1	36.8	46.2
250.0	2	30.8	77.0
125.0	3	13.0	90.0
62.5	4	5.0	95.0
31.2	5	1.5	96.5
15.6	6	0.9	97.4
7.8	7	0.9	98.3
3.9	8	1.0	99.3
< 3.9	> 8	0.7	100
Total		100	100

Particle Size Distribution



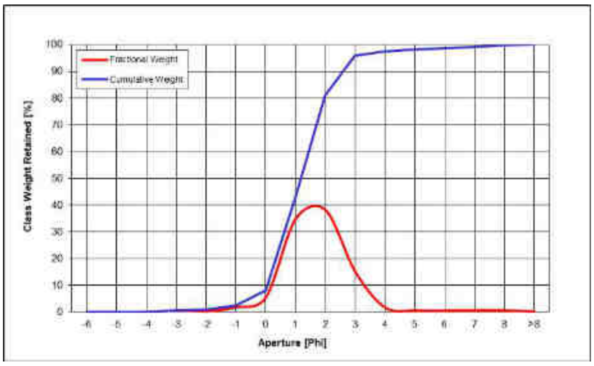
Sorting [µm] †	1.29	Poorly sorted
Skewness [µm] †	0.22	Fine skewed
Kurtosis [µm] †	1.25	Leptokurtic
Mean [µm]* †	412	Medium sand
Mean [phi]* †	1.28	
Median [µm]* †	459	Medium sand
Median [phi]* †	1.12	
Gravel [%]*	2.1	Slightly gravelly sand
Sand [%]*	93.0	
Mud [%]*	5.0	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_010

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.5	0.5
4000.0	-2	0.3	0.9
2000.0	-1	1.7	2.6
1000.0	0	5.5	8.1
500.0	1	34.8	42.9
250.0	2	38.1	80.9
125.0	3	15.0	95.9
62.5	4	1.6	97.6
31.2	5	0.6	98.1
15.6	6	0.5	98.7
7.8	7	0.6	99.2
3.9	8	0.6	99.8
< 3.9	> 8	0.2	100
Total		100	100

Particle Size Distribution



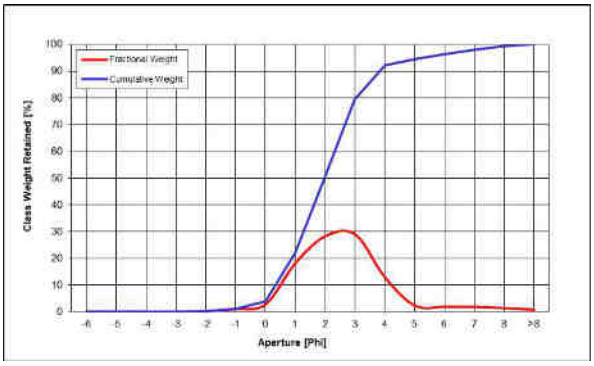
Sorting [µm] †	1.02	Poorly sorted
Skewness [µm] †	0.01	Symmetrical
Kurtosis [µm] †	1.06	Mesokurtic
Mean [µm]* †	433	Medium sand
Mean [phi]* †	1.21	
Median [µm]* †	439	Medium sand
Median [phi]* †	1.19	
Gravel [%]*	2.6	Slightly gravelly sand
Sand [%]*	95.0	
Mud [%]*	2.4	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_011

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.2	0.2
2000.0	-1	1.0	1.2
1000.0	0	2.7	3.9
500.0	1	18.2	22.1
250.0	2	28.2	50.3
125.0	3	28.9	79.3
62.5	4	12.9	92.2
31.2	5	2.3	94.4
15.6	6	1.8	96.2
7.8	7	1.7	97.9
3.9	8	1.4	99.3
< 3.9	> 8	0.7	100
Total		100	100

Particle Size Distribution



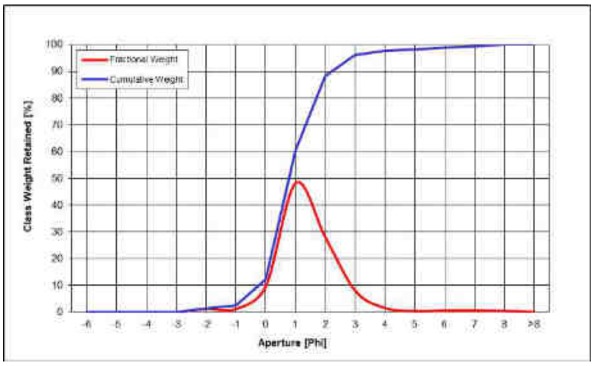
Sorting [µm] †	1.47	Poorly sorted
Skewness [µm] †	0.14	Fine skewed
Kurtosis [µm] †	1.23	Leptokurtic
Mean [µm]* †	249	Fine Sand
Mean [phi]* †	2.01	
Median [µm]* †	252	Medium sand
Median [phi]* †	1.99	
Gravel [%]*	1.2	Slightly gravelly sand
Sand [%]*	91.0	
Mud [%]*	7.8	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_012

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	1.3	1.3
2000.0	-1	1.2	2.5
1000.0	0	9.7	12.2
500.0	1	48.2	60.4
250.0	2	27.8	88.2
125.0	3	8.0	96.2
62.5	4	1.6	97.7
31.2	5	0.4	98.2
15.6	6	0.6	98.8
7.8	7	0.6	99.4
3.9	8	0.5	99.9
< 3.9	> 8	0.1	100
Total		100	100

Particle Size Distribution



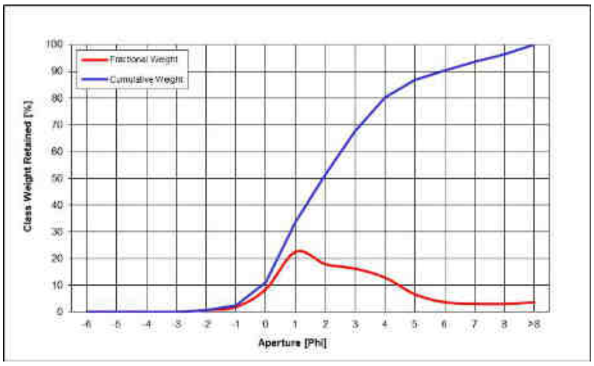
Sorting [µm] †	0.99	Moderately sorted
Skewness [µm] †	0.18	Fine skewed
Kurtosis [µm] †	1.17	Leptokurtic
Mean [µm]* †	534	Coarse sand
Mean [phi]* †	0.90	
Median [µm]* †	580	Coarse sand
Median [phi]* †	0.78	
Gravel [%]*	2.5	Slightly gravelly sand
Sand [%]*	95.3	
Mud [%]*	2.3	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_013

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.7	0.7
2000.0	-1	1.8	2.5
1000.0	0	8.5	11.1
500.0	1	22.4	33.5
250.0	2	17.8	51.3
125.0	3	16.1	67.5
62.5	4	12.8	80.3
31.2	5	6.5	86.8
15.6	6	3.6	90.4
7.8	7	3.1	93.5
3.9	8	3.0	96.4
< 3.9	> 8	3.6	100
Total		100	100

Particle Size Distribution



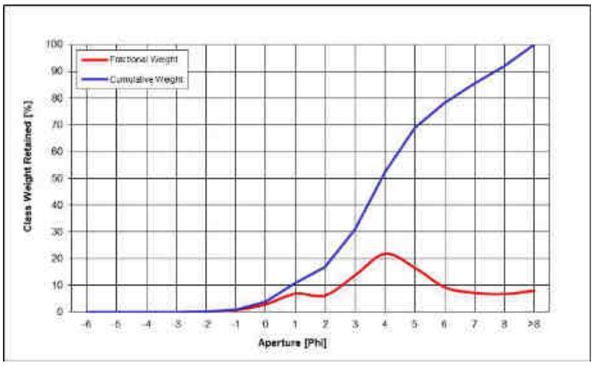
Sorting [µm] †	2.34	Very poorly sorted
Skewness [µm] †	0.29	Fine skewed
Kurtosis [µm] †	1.14	Leptokurtic
Mean [µm]* †	212	Fine sand
Mean [phi]* †	2.24	
Median [µm]* †	264	Medium sand
Median [phi]* †	1.92	
Gravel [%]*	2.5	Slightly gravelly muddy sand
Sand [%]*	77.7	
Mud [%]*	19.7	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_014

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.2	0.2
2000.0	-1	0.7	0.9
1000.0	0	3.0	3.9
500.0	1	6.8	10.8
250.0	2	6.2	17.0
125.0	3	13.8	30.8
62.5	4	21.7	52.5
31.2	5	16.5	68.9
15.6	6	9.2	78.2
7.8	7	7.2	85.3
3.9	8	6.7	92.0
< 3.9	> 8	8.0	100
Total		100	100

Particle Size Distribution



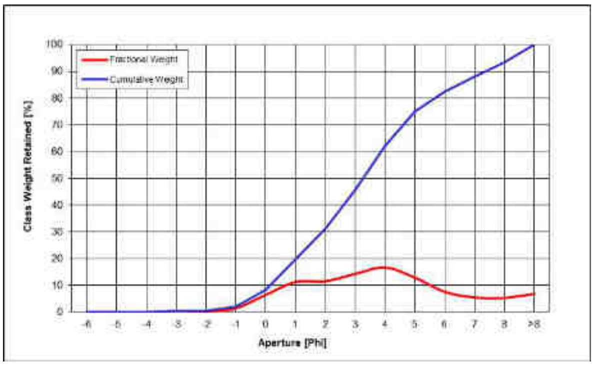
Sorting [µm] †	2.73	Very poorly sorted
Skewness [µm] †	0.21	Fine skewed
Kurtosis [µm] †	1.31	Leptokurtic
Mean [µm]* †	55	Coarse silt
Mean [phi]* †	4.18	
Median [µm]* †	68	Very fine sand
Median [phi]* †	3.89	
Gravel [%]*	0.9	Slightly gravelly muddy sand
Sand [%]*	51.5	
Mud [%]*	47.5	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_015

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.4	0.4
4000.0	-2	0.2	0.5
2000.0	-1	1.4	1.9
1000.0	0	6.4	8.4
500.0	1	11.2	19.6
250.0	2	11.5	31.1
125.0	3	14.3	45.4
62.5	4	16.7	62.1
31.2	5	12.8	74.9
15.6	6	7.5	82.4
7.8	7	5.5	87.9
3.9	8	5.3	93.2
< 3.9	> 8	6.8	100
Total		100	100

Particle Size Distribution



Sorting [µm] [†]	2.91	Very poorly sorted
Skewness [µm] [†]	0.15	Fine skewed
Kurtosis [µm] [†]	1.15	Leptokurtic
Mean [µm]* [†]	94	Very fine sand
Mean [phi]* [†]	3.41	
Median [µm]* [†]	103.3	Very fine sand
Median [phi]* [†]	3	
Gravel [%]*	1.9	Slightly gravelly muddy sand
Sand [%]*	60.1	
Mud [%]*	37.9	

Notes

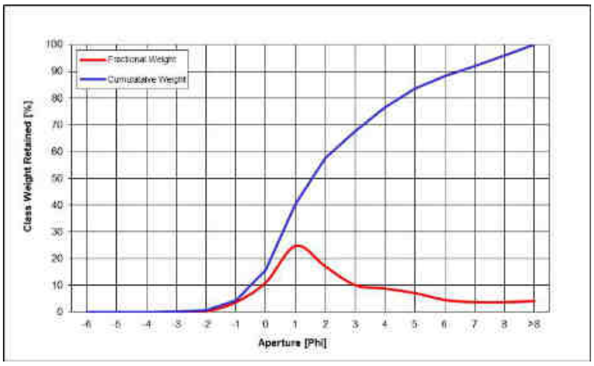
* = Sediment descriptions based on Wentworth (1922) grain size classification

= Statistics based on Folk and Ward (1957)

STATION R2_ENV_016

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.3	0.3
4000.0	-2	0.4	0.6
2000.0	-1	3.8	4.4
1000.0	0	11.2	15.6
500.0	1	24.8	40.4
250.0	2	17.1	57.5
125.0	3	10.1	67.6
62.5	4	8.9	76.5
31.2	5	7.2	83.6
15.6	6	4.6	88.2
7.8	7	3.8	92.0
3.9	8	3.7	95.8
< 3.9	> 8	4.2	100
Total		100	100

Particle Size Distribution



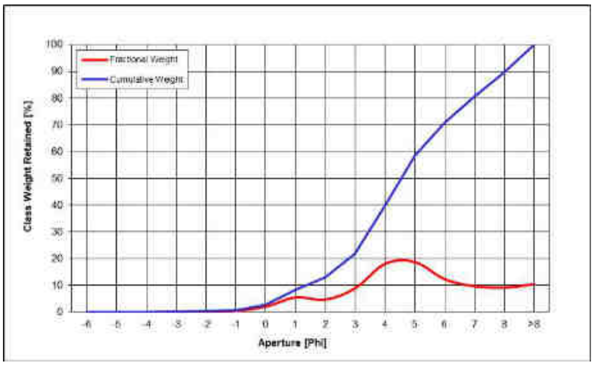
Sorting [µm] †	2.59	Very poorly sorted
Skewness [µm] †	0.41	Very fine skewed
Kurtosis [µm] †	1.04	Mesokurtic
Mean [µm]* †	215	Fine sand
Mean [phi]* †	2.22	
Median [µm]* †	339	Medium sand
Median [phi]* †	1.56	
Gravel [%]*	4.4	Slightly gravelly muddy sand
Sand [%]*	72.0	
Mud [%]*	23.5	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
 = Statistics based on Folk and Ward (1957)

STATION R2_ENV_017

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.3	0.3
4000.0	-2	0.0	0.3
2000.0	-1	0.4	0.7
1000.0	0	2.1	2.8
500.0	1	5.5	8.3
250.0	2	4.7	12.9
125.0	3	8.9	21.9
62.5	4	18.0	39.9
31.2	5	18.7	58.5
15.6	6	12.2	70.8
7.8	7	9.7	80.4
3.9	8	9.1	89.6
< 3.9	> 8	10.4	100
Total		100	100

Particle Size Distribution



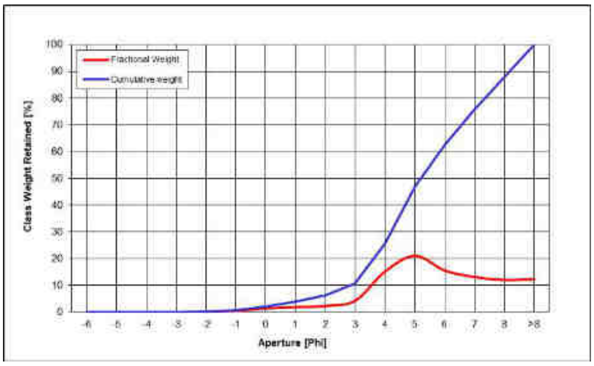
Sorting [µm] †	2.83	Very poorly sorted
Skewness [µm] †	0.16	Fine skewed
Kurtosis [µm] †	1.30	Leptokurtic
Mean [µm]* †	37	Coarse silt
Mean [phi]* †	4.76	
Median [µm]* †	43	Coarse silt
Median [phi]* †	4.54	
Gravel [%]*	0.7	Slightly gravelly sandy mud
Sand [%]*	39.2	
Mud [%]*	60.1	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_018

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.1	0.1
2000.0	-1	0.5	0.6
1000.0	0	1.4	2.0
500.0	1	1.8	3.9
250.0	2	2.3	6.2
125.0	3	4.3	10.5
62.5	4	15.3	25.8
31.2	5	21.1	46.9
15.6	6	15.6	62.5
7.8	7	13.2	75.6
3.9	8	12.0	87.6
< 3.9	> 8	12.4	100
Total		100	100

Particle Size Distribution



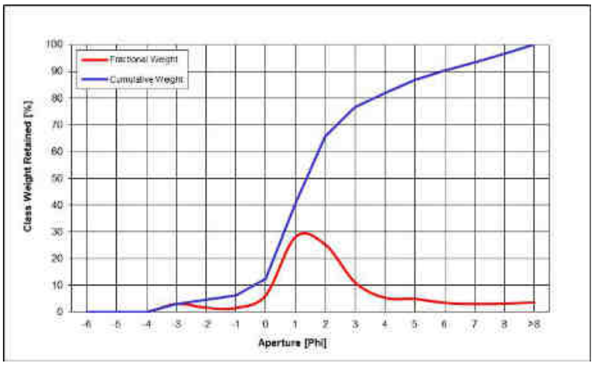
Sorting [µm] †	2.55	Very poorly sorted
Skewness [µm] †	0.19	Fine skewed
Kurtosis [µm] †	1.32	Leptokurtic
Mean [µm]* †	23	Medium silt
Mean [phi]* †	5.42	
Median [µm]* †	27	Medium silt
Median [phi]* †	5.20	
Gravel [%]*	0.6	Slightly gravelly sandy mud
Sand [%]*	25.2	
Mud [%]*	74.2	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_019

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	3.1	3.1
4000.0	-2	1.6	4.7
2000.0	-1	1.5	6.2
1000.0	0	6.3	12.6
500.0	1	28.1	40.6
250.0	2	25.1	65.7
125.0	3	11.0	76.7
62.5	4	5.3	81.9
31.2	5	4.9	86.8
15.6	6	3.4	90.2
7.8	7	3.0	93.3
3.9	8	3.2	96.4
< 3.9	> 8	3.6	100
Total		100	100

Particle Size Distribution



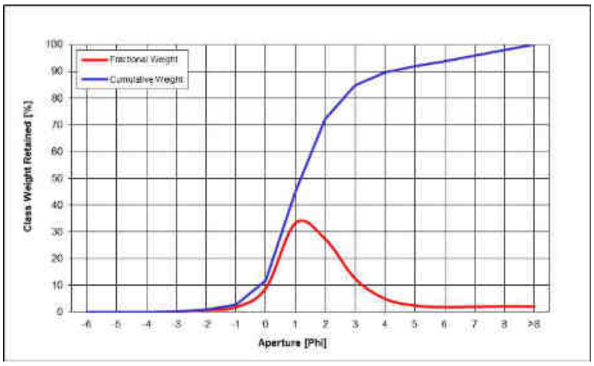
Sorting [µm] †	2.49	Very poorly sorted
Skewness [µm] †	0.37	Very fine skewed
Kurtosis [µm] †	1.59	Very leptokurtic
Mean [µm]* †	254	Medium sand
Mean [phi]* †	1.97	
Median [µm]* †	386	Medium sand
Median [phi]* †	1.37	
Gravel [%]*	6.2	Gravelly muddy sand
Sand [%]*	75.7	
Mud [%]*	18.1	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_020

Aperture [μm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.2	0.2
4000.0	-2	0.8	1.0
2000.0	-1	1.9	2.8
1000.0	0	8.9	11.7
500.0	1	33.3	45.0
250.0	2	27.2	72.2
125.0	3	12.4	84.6
62.5	4	5.0	89.6
31.2	5	2.4	92.0
15.6	6	1.8	93.8
7.8	7	2.0	95.8
3.9	8	2.1	98.0
< 3.9	> 8	2.0	100
Total		100	100

Particle Size Distribution



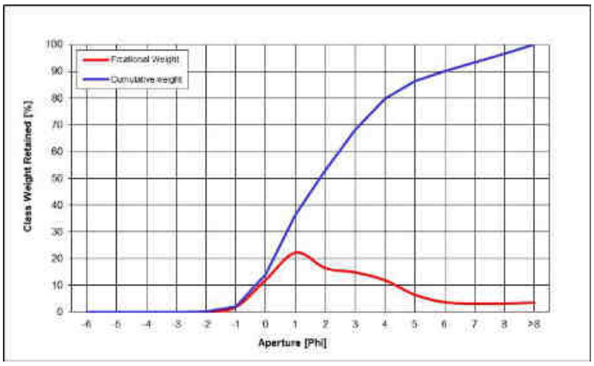
Sorting [μm] †	1.82	Poorly sorted
Skewness [μm] †	0.36	Very fine skewed
Kurtosis [μm] †	1.65	Very leptokurtic
Mean [μm]* †	374	Medium sand
Mean [phi]* †	1.42	
Median [μm]* †	441	Medium sand
Median [phi]* †	1.18	
Gravel [%]*	2.8	Slightly gravelly muddy sand
Sand [%]*	86.7	
Mud [%]*	10.4	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
 = Statistics based on Folk and Ward (1957)

STATION R2_ENV_021

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.1	0.1
2000.0	-1	1.9	2.0
1000.0	0	12.2	14.2
500.0	1	22.3	36.5
250.0	2	16.5	53.0
125.0	3	14.9	67.9
62.5	4	11.9	79.8
31.2	5	6.5	86.3
15.6	6	3.7	90.0
7.8	7	3.2	93.2
3.9	8	3.3	96.5
< 3.9	> 8	3.5	100
Total		100	100

Particle Size Distribution



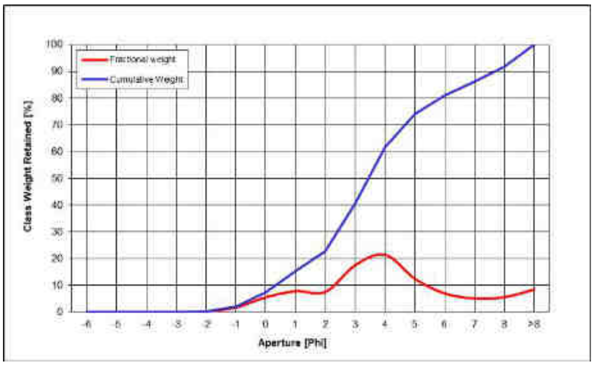
Sorting [µm] †	2.40	Very poorly sorted
Skewness [µm] †	0.31	Very fine skewed
Kurtosis [µm] †	1.09	Mesokurtic
Mean [µm]* †	220	Fine sand
Mean [phi]* †	2.18	
Median [µm]* †	284	Medium sand
Median [phi]* †	1.82	
Gravel [%]*	2.0	Slightly gravelly muddy sand
Sand [%]*	77.8	
Mud [%]*	20.2	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_022

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.2	0.2
2000.0	-1	1.7	1.9
1000.0	0	5.5	7.4
500.0	1	7.8	15.2
250.0	2	7.6	22.8
125.0	3	17.5	40.3
62.5	4	21.4	61.7
31.2	5	12.4	74.0
15.6	6	6.9	81.0
7.8	7	5.1	86.0
3.9	8	5.5	91.6
< 3.9	> 8	8.4	100
Total		100	100

Particle Size Distribution



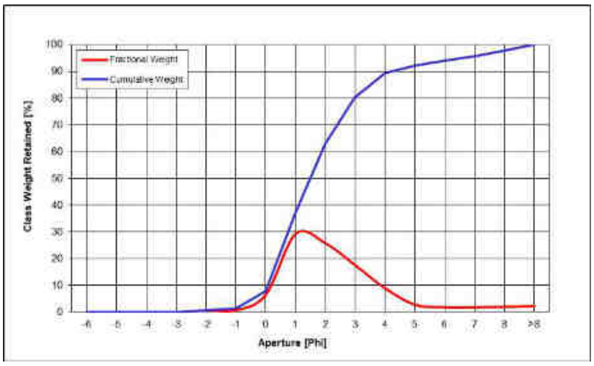
Sorting [µm] †	2.98	Very poorly sorted
Skewness [µm] †	0.20	Fine skewed
Kurtosis [µm] †	1.44	Leptokurtic
Mean [µm]* †	76	Very fine sand
Mean [phi]* †	3.72	
Median [µm]* †	91	Very fine sand
Median [phi]* †	3.45	
Gravel [%]*	1.9	Slightly gravelly muddy sand
Sand [%]*	59.7	
Mud [%]*	38.3	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_023

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.6	0.6
2000.0	-1	0.8	1.4
1000.0	0	6.5	7.9
500.0	1	29.3	37.2
250.0	2	25.7	62.9
125.0	3	17.5	80.4
62.5	4	8.9	89.3
31.2	5	2.8	92.1
15.6	6	1.8	93.9
7.8	7	1.8	95.7
3.9	8	2.0	97.7
< 3.9	> 8	2.3	100
Total		100	100

Particle Size Distribution



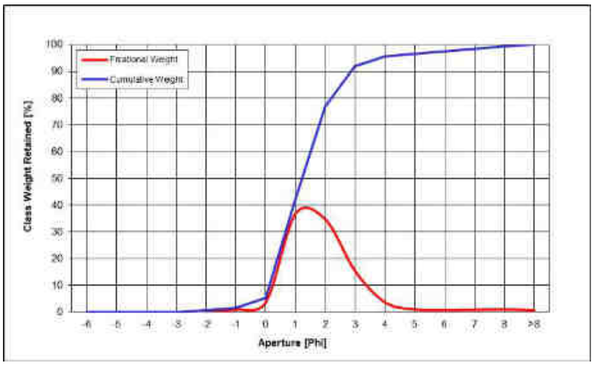
Sorting [µm] †	1.85	Poorly sorted
Skewness [µm] †	0.33	Very fine skewed
Kurtosis [µm] †	1.37	Leptokurtic
Mean [µm]* †	302	Medium sand
Mean [phi]* †	1.73	
Median [µm]* †	354	Medium sand
Median [phi]* †	1.50	
Gravel [%]*	1.4	Slightly gravelly muddy sand
Sand [%]*	87.9	
Mud [%]*	10.7	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_024

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.7	0.7
2000.0	-1	1.0	1.6
1000.0	0	3.7	5.4
500.0	1	36.8	42.2
250.0	2	34.5	76.7
125.0	3	15.2	92.0
62.5	4	3.6	95.6
31.2	5	1.0	96.6
15.6	6	0.8	97.4
7.8	7	0.9	98.3
3.9	8	1.0	99.3
< 3.9	> 8	0.7	100
Total		100	100

Particle Size Distribution



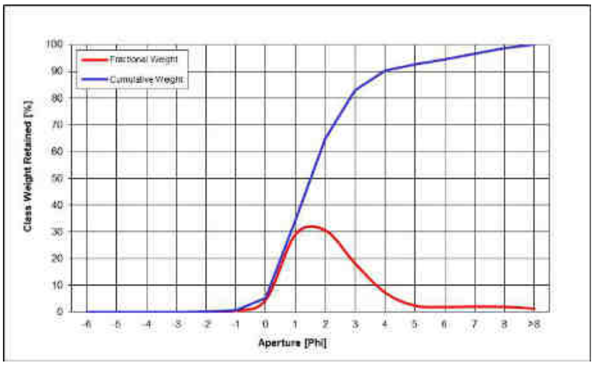
Sorting [µm] †	1.14	Poorly sorted
Skewness [µm] †	0.24	Fine skewed
Kurtosis [µm] †	1.14	Leptokurtic
Mean [µm]* †	398	Medium sand
Mean [phi]* †	1.33	
Median [µm]* †	428	Medium sand
Median [phi]* †	1.23	
Gravel [%]*	1.6	Slightly gravelly sand
Sand [%]*	94.0	
Mud [%]*	4.4	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
 = Statistics based on Folk and Ward (1957)

STATION R2_ENV_025

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.1	0.1
2000.0	-1	0.6	0.6
1000.0	0	4.7	5.3
500.0	1	29.1	34.4
250.0	2	30.4	64.8
125.0	3	18.0	82.9
62.5	4	7.3	90.2
31.2	5	2.4	92.6
15.6	6	1.9	94.5
7.8	7	2.1	96.6
3.9	8	2.0	98.6
< 3.9	> 8	1.4	100
Total		100	100

Particle Size Distribution



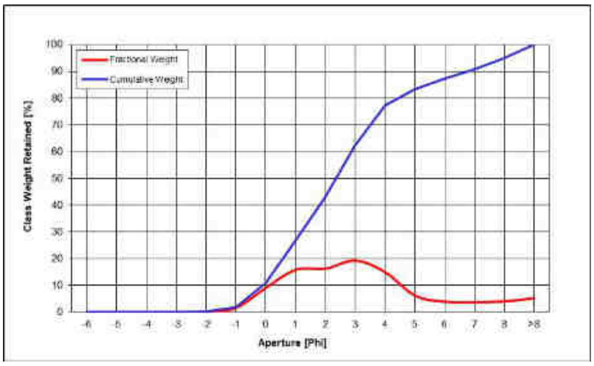
Sorting [µm] †	1.65	Poorly sorted
Skewness [µm] †	0.34	Very fine skewed
Kurtosis [µm] †	1.37	Leptokurtic
Mean [µm]* †	313	Medium sand
Mean [phi]* †	1.68	
Median [µm]* †	350	Medium sand
Median [phi]* †	1.51	
Gravel [%]*	0.6	Slightly Gravelly Sand
Sand [%]*	89.5	
Mud [%]*	9.8	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_027

Aperture [μm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.2	0.2
2000.0	-1	1.5	1.7
1000.0	0	9.1	10.8
500.0	1	15.8	26.6
250.0	2	16.3	42.9
125.0	3	19.3	62.2
62.5	4	15.0	77.2
31.2	5	6.2	83.3
15.6	6	3.9	87.2
7.8	7	3.6	90.8
3.9	8	4.0	94.9
< 3.9	> 8	5.1	100
Total		100	100

Particle Size Distribution



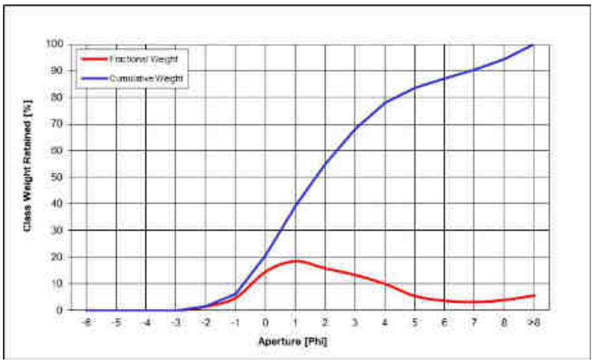
Sorting [μm] †	2.54	Very poorly sorted
Skewness [μm] †	0.24	Fine skewed
Kurtosis [μm] †	1.22	Leptokurtic
Mean [μm]* †	162	Fine sand
Mean [phi]* †	2.62	
Median [μm]* †	194	Fine sand
Median [phi]* †	2.37	
Gravel [%]*	1.7	Slightly gravelly muddy sand
Sand [%]*	75.5	
Mud [%]*	22.8	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_028

Aperture [μm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	1.5	1.5
2000.0	-1	4.8	6.3
1000.0	0	14.5	20.8
500.0	1	18.4	39.2
250.0	2	15.7	54.9
125.0	3	13.3	68.2
62.5	4	9.9	78.1
31.2	5	5.4	83.5
15.6	6	3.7	87.2
7.8	7	3.2	90.4
3.9	8	4.0	94.3
< 3.9	> 8	5.7	100
Total		100	100

Particle Size Distribution



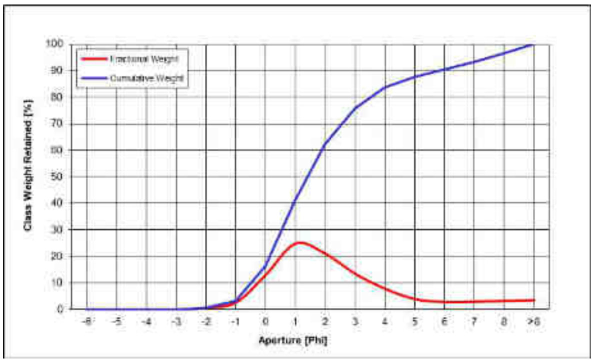
Sorting [μm] †	2.87	Very poorly sorted
Skewness [μm] †	0.33	Very fine skewed
Kurtosis [μm] †	1.17	Leptokurtic
Mean [μm]* †	223	Fine sand
Mean [phi]* †	2.16	
Median [μm]* †	310	Medium sand
Median [phi]* †	1.69	
Gravel [%]*	6.3	Gravelly muddy sand
Sand [%]*	71.7	
Mud [%]*	21.9	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_029

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.6	0.6
2000.0	-1	2.6	3.2
1000.0	0	13.0	16.2
500.0	1	24.9	41.1
250.0	2	21.1	62.2
125.0	3	13.5	75.7
62.5	4	7.8	83.6
31.2	5	3.9	87.5
15.6	6	2.8	90.3
7.8	7	2.9	93.2
3.9	8	3.2	96.4
< 3.9	> 8	3.6	100
Total		100	100

Particle Size Distribution



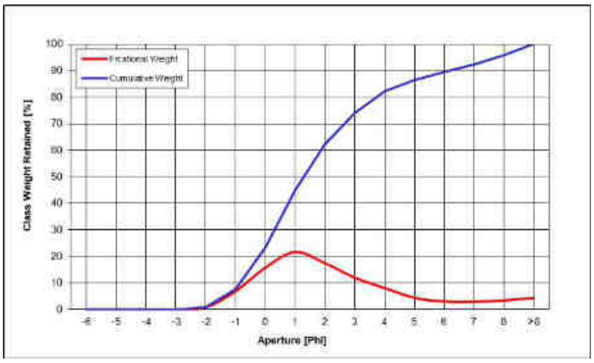
Sorting [µm] †	2.31	Very poorly sorted
Skewness [µm] †	0.38	Very fine skewed
Kurtosis [µm] †	1.33	Leptokurtic
Mean [µm]* †	280	Medium sand
Mean [phi]* †	1.84	
Median [µm]* †	374	Medium sand
Median [phi]* †	1.42	
Gravel [%]*	3.2	Slightly gravelly muddy sand
Sand [%]*	80.4	
Mud [%]*	16.4	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_030

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.8	0.8
2000.0	-1	6.8	7.6
1000.0	0	15.7	23.3
500.0	1	21.6	44.8
250.0	2	17.4	62.2
125.0	3	11.9	74.1
62.5	4	8.0	82.1
31.2	5	4.3	86.5
15.6	6	3.0	89.5
7.8	7	2.8	92.3
3.9	8	3.4	95.7
< 3.9	> 8	4.3	100
Total		100	100

Particle Size Distribution



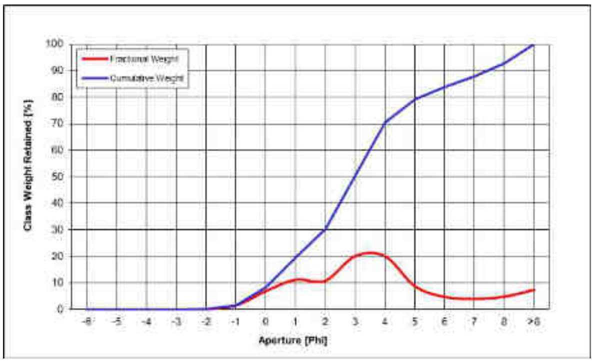
Sorting [µm] †	2.61	Very poorly sorted
Skewness [µm] †	0.35	Very fine skewed
Kurtosis [µm] †	1.24	Leptokurtic
Mean [µm]* †	296	Medium sand
Mean [phi]* †	1.76	
Median [µm]* †	407	Medium sand
Median [phi]* †	1.30	
Gravel [%]*	7.6	Gravelly muddy sand
Sand [%]*	74.5	
Mud [%]*	17.9	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_031

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.1	0.1
2000.0	-1	1.5	1.6
1000.0	0	6.9	8.5
500.0	1	11.2	19.6
250.0	2	10.8	30.4
125.0	3	20.0	50.4
62.5	4	20.0	70.4
31.2	5	8.7	79.2
15.6	6	4.7	83.9
7.8	7	4.0	87.8
3.9	8	4.8	92.6
< 3.9	> 8	7.4	100
Total		100	100

Particle Size Distribution



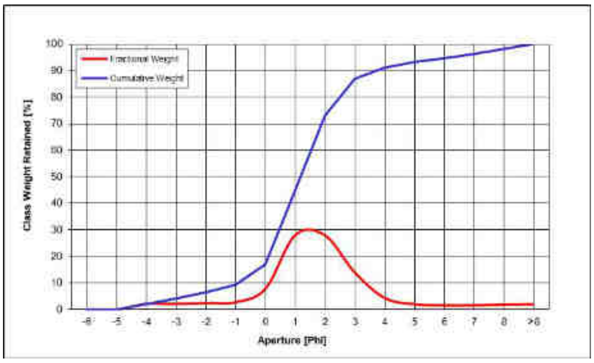
Sorting [µm] †	2.89	Very poorly sorted
Skewness [µm] †	0.23	Fine skewed
Kurtosis [µm] †	1.38	Leptokurtic
Mean [µm]* †	107	Very fine sand
Mean [phi]* †	3.23	
Median [µm]* †	127	Fine sand
Median [phi]* †	2.98	
Gravel [%]*	1.6	Slightly gravelly muddy sand
Sand [%]*	68.9	
Mud [%]*	29.6	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_033

Aperture [μm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	2.1	2.1
8000.0	-3	2.0	4.2
4000.0	-2	2.4	6.6
2000.0	-1	2.7	9.3
1000.0	0	7.8	17.1
500.0	1	28.0	45.0
250.0	2	27.9	72.9
125.0	3	13.9	86.9
62.5	4	4.3	91.2
31.2	5	1.9	93.1
15.6	6	1.5	94.7
7.8	7	1.6	96.3
3.9	8	1.8	98.1
< 3.9	> 8	1.9	100
Total		100	100

Particle Size Distribution



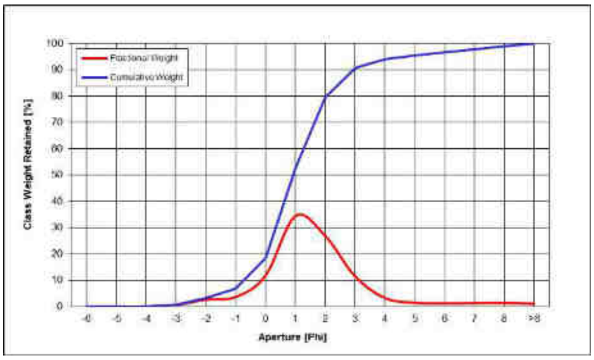
Sorting [μm] †	2.07	Very poorly sorted
Skewness [μm] †	0.12	Fine skewed
Kurtosis [μm] †	1.95	Very leptokurtic
Mean [μm]* †	412	Medium sand
Mean [phi]* †	1.28	
Median [μm]* †	442	Medium sand
Median [phi]* †	1.18	
Gravel [%]*	9.3	Gravelly Sand
Sand [%]*	81.9	
Mud [%]*	8.8	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_034

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.5	0.5
4000.0	-2	2.6	3.1
2000.0	-1	3.6	6.7
1000.0	0	11.7	18.4
500.0	1	34.2	52.6
250.0	2	26.7	79.4
125.0	3	11.4	90.8
62.5	4	3.2	94.0
31.2	5	1.4	95.4
15.6	6	1.1	96.5
7.8	7	1.2	97.7
3.9	8	1.3	99.0
< 3.9	> 8	1.0	100
Total		100	100

Particle Size Distribution



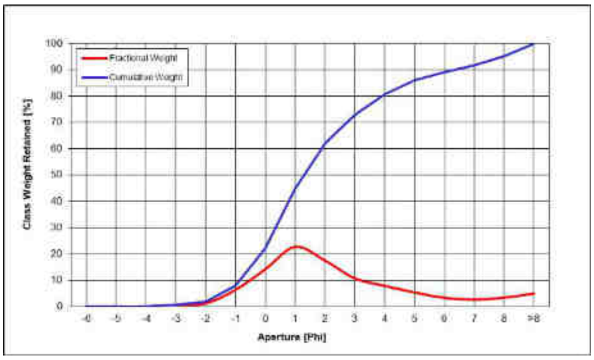
Sorting [µm] †	1.59	Poorly sorted
Skewness [µm] †	0.18	Fine skewed
Kurtosis [µm] †	1.54	Very leptokurtic
Mean [µm]* †	486	Medium sand
Mean [phi]* †	1.04	
Median [µm]* †	528	Coarse sand
Median [phi]* †	0.92	
Gravel [%]*	6.7	Gravelly Sand
Sand [%]*	87.3	
Mud [%]*	6.0	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_035

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.5	0.5
4000.0	-2	1.2	1.7
2000.0	-1	6.3	7.9
1000.0	0	14.1	22.1
500.0	1	22.6	44.7
250.0	2	17.4	62.1
125.0	3	10.7	72.8
62.5	4	7.8	80.6
31.2	5	5.3	85.9
15.6	6	3.3	89.2
7.8	7	2.6	91.8
3.9	8	3.3	95.1
< 3.9	> 8	4.9	100
Total		100	100

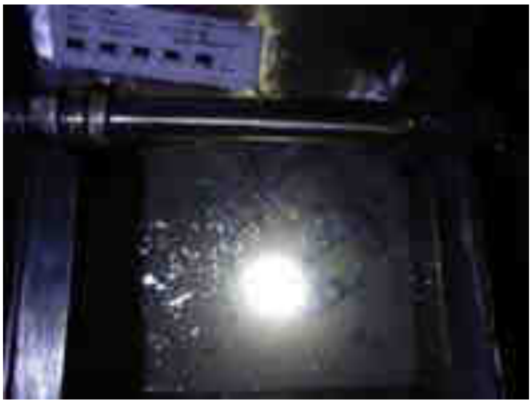
Particle Size Distribution



Sorting [µm] †	2.70	Very poorly sorted
Skewness [µm] †	0.36	Very fine skewed
Kurtosis [µm] †	1.23	Leptokurtic
Mean [µm]* †	280	Medium sand
Mean [phi]* †	1.84	
Median [µm]* †	405	Medium sand
Median [phi]* †	1.30	
Gravel [%]*	7.9	Gravelly muddy sand
Sand [%]*	72.7	
Mud [%]*	19.4	

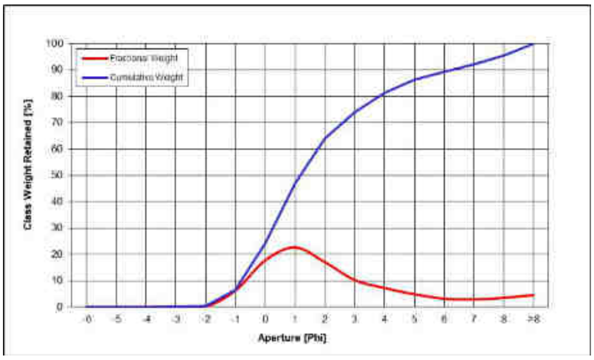
Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_036



Aperture [μm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.2	0.2
4000.0	-2	0.2	0.3
2000.0	-1	6.2	6.6
1000.0	0	17.7	24.3
500.0	1	22.6	46.9
250.0	2	17.0	63.9
125.0	3	10.2	74.1
62.5	4	7.2	81.3
31.2	5	4.8	86.2
15.6	6	3.1	89.3
7.8	7	2.8	92.1
3.9	8	3.4	95.5
< 3.9	> 8	4.5	100
Total		100	100

Particle Size Distribution



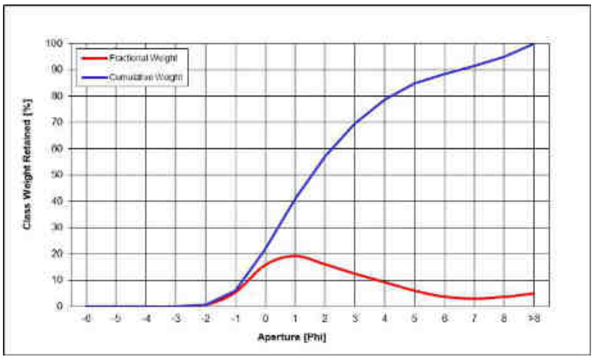
Sorting [μm] †	2.63	Very poorly sorted
Skewness [μm] †	0.40	Very fine skewed
Kurtosis [μm] †	1.21	Leptokurtic
Mean [μm]* †	296	Medium sand
Mean [phi]* †	1.76	
Median [μm]* †	441	Medium sand
Median [phi]* †	1.18	
Gravel [%]*	6.6	Gravelly muddy sand
Sand [%]*	74.8	
Mud [%]*	18.7	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_037

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.6	0.6
2000.0	-1	5.4	6.0
1000.0	0	15.8	21.8
500.0	1	19.2	41.0
250.0	2	16.1	57.0
125.0	3	12.5	69.5
62.5	4	9.2	78.8
31.2	5	6.0	84.8
15.6	6	3.7	88.4
7.8	7	3.0	91.4
3.9	8	3.6	95.1
< 3.9	> 8	4.9	100
Total		100	100

Particle Size Distribution



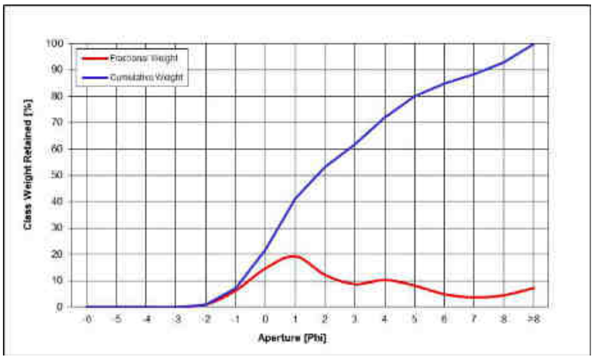
Sorting [µm] †	2.70	Very poorly sorted
Skewness [µm] †	0.33	Very fine skewed
Kurtosis [µm] †	1.10	Mesokurtic
Mean [µm]* †	246	Fine sand
Mean [phi]* †	2.02	
Median [µm]* †	339	Medium sand
Median [phi]* †	1.56	
Gravel [%]*	6.0	Gravelly muddy sand
Sand [%]*	72.8	
Mud [%]*	21.2	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_038

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.9	0.9
2000.0	-1	6.2	7.1
1000.0	0	14.7	21.8
500.0	1	19.2	41.0
250.0	2	12.1	53.1
125.0	3	8.6	61.7
62.5	4	10.2	71.9
31.2	5	8.1	80.0
15.6	6	4.8	84.8
7.8	7	3.6	88.4
3.9	8	4.4	92.8
< 3.9	> 8	7.2	100
Total		100	100

Particle Size Distribution



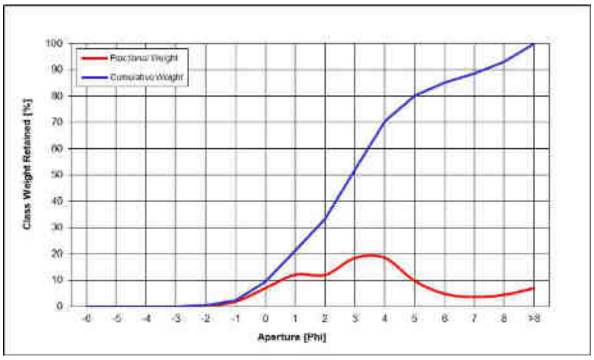
Sorting [µm] †	3.22	Very poorly sorted
Skewness [µm] †	0.37	Very fine skewed
Kurtosis [µm] †	1.07	Mesokurtic
Mean [µm]* †	190	Fine sand
Mean [phi]* †	2.39	
Median [µm]* †	299	Medium sand
Median [phi]* †	1.74	
Gravel [%]*	7.1	Gravelly muddy sand
Sand [%]*	64.8	
Mud [%]*	28.1	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_039

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.3	0.3
2000.0	-1	1.9	2.2
1000.0	0	7.0	9.2
500.0	1	12.1	21.4
250.0	2	12.0	33.4
125.0	3	18.5	51.9
62.5	4	18.5	70.4
31.2	5	9.7	80.2
15.6	6	4.8	85.0
7.8	7	3.6	88.6
3.9	8	4.5	93.1
< 3.9	> 8	6.9	100
Total		100	100

Particle Size Distribution



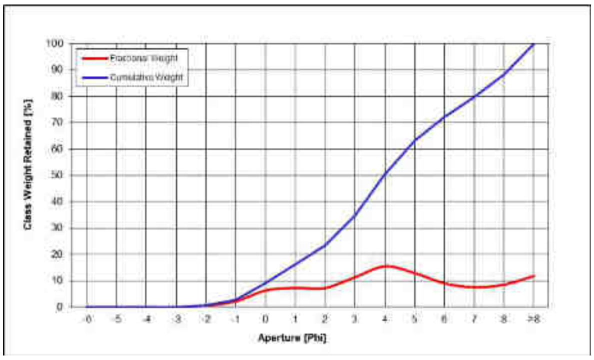
Sorting [µm] †	2.84	Very poorly sorted
Skewness [µm] †	0.21	Fine skewed
Kurtosis [µm] †	1.30	Leptokurtic
Mean [µm]* †	118	Very fine sand
Mean [phi]* †	3.08	
Median [µm]* †	134	Fine sand
Median [phi]* †	2.90	
Gravel [%]*	2.2	Slightly gravelly muddy sand
Sand [%]*	68.2	
Mud [%]*	29.6	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_040

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.5	0.5
2000.0	-1	2.2	2.7
1000.0	0	6.3	9.0
500.0	1	7.3	16.2
250.0	2	7.2	23.5
125.0	3	11.3	34.8
62.5	4	15.4	50.2
31.2	5	12.9	63.1
15.6	6	9.0	72.2
7.8	7	7.5	79.7
3.9	8	8.5	88.2
< 3.9	> 8	11.8	100
Total		100	100

Particle Size Distribution



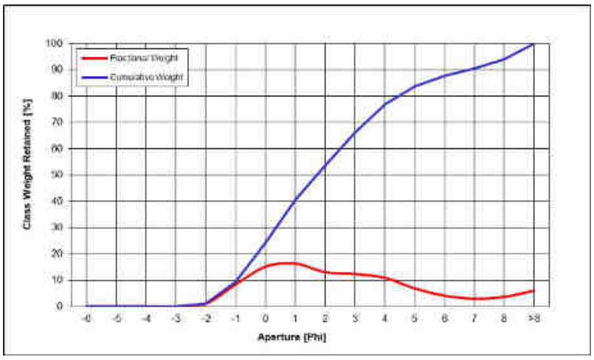
Sorting [µm] †	3.41	Very poorly sorted
Skewness [µm] †	0.14	Fine skewed
Kurtosis [µm] †	1.13	Leptokurtic
Mean [µm]* †	56	Coarse silt
Mean [phi]* †	4.15	
Median [µm]* †	63	Very fine sand
Median [phi]* †	3.98	
Gravel [%]*	2.7	Slightly gravelly sandy mud
Sand [%]*	47.6	
Mud [%]*	49.8	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_041

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	1.0	1.0
2000.0	-1	8.3	9.3
1000.0	0	15.1	24.4
500.0	1	16.2	40.7
250.0	2	13.0	53.7
125.0	3	12.3	65.9
62.5	4	10.8	76.8
31.2	5	6.8	83.6
15.6	6	4.0	87.6
7.8	7	2.9	90.5
3.9	8	3.6	94.1
< 3.9	> 8	5.9	100
Total		100	100

Particle Size Distribution



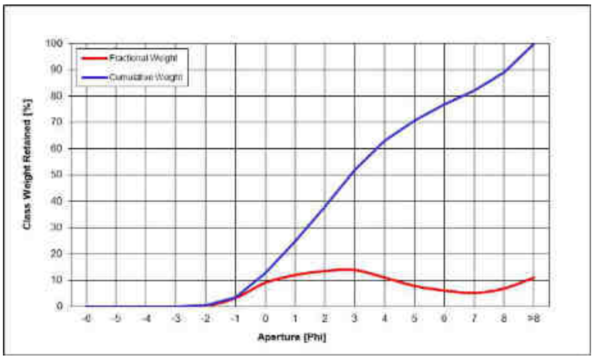
Sorting [µm] †	2.98	Very poorly sorted
Skewness [µm] †	0.28	Fine skewed
Kurtosis [µm] †	1.12	Leptokurtic
Mean [µm]* †	235	Fine sand
Mean [phi]* †	2.09	
Median [µm]* †	304	Medium sand
Median [phi]* †	1.72	
Gravel [%]*	9.3	Gravelly muddy sand
Sand [%]*	67.4	
Mud [%]*	23.2	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_042

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.3	0.3
2000.0	-1	3.2	3.5
1000.0	0	9.0	12.5
500.0	1	12.0	24.5
250.0	2	13.5	38.0
125.0	3	13.9	52.0
62.5	4	11.0	63.0
31.2	5	7.8	70.8
15.6	6	6.1	76.9
7.8	7	5.2	82.1
3.9	8	6.9	89.0
< 3.9	> 8	11.0	100
Total		100	100

Particle Size Distribution



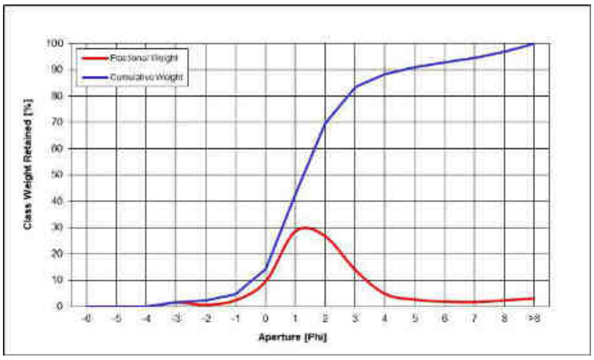
Sorting [µm] †	3.52	Very poorly sorted
Skewness [µm] †	0.32	Very fine skewed
Kurtosis [µm] †	1.03	Mesokurtic
Mean [µm]* †	90	Very fine sand
Mean [phi]* †	3.48	
Median [µm]* †	138	Fine sand
Median [phi]* †	2.86	
Gravel [%]*	3.5	Slightly gravelly muddy sand
Sand [%]*	59.5	
Mud [%]*	37.0	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_043

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	1.5	1.5
4000.0	-2	0.7	2.2
2000.0	-1	2.4	4.6
1000.0	0	9.5	14.2
500.0	1	28.6	42.8
250.0	2	26.7	69.4
125.0	3	14.0	83.4
62.5	4	4.8	88.3
31.2	5	2.7	90.9
15.6	6	1.9	92.8
7.8	7	1.7	94.6
3.9	8	2.3	96.9
< 3.9	> 8	3.1	100
Total		100	100

Particle Size Distribution



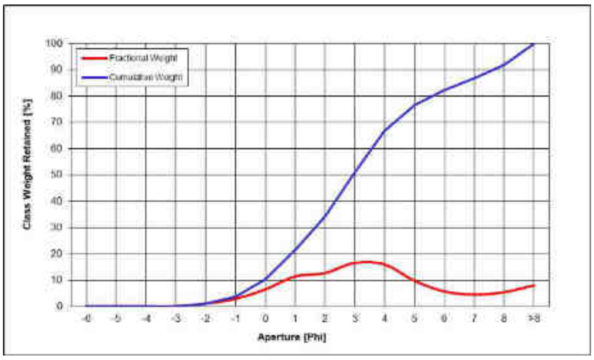
Sorting [µm] †	2.00	Poorly sorted
Skewness [µm] †	0.33	Very fine skewed
Kurtosis [µm] †	1.65	Very leptokurtic
Mean [µm]* †	357	Medium sand
Mean [phi]* †	1.48	
Median [µm]* †	414	Medium sand
Median [phi]* †	1.27	
Gravel [%]*	4.6	Slightly gravelly muddy sand
Sand [%]*	83.6	
Mud [%]*	11.7	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_044

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	1.0	1.0
2000.0	-1	2.8	3.8
1000.0	0	6.4	10.2
500.0	1	11.4	21.6
250.0	2	12.7	34.3
125.0	3	16.6	50.9
62.5	4	15.9	66.8
31.2	5	9.7	76.5
15.6	6	5.7	82.2
7.8	7	4.4	86.6
3.9	8	5.4	92.0
< 3.9	> 8	8.0	100
Total		100	100

Particle Size Distribution



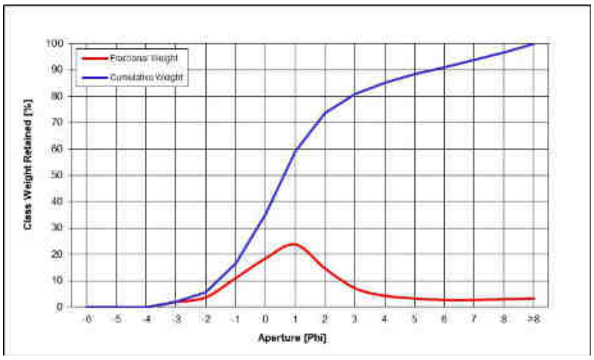
Sorting [µm] †	3.11	Very poorly sorted
Skewness [µm] †	0.24	Fine skewed
Kurtosis [µm] †	1.24	Leptokurtic
Mean [µm]* †	102	Very fine sand
Mean [phi]* †	3.29	
Median [µm]* †	130	Fine sand
Median [phi]* †	2.95	
Gravel [%]*	3.8	Slightly gravelly muddy sand
Sand [%]*	63.0	
Mud [%]*	33.2	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_045

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	1.9	1.9
4000.0	-2	3.7	5.6
2000.0	-1	11.0	16.7
1000.0	0	18.5	35.2
500.0	1	23.8	59.0
250.0	2	14.6	73.6
125.0	3	7.2	80.8
62.5	4	4.3	85.1
31.2	5	3.3	88.4
15.6	6	2.7	91.0
7.8	7	2.7	93.7
3.9	8	3.0	96.7
< 3.9	> 8	3.3	100
Total		100	100

Particle Size Distribution



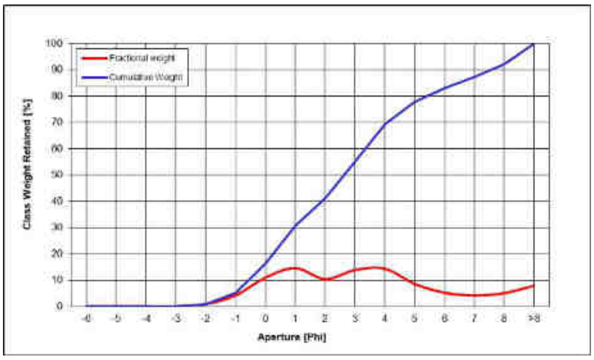
Sorting [µm] †	2.66	Very poorly sorted
Skewness [µm] †	0.36	Very fine skewed
Kurtosis [µm] †	1.44	Leptokurtic
Mean [µm]* †	465	Medium sand
Mean [phi]* †	1.10	
Median [µm]* †	650	Coarse sand
Median [phi]* †	0.62	
Gravel [%]*	16.7	Gravelly muddy sand
Sand [%]*	68.4	
Mud [%]*	14.9	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
  = Statistics based on Folk and Ward (1957)

STATION R2_ENV_046

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.8	0.8
2000.0	-1	4.2	5.0
1000.0	0	11.0	16.0
500.0	1	14.6	30.6
250.0	2	10.4	41.0
125.0	3	13.9	54.9
62.5	4	14.4	69.3
31.2	5	8.5	77.8
15.6	6	5.2	83.0
7.8	7	4.1	87.1
3.9	8	5.0	92.1
< 3.9	> 8	7.9	100
Total		100	100

Particle Size Distribution



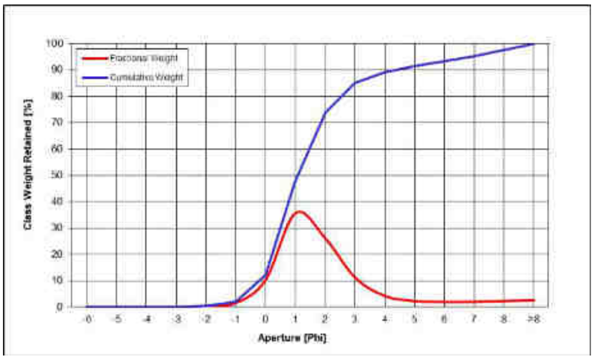
Sorting [µm] †	3.22	Very poorly sorted
Skewness [µm] †	0.24	Fine skewed
Kurtosis [µm] †	1.11	Mesokurtic
Mean [µm]* †	128	Fine sand
Mean [phi]* †	2.96	
Median [µm]* †	160	Fine sand
Median [phi]* †	2.65	
Gravel [%]*	5.0	Gravelly muddy sand
Sand [%]*	64.2	
Mud [%]*	30.7	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_047

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.4	0.4
2000.0	-1	1.5	1.9
1000.0	0	10.2	12.1
500.0	1	35.6	47.7
250.0	2	26.1	73.9
125.0	3	11.1	85.0
62.5	4	4.2	89.2
31.2	5	2.2	91.4
15.6	6	1.9	93.3
7.8	7	1.9	95.2
3.9	8	2.3	97.5
< 3.9	> 8	2.5	100
Total		100	100

Particle Size Distribution



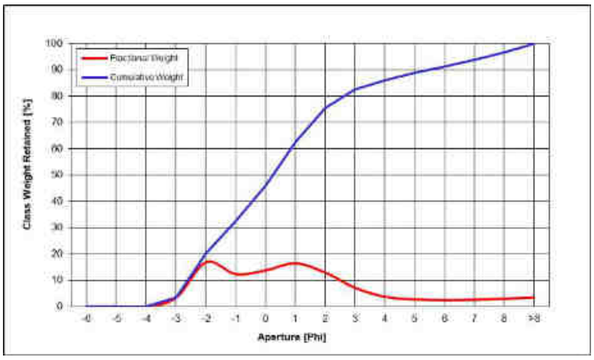
Sorting [µm] †	1.85	Poorly sorted
Skewness [µm] †	0.42	Very fine skewed
Kurtosis [µm] †	1.79	Very Leptokurtic
Mean [µm]* †	388	Medium sand
Mean [phi]* †	1.37	
Median [µm]* †	471	Medium sand
Median [phi]* †	1.09	
Gravel [%]*	1.9	Slightly gravelly muddy sand
Sand [%]*	87.3	
Mud [%]*	10.8	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_048

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	3.3	3.3
4000.0	-2	16.8	20.1
2000.0	-1	12.3	32.4
1000.0	0	13.7	46.1
500.0	1	16.4	62.5
250.0	2	12.9	75.3
125.0	3	7.1	82.4
62.5	4	3.7	86.1
31.2	5	2.7	88.8
15.6	6	2.4	91.2
7.8	7	2.5	93.7
3.9	8	2.9	96.6
< 3.9	> 8	3.4	100
Total		100	100

Particle Size Distribution



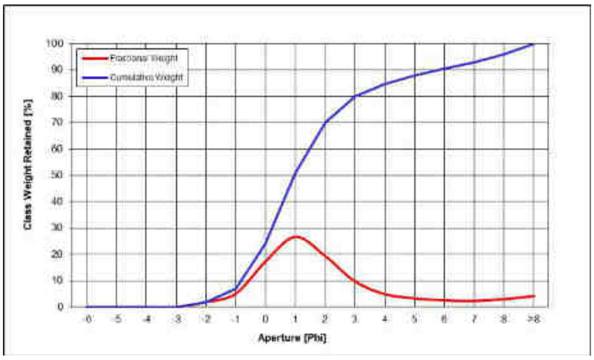
Sorting [µm] †	2.99	Very poorly sorted
Skewness [µm] †	0.26	Fine skewed
Kurtosis [µm] †	1.19	Leptokurtic
Mean [µm]* †	721	Coarse sand
Mean [phi]* †	0.47	
Median [µm]* †	848	Coarse sand
Median [phi]* †	0.24	
Gravel [%]*	32.4	Muddy sandy gravel
Sand [%]*	53.7	
Mud [%]*	13.9	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_049

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	1.9	1.9
2000.0	-1	5.1	6.9
1000.0	0	17.3	24.2
500.0	1	26.6	50.8
250.0	2	19.3	70.1
125.0	3	9.7	79.8
62.5	4	4.9	84.7
31.2	5	3.3	88.0
15.6	6	2.5	90.5
7.8	7	2.3	92.9
3.9	8	3.0	95.9
< 3.9	> 8	4.1	100
Total		100	100

Particle Size Distribution



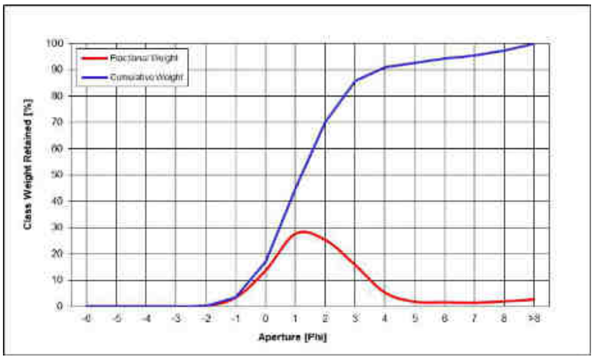
Sorting [µm] †	2.46	Very poorly sorted
Skewness [µm] †	0.41	Very fine skewed
Kurtosis [µm] †	1.50	Very leptokurtic
Mean [µm]* †	366	Medium sand
Mean [phi]* †	1.45	
Median [µm]* †	511	Coarse sand
Median [phi]* †	0.97	
Gravel [%]*	6.9	Gravelly muddy sand
Sand [%]*	77.8	
Mud [%]*	15.3	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_050

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.2	0.2
2000.0	-1	3.3	3.5
1000.0	0	13.6	17.1
500.0	1	27.6	44.7
250.0	2	25.3	70.0
125.0	3	15.7	85.7
62.5	4	5.2	90.9
31.2	5	1.7	92.7
15.6	6	1.5	94.2
7.8	7	1.4	95.5
3.9	8	1.9	97.4
< 3.9	> 8	2.6	100
Total		100	100

Particle Size Distribution



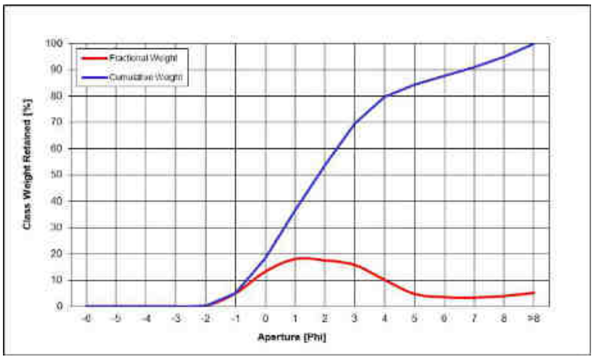
Sorting [µm] †	1.88	Poorly sorted
Skewness [µm] †	0.29	Fine skewed
Kurtosis [µm] †	1.51	Very leptokurtic
Mean [µm]* †	396	Medium sand
Mean [phi]* †	1.34	
Median [µm]* †	433	Medium sand
Median [phi]* †	1.21	
Gravel [%]*	3.5	Slightly gravelly sand
Sand [%]*	87.4	
Mud [%]*	9.1	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_051

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.2	0.2
2000.0	-1	4.9	5.1
1000.0	0	13.2	18.3
500.0	1	18.0	36.3
250.0	2	17.5	53.8
125.0	3	15.7	69.5
62.5	4	10.0	79.6
31.2	5	4.7	84.3
15.6	6	3.4	87.7
7.8	7	3.3	91.0
3.9	8	3.9	94.9
< 3.9	> 8	5.1	100
Total		100	100

Particle Size Distribution



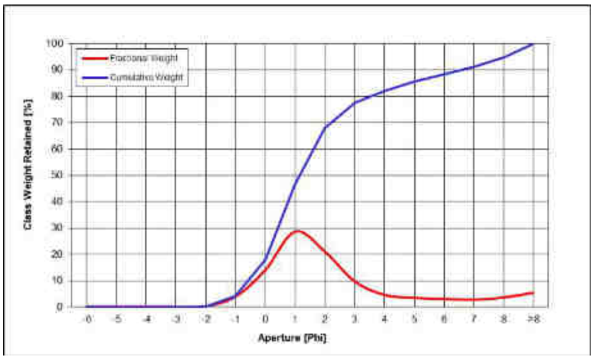
Sorting [µm] †	2.66	Very poorly sorted
Skewness [µm] †	0.31	Very fine skewed
Kurtosis [µm] †	1.18	Leptokurtic
Mean [µm]* †	220	Fine sand
Mean [phi]* †	2.18	
Median [µm]* †	291	Medium sand
Median [phi]* †	1.78	
Gravel [%]*	5.1	Gravelly muddy sand
Sand [%]*	74.4	
Mud [%]*	20.4	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_052

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.2	0.2
2000.0	-1	3.9	4.1
1000.0	0	14.0	18.1
500.0	1	28.7	46.8
250.0	2	21.0	67.8
125.0	3	9.7	77.5
62.5	4	4.5	82.1
31.2	5	3.4	85.5
15.6	6	3.0	88.4
7.8	7	2.7	91.1
3.9	8	3.5	94.6
< 3.9	> 8	5.4	100
Total		100	100

Particle Size Distribution



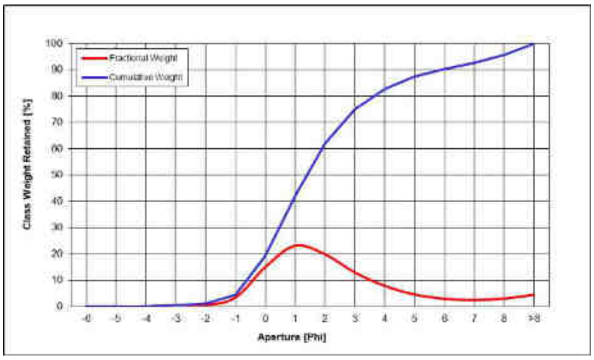
Sorting [µm] †	2.59	Very poorly sorted
Skewness [µm] †	0.50	Very fine skewed
Kurtosis [µm] †	1.53	Very Leptokurtic
Mean [µm]* †	276	Medium sand
Mean [phi]* †	1.86	
Median [µm]* †	450	Medium sand
Median [phi]* †	1.15	
Gravel [%]*	4.1	Slightly gravelly muddy sand
Sand [%]*	78.0	
Mud [%]*	17.9	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_053

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.5	0.5
4000.0	-2	0.6	1.0
2000.0	-1	3.4	4.4
1000.0	0	14.9	19.3
500.0	1	23.0	42.3
250.0	2	19.8	62.1
125.0	3	12.9	75.0
62.5	4	7.8	82.8
31.2	5	4.5	87.3
15.6	6	2.9	90.2
7.8	7	2.4	92.6
3.9	8	3.0	95.6
< 3.9	> 8	4.4	100
Total		100	100

Particle Size Distribution



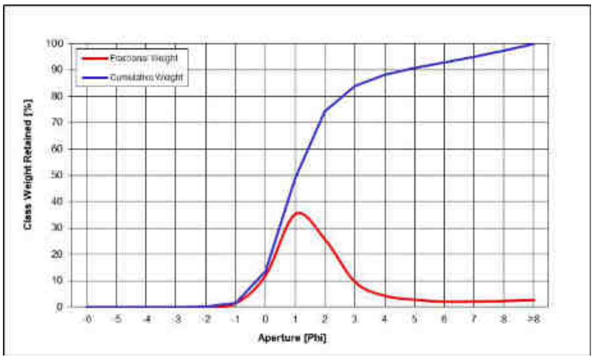
Sorting [µm] †	2.45	Very poorly sorted
Skewness [µm] †	0.37	Very fine skewed
Kurtosis [µm] †	1.30	Leptokurtic
Mean [µm]* †	285	Medium sand
Mean [phi]* †	1.81	
Median [µm]* †	382	Medium sand
Median [phi]* †	1.39	
Gravel [%]*	4.4	Slightly gravelly muddy sand
Sand [%]*	78.4	
Mud [%]*	17.2	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_055

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.2	0.2
2000.0	-1	1.4	1.6
1000.0	0	11.9	13.6
500.0	1	35.2	48.8
250.0	2	25.5	74.3
125.0	3	9.5	83.8
62.5	4	4.3	88.1
31.2	5	2.8	90.8
15.6	6	2.1	92.9
7.8	7	2.1	95.0
3.9	8	2.4	97.4
< 3.9	> 8	2.6	100
Total		100	100

Particle Size Distribution



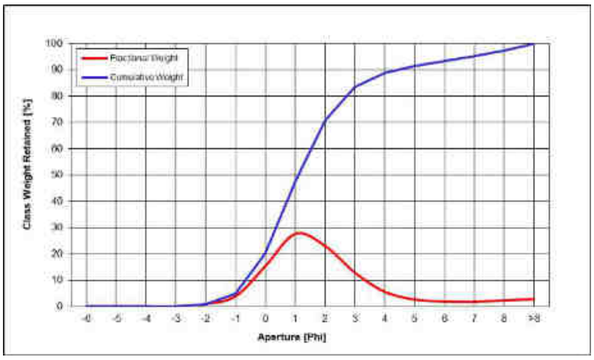
Sorting [µm] †	1.91	Poorly sorted
Skewness [µm] †	0.44	Very fine skewed
Kurtosis [µm] †	1.81	Very leptokurtic
Mean [µm]* †	382	Medium sand
Mean [phi]* †	1.39	
Median [µm]* †	484	Medium sand
Median [phi]* †	1.05	
Gravel [%]*	1.6	Slightly gravelly muddy sand
Sand [%]*	86.4	
Mud [%]*	11.9	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_056

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.8	0.8
2000.0	-1	3.9	4.7
1000.0	0	15.4	20.1
500.0	1	27.6	47.8
250.0	2	23.0	70.7
125.0	3	12.8	83.5
62.5	4	5.5	89.0
31.2	5	2.6	91.5
15.6	6	1.8	93.3
7.8	7	1.8	95.1
3.9	8	2.2	97.3
< 3.9	> 8	2.7	100
Total		100	100

Particle Size Distribution



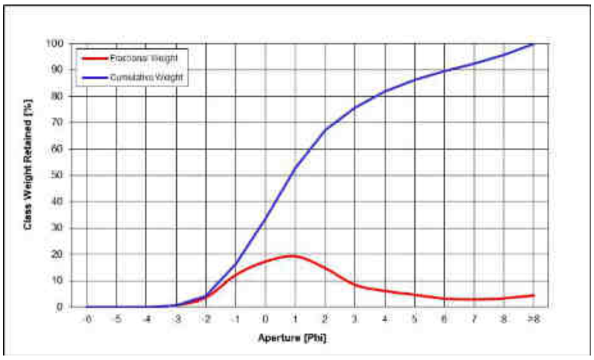
Sorting [µm] †	2.04	Very poorly sorted
Skewness [µm] †	0.33	Very fine skewed
Kurtosis [µm] †	1.50	Very leptokurtic
Mean [µm]* †	404	Medium sand
Mean [phi]* †	1.31	
Median [µm]* †	467	Medium sand
Median [phi]* †	1.10	
Gravel [%]*	4.7	Slightly gravelly muddy sand
Sand [%]*	84.2	
Mud [%]*	11.0	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_057

Aperture [μm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.6	0.6
4000.0	-2	3.6	4.2
2000.0	-1	12.1	16.3
1000.0	0	17.2	33.5
500.0	1	19.1	52.6
250.0	2	14.7	67.3
125.0	3	8.3	75.6
62.5	4	6.1	81.7
31.2	5	4.6	86.3
15.6	6	3.2	89.5
7.8	7	2.8	92.3
3.9	8	3.3	95.6
< 3.9	> 8	4.4	100
Total		100	100

Particle Size Distribution



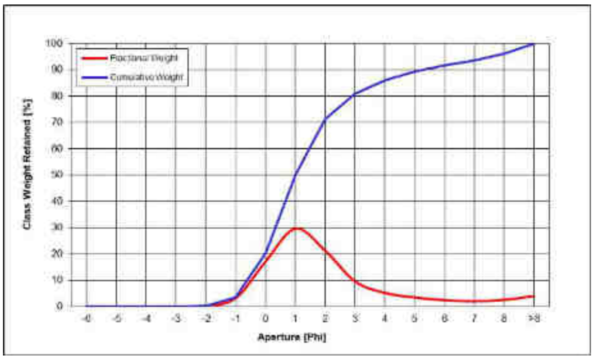
Sorting [μm] †	2.86	Very poorly sorted
Skewness [μm] †	0.37	Very fine skewed
Kurtosis [μm] †	1.17	Leptokurtic
Mean [μm]* †	367	Medium sand
Mean [phi]* †	1.45	
Median [μm]* †	550	Coarse sand
Median [phi]* †	0.86	
Gravel [%]*	16.3	Gravelly muddy sand
Sand [%]*	65.4	
Mud [%]*	18.3	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_058

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.2	0.2
2000.0	-1	3.2	3.4
1000.0	0	17.1	20.5
500.0	1	29.6	50.1
250.0	2	21.2	71.3
125.0	3	9.5	80.8
62.5	4	5.1	85.9
31.2	5	3.4	89.3
15.6	6	2.4	91.7
7.8	7	1.9	93.6
3.9	8	2.5	96.1
< 3.9	> 8	3.9	100
Total		100	100

Particle Size Distribution



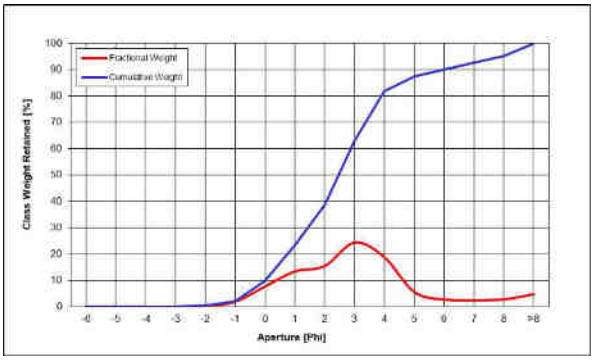
Sorting [µm] †	2.25	Very poorly sorted
Skewness [µm] †	0.45	Very fine skewed
Kurtosis [µm] †	1.55	Very leptokurtic
Mean [µm]* †	366	Medium sand
Mean [phi]* †	1.45	Medium sand
Median [µm]* †	501	Coarse sand
Median [phi]* †	1.00	Coarse sand
Gravel [%]*	3.4	Slightly gravelly muddy sand
Sand [%]*	82.6	Slightly gravelly muddy sand
Mud [%]*	14.1	Slightly gravelly muddy sand

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_062

Aperture [μm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.2	0.2
2000.0	-1	1.9	2.1
1000.0	0	7.7	9.8
500.0	1	13.4	23.2
250.0	2	15.5	38.7
125.0	3	24.4	63.0
62.5	4	18.8	81.8
31.2	5	5.6	87.4
15.6	6	2.7	90.1
7.8	7	2.4	92.5
3.9	8	2.8	95.3
< 3.9	> 8	4.7	100
Total		100	100

Particle Size Distribution



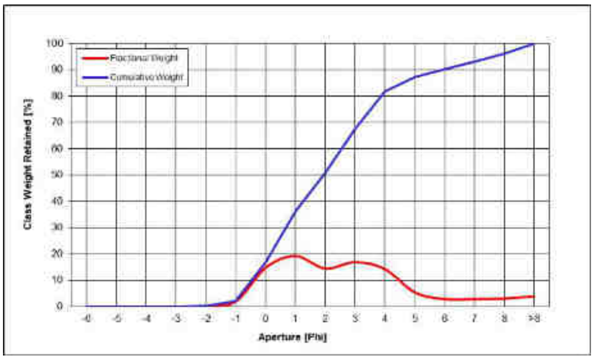
Sorting [μm] †	2.27	Very poorly sorted
Skewness [μm] †	0.13	Fine skewed
Kurtosis [μm] †	1.39	Leptokurtic
Mean [μm]* †	184	Fine sand
Mean [phi]* †	2.44	
Median [μm]* †	181	Fine sand
Median [phi]* †	2.47	
Gravel [%]*	2.1	Slightly gravelly muddy sand
Sand [%]*	79.7	
Mud [%]*	18.2	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_063

Aperture [μm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.1	0.1
2000.0	-1	2.0	2.1
1000.0	0	14.8	16.9
500.0	1	19.2	36.2
250.0	2	14.5	50.7
125.0	3	16.9	67.6
62.5	4	14.3	81.9
31.2	5	5.4	87.3
15.6	6	2.9	90.2
7.8	7	2.9	93.0
3.9	8	3.1	96.1
< 3.9	> 8	3.9	100
Total		100	100

Particle Size Distribution



Sorting [μm] †	2.39	Very poorly sorted
Skewness [μm] †	0.22	Fine skewed
Kurtosis [μm] †	1.12	Leptokurtic
Mean [μm]* †	234	Fine sand
Mean [phi]* †	2.09	
Median [μm]* †	258	Medium sand
Median [phi]* †	1.95	
Gravel [%]*	2.1	Slightly gravelly muddy sand
Sand [%]*	79.8	
Mud [%]*	18.1	

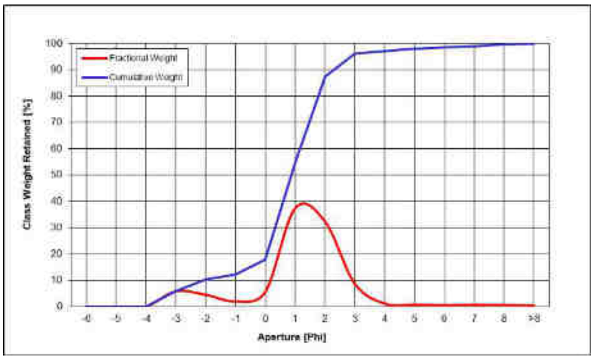
Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_064

No photograph available

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	5.8	5.8
4000.0	-2	4.5	10.3
2000.0	-1	2.0	12.2
1000.0	0	5.5	17.7
500.0	1	37.3	55.1
250.0	2	32.3	87.4
125.0	3	8.7	96.1
62.5	4	1.1	97.2
31.2	5	0.7	97.9
15.6	6	0.5	98.4
7.8	7	0.6	99.1
3.9	8	0.6	99.7
< 3.9	> 8	0.3	100
Total		100	100

Particle Size Distribution



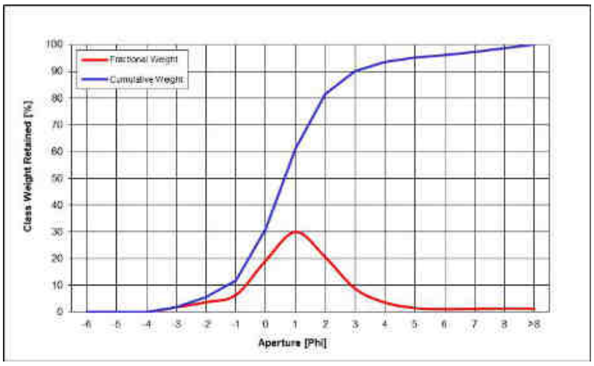
Sorting [µm] †	1.46	No data
Skewness [µm] †	-0.20	No data
Kurtosis [µm] †	1.73	No data
Mean [µm]* †	568	Coarse sand
Mean [phi]* †	0.81	
Median [µm]* †	549	Coarse sand
Median [phi]* †	0.86	
Gravel [%]*	12.2	Gravelly sand
Sand [%]*	85.0	
Mud [%]*	2.8	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_066

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	1.8	1.8
4000.0	-2	3.7	5.5
2000.0	-1	6.4	11.9
1000.0	0	19.3	31.1
500.0	1	29.9	61.0
250.0	2	20.4	81.4
125.0	3	8.7	90.1
62.5	4	3.5	93.6
31.2	5	1.5	95.1
15.6	6	1.1	96.2
7.8	7	1.2	97.3
3.9	8	1.3	98.7
< 3.9	> 8	1.3	100
Total		100	100

Particle Size Distribution



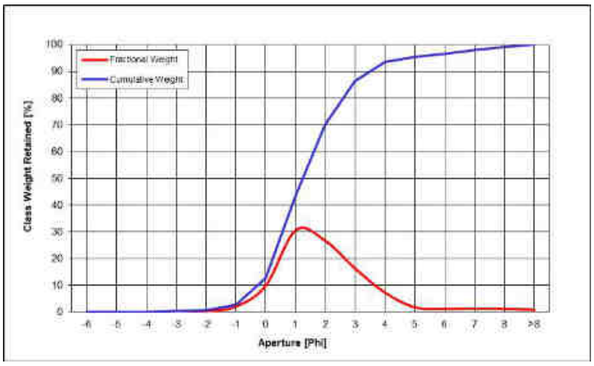
Sorting [µm] †	1.84	Poorly sorted
Skewness [µm] †	0.15	Fine skewed
Kurtosis [µm] †	1.44	Leptokurtic
Mean [µm]* †	609	Coarse sand
Mean [phi]* †	0.72	
Median [µm]* †	645	Coarse sand
Median [phi]* †	0.63	
Gravel [%]*	11.9	Gravelly sand
Sand [%]*	81.7	
Mud [%]*	6.4	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_067

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.4	0.4
4000.0	-2	0.4	0.7
2000.0	-1	2.1	2.8
1000.0	0	9.9	12.8
500.0	1	30.7	43.5
250.0	2	26.6	70.1
125.0	3	16.2	86.4
62.5	4	7.2	93.6
31.2	5	1.8	95.4
15.6	6	1.2	96.6
7.8	7	1.4	98.0
3.9	8	1.2	99.2
< 3.9	> 8	0.8	100
Total		100	100

Particle Size Distribution



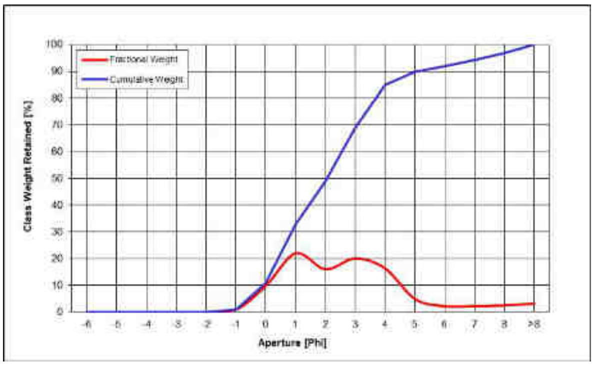
Sorting [µm] †	1.53	Poorly sorted
Skewness [µm] †	0.22	Fine skewed
Kurtosis [µm] †	1.20	Leptokurtic
Mean [µm]* †	379	Medium sand
Mean [phi]* †	1.40	
Median [µm]* †	422	Medium sand
Median [phi]* †	1.24	
Gravel [%]*	2.8	Slightly gravelly sand
Sand [%]*	90.8	
Mud [%]*	6.4	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_068

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.0	0.0
2000.0	-1	0.9	1.0
1000.0	0	9.8	10.8
500.0	1	21.9	32.7
250.0	2	16.0	48.6
125.0	3	20.0	68.7
62.5	4	16.3	84.9
31.2	5	4.9	89.8
15.6	6	2.2	92.0
7.8	7	2.3	94.3
3.9	8	2.5	96.8
< 3.9	> 8	3.2	100
Total		100	100

Particle Size Distribution



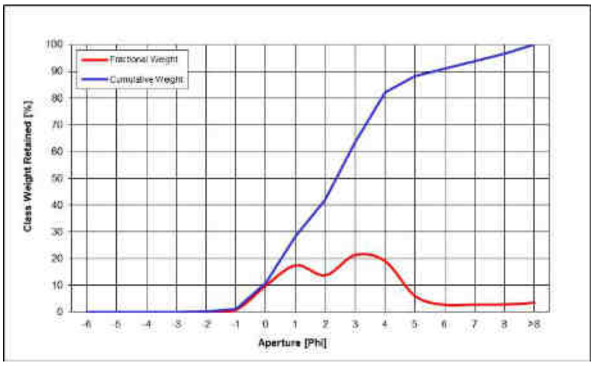
Sorting [µm] †	2.12	Very poorly sorted
Skewness [µm] †	0.17	Fine skewed
Kurtosis [µm] †	1.18	Leptokurtic
Mean [µm]* †	236	Fine sand
Mean [phi]* †	2.08	
Median [µm]* †	239	Fine sand
Median [phi]* †	2.07	
Gravel [%]*	1.0	Slightly gravelly muddy sand
Sand [%]*	84.0	
Mud [%]*	15.1	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_069

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.3	0.3
2000.0	-1	0.8	1.1
1000.0	0	9.8	10.9
500.0	1	17.4	28.3
250.0	2	13.7	42.0
125.0	3	21.3	63.3
62.5	4	18.9	82.2
31.2	5	6.0	88.2
15.6	6	2.7	90.9
7.8	7	2.8	93.7
3.9	8	2.8	96.5
< 3.9	> 8	3.5	100
Total		100	100

Particle Size Distribution



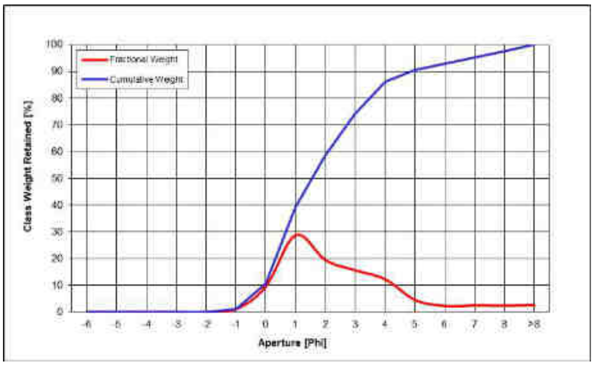
Sorting [µm] †	2.22	Very poorly sorted
Skewness [µm] †	0.11	Fine skewed
Kurtosis [µm] †	1.18	Leptokurtic
Mean [µm]* †	200	Fine sand
Mean [phi]* †	2.32	
Median [µm]* †	193	Fine sand
Median [phi]* †	2.37	
Gravel [%]*	1.1	Slightly gravelly muddy sand
Sand [%]*	81.1	
Mud [%]*	17.8	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_070

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.0	0.0
2000.0	-1	1.0	1.0
1000.0	0	9.5	10.5
500.0	1	28.6	39.1
250.0	2	19.3	58.5
125.0	3	15.5	74.0
62.5	4	12.2	86.1
31.2	5	4.5	90.6
15.6	6	2.2	92.8
7.8	7	2.4	95.2
3.9	8	2.3	97.5
< 3.9	> 8	2.5	100
Total		100	100

Particle Size Distribution



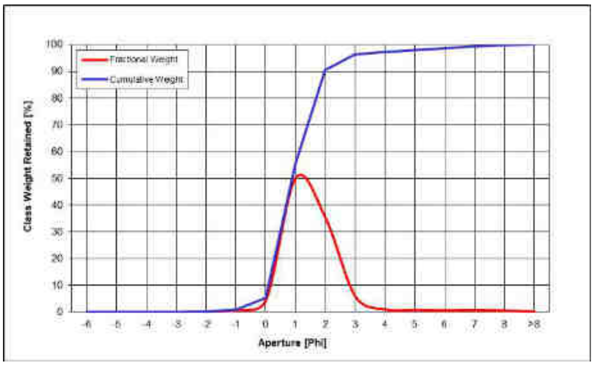
Sorting [µm] †	2.04	Very poorly sorted
Skewness [µm] †	0.34	Very fine skewed
Kurtosis [µm] †	1.19	Leptokurtic
Mean [µm]* †	276	Medium sand
Mean [phi]* †	1.86	
Median [µm]* †	339	Medium sand
Median [phi]* †	1.56	
Gravel [%]*	1.0	Slightly gravelly muddy sand
Sand [%]*	85.1	
Mud [%]*	13.9	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_071

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.2	0.2
2000.0	-1	0.7	0.9
1000.0	0	4.4	5.3
500.0	1	50.1	55.3
250.0	2	35.2	90.5
125.0	3	5.8	96.4
62.5	4	0.9	97.3
31.2	5	0.7	98.0
15.6	6	0.6	98.6
7.8	7	0.7	99.3
3.9	8	0.5	99.9
< 3.9	> 8	0.1	100
Total		100	100

Particle Size Distribution



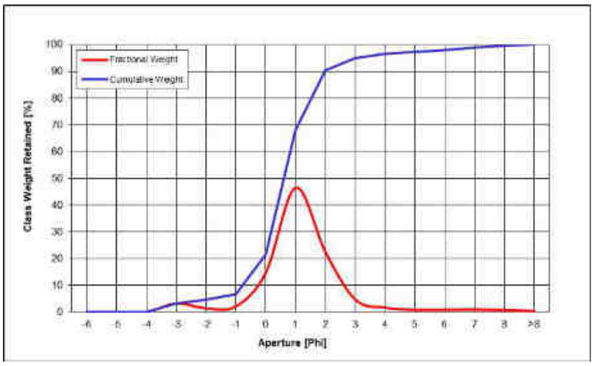
Sorting [µm] †	0.83	Moderately sorted
Skewness [µm] †	0.24	Fine skewed
Kurtosis [µm] †	1.00	Mesokurtic
Mean [µm]* †	509	Coarse sand
Mean [phi]* †	0.97	
Median [µm]* †	538	Coarse sand
Median [phi]* †	0.89	
Gravel [%]*	0.9	Slightly gravelly sand
Sand [%]*	96.4	
Mud [%]*	2.7	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_072

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	3.2	3.2
4000.0	-2	1.4	4.6
2000.0	-1	2.1	6.7
1000.0	0	14.8	21.5
500.0	1	46.4	67.9
250.0	2	22.3	90.2
125.0	3	4.6	94.8
62.5	4	1.6	96.5
31.2	5	0.8	97.3
15.6	6	0.8	98.1
7.8	7	0.9	99.0
3.9	8	0.7	99.7
< 3.9	> 8	0.3	100
Total		100	100

Particle Size Distribution



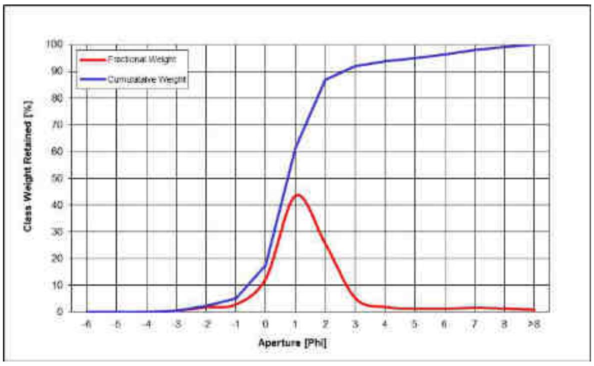
Sorting [µm] †	1.27	Poorly sorted
Skewness [µm] †	0.03	Symmetrical
Kurtosis [µm] †	1.62	Very leptokurtic
Mean [µm]* †	635	Coarse sand
Mean [phi]* †	0.66	
Median [µm]* †	653	Coarse sand
Median [phi]* †	0.61	
Gravel [%]*	6.7	Gravelly sand
Sand [%]*	89.7	
Mud [%]*	3.5	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
 = Statistics based on Folk and Ward (1957)

STATION R2_ENV_073

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.5	0.5
4000.0	-2	1.7	2.2
2000.0	-1	2.8	5.1
1000.0	0	12.6	17.6
500.0	1	43.6	61.3
250.0	2	25.4	86.7
125.0	3	5.2	91.9
62.5	4	1.8	93.7
31.2	5	1.3	95.0
15.6	6	1.3	96.3
7.8	7	1.5	97.9
3.9	8	1.3	99.2
< 3.9	> 8	0.8	100
Total		100	100

Particle Size Distribution



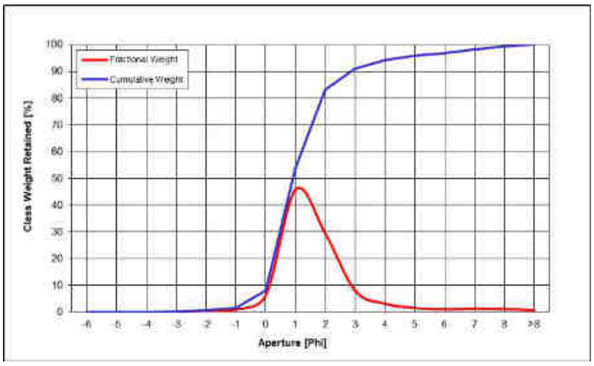
Sorting [µm] †	1.42	Poorly sorted
Skewness [µm] †	0.27	Fine skewed
Kurtosis [µm] †	1.79	Very Leptokurtic
Mean [µm]* †	561	Coarse sand
Mean [phi]* †	0.84	
Median [µm]* †	598	Coarse sand
Median [phi]* †	0.74	
Gravel [%]*	5.1	Gravelly sand
Sand [%]*	88.6	
Mud [%]*	6.3	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_074

Aperture [μm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.1	0.1
4000.0	-2	0.5	0.6
2000.0	-1	1.0	1.7
1000.0	0	6.4	8.0
500.0	1	45.8	53.8
250.0	2	29.2	83.1
125.0	3	8.0	91.0
62.5	4	3.2	94.2
31.2	5	1.6	95.8
15.6	6	1.1	96.8
7.8	7	1.3	98.1
3.9	8	1.2	99.3
< 3.9	> 8	0.7	100
Total		100	100

Particle Size Distribution



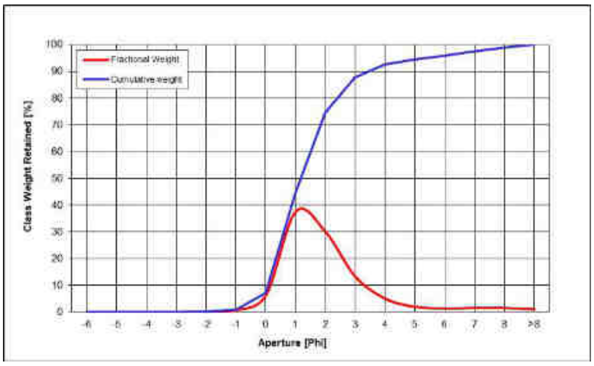
Sorting [μm] †	1.24	Poorly sorted
Skewness [μm] †	0.34	Very fine skewed
Kurtosis [μm] †	1.51	Very leptokurtic
Mean [μm]* †	477	Medium sand
Mean [phi]* †	1.07	
Median [μm]* †	530	Coarse sand
Median [phi]* †	0.92	
Gravel [%]*	1.7	Slightly gravelly sand
Sand [%]*	92.5	
Mud [%]*	5.8	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_075

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.2	0.2
2000.0	-1	0.7	0.9
1000.0	0	6.2	7.0
500.0	1	37.5	44.5
250.0	2	29.9	74.5
125.0	3	13.2	87.7
62.5	4	5.0	92.7
31.2	5	1.9	94.6
15.6	6	1.3	95.9
7.8	7	1.5	97.4
3.9	8	1.5	98.9
< 3.9	> 8	1.1	100
Total		100	100

Particle Size Distribution



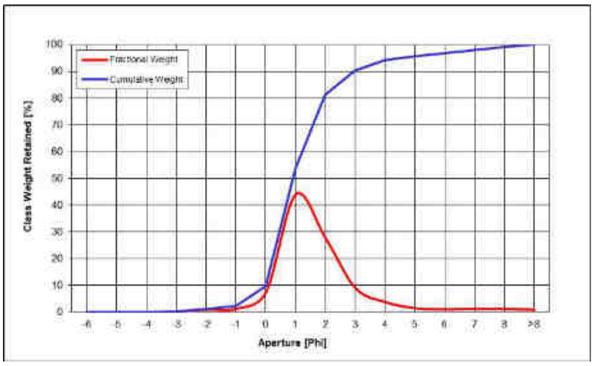
Sorting [µm] †	1.48	Poorly sorted
Skewness [µm] †	0.35	Very fine skewed
Kurtosis [µm] †	1.48	Leptokurtic
Mean [µm]* †	384	Medium sand
Mean [phi]* †	1.38	
Median [µm]* †	441	Medium sand
Median [phi]* †	1.18	
Gravel [%]*	0.9	Slightly gravelly sand
Sand [%]*	91.8	
Mud [%]*	7.3	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
 = Statistics based on Folk and Ward (1957)

STATION R2_ENV_076

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.1	0.1
4000.0	-2	1.0	1.1
2000.0	-1	1.2	2.3
1000.0	0	7.3	9.7
500.0	1	44.0	53.6
250.0	2	27.7	81.3
125.0	3	9.0	90.4
62.5	4	3.8	94.2
31.2	5	1.5	95.6
15.6	6	1.1	96.7
7.8	7	1.3	97.9
3.9	8	1.2	99.1
< 3.9	> 8	0.9	100
Total		100	100

Particle Size Distribution



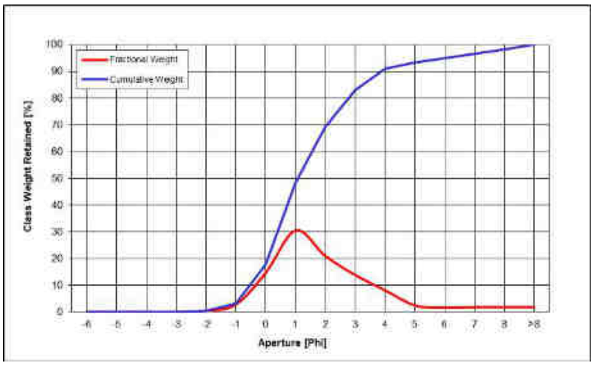
Sorting [µm] †	1.33	Poorly sorted
Skewness [µm] †	0.34	Very fine skewed
Kurtosis [µm] †	1.50	Very leptokurtic
Mean [µm]* †	460	Medium sand
Mean [phi]* †	1.12	
Median [µm]* †	529	Coarse sand
Median [phi]* †	0.92	
Gravel [%]*	2.3	Slightly gravelly sand
Sand [%]*	91.8	
Mud [%]*	5.8	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_077

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.3	0.3
2000.0	-1	2.8	3.1
1000.0	0	14.7	17.8
500.0	1	30.5	48.3
250.0	2	20.9	69.2
125.0	3	13.8	82.9
62.5	4	8.0	91.0
31.2	5	2.4	93.4
15.6	6	1.5	94.9
7.8	7	1.7	96.6
3.9	8	1.7	98.3
< 3.9	> 8	1.7	100
Total		100	100

Particle Size Distribution



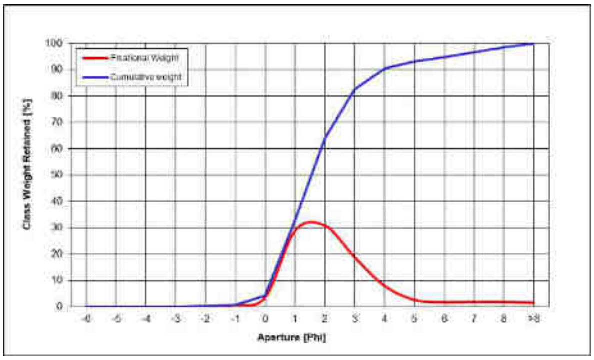
Sorting [µm] †	1.86	Poorly sorted
Skewness [µm] †	0.35	Very fine skewed
Kurtosis [µm] †	1.30	Leptokurtic
Mean [µm]* †	389	Medium sand
Mean [phi]* †	1.36	
Median [µm]* †	473	Medium sand
Median [phi]* †	1.08	
Gravel [%]*	3.1	Slightly gravelly sand
Sand [%]*	87.9	
Mud [%]*	9.0	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_078

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.1	0.1
2000.0	-1	0.5	0.6
1000.0	0	3.6	4.2
500.0	1	28.9	33.2
250.0	2	30.7	63.9
125.0	3	18.7	82.6
62.5	4	7.9	90.5
31.2	5	2.6	93.0
15.6	6	1.8	94.8
7.8	7	1.8	96.6
3.9	8	1.8	98.5
< 3.9	> 8	1.5	100
Total		100	100

Particle Size Distribution



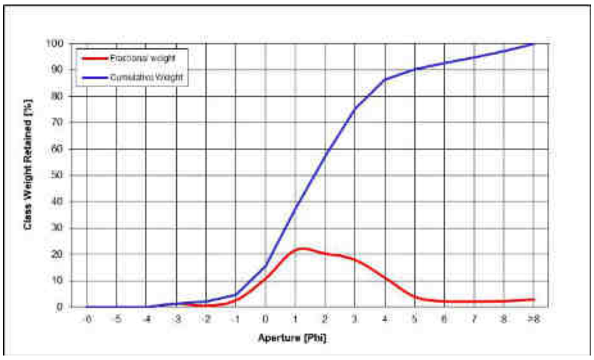
Sorting [µm] †	1.61	Poorly sorted
Skewness [µm] †	0.34	Very fine skewed
Kurtosis [µm] †	1.33	Leptokurtic
Mean [µm]* †	305	Medium sand
Mean [phi]* †	1.71	
Median [µm]* †	342	Medium sand
Median [phi]* †	1.55	
Gravel [%]*	0.6	Slightly gravelly sand
Sand [%]*	89.9	
Mud [%]*	9.5	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_079

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	1.4	1.4
4000.0	-2	0.6	2.0
2000.0	-1	2.6	4.6
1000.0	0	10.8	15.4
500.0	1	21.6	37.0
250.0	2	20.3	57.3
125.0	3	17.9	75.1
62.5	4	11.2	86.3
31.2	5	4.0	90.3
15.6	6	2.3	92.5
7.8	7	2.2	94.7
3.9	8	2.4	97.1
< 3.9	> 8	2.9	100
Total		100	100

Particle Size Distribution



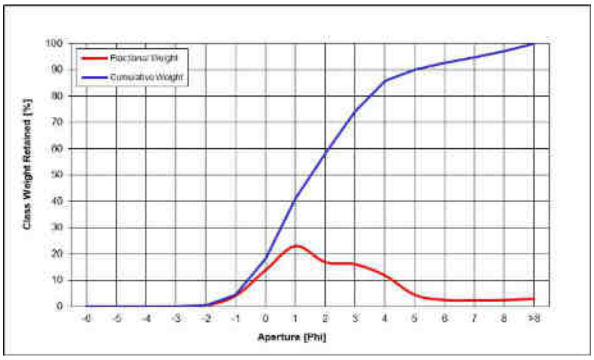
Sorting [µm] †	2.17	Very poorly sorted
Skewness [µm] †	0.25	Fine skewed
Kurtosis [µm] †	1.30	Leptokurtic
Mean [µm]* †	283	Medium sand
Mean [phi]* †	1.82	
Median [µm]* †	320	Medium sand
Median [phi]* †	1.64	
Gravel [%]*	4.6	Slightly gravelly muddy sand
Sand [%]*	81.7	
Mud [%]*	13.7	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_080

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.3	0.3
2000.0	-1	4.1	4.4
1000.0	0	13.8	18.2
500.0	1	22.9	41.2
250.0	2	16.8	58.0
125.0	3	16.0	74.0
62.5	4	11.8	85.7
31.2	5	4.4	90.1
15.6	6	2.4	92.5
7.8	7	2.3	94.8
3.9	8	2.3	97.1
< 3.9	> 8	2.9	100
Total		100	100

Particle Size Distribution



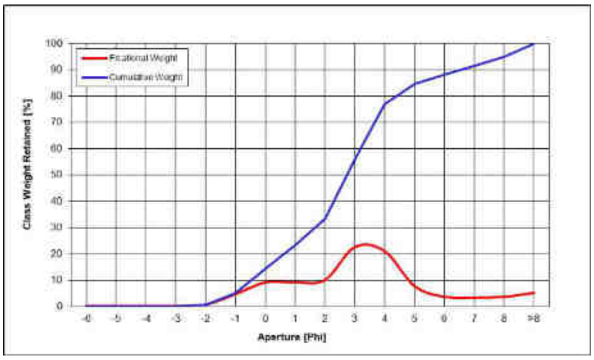
Sorting [µm] †	2.22	Very poorly sorted
Skewness [µm] †	0.27	Fine skewed
Kurtosis [µm] †	1.18	Leptokurtic
Mean [µm]* †	300	Medium sand
Mean [phi]* †	1.74	Medium sand
Median [µm]* †	347	Medium sand
Median [phi]* †	1.53	Medium sand
Gravel [%]*	4.4	Slightly gravelly muddy sand
Sand [%]*	81.3	Slightly gravelly muddy sand
Mud [%]*	14.3	Slightly gravelly muddy sand

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_081

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.5	0.5
2000.0	-1	4.6	5.1
1000.0	0	9.0	14.1
500.0	1	9.1	23.3
250.0	2	10.0	33.3
125.0	3	22.6	55.9
62.5	4	21.0	76.9
31.2	5	7.7	84.6
15.6	6	3.6	88.2
7.8	7	3.2	91.4
3.9	8	3.5	94.9
< 3.9	> 8	5.1	100
Total		100	100

Particle Size Distribution



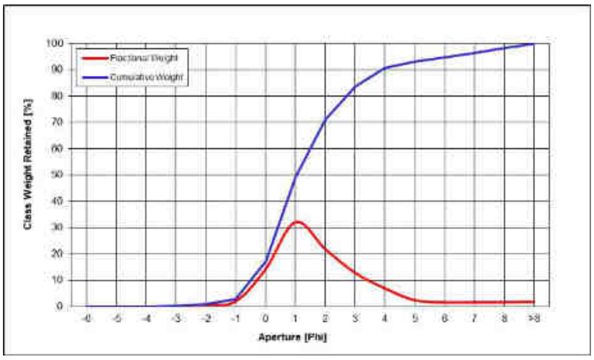
Sorting [µm] †	2.56	Very poorly sorted
Skewness [µm] †	0.05	Symmetrical
Kurtosis [µm] †	1.37	Leptokurtic
Mean [µm]* †	163	Fine sand
Mean [phi]* †	2.62	
Median [µm]* †	150	Fine sand
Median [phi]* †	2.74	
Gravel [%]*	5.1	Gravelly muddy sand
Sand [%]*	71.9	
Mud [%]*	23.1	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_082

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.1	0.1
4000.0	-2	0.6	0.7
2000.0	-1	2.0	2.8
1000.0	0	14.2	17.0
500.0	1	32.1	49.1
250.0	2	21.8	70.9
125.0	3	12.8	83.8
62.5	4	7.0	90.7
31.2	5	2.4	93.2
15.6	6	1.6	94.8
7.8	7	1.7	96.5
3.9	8	1.7	98.2
< 3.9	> 8	1.8	100
Total		100	100

Particle Size Distribution



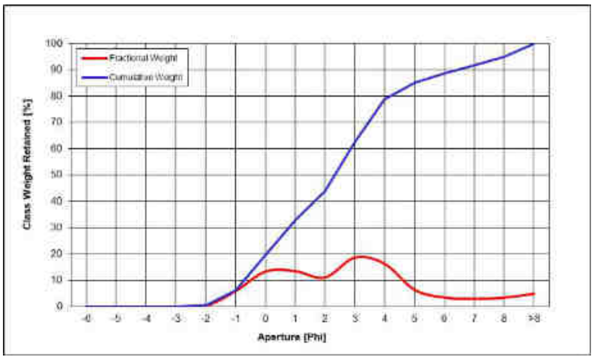
Sorting [µm] †	1.83	Poorly sorted
Skewness [µm] †	0.37	Very fine skewed
Kurtosis [µm] †	1.38	Leptokurtic
Mean [µm]* †	396	Medium sand
Mean [phi]* †	1.34	
Median [µm]* †	486	Medium sand
Median [phi]* †	1.04	
Gravel [%]*	2.8	Slightly gravelly sand
Sand [%]*	88.0	
Mud [%]*	9.3	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_083

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.3	0.3
2000.0	-1	5.8	6.1
1000.0	0	13.3	19.4
500.0	1	13.5	32.9
250.0	2	11.0	43.9
125.0	3	18.6	62.5
62.5	4	16.3	78.8
31.2	5	6.4	85.2
15.6	6	3.5	88.6
7.8	7	3.0	91.7
3.9	8	3.4	95.1
< 3.9	> 8	4.9	100
Total		100	100

Particle Size Distribution



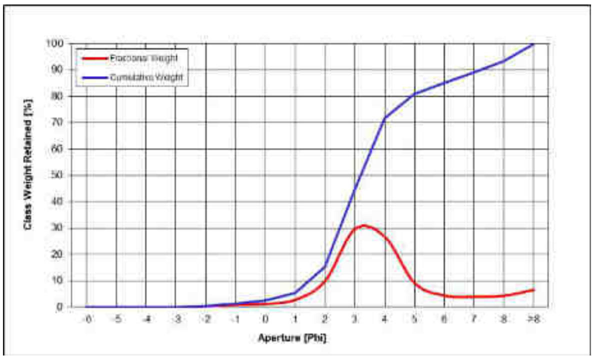
Sorting [µm] †	2.65	Very poorly sorted
Skewness [µm] †	0.11	Fine skewed
Kurtosis [µm] †	1.12	Leptokurtic
Mean [µm]* †	204	Fine sand
Mean [phi]* †	2.30	Fine sand
Median [µm]* †	199	Fine sand
Median [phi]* †	2.33	Fine sand
Gravel [%]*	6.1	Gravelly muddy sand
Sand [%]*	72.7	Gravelly muddy sand
Mud [%]*	21.2	Gravelly muddy sand

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_084

Aperture [μm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.3	0.3
2000.0	-1	0.9	1.2
1000.0	0	1.2	2.5
500.0	1	2.8	5.3
250.0	2	10.0	15.2
125.0	3	29.7	44.9
62.5	4	26.7	71.6
31.2	5	9.2	80.8
15.6	6	4.4	85.2
7.8	7	3.9	89.1
3.9	8	4.3	93.4
< 3.9	> 8	6.6	100
Total		100	100

Particle Size Distribution



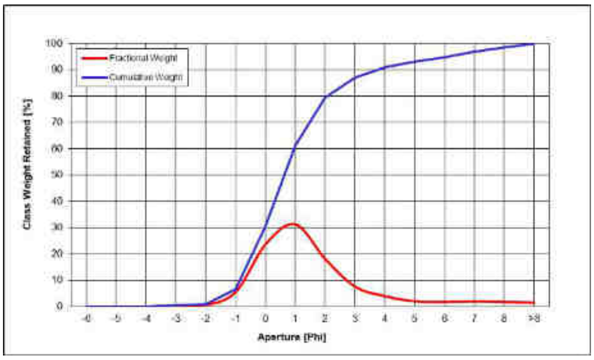
Sorting [μm] †	2.19	Very poorly sorted
Skewness [μm] †	0.41	Very fine skewed
Kurtosis [μm] †	1.68	Very Leptokurtic
Mean [μm]* †	80	Very fine sand
Mean [phi]* †	3.65	
Median [μm]* †	110	Very fine sand
Median [phi]* †	3.19	
Gravel [%]*	1.2	Slightly gravelly muddy sand
Sand [%]*	70.4	
Mud [%]*	28.4	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_085

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.3	0.3
4000.0	-2	0.6	0.9
2000.0	-1	5.6	6.5
1000.0	0	23.7	30.1
500.0	1	31.3	61.4
250.0	2	18.1	79.5
125.0	3	7.6	87.0
62.5	4	3.9	91.0
31.2	5	2.0	93.0
15.6	6	1.8	94.8
7.8	7	2.0	96.7
3.9	8	1.8	98.5
< 3.9	> 8	1.5	100
Total		100	100

Particle Size Distribution



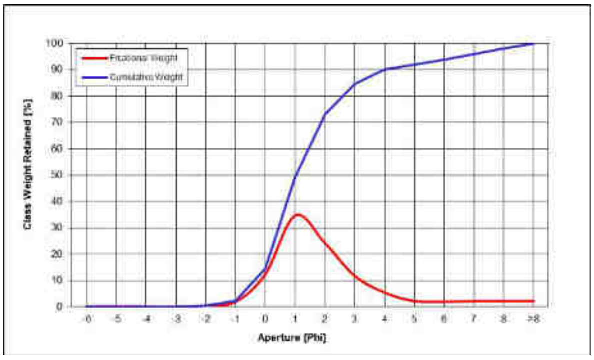
Sorting [µm] †	1.92	Poorly sorted
Skewness [µm] †	0.36	Very fine skewed
Kurtosis [µm] †	1.54	Very leptokurtic
Mean [µm]* †	544	Coarse sand
Mean [phi]* †	0.88	
Median [µm]* †	644	Coarse sand
Median [phi]* †	0.64	
Gravel [%]*	6.5	Gravelly sand
Sand [%]*	84.5	
Mud [%]*	9.0	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_086

Aperture [μm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.3	0.3
2000.0	-1	1.8	2.1
1000.0	0	12.3	14.4
500.0	1	34.6	49.0
250.0	2	24.1	73.1
125.0	3	11.6	84.7
62.5	4	5.3	89.9
31.2	5	2.1	92.0
15.6	6	1.8	93.8
7.8	7	2.1	95.9
3.9	8	2.1	97.9
< 3.9	> 8	2.1	100
Total		100	100

Particle Size Distribution



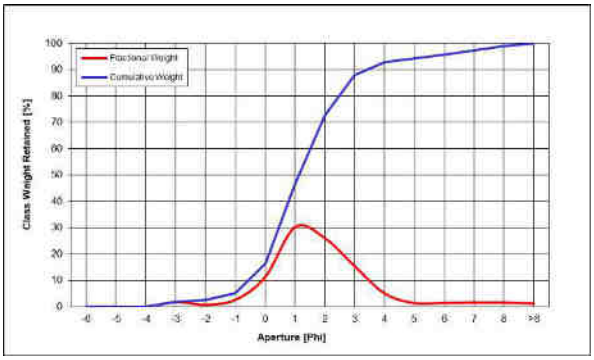
Sorting [μm] [†]	1.84	Poorly sorted
Skewness [μm] [†]	0.41	Very fine skewed
Kurtosis [μm] [†]	1.62	Very Leptokurtic
Mean [μm]* [†]	394	Medium sand
Mean [phi]* [†]	1.34	
Median [μm]* [†]	486	Medium sand
Median [phi]* [†]	1.04	
Gravel [%]*	2.1	Slightly gravelly muddy sand
Sand [%]*	87.8	
Mud [%]*	10.1	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_087

Aperture [μm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	1.8	1.8
4000.0	-2	0.7	2.5
2000.0	-1	2.6	5.1
1000.0	0	11.3	16.5
500.0	1	30.2	46.7
250.0	2	26.0	72.7
125.0	3	15.3	87.9
62.5	4	5.0	93.0
31.2	5	1.3	94.3
15.6	6	1.4	95.7
7.8	7	1.6	97.3
3.9	8	1.6	98.9
< 3.9	> 8	1.1	100
Total		100	100

Particle Size Distribution



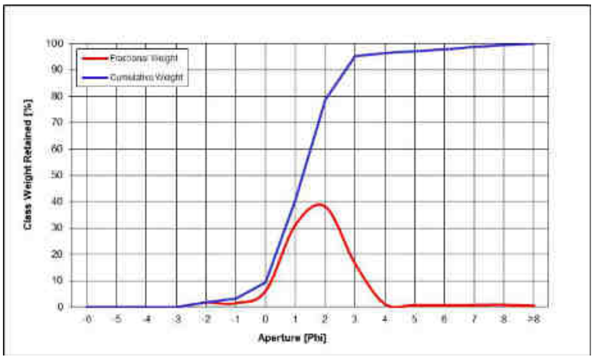
Sorting [μm]	1.69	Poorly sorted
Skewness [μm]	0.25	Fine skewed
Kurtosis [μm]	1.43	Leptokurtic
Mean [μm]*	413	Medium sand
Mean [phi]*	1.28	
Median [μm]*	458	Medium sand
Median [phi]*	1.13	
Gravel [%]*	5.1	Gravelly sand
Sand [%]*	87.8	
Mud [%]*	7.0	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_096

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	1.7	1.7
2000.0	-1	1.5	3.2
1000.0	0	6.1	9.3
500.0	1	31.2	40.5
250.0	2	38.2	78.7
125.0	3	16.5	95.2
62.5	4	1.1	96.4
31.2	5	0.8	97.2
15.6	6	0.7	97.9
7.8	7	0.8	98.6
3.9	8	0.8	99.5
< 3.9	> 8	0.5	100
Total		100	100

Particle Size Distribution



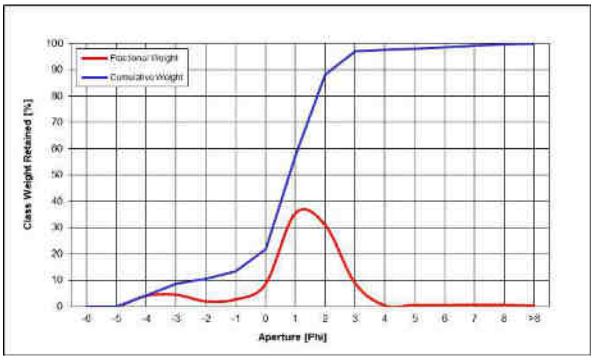
Sorting [µm] †	1.08	Poorly sorted
Skewness [µm] †	-0.02	Symmetrical
Kurtosis [µm] †	1.08	Mesokurtic
Mean [µm]* †	417	Medium sand
Mean [phi]* †	1.26	
Median [µm]* †	421	Medium sand
Median [phi]* †	1.25	
Gravel [%]*	3.2	Slightly gravelly sand
Sand [%]*	93.2	
Mud [%]*	3.6	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_097

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	4.1	4.1
8000.0	-3	4.5	8.5
4000.0	-2	2.0	10.5
2000.0	-1	2.7	13.2
1000.0	0	8.6	21.8
500.0	1	35.5	57.3
250.0	2	30.9	88.2
125.0	3	8.9	97.0
62.5	4	0.4	97.4
31.2	5	0.5	98.0
15.6	6	0.5	98.5
7.8	7	0.7	99.1
3.9	8	0.6	99.7
< 3.9	> 8	0.3	100
Total		100	100

Particle Size Distribution



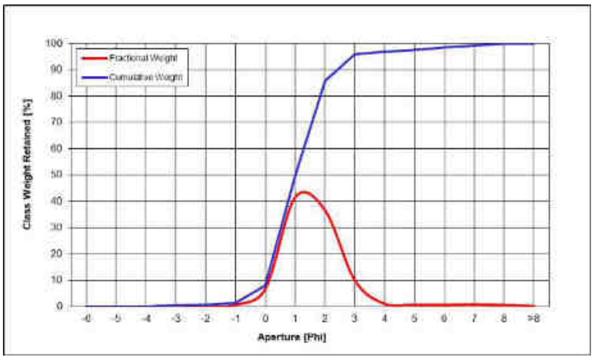
Sorting [µm] †	1.63	Poorly sorted
Skewness [µm] †	-0.28	Coarse skewed
Kurtosis [µm] †	1.81	Very leptokurtic
Mean [µm]* †	632	Coarse sand
Mean [phi]* †	0.66	
Median [µm]* †	576	Coarse sand
Median [phi]* †	0.80	
Gravel [%]*	13.2	Gravelly sand
Sand [%]*	84.2	
Mud [%]*	2.6	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_103

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.3	0.3
4000.0	-2	0.2	0.6
2000.0	-1	0.7	1.3
1000.0	0	6.6	7.9
500.0	1	41.4	49.3
250.0	2	36.6	85.9
125.0	3	10.0	95.8
62.5	4	1.1	96.9
31.2	5	0.8	97.7
15.6	6	0.7	98.4
7.8	7	0.9	99.2
3.9	8	0.6	99.9
< 3.9	> 8	0.1	100
Total		100	100

Particle Size Distribution



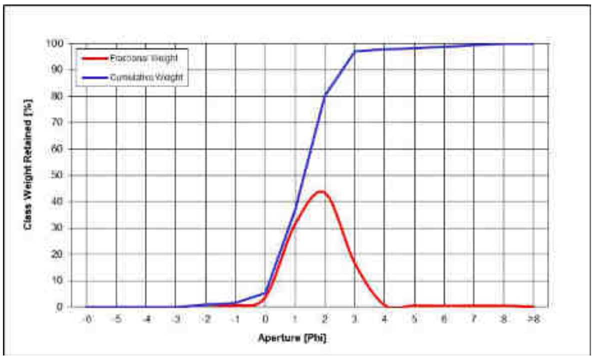
Sorting [µm] †	0.95	Moderately sorted
Skewness [µm] †	0.10	Symmetrical
Kurtosis [µm] †	1.06	Mesokurtic
Mean [µm]* †	481	Medium sand
Mean [phi]* †	1.06	
Median [µm]* †	493	Medium sand
Median [phi]* †	1.02	
Gravel [%]*	1.3	Slightly gravelly sand
Sand [%]*	95.6	
Mud [%]*	3.1	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_106

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.9	0.9
2000.0	-1	0.7	1.6
1000.0	0	3.8	5.4
500.0	1	31.4	36.8
250.0	2	43.4	80.2
125.0	3	16.8	97.0
62.5	4	0.8	97.8
31.2	5	0.6	98.3
15.6	6	0.5	98.8
7.8	7	0.5	99.4
3.9	8	0.5	99.9
< 3.9	> 8	0.1	100
Total		100	100

Particle Size Distribution



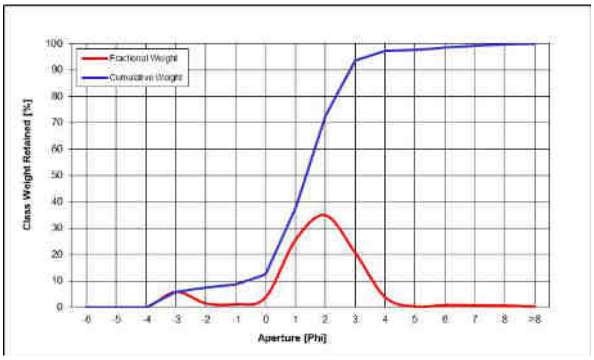
Sorting [µm] †	0.93	Moderately sorted
Skewness [µm] †	0.02	Symmetrical
Kurtosis [µm] †	0.97	Mesokurtic
Mean [µm]* †	409	Medium sand
Mean [phi]* †	1.29	
Median [µm]* †	405	Medium sand
Median [phi]* †	1.30	
Gravel [%]*	1.6	Slightly gravelly sand
Sand [%]*	96.1	
Mud [%]*	2.2	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_107

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	5.8	5.8
4000.0	-2	1.5	7.3
2000.0	-1	1.2	8.5
1000.0	0	3.8	12.3
500.0	1	25.5	37.8
250.0	2	34.9	72.7
125.0	3	20.7	93.4
62.5	4	3.8	97.3
31.2	5	0.3	97.6
15.6	6	0.8	98.4
7.8	7	0.7	99.1
3.9	8	0.6	99.7
< 3.9	> 8	0.3	100
Total		100	100

Particle Size Distribution



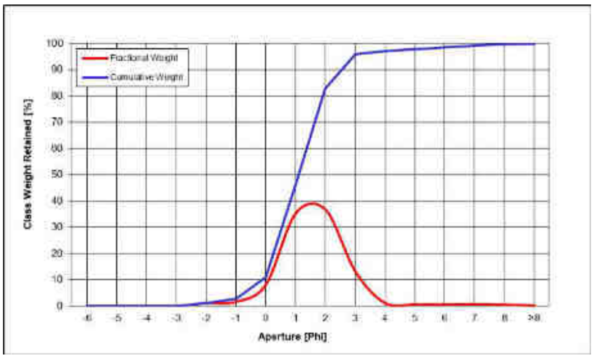
Sorting [µm] †	1.59	Poorly sorted
Skewness [µm] †	-0.19	Coarse skewed
Kurtosis [µm] †	1.67	Very leptokurtic
Mean [µm]* †	393	Medium sand
Mean [phi]* †	1.35	
Median [µm]* †	392	Medium sand
Median [phi]* †	1.35	
Gravel [%]*	8.5	Gravelly sand
Sand [%]*	88.8	
Mud [%]*	2.7	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_109

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	1.1	1.1
2000.0	-1	1.6	2.8
1000.0	0	8.1	10.9
500.0	1	35.2	46.1
250.0	2	36.6	82.7
125.0	3	13.2	95.9
62.5	4	1.1	97.0
31.2	5	0.7	97.7
15.6	6	0.7	98.4
7.8	7	0.8	99.2
3.9	8	0.6	99.8
< 3.9	> 8	0.2	100
Total		100	100

Particle Size Distribution



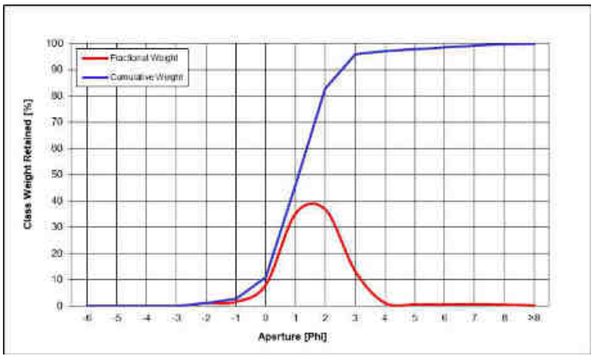
Sorting [µm] †	1.04	Poorly sorted
Skewness [µm] †	0.01	Symmetrical
Kurtosis [µm] †	1.08	Mesokurtic
Mean [µm]* †	461	Medium sand
Mean [phi]* †	1.12	
Median [µm]* †	464	Medium sand
Median [phi]* †	1.11	
Gravel [%]*	2.8	Slightly gravelly sand
Sand [%]*	94.2	
Mud [%]*	3.0	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_110

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	1.1	1.1
2000.0	-1	1.6	2.8
1000.0	0	8.1	10.9
500.0	1	35.2	46.1
250.0	2	36.6	82.7
125.0	3	13.2	95.9
62.5	4	1.1	97.0
31.2	5	0.7	97.7
15.6	6	0.7	98.4
7.8	7	0.8	99.2
3.9	8	0.6	99.8
< 3.9	> 8	0.2	100
Total		100	100

Particle Size Distribution



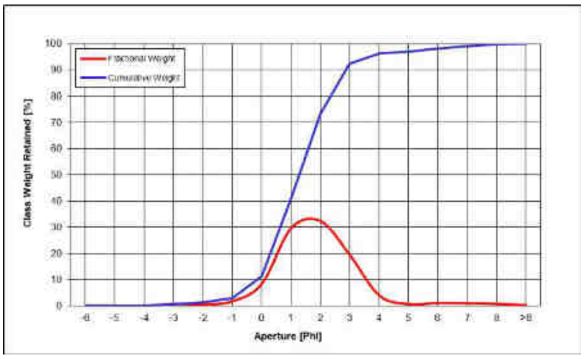
Sorting [µm] †	1.04	Poorly sorted
Skewness [µm] †	0.01	Symmetrical
Kurtosis [µm] †	1.08	Mesokurtic
Mean [µm]* †	461	Medium sand
Mean [phi]* †	1.12	
Median [µm]* †	464	Medium sand
Median [phi]* †	1.11	
Gravel [%]*	2.8	Slightly gravelly sand
Sand [%]*	94.2	
Mud [%]*	3.0	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_111

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.7	0.7
4000.0	-2	0.5	1.2
2000.0	-1	1.7	2.9
1000.0	0	8.4	11.3
500.0	1	29.6	40.9
250.0	2	32.3	73.2
125.0	3	19.3	92.5
62.5	4	3.9	96.4
31.2	5	0.6	97.0
15.6	6	1.1	98.1
7.8	7	0.9	99.0
3.9	8	0.7	99.8
< 3.9	> 8	0.2	100
Total		100	100

Particle Size Distribution



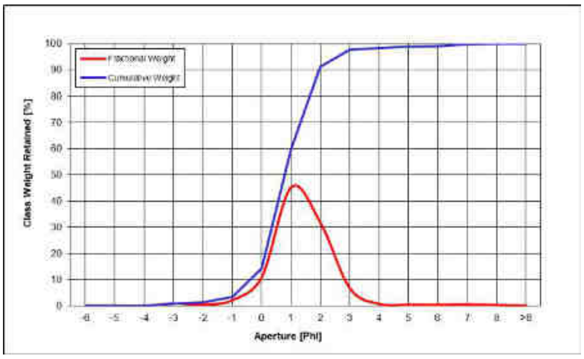
Sorting [µm] †	1.27	Poorly sorted
Skewness [µm] †	0.07	Symmetrical
Kurtosis [µm] †	1.11	Mesokurtic
Mean [µm]* †	397	Medium sand
Mean [phi]* †	1.33	
Median [µm]* †	411	Medium sand
Median [phi]* †	1.28	
Gravel [%]*	2.9	Slightly gravelly sand
Sand [%]*	93.4	
Mud [%]*	3.6	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_112

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.9	0.9
4000.0	-2	0.4	1.2
2000.0	-1	2.1	3.4
1000.0	0	11.0	14.3
500.0	1	45.2	59.6
250.0	2	31.6	91.2
125.0	3	6.6	97.8
62.5	4	0.7	98.4
31.2	5	0.4	98.8
15.6	6	0.4	99.2
7.8	7	0.5	99.7
3.9	8	0.3	100
< 3.9	> 8	0.0	100
Total		100	100

Particle Size Distribution



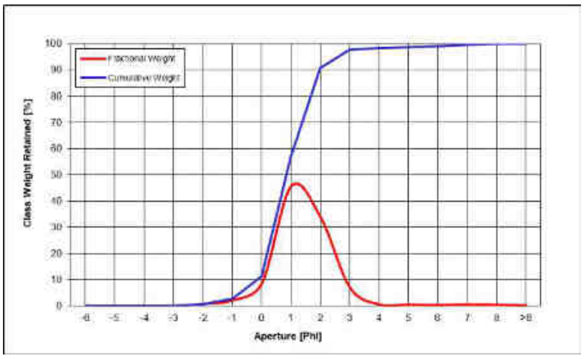
Sorting [µm] [†]	0.95	Moderately sorted
Skewness [µm] [†]	0.09	Symmetrical
Kurtosis [µm] [†]	1.12	Leptokurtic
Mean [µm]* [†]	549	Coarse sand
Mean [phi]* [†]	0.87	
Median [µm]* [†]	579	Coarse sand
Median [phi]* [†]	0.79	
Gravel [%]*	3.4	Slightly gravelly sand
Sand [%]*	95.1	
Mud [%]*	1.6	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_113

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.7	0.7
2000.0	-1	2.1	2.8
1000.0	0	8.6	11.4
500.0	1	45.6	57.0
250.0	2	33.8	90.8
125.0	3	7.0	97.8
62.5	4	0.5	98.3
31.2	5	0.4	98.8
15.6	6	0.3	99.0
7.8	7	0.5	99.5
3.9	8	0.4	99.9
< 3.9	> 8	0.1	100
Total		100	100

Particle Size Distribution



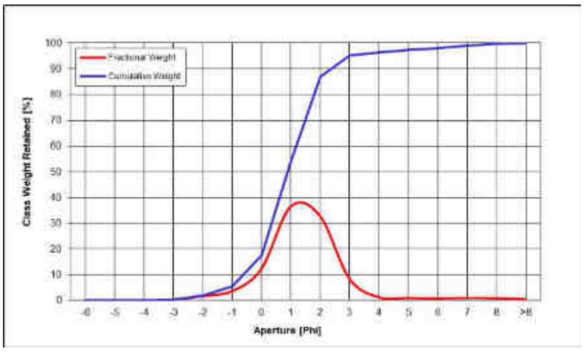
Sorting [µm] †	0.93	Moderately sorted
Skewness [µm] †	0.08	Symmetrical
Kurtosis [µm] †	1.11	Leptokurtic
Mean [µm]* †	530	Coarse sand
Mean [phi]* †	0.92	
Median [µm]* †	556	Coarse sand
Median [phi]* †	0.85	
Gravel [%]*	2.8	Slightly gravelly sand
Sand [%]*	95.5	
Mud [%]*	1.7	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_115

Aperture [μm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.3	0.3
4000.0	-2	1.6	1.9
2000.0	-1	3.6	5.4
1000.0	0	12.2	17.6
500.0	1	36.5	54.1
250.0	2	32.8	86.9
125.0	3	8.4	95.2
62.5	4	1.2	96.4
31.2	5	0.9	97.3
15.6	6	0.7	98.0
7.8	7	0.9	98.9
3.9	8	0.8	99.7
< 3.9	> 8	0.3	100
Total		100	100

Particle Size Distribution



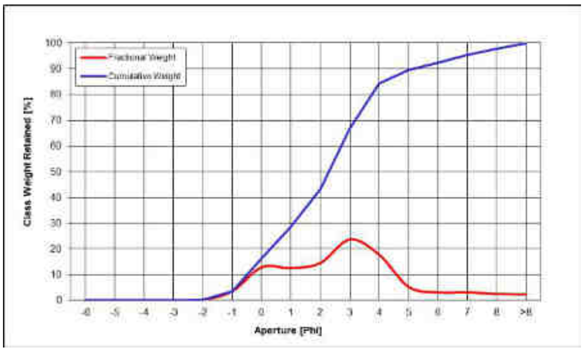
Sorting [μm] †	1.13	Poorly sorted
Skewness [μm] †	0.01	Symmetrical
Kurtosis [μm] †	1.17	Leptokurtic
Mean [μm]* †	540	Coarse sand
Mean [phi]* †	0.89	
Median [μm]* †	540	Coarse sand
Median [phi]* †	0.89	
Gravel [%]*	5.4	Gravelly Sand
Sand [%]*	91.0	
Mud [%]*	3.6	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
 = Statistics based on Folk and Ward (1957)

STATION R2_ENV_116

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.2	0.2
2000.0	-1	3.4	3.5
1000.0	0	12.8	16.3
500.0	1	12.4	28.7
250.0	2	14.4	43.2
125.0	3	23.6	66.7
62.5	4	17.6	84.4
31.2	5	5.1	89.5
15.6	6	3.0	92.5
7.8	7	3.0	95.5
3.9	8	2.4	97.8
< 3.9	> 8	2.2	100
Total		100	100

Particle Size Distribution



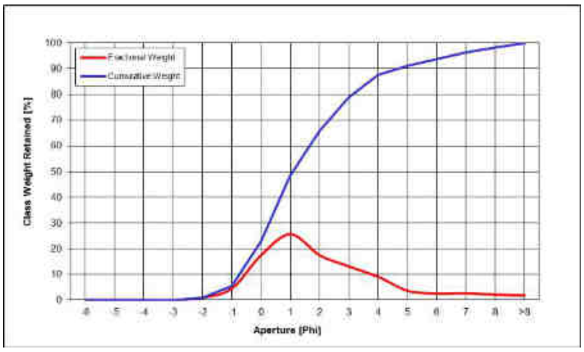
Sorting [µm] †	2.17	Very poorly sorted
Skewness [µm] †	0.01	Symmetrical
Kurtosis [µm] †	1.15	Leptokurtic
Mean [µm]* †	236	Fine sand
Mean [phi]* †	2.08	
Median [µm]* †	205	Fine sand
Median [phi]* †	2.29	
Gravel [%]*	3.5	Slightly gravelly muddy sand
Sand [%]*	80.9	
Mud [%]*	15.6	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_117

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.9	0.9
2000.0	-1	4.5	5.3
1000.0	0	17.4	22.8
500.0	1	25.6	48.3
250.0	2	17.4	65.7
125.0	3	13.0	78.7
62.5	4	9.0	87.7
31.2	5	3.5	91.2
15.6	6	2.5	93.7
7.8	7	2.6	96.3
3.9	8	2.0	98.3
< 3.9	> 8	1.7	100
Total		100	100

Particle Size Distribution



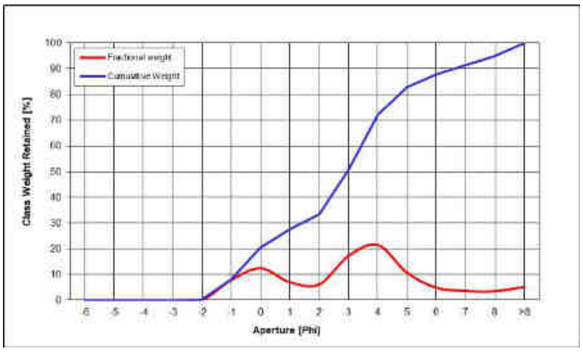
Sorting [µm] †	2.14	Very poorly sorted
Skewness [µm] †	0.34	Very fine skewed
Kurtosis [µm] †	1.18	Leptokurtic
Mean [µm]* †	371	Medium sand
Mean [phi]* †	1.43	
Median [µm]* †	468	Medium sand
Median [phi]* †	1.10	
Gravel [%]*	5.3	Gravelly muddy sand
Sand [%]*	82.4	
Mud [%]*	12.3	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_118

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.1	0.1
2000.0	-1	7.9	8.0
1000.0	0	12.4	20.4
500.0	1	7.0	27.4
250.0	2	6.2	33.6
125.0	3	17.2	50.7
62.5	4	21.4	72.2
31.2	5	10.7	82.9
15.6	6	4.9	87.8
7.8	7	3.6	91.4
3.9	8	3.5	94.9
< 3.9	> 8	5.1	100
Total		100	100

Particle Size Distribution



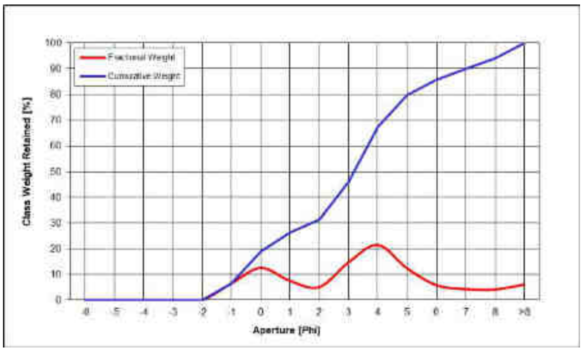
Sorting [µm] †	2.84	Very poorly sorted
Skewness [µm] †	-0.05	Symmetrical
Kurtosis [µm] †	1.08	Mesokurtic
Mean [µm]* †	164	Fine sand
Mean [phi]* †	2.61	
Median [µm]* †	129	Fine sand
Median [phi]* †	2.96	
Gravel [%]*	8.0	Gravelly muddy sand
Sand [%]*	64.2	
Mud [%]*	27.8	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_119

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.0	0.0
2000.0	-1	6.4	6.5
1000.0	0	12.5	19.0
500.0	1	7.5	26.4
250.0	2	5.0	31.4
125.0	3	14.6	46.0
62.5	4	21.4	67.5
31.2	5	12.4	79.9
15.6	6	5.8	85.7
7.8	7	4.2	89.9
3.9	8	4.1	94.0
< 3.9	> 8	6.0	100
Total		100	100

Particle Size Distribution



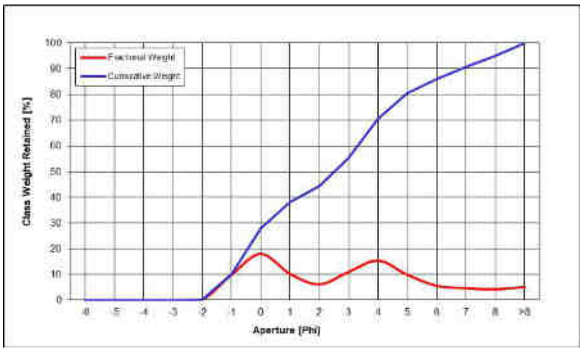
Sorting [µm] †	3.02	Very poorly sorted
Skewness [µm] †	-0.01	Symmetrical
Kurtosis [µm] †	1.09	Mesokurtic
Mean [µm]* †	135	Fine sand
Mean [phi]* †	2.89	
Median [µm]* †	110	Very fine sand
Median [phi]* †	3.18	
Gravel [%]*	6.5	Gravelly muddy sand
Sand [%]*	61.0	
Mud [%]*	32.5	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_120

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.2	0.2
2000.0	-1	9.8	10.1
1000.0	0	17.9	28.0
500.0	1	10.1	38.1
250.0	2	6.2	44.3
125.0	3	11.0	55.2
62.5	4	15.3	70.6
31.2	5	9.8	80.4
15.6	6	5.6	86.0
7.8	7	4.6	90.6
3.9	8	4.3	94.9
< 3.9	> 8	5.1	100
Total		100	100

Particle Size Distribution



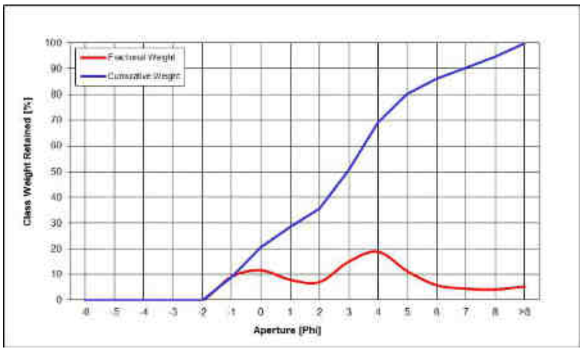
Sorting [µm] †	3.04	Very poorly sorted
Skewness [µm] †	0.08	Symmetrical
Kurtosis [µm] †	0.86	Platykurtic
Mean [µm]* †	177	Fine sand
Mean [phi]* †	2.50	
Median [µm]* †	174	Fine sand
Median [phi]* †	2.52	
Gravel [%]*	10.1	Gravelly muddy sand
Sand [%]*	60.5	
Mud [%]*	29.4	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_121

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.0	0.0
2000.0	-1	9.0	9.1
1000.0	0	11.5	20.6
500.0	1	7.9	28.5
250.0	2	7.0	35.5
125.0	3	14.9	50.4
62.5	4	18.7	69.2
31.2	5	11.2	80.3
15.6	6	5.8	86.1
7.8	7	4.4	90.5
3.9	8	4.1	94.7
< 3.9	> 8	5.3	100
Total		100	100

Particle Size Distribution



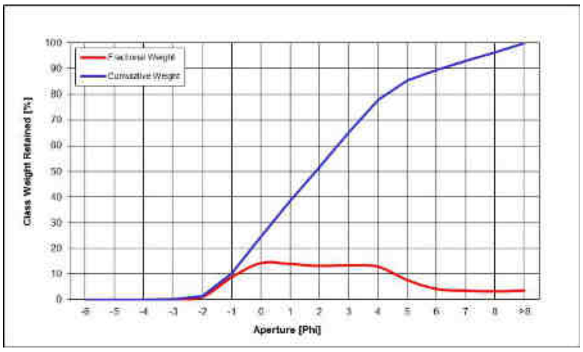
Sorting [µm] †	2.99	Very poorly sorted
Skewness [µm] †	-0.01	Symmetrical
Kurtosis [µm] †	1.01	Mesokurtic
Mean [µm]* †	150	Fine sand
Mean [phi]* †	2.74	
Median [µm]* †	128	Fine sand
Median [phi]* †	2.97	
Gravel [%]*	9.1	Gravelly muddy sand
Sand [%]*	60.1	
Mud [%]*	30.8	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_122

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.3	0.3
4000.0	-2	1.1	1.4
2000.0	-1	8.8	10.2
1000.0	0	14.3	24.4
500.0	1	13.9	38.3
250.0	2	13.2	51.5
125.0	3	13.4	64.9
62.5	4	12.9	77.8
31.2	5	7.6	85.4
15.6	6	4.2	89.6
7.8	7	3.5	93.1
3.9	8	3.3	96.4
< 3.9	> 8	3.6	100
Total		100	100

Particle Size Distribution



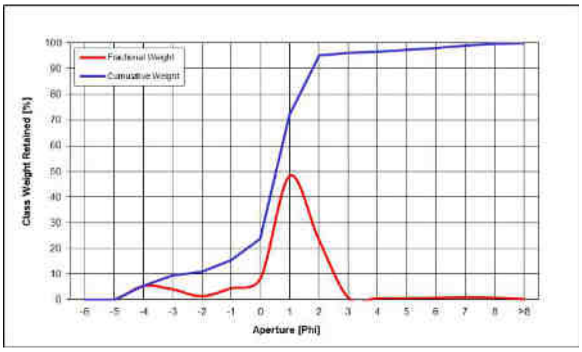
Sorting [µm] †	2.74	Very poorly sorted
Skewness [µm] †	0.16	Fine skewed
Kurtosis [µm] †	1.00	Mesokurtic
Mean [µm]* †	244	Fine sand
Mean [phi]* †	2.04	
Median [µm]* †	271	Medium sand
Median [phi]* †	1.89	
Gravel [%]*	10.2	Gravelly muddy sand
Sand [%]*	67.6	
Mud [%]*	22.2	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_123

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	5.4	5.4
8000.0	-3	4.0	9.4
4000.0	-2	1.4	10.8
2000.0	-1	4.5	15.3
1000.0	0	8.3	23.6
500.0	1	48.3	71.9
250.0	2	23.3	95.2
125.0	3	0.9	96.1
62.5	4	0.6	96.7
31.2	5	0.6	97.3
15.6	6	0.7	98.0
7.8	7	1.0	99.0
3.9	8	0.8	99.7
< 3.9	> 8	0.3	100
Total		100	100

Particle Size Distribution



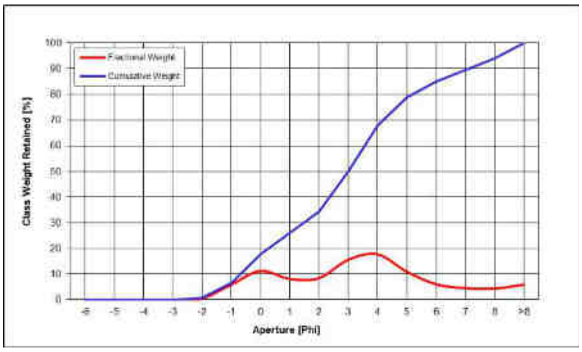
Sorting [µm] †	1.53	Poorly sorted
Skewness [µm] †	-0.36	Very coarse skewed
Kurtosis [µm] †	2.25	Very Leptokurtic
Mean [µm]* †	766	Coarse sand
Mean [phi]* †	0.38	
Median [µm]* †	685	Coarse sand
Median [phi]* †	0.55	
Gravel [%]*	15.3	Gravelly sand
Sand [%]*	81.4	
Mud [%]*	3.3	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_124

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.6	0.6
2000.0	-1	5.9	6.5
1000.0	0	11.3	17.8
500.0	1	8.2	26.0
250.0	2	8.5	34.5
125.0	3	15.6	50.1
62.5	4	17.8	67.9
31.2	5	11.0	78.9
15.6	6	6.1	85.0
7.8	7	4.6	89.6
3.9	8	4.4	94.0
< 3.9	> 8	6.0	100
Total		100	100

Particle Size Distribution



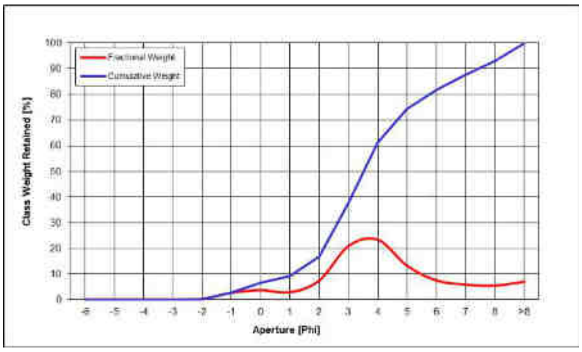
Sorting [µm] †	3.03	Very poorly sorted
Skewness [µm] †	0.05	Symmetrical
Kurtosis [µm] †	1.10	Mesokurtic
Mean [µm]* †	135	Fine sand
Mean [phi]* †	2.89	
Median [µm]* †	126	Fine sand
Median [phi]* †	2.99	
Gravel [%]*	6.5	Gravelly muddy sand
Sand [%]*	61.4	
Mud [%]*	32.1	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_125

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.3	0.3
2000.0	-1	2.6	2.8
1000.0	0	3.6	6.5
500.0	1	2.8	9.3
250.0	2	7.4	16.7
125.0	3	21.0	37.7
62.5	4	23.4	61.1
31.2	5	13.2	74.3
15.6	6	7.5	81.8
7.8	7	5.8	87.6
3.9	8	5.4	93.0
< 3.9	> 8	7.0	100
Total		100	100

Particle Size Distribution



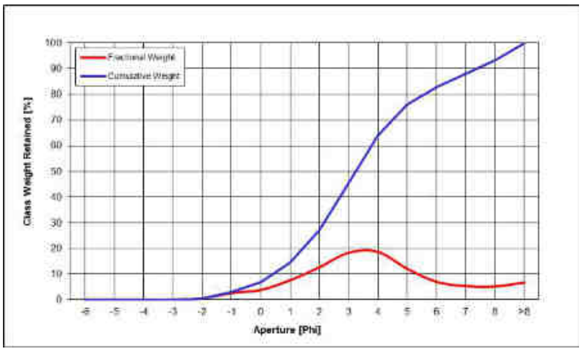
Sorting [µm] †	2.62	Very poorly sorted
Skewness [µm] †	0.24	Fine skewed
Kurtosis [µm] †	1.50	Very leptokurtic
Mean [µm]* †	65	Very fine sand
Mean [phi]* †	3.94	
Median [µm]* †	87	Very fine sand
Median [phi]* †	3.53	
Gravel [%]*	2.8	Slightly gravelly muddy sand
Sand [%]*	58.3	
Mud [%]*	38.9	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_126

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.5	0.5
2000.0	-1	2.5	3.0
1000.0	0	3.8	6.8
500.0	1	7.5	14.4
250.0	2	12.6	27.0
125.0	3	18.3	45.3
62.5	4	18.6	63.9
31.2	5	12.1	75.9
15.6	6	6.9	82.9
7.8	7	5.3	88.2
3.9	8	5.1	93.3
< 3.9	> 8	6.7	100
Total		100	100

Particle Size Distribution



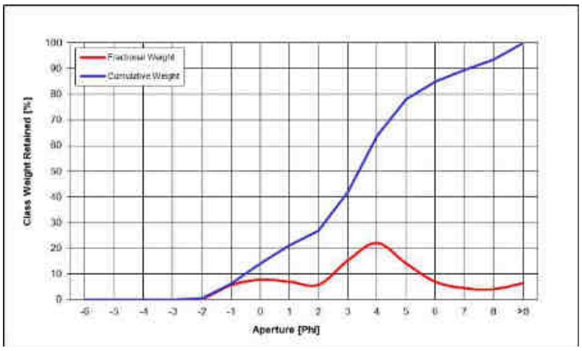
Sorting [µm] †	2.76	Very poorly sorted
Skewness [µm] †	0.20	Fine skewed
Kurtosis [µm] †	1.31	Leptokurtic
Mean [µm]* †	87	Very fine sand
Mean [phi]* †	3.53	
Median [µm]* †	105	Very fine sand
Median [phi]* †	3.25	
Gravel [%]*	3.0	Slightly gravelly muddy sand
Sand [%]*	60.8	
Mud [%]*	36.1	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_127

Aperture [μm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.5	0.5
2000.0	-1	5.7	6.2
1000.0	0	7.8	14.0
500.0	1	7.0	21.0
250.0	2	5.8	26.8
125.0	3	15.2	42.0
62.5	4	22.0	63.9
31.2	5	14.1	78.0
15.6	6	7.0	85.0
7.8	7	4.5	89.5
3.9	8	4.1	93.6
< 3.9	> 8	6.4	100
Total		100	100

Particle Size Distribution



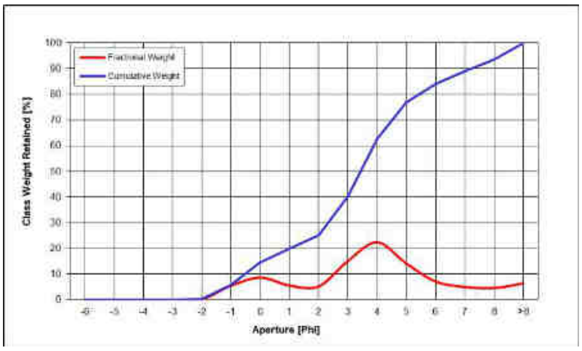
Sorting [μm] †	2.96	Very poorly sorted
Skewness [μm] †	0.01	Symmetrical
Kurtosis [μm] †	1.37	Leptokurtic
Mean [μm]* †	111	Very fine sand
Mean [phi]* †	3.17	
Median [μm]* †	97	Very fine sand
Median [phi]* †	3.37	
Gravel [%]*	6.2	Gravelly muddy sand
Sand [%]*	57.8	
Mud [%]*	36.1	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_128

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.2	0.2
2000.0	-1	5.5	5.7
1000.0	0	8.7	14.3
500.0	1	5.6	19.9
250.0	2	5.2	25.1
125.0	3	15.1	40.2
62.5	4	22.5	62.7
31.2	5	14.2	76.9
15.6	6	7.2	84.0
7.8	7	5.0	89.1
3.9	8	4.6	93.6
< 3.9	> 8	6.4	100
Total		100	100

Particle Size Distribution



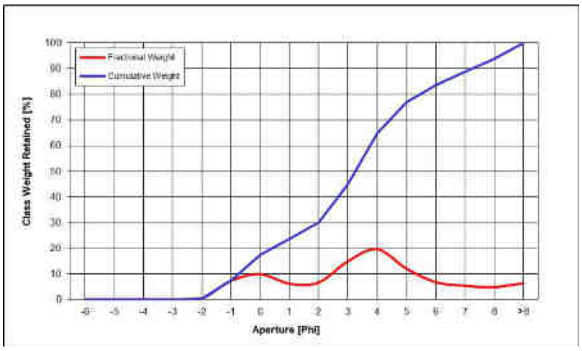
Sorting [µm] †	2.98	Very poorly sorted
Skewness [µm] †	0.01	Symmetrical
Kurtosis [µm] †	1.46	Leptokurtic
Mean [µm]* †	106	Very fine sand
Mean [phi]* †	3.24	
Median [µm]* †	93	Very fine sand
Median [phi]* †	3.43	
Gravel [%]*	5.7	Gravelly muddy sand
Sand [%]*	57.0	
Mud [%]*	37.3	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_129

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.3	0.3
2000.0	-1	7.3	7.6
1000.0	0	9.8	17.4
500.0	1	6.2	23.6
250.0	2	6.6	30.2
125.0	3	14.9	45.1
62.5	4	19.7	64.7
31.2	5	12.1	76.8
15.6	6	6.8	83.6
7.8	7	5.3	88.9
3.9	8	4.8	93.7
< 3.9	> 8	6.3	100
Total		100	100

Particle Size Distribution



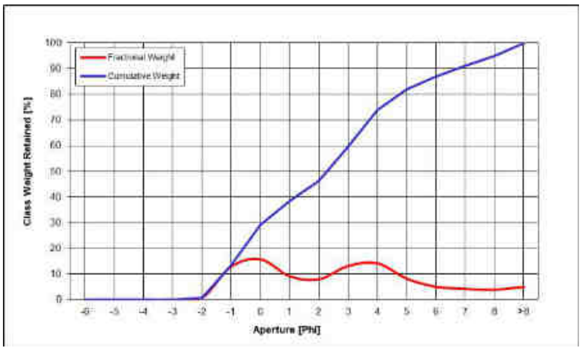
Sorting [µm] †	3.14	Very poorly sorted
Skewness [µm] †	0.01	Symmetrical
Kurtosis [µm] †	1.18	Leptokurtic
Mean [µm]* †	120	Very fine sand
Mean [phi]* †	3.06	
Median [µm]* †	105	Very fine sand
Median [phi]* †	3.25	
Gravel [%]*	7.6	Gravelly muddy sand
Sand [%]*	57.1	
Mud [%]*	35.3	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_130

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.6	0.6
2000.0	-1	12.9	13.5
1000.0	0	15.8	29.3
500.0	1	9.2	38.4
250.0	2	7.9	46.4
125.0	3	13.2	59.6
62.5	4	14.2	73.8
31.2	5	8.2	81.9
15.6	6	5.0	87.0
7.8	7	4.2	91.1
3.9	8	3.9	95.0
< 3.9	> 8	5.0	100
Total		100	100

Particle Size Distribution



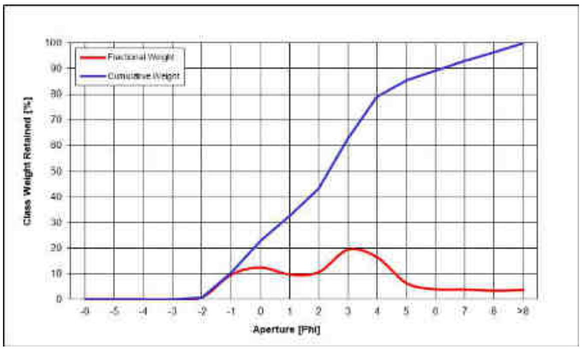
Sorting [µm]	3.02	Very poorly sorted
Skewness [µm]	0.09	Symmetrical
Kurtosis [µm]	0.89	Platykurtic
Mean [µm]*	206	Fine sand
Mean [phi]*	2.28	
Median [µm]*	207	Fine sand
Median [phi]*	2.27	
Gravel [%]*	13.5	Gravelly muddy sand
Sand [%]*	60.3	
Mud [%]*	26.2	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_131

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.8	0.8
2000.0	-1	9.7	10.4
1000.0	0	12.4	22.9
500.0	1	9.7	32.6
250.0	2	10.7	43.2
125.0	3	19.5	62.7
62.5	4	16.4	79.1
31.2	5	6.3	85.4
15.6	6	3.9	89.3
7.8	7	3.8	93.1
3.9	8	3.3	96.4
< 3.9	> 8	3.6	100
Total		100	100

Particle Size Distribution



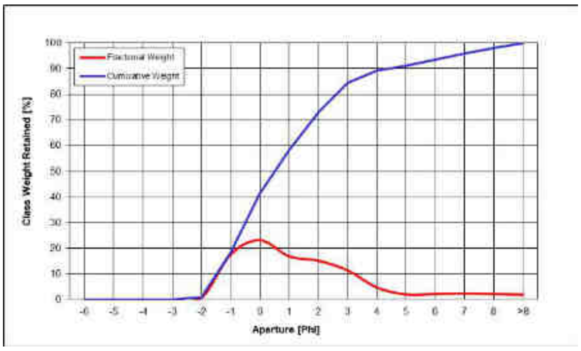
Sorting [µm] †	2.72	Very poorly sorted
Skewness [µm] †	0.03	Symmetrical
Kurtosis [µm] †	1.06	Mesokurtic
Mean [µm]* †	219	Fine sand
Mean [phi]* †	2.19	
Median [µm]* †	196	Fine sand
Median [phi]* †	2.35	
Gravel [%]*	10.4	Gravelly muddy sand
Sand [%]*	68.6	
Mud [%]*	20.9	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_132

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.8	0.8
2000.0	-1	17.5	18.3
1000.0	0	23.0	41.4
500.0	1	16.8	58.1
250.0	2	15.1	73.2
125.0	3	11.3	84.5
62.5	4	4.7	89.2
31.2	5	2.0	91.3
15.6	6	2.2	93.4
7.8	7	2.4	95.9
3.9	8	2.2	98.1
< 3.9	> 8	1.9	100
Total		100	100

Particle Size Distribution



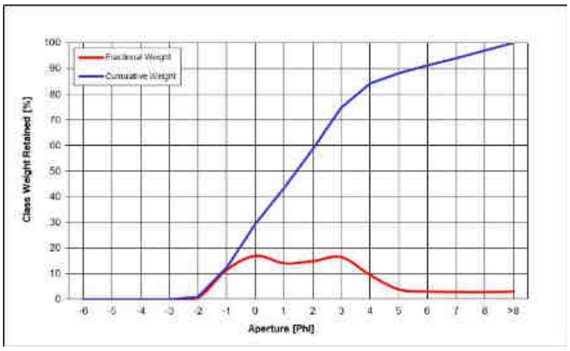
Sorting [µm] †	2.29	No data
Skewness [µm] †	0.33	No data
Kurtosis [µm] †	1.20	No data
Mean [µm]* †	583	Coarse sand
Mean [phi]* †	0.78	
Median [µm]* †	700	Coarse sand
Median [phi]* †	0.52	
Gravel [%]*	18.3	Gravelly muddy sand
Sand [%]*	70.9	
Mud [%]*	10.8	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_133

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	0.8	0.8
2000.0	-1	11.6	12.4
1000.0	0	17.0	29.4
500.0	1	14.1	43.5
250.0	2	14.9	58.4
125.0	3	16.5	74.8
62.5	4	9.5	84.3
31.2	5	3.9	88.2
15.6	6	3.1	91.2
7.8	7	2.9	94.1
3.9	8	2.8	96.9
< 3.9	> 8	3.1	100
Total		100	100

Particle Size Distribution



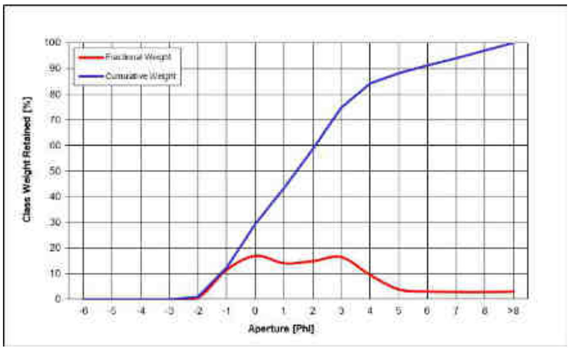
Sorting [µm] †	2.55	Very poorly sorted
Skewness [µm] †	0.19	Fine skewed
Kurtosis [µm] †	1.12	Leptokurtic
Mean [µm]* †	344	Medium sand
Mean [phi]* †	1.54	
Median [µm]* †	369	Medium sand
Median [phi]* †	1.44	
Gravel [%]*	12.4	Gravelly muddy sand
Sand [%]*	71.9	
Mud [%]*	15.7	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
= Statistics based on Folk and Ward (1957)

STATION R2_ENV_134

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cum. [%]
63000.0	-6	0.0	0.0
31500.0	-5	0.0	0.0
16000.0	-4	0.0	0.0
8000.0	-3	0.0	0.0
4000.0	-2	3.1	3.1
2000.0	-1	10.2	13.3
1000.0	0	13.8	27.1
500.0	1	13.5	40.6
250.0	2	16.9	57.4
125.0	3	17.7	75.2
62.5	4	9.6	84.8
31.2	5	4.1	88.9
15.6	6	3.0	91.9
7.8	7	2.8	94.7
3.9	8	2.6	97.3
< 3.9	>8	2.7	100
Total		100	100

Particle Size Distribution



Sorting [µm] †	2.53	Very poorly sorted
Skewness [µm] †	0.12	Fine skewed
Kurtosis [µm] †	1.16	Leptokurtic
Mean [µm]* †	339	Medium sand
Mean [phi]* †	1.56	
Median [µm]* †	339	Medium sand
Median [phi]* †	1.56	
Gravel [%]*	13.3	Gravelly muddy sand
Sand [%]*	71.5	
Mud [%]*	15.2	

Notes
* = Sediment descriptions based on Wentworth (1922) grain size classification
 = Statistics based on Folk and Ward (1957)

H.2 Summary of Sediment Characteristics

Summary of Sediment Characteristics								
Station	TOC [%]	Carbonate [%]	Fractional Composition			Fines		Folk Description (BGS modified)
			Gravel [%]	Sand [%]	Fines [%]	Silt [%]	Clay [%]	
R2_ENV_009	0.17	90.9	2.06	92.96	4.98	0.60	4.38	Slightly gravelly sand
R2_ENV_010	0.12	91.2	2.59	94.99	2.42	0.16	2.25	Slightly gravelly sand
R2_ENV_011	0.19	90.9	1.18	90.97	7.85	0.57	7.28	Slightly gravelly sand
R2_ENV_012	0.14	96.5	2.49	95.26	2.25	0.05	2.20	Slightly gravelly sand
R2_ENV_013	0.30	89.5	2.55	77.71	19.74	2.89	16.86	Slightly gravelly muddy sand
R2_ENV_014	0.44	89.0	0.95	51.53	47.52	6.47	41.05	Slightly gravelly muddy sand
R2_ENV_015	0.37	86.5	1.93	60.14	37.92	5.51	32.41	Slightly gravelly muddy sand
R2_ENV_016	0.33	93.1	4.43	72.05	23.52	3.43	20.09	Slightly gravelly muddy sand
R2_ENV_017	0.58	87.1	0.72	39.18	60.11	8.45	51.65	Slightly gravelly sandy mud
R2_ENV_018	0.70	86.1	0.61	25.18	74.21	10.02	64.19	Slightly gravelly sandy mud
R2_ENV_019	0.26	94.7	6.22	75.70	18.08	2.88	15.20	Gravelly muddy sand
R2_ENV_020	0.16	96.6	2.83	86.73	10.44	1.66	8.78	Slightly gravelly muddy sand
R2_ENV_021	0.25	89.2	2.02	77.80	20.19	2.87	17.32	Slightly gravelly muddy sand
R2_ENV_022	0.50	84.0	1.93	59.73	38.35	6.82	31.52	Slightly gravelly muddy sand
R2_ENV_023	0.22	96.4	1.36	87.94	10.69	1.89	8.80	Slightly gravelly muddy sand
R2_ENV_024	0.13	97.3	1.64	93.97	4.39	0.56	3.83	Slightly gravelly sand
R2_ENV_025	0.18	98.2	0.64	89.53	9.83	1.13	8.69	Slightly gravelly sand

Summary of Sediment Characteristics								
Station	TOC [%]	Carbonate [%]	Fractional Composition			Fines		Folk Description (BGS modified)
			Gravel [%]	Sand [%]	Fines [%]	Silt [%]	Clay [%]	
R2_ENV_026	0.20	-	-	-	-	-	-	-
R2_ENV_027	0.23	95.3	1.72	75.46	22.82	4.17	18.65	Slightly gravelly muddy sand
R2_ENV_028	0.23	97.4	6.34	71.74	21.92	4.58	17.34	Gravelly muddy sand
R2_ENV_029	0.19	95.3	3.20	80.37	16.43	2.88	13.54	Slightly gravelly muddy sand
R2_ENV_030	0.19	96.2	7.61	74.51	17.88	3.49	14.38	Gravelly muddy sand
R2_ENV_031	0.33	93.3	1.59	68.85	29.55	5.98	23.58	Slightly gravelly muddy sand
R2_ENV_032	-	96.6	-	-	-	-	-	-
R2_ENV_033	0.20	98.0	9.29	81.92	8.80	1.57	7.23	Gravelly sand
R2_ENV_034	0.16	97.2	6.68	87.32	6.00	0.78	5.22	Gravelly sand
R2_ENV_035	0.23	96.9	7.95	72.66	19.39	3.98	15.42	Gravelly muddy sand
R2_ENV_036	0.20	97.7	6.56	74.77	18.68	3.64	15.04	Gravelly muddy sand
R2_ENV_037	0.21	93.5	5.96	72.79	21.25	4.00	17.24	Gravelly muddy sand
R2_ENV_038	0.29	90.7	7.13	64.82	28.05	5.83	22.22	Gravelly muddy sand
R2_ENV_039	0.24	91.6	2.20	68.21	29.59	5.63	23.96	Slightly gravelly muddy sand
R2_ENV_040	0.39	91.7	2.67	47.56	49.77	9.58	40.18	Slightly gravelly sandy mud
R2_ENV_041	0.19	92.1	9.35	67.43	23.23	4.80	18.42	Gravelly muddy sand
R2_ENV_042	0.30	94.0	3.48	59.51	37.02	8.95	28.07	Slightly gravelly muddy sand

Summary of Sediment Characteristics								
Station	TOC [%]	Carbonate [%]	Fractional Composition			Fines		Folk Description (BGS modified)
			Gravel [%]	Sand [%]	Fines [%]	Silt [%]	Clay [%]	
R2_ENV_043	0.13	93.2	4.65	83.61	11.74	2.51	9.23	Slightly gravelly muddy sand
R2_ENV_044	0.31	95.7	3.77	63.03	33.20	6.48	26.72	Slightly gravelly muddy sand
R2_ENV_045	0.16	96.2	16.65	68.41	14.93	2.68	12.26	Gravelly muddy sand
R2_ENV_046	0.27	91.2	5.04	64.22	30.74	6.40	24.33	Gravelly muddy sand
R2_ENV_047	0.19	98.4	1.91	87.27	10.82	2.02	8.80	Slightly gravelly muddy sand
R2_ENV_048	0.21	96.5	32.41	53.70	13.89	2.73	11.16	Muddy sandy gravel
R2_ENV_049	0.16	96.9	6.92	77.76	15.32	3.35	11.97	Gravelly muddy sand
R2_ENV_050	0.15	98.2	3.54	87.39	9.07	2.09	6.97	Slightly gravelly sand
R2_ENV_051	0.22	95.5	5.12	74.44	20.44	4.15	16.29	Gravelly muddy sand
R2_ENV_052	0.16	93.1	4.10	77.96	17.94	4.36	13.58	Slightly gravelly muddy sand
R2_ENV_053	0.21	96.8	4.39	78.41	17.20	3.57	13.64	Slightly gravelly muddy sand
R2_ENV_055	0.19	97.8	1.61	86.45	11.94	2.14	9.80	Slightly gravelly muddy sand
R2_ENV_056	0.17	97.4	4.74	84.22	11.04	2.18	8.86	Slightly gravelly muddy sand
R2_ENV_057	0.19	96.2	16.31	65.40	18.29	3.55	14.74	Gravelly muddy sand
R2_ENV_058	0.14	96.7	3.35	82.59	14.05	3.17	10.89	Slightly gravelly muddy sand
R2_ENV_062	0.27	93.4	2.12	79.71	18.17	3.83	14.34	Slightly gravelly muddy sand
R2_ENV_063	0.21	95.2	2.11	79.75	18.14	3.14	14.99	Slightly gravelly muddy sand

Summary of Sediment Characteristics								
Station	TOC [%]	Carbonate [%]	Fractional Composition			Fines		Folk Description (BGS modified)
			Gravel [%]	Sand [%]	Fines [%]	Silt [%]	Clay [%]	
R2_ENV_064	0.17	98.5	12.22	84.98	2.80	0.26	2.54	Gravelly sand
R2_ENV_066	0.14	99.6	11.85	81.74	6.41	1.07	5.34	Gravelly sand
R2_ENV_067	0.17	97.8	2.82	90.79	6.39	0.67	5.72	Slightly gravelly sand
R2_ENV_068	0.25	95.3	0.95	83.96	15.09	2.60	12.49	Slightly gravelly muddy sand
R2_ENV_069	0.26	98.3	1.10	81.15	17.75	2.82	14.94	Slightly gravelly muddy sand
R2_ENV_070	0.23	98.0	1.00	85.12	13.88	2.00	11.88	Slightly gravelly muddy sand
R2_ENV_071	0.17	98.8	0.92	96.38	2.70	0.11	2.59	Slightly gravelly sand
R2_ENV_072	0.17	99.1	6.72	89.73	3.55	0.25	3.30	Gravelly sand
R2_ENV_073	0.23	98.6	5.08	88.62	6.31	0.68	5.63	Gravelly sand
R2_ENV_074	0.19	98.4	1.66	92.54	5.80	0.57	5.24	Slightly gravelly sand
R2_ENV_075	0.19	98.1	0.87	91.79	7.34	0.87	6.47	Slightly gravelly sand
R2_ENV_076	0.18	98.3	2.33	91.83	5.85	0.69	5.15	Slightly gravelly sand
R2_ENV_077	0.17	98.0	3.11	87.88	9.01	1.38	7.63	Slightly gravelly sand
R2_ENV_078	0.27	97.8	0.62	89.86	9.53	1.25	8.27	Slightly gravelly sand
R2_ENV_079	0.15	97.8	4.60	81.71	13.69	2.36	11.33	Slightly gravelly muddy sand
R2_ENV_080	0.21	97.4	4.44	81.27	14.28	2.33	11.96	Slightly gravelly muddy sand
R2_ENV_081	0.29	96.3	5.09	71.86	23.06	4.13	18.93	Gravelly muddy sand

Summary of Sediment Characteristics								
Station	TOC [%]	Carbonate [%]	Fractional Composition			Fines		Folk Description (BGS modified)
			Gravel [%]	Sand [%]	Fines [%]	Silt [%]	Clay [%]	
R2_ENV_082	0.18	97.7	2.76	87.96	9.27	1.47	7.80	Slightly gravelly sand
R2_ENV_083	0.33	96.5	6.07	72.72	21.21	3.99	17.22	Gravelly muddy sand
R2_ENV_084	0.36	95.5	1.23	70.39	28.39	5.34	23.04	Slightly gravelly muddy sand
R2_ENV_085	0.17	98.0	6.46	84.52	9.01	1.22	7.79	Gravelly sand
R2_ENV_086	0.23	97.9	2.15	87.80	10.06	1.67	8.39	Slightly gravelly muddy sand
R2_ENV_087	0.24	98.1	5.14	87.82	7.04	0.93	6.11	Gravelly sand
R2_ENV_096	0.29	98.7	3.18	93.20	3.61	0.43	3.19	Slightly gravelly sand
R2_ENV_097	0.18	98.7	13.22	84.22	2.56	0.22	2.34	Gravelly sand
R2_ENV_103	0.17	98.8	1.26	95.64	3.10	0.12	2.99	Slightly gravelly sand
R2_ENV_106	0.20	98.6	1.64	96.13	2.24	0.11	2.13	Slightly gravelly sand
R2_ENV_107	0.33	98.6	8.50	88.78	2.72	0.21	2.51	Gravelly sand
R2_ENV_109	0.23	99.3	2.76	94.24	3.00	0.17	2.82	Slightly gravelly sand
R2_ENV_110	0.20	97.1	18.61	79.09	2.29	0.09	2.20	Gravelly sand
R2_ENV_111	0.26	99.1	2.95	93.43	3.62	0.20	3.42	Slightly gravelly sand
R2_ENV_112	0.13	99.7	3.37	95.06	1.57	0.00	1.57	Slightly gravelly sand
R2_ENV_113	0.16	98.8	2.82	95.50	1.69	0.05	1.64	Slightly gravelly sand
R2_ENV_115	0.09	98.6	5.43	90.97	3.60	0.27	3.33	Gravelly sand

Summary of Sediment Characteristics								
Station	TOC [%]	Carbonate [%]	Fractional Composition			Fines		Folk Description (BGS modified)
			Gravel [%]	Sand [%]	Fines [%]	Silt [%]	Clay [%]	
R2_ENV_116	0.27	96.4	3.54	80.85	15.61	1.76	13.85	Slightly gravelly muddy sand
R2_ENV_117	0.21	98.8	5.32	82.38	12.31	1.37	10.93	Gravelly muddy sand
R2_ENV_118	0.35	97.4	8.02	64.15	27.83	4.16	23.67	Gravelly muddy sand
R2_ENV_119	0.40	95.2	6.46	61.02	32.51	4.86	27.66	Gravelly muddy sand
R2_ENV_120	0.38	97.6	10.06	60.52	29.42	4.15	25.27	Gravelly muddy sand
R2_ENV_121	0.35	95.5	9.08	60.09	30.83	4.32	26.51	Gravelly muddy sand
R2_ENV_122	0.34	97.4	10.15	67.64	22.21	2.92	19.29	Gravelly muddy sand
R2_ENV_123	0.14	93.9	15.27	81.45	3.28	0.22	3.06	Gravelly sand
R2_ENV_124	0.37	99.2	6.51	61.36	32.13	4.84	27.29	Gravelly muddy sand
R2_ENV_125	0.45	89.8	2.85	58.28	38.87	5.64	33.23	Slightly gravelly muddy sand
R2_ENV_126	0.61	94.6	3.04	60.84	36.12	5.42	30.70	Slightly gravelly muddy sand
R2_ENV_127	0.40	95.6	6.19	57.76	36.05	5.18	30.88	Gravelly muddy sand
R2_ENV_128	0.41	97.3	5.68	57.02	37.30	5.18	32.12	Gravelly muddy sand
R2_ENV_129	0.36	95.1	7.59	57.14	35.27	5.09	30.18	Gravelly muddy sand
R2_ENV_130	0.30	98.4	13.49	60.27	26.24	4.02	22.22	Gravelly muddy sand
R2_ENV_131	0.26	98.0	10.43	68.64	20.93	2.91	18.02	Gravelly muddy sand
R2_ENV_132	0.16	98.2	18.32	70.92	10.76	1.56	9.20	Gravelly muddy sand

Summary of Sediment Characteristics								
Station	TOC [%]	Carbonate [%]	Fractional Composition			Fines		Folk Description (BGS modified)
			Gravel [%]	Sand [%]	Fines [%]	Silt [%]	Clay [%]	
R2_ENV_133	0.17	98.0	12.38	71.91	15.71	2.49	13.23	Gravelly muddy sand
R2_ENV_134	0.15	99.4	13.27	71.50	15.23	2.16	13.07	Gravelly muddy sand
Minimum	**0.09**	**84.0**	**0.61**	**25.18**	**1.57**	**0.00**	**1.57**	-
Maximum	**0.70**	**99.7**	**32.41**	**96.38**	**74.21**	**10.02**	**64.19**	
Mean	**0.25**	**95.9**	**5.46**	**77.02**	**17.52**	**2.87**	**14.65**	
Standard Deviation	**0.107**	**3.29**	**4.98**	**13.81**	**13.44**	**2.28**	**11.28**	
RSD [%]	**43**	**3**	**91**	**18**	**77**	**79**	**77**	
Zakum Oil Field (Blue Sea Environmental Consultants, 2011)*								
Mean	-	-	**12.61**	**82.0**	**5.39**	-	-	-
Upper Zakum Pipelines Replacement Project EBS (NPCC, 2019)†								
Mean	**0.4692**	**31.615**	-	-	-	-	-	-

Notes

Fines = silt and clay content
Silt = +4.0 to +8.0 ø units or 3.9 µm to 62.5 µm
Clay = +8.0 to +10.0 ø units or 0.98 µm to 3.9 µm
TOC = Total organic carbon
RSD = Relative standard deviation

nts, 2011).
CC, 2019)

H.3 Summary of Particle Size Distribution

Summary of Particle Size Distribution								
Station	Modality	Median [µm]	Mean Particle Size		Sorting Coefficient		Skewness	
			[µm]	Wentworth Description‡	[µm]	Description	[µm]	Description
R2_ENV_009	Unimodal	459	412	Medium sand	1.29	Poorly sorted	0.22	Fine skewed
R2_ENV_010	Unimodal	439	433	Medium sand	1.02	Poorly sorted	0.01	Symmetrical
R2_ENV_011	Unimodal	252	249	Fine sand	1.47	Poorly sorted	0.14	Fine skewed
R2_ENV_012	Unimodal	580	534	Coarse sand	0.99	Moderately sorted	0.18	Fine skewed
R2_ENV_013	Unimodal	263	212	Fine sand	2.34	Very poorly sorted	0.29	Fine skewed
R2_ENV_014	Bimodal	67.6	55.1	Coarse silt	2.73	Very poorly sorted	0.21	Fine skewed
R2_ENV_015	Unimodal	103	93.9	Very fine sand	2.91	Very poorly sorted	0.15	Fine skewed
R2_ENV_016	Unimodal	339	215	Fine sand	2.59	Very poorly sorted	0.41	Very fine skewed
R2_ENV_017	Bimodal	42.9	37.0	Coarse silt	2.83	Very poorly sorted	0.16	Fine skewed
R2_ENV_018	Unimodal	27.2	23.4	Medium silt	2.55	Very poorly sorted	0.19	Fine skewed
R2_ENV_019	Unimodal	386	254	Medium sand	2.49	Very poorly sorted	0.37	Very fine skewed
R2_ENV_020	Unimodal	441	374	Medium sand	1.82	Poorly sorted	0.36	Very fine skewed
R2_ENV_021	Unimodal	283	220	Fine sand	2.40	Very poorly sorted	0.31	Very fine skewed
R2_ENV_022	Trimodal	91.2	75.9	Very fine sand	2.98	Very poorly sorted	0.20	Fine skewed
R2_ENV_023	Unimodal	354	302	Medium sand	1.85	Poorly sorted	0.33	Very fine skewed
R2_ENV_024	Unimodal	428	398	Medium sand	1.14	Poorly sorted	0.24	Fine skewed
R2_ENV_025	Unimodal	350	312	Medium sand	1.65	Poorly sorted	0.34	Very fine skewed

Summary of Particle Size Distribution								
Station	Modality	Median [µm]	Mean Particle Size		Sorting Coefficient		Skewness	
			[µm]	Wentworth Description‡	[µm]	Description	[µm]	Description
R2_ENV_027	Bimodal	194	162	Fine sand	2.54	Very poorly sorted	0.24	Fine skewed
R2_ENV_028	Bimodal	310	223	Fine sand	2.87	Very poorly sorted	0.33	Very fine skewed
R2_ENV_029	Unimodal	374	280	Medium sand	2.31	Very poorly sorted	0.38	Very fine skewed
R2_ENV_030	Bimodal	407	296	Medium sand	2.61	Very poorly sorted	0.35	Very fine skewed
R2_ENV_031	Trimodal	127	107	Very fine sand	2.89	Very poorly sorted	0.23	Fine skewed
R2_ENV_033	Unimodal	442	412	Medium sand	2.07	Very poorly sorted	0.12	Fine skewed
R2_ENV_034	Unimodal	527	486	Medium sand	1.59	Poorly sorted	0.18	Fine skewed
R2_ENV_035	Unimodal	405	280	Medium sand	2.70	Very poorly sorted	0.36	Very fine skewed
R2_ENV_036	Bimodal	441	296	Medium sand	2.63	Very poorly sorted	0.40	Very fine skewed
R2_ENV_037	Bimodal	339	246	Fine sand	2.70	Very poorly sorted	0.33	Very fine skewed
R2_ENV_038	Trimodal	299	190	Fine sand	3.22	Very poorly sorted	0.37	Very fine skewed
R2_ENV_039	Trimodal	134	118	Very fine sand	2.84	Very poorly sorted	0.21	Fine skewed
R2_ENV_040	Trimodal	63.2	56.2	Coarse silt	3.41	Very poorly sorted	0.14	Fine skewed
R2_ENV_041	Bimodal	304	235	Fine sand	2.98	Very poorly sorted	0.28	Fine skewed
R2_ENV_042	Bimodal	138	89.9	Very fine sand	3.52	Very poorly sorted	0.32	Very fine skewed
R2_ENV_043	Unimodal	414	357	Medium sand	2.00	Poorly sorted	0.33	Very fine skewed
R2_ENV_044	Bimodal	130	102	Very fine sand	3.11	Very poorly sorted	0.24	Fine skewed

Summary of Particle Size Distribution								
Station	Modality	Median [µm]	Mean Particle Size		Sorting Coefficient		Skewness	
			[µm]	Wentworth Description‡	[µm]	Description	[µm]	Description
R2_ENV_045	Unimodal	650	465	Medium sand	2.66	Very poorly sorted	0.36	Very fine skewed
R2_ENV_046	Trimodal	160	128	Fine sand	3.22	Very poorly sorted	0.24	Fine skewed
R2_ENV_047	Unimodal	471	388	Medium sand	1.85	Poorly sorted	0.42	Very fine skewed
R2_ENV_048	Trimodal	848	720	Coarse sand	2.99	Very poorly sorted	0.26	Fine skewed
R2_ENV_049	Unimodal	511	366	Medium sand	2.46	Very poorly sorted	0.41	Very fine skewed
R2_ENV_050	Unimodal	433	395	Medium sand	1.88	Poorly sorted	0.29	Fine skewed
R2_ENV_051	Bimodal	291	220	Fine sand	2.66	Very poorly sorted	0.31	Very fine skewed
R2_ENV_052	Unimodal	450	276	Medium sand	2.59	Very poorly sorted	0.50	Very fine skewed
R2_ENV_053	Unimodal	382	285	Medium sand	2.45	Very poorly sorted	0.37	Very fine skewed
R2_ENV_055	Unimodal	484	382	Medium sand	1.91	Poorly sorted	0.44	Very fine skewed
R2_ENV_056	Unimodal	467	404	Medium sand	2.04	Very poorly sorted	0.33	Very fine skewed
R2_ENV_057	Bimodal	550	367	Medium sand	2.86	Very poorly sorted	0.37	Very fine skewed
R2_ENV_058	Unimodal	501	366	Medium sand	2.25	Very poorly sorted	0.45	Very fine skewed
R2_ENV_062	Unimodal	181	184	Fine Sand	2.27	Very poorly sorted	0.13	Fine skewed
R2_ENV_063	Trimodal	258	234	Fine sand	2.39	Very poorly sorted	0.22	Fine skewed
R2_ENV_064	Bimodal	549	568	Coarse sand	1.46	Poorly Sorted	-0.20	Coarse skewed
R2_ENV_066	Unimodal	645	609	Coarse sand	1.84	Poorly Sorted	0.15	Fine skewed

Summary of Particle Size Distribution								
Station	Modality	Median [µm]	Mean Particle Size		Sorting Coefficient		Skewness	
			[µm]	Wentworth Description‡	[µm]	Description	[µm]	Description
R2_ENV_067	Unimodal	422	379	Medium sand	1.53	Poorly Sorted	0.22	Fine skewed
R2_ENV_068	Bimodal	238	236	Fine Sand	2.12	Very poorly sorted	0.17	Fine skewed
R2_ENV_069	Bimodal	193	200	Fine Sand	2.22	Very poorly sorted	0.11	Fine skewed
R2_ENV_070	Unimodal	339	276	Medium sand	2.04	Very poorly sorted	0.34	Very fine skewed
R2_ENV_071	Unimodal	538	509	Coarse sand	0.83	Moderately Sorted	0.24	Fine skewed
R2_ENV_072	Unimodal	653	635	Coarse sand	1.27	Poorly Sorted	0.03	Symmetrical
R2_ENV_073	Unimodal	598	561	Coarse sand	1.42	Poorly Sorted	0.27	Fine skewed
R2_ENV_074	Unimodal	530	477	Medium sand	1.24	Poorly Sorted	0.34	Very fine skewed
R2_ENV_075	Unimodal	441	384	Medium sand	1.48	Poorly Sorted	0.35	Very fine skewed
R2_ENV_076	Unimodal	529	460	Medium sand	1.33	Poorly Sorted	0.34	Very fine skewed
R2_ENV_077	Unimodal	473	389	Medium sand	1.86	Poorly Sorted	0.35	Very fine skewed
R2_ENV_078	Unimodal	342	305	Medium sand	1.61	Poorly Sorted	0.34	Very fine skewed
R2_ENV_079	Unimodal	320	283	Medium sand	2.17	Very poorly sorted	0.25	Fine skewed
R2_ENV_080	Unimodal	347	299	Medium sand	2.22	Very poorly sorted	0.27	Fine skewed
R2_ENV_081	Bimodal	150	162	Fine sand	2.56	Very poorly sorted	0.05	Symmetrical
R2_ENV_082	Unimodal	486	396	Medium sand	1.83	Poorly sorted	0.37	Very fine skewed
R2_ENV_083	Trimodal	199	204	Fine sand	2.65	Very poorly sorted	0.11	Fine skewed

Summary of Particle Size Distribution								
Station	Modality	Median [µm]	Mean Particle Size		Sorting Coefficient		Skewness	
			[µm]	Wentworth Description‡	[µm]	Description	[µm]	Description
R2_ENV_084	Unimodal	110	79.7	Very fine sand	2.19	Very poorly sorted	0.41	Very fine skewed
R2_ENV_085	Unimodal	644	544	Coarse sand	1.92	Poorly sorted	0.36	Very fine skewed
R2_ENV_086	Unimodal	486	394	Medium sand	1.84	Poorly sorted	0.41	Very fine skewed
R2_ENV_087	Unimodal	458	413	Medium sand	1.69	Poorly sorted	0.25	Fine skewed
R2_ENV_096	Unimodal	421	417	Medium sand	1.08	Poorly sorted	-0.02	Symmetrical
R2_ENV_097	Unimodal	576	632	Coarse sand	1.63	Poorly sorted	-0.28	Coarse skewed
R2_ENV_103	Unimodal	493	481	Medium sand	0.95	Moderately sorted	0.10	Symmetrical
R2_ENV_106	Unimodal	405	409	Medium sand	0.93	Moderately sorted	0.02	Symmetrical
R2_ENV_107	Bimodal	392	393	Medium sand	1.59	Poorly sorted	-0.19	Coarse skewed
R2_ENV_109	Unimodal	464	461	Medium sand	1.04	Poorly sorted	0.01	Symmetrical
R2_ENV_110	Bimodal	462	1004	Very coarse sand	2.50	Very poorly sorted	-0.57	Very coarse skewed
R2_ENV_111	Unimodal	411	397	Medium sand	1.27	Poorly sorted	0.07	Symmetrical
R2_ENV_112	Unimodal	579	549	Coarse sand	0.95	Moderately sorted	0.09	Symmetrical
R2_ENV_113	Unimodal	556	530	Coarse sand	0.93	Moderately sorted	0.08	Symmetrical
R2_ENV_115	Unimodal	540	540	Coarse sand	1.13	Poorly sorted	0.01	Symmetrical
R2_ENV_116	Bimodal	204	236	Fine sand	2.17	Very poorly sorted	0.01	Symmetrical
R2_ENV_117	Unimodal	468	371	Medium sand	2.14	Very poorly sorted	0.34	Very fine skewed

Summary of Particle Size Distribution								
Station	Modality	Median [µm]	Mean Particle Size		Sorting Coefficient		Skewness	
			[µm]	Wentworth Description‡	[µm]	Description	[µm]	Description
R2_ENV_118	Bimodal	129	164	Fine sand	2.84	Very poorly sorted	-0.05	Symmetrical
R2_ENV_119	Bimodal	110	135	Fine sand	3.02	Very poorly sorted	-0.01	Symmetrical
R2_ENV_120	Bimodal	174	177	Fine sand	3.04	Very poorly sorted	0.08	Symmetrical
R2_ENV_121	Bimodal	128	150	Fine sand	2.99	Very poorly sorted	-0.01	Symmetrical
R2_ENV_122	Bimodal	271	244	Fine sand	2.74	Very poorly sorted	0.16	Fine skewed
R2_ENV_123	Unimodal	685	766	Coarse sand	1.53	Poorly sorted	-0.36	Very coarse skewed
R2_ENV_124	Bimodal	126	135	Fine sand	3.03	Very poorly sorted	0.05	Symmetrical
R2_ENV_125	Bimodal	86.9	65.3	Very fine sand	2.62	Very poorly sorted	0.24	Fine skewed
R2_ENV_126	Unimodal	105	86.5	Very fine sand	2.76	Very poorly sorted	0.20	Fine skewed
R2_ENV_127	Bimodal	97.0	111	Very fine sand	2.96	Very poorly sorted	0.01	Symmetrical
R2_ENV_128	Bimodal	92.5	106	Very fine sand	2.98	Very poorly sorted	0.01	Symmetrical
R2_ENV_129	Bimodal	105	120	Very fine sand	3.14	Very poorly sorted	0.01	Symmetrical
R2_ENV_130	Bimodal	207	206	Fine sand	3.02	Very poorly sorted	0.09	Symmetrical
R2_ENV_131	Bimodal	196	219	Fine sand	2.72	Very poorly sorted	0.03	Symmetrical
R2_ENV_132	Unimodal	700	583	Coarse sand	2.29	Very poorly sorted	0.33	Very fine skewed
R2_ENV_133	Bimodal	369	344	Medium sand	2.55	Very poorly sorted	0.19	Fine skewed
R2_ENV_134	Bimodal	339	339	Medium sand	2.53	Very poorly sorted	0.12	Fine skewed

Summary of Particle Size Distribution								
Station	Modality	Median [µm]	Mean Particle Size		Sorting Coefficient		Skewness	
			[µm]	Wentworth Description‡	[µm]	Description	[µm]	Description
Minimum	-	27.2	23.4	-	0.83	-	-0.57	-
Maximum		848	1004		3.52		0.50	
Mean		355	318		2.20		0.20	
Standard Deviation		180	178		0.683		0.181	
RSD [%]		51	56		31		91	

Notes
RSD = Relative standard deviation
* = Folk and Ward method (Gradistat statistics)
graphical measures (Gradistat statistics)

I. Sediment Hydrocarbons

I.1 Sediment United States Environmental Protection Agency 16 Polycyclic Aromatic Hydrocarbon Concentrations

Sediment United States Environmental Protection Agency 16 Polycyclic Aromatic Hydrocarbon Concentrations																	
Station	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[a]pyrene	Indeno[1,2,3-cd]pyrene	Benzo[ghi]perylene	Dibenzo[a,h]anthracene	Total US EPA 16 PAHs*
R2_ENV_009	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_010	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_011	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_012	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_013	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_014	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.2	0.1	0.1	0.2	0.2	< 0.1	0.2	0.1	0.1	< 0.1	< 2.0
R2_ENV_015	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.1	0.1	0.1	0.1	0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_016	0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_017	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.1	0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_018	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.1	0.1	< 0.1	0.1	0.1	0.1	< 0.1	< 1.6
R2_ENV_019	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_020	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_021	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_022	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	0.1	< 0.1	0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_023	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_024	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6

Sediment United States Environmental Protection Agency 16 Polycyclic Aromatic Hydrocarbon Concentrations																	
Station	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[a]pyrene	Indeno[1,2,3-cd]pyrene	Benzo[ghi]perylene	Dibenzo[a,h]anthracene	Total US EPA 16 PAHs*
R2_ENV_025	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_026	0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.1	0.1	0.1	0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_027	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_028	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_029	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_030	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_031	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	0.1	< 0.1	0.1	0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_032	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_033	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_034	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_035	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_036	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_037	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_038	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.1	0.1	< 0.1	0.1	0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.7
R2_ENV_039	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_040	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	< 0.1	< 0.1	< 1.7

Sediment United States Environmental Protection Agency 16 Polycyclic Aromatic Hydrocarbon Concentrations

Station	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[a]pyrene	Indeno[1,2,3-cd]pyrene	Benzo[ghi]perylene	Dibenzo[a,h]anthracene	Total US EPA 16 PAHs*
R2_ENV_041	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	0.1	< 0.1	0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_042	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	0.1	< 0.1	0.1	0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_043	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_044	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_045	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_046	0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.1	0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_047	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	0.2	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.7
R2_ENV_048	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_049	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.2	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.7
R2_ENV_050	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_051	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_052	0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_053	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.7
R2_ENV_055	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.2	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.7
R2_ENV_056	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	0.1	0.1	< 0.1	< 1.6
R2_ENV_057	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6

Sediment United States Environmental Protection Agency 16 Polycyclic Aromatic Hydrocarbon Concentrations																	
Station	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[a]pyrene	Indeno[1,2,3-cd]pyrene	Benzo[ghi]perylene	Dibenzo[a,h]anthracene	Total US EPA 16 PAHs*
R2_ENV_058	< 0.1	< 0.1	< 0.1	< 0.1	0.3	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.8
R2_ENV_060	0.1	< 0.1	0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_062	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_063	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_064	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_066	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_067	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_068	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	0.1	0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_069	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_070	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_071	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_072	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_073	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_074	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_075	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_076	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6

Sediment United States Environmental Protection Agency 16 Polycyclic Aromatic Hydrocarbon Concentrations																	
Station	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[a]pyrene	Indeno[1,2,3-cd]pyrene	Benzo[ghi]perylene	Dibenzo[a,h]anthracene	Total US EPA 16 PAHs*
R2_ENV_077	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_078	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.1	< 0.1	< 0.1	0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_079	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_080	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	0.1	0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.7
R2_ENV_081	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_082	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_083	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_084	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.1	0.1	< 0.1	0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_085	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_086	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_087	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_093	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_096	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_097	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_101	< 0.1	< 0.1	0.3	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.8
R2_ENV_103	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6

Sediment United States Environmental Protection Agency 16 Polycyclic Aromatic Hydrocarbon Concentrations																	
Station	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[a]pyrene	Indeno[1,2,3-cd]pyrene	Benzo[ghi]perylene	Dibenzo[a,h]anthracene	Total US EPA 16 PAHs*
R2_ENV_104	0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_105	0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_106	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_107	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_108	0.1	< 0.1	0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_109	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_110	0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_111	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_112	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_113	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_114	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_115	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_116	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_117	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_118	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.1	0.1	< 0.1	0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_119	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	0.1	0.1	0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6

Sediment United States Environmental Protection Agency 16 Polycyclic Aromatic Hydrocarbon Concentrations																	
Station	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[a]pyrene	Indeno[1,2,3-cd]pyrene	Benzo[ghi]perylene	Dibenzo[a,h]anthracene	Total US EPA 16 PAHs*
R2_ENV_120	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.1	0.1	0.1	0.1	0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_121	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	0.1	< 0.1	0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_122	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
R2_ENV_123	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.3	0.2	0.2	0.2	0.3	0.1	0.1	< 0.1	< 0.1	< 0.1	< 2.3
R2_ENV_124	0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.4	0.3	0.2	0.2	0.4	0.1	0.2	0.1	0.1	< 0.1	< 2.7
R2_ENV_125	0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.2	0.2	0.1	0.1	0.3	0.1	0.1	< 0.1	< 0.1	< 0.1	< 2.0
R2_ENV_126	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.3	0.2	0.1	0.2	0.2	0.1	0.1	< 0.1	< 0.1	< 0.1	< 2.1
R2_ENV_127	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.3	0.2	0.1	0.1	0.2	0.1	0.1	< 0.1	< 0.1	< 0.1	< 2.0
R2_ENV_128	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.6	0.4	0.3	0.3	0.7	0.2	0.2	0.1	< 0.1	< 0.1	< 3.6
R2_ENV_129	< 0.1	< 0.1	< 0.1	< 0.1	0.2	< 0.1	0.9	0.7	0.4	0.5	0.8	0.3	0.3	0.1	0.1	< 0.1	< 4.9
R2_ENV_130	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.3	0.2	0.1	0.1	0.3	0.1	0.1	0.1	0.1	< 0.1	< 2.1
R2_ENV_131	< 0.1	< 0.1	< 0.1	< 0.1	0.7	0.2	3.8	2.9	2.1	2.0	2.6	0.8	1.3	0.6	0.5	0.1	< 18.0
R2_ENV_132	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.6	0.4	0.4	0.6	0.7	0.3	0.4	0.3	0.2	0.1	< 4.6
R2_ENV_133	< 0.1	< 0.1	< 0.1	< 0.1	0.2	< 0.1	0.8	0.7	0.5	0.5	1.2	0.4	0.6	0.6	0.5	0.1	< 6.6
R2_ENV_134	0.1	< 0.1	0.1	0.1	0.9	0.1	4.0	3.1	2.1	2.1	4.2	1.3	1.7	1.1	0.6	0.2	< 21.8

Sediment United States Environmental Protection Agency 16 Polycyclic Aromatic Hydrocarbon Concentrations																	
Station	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[a]pyrene	Indeno[1,2,3-cd]pyrene	Benzo[ghi]perylene	Dibenzo[a,h]anthracene	Total US EPA 16 PAHs*
Minimum	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.6
Maximum	0.1	< 0.1	0.3	0.1	0.9	0.2	4.0	3.1	2.1	2.1	4.2	1.3	1.7	1.1	0.6	0.2	< 21.8
Mean	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.1
Standard Deviation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.52
RSD [%]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	121
Sediment Standards (QCC, 2017)																	
General use areas	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1700†
Marine protected areas	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1700†
NOAA Assessment Criteria (Buchman, 2008)																	

Sediment United States Environmental Protection Agency 16 Polycyclic Aromatic Hydrocarbon Concentrations

Station	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[a]pyrene	Indeno[1,2,3-cd]pyrene	Benzo[ghi]perylene	Dibenzo[a,h]anthracene	Total US EPA 16 PAHs*
ERL	160	44	16	19	240	85.3	600	665	261	384	-	-	430	-	-	63.4	-
ERM	2100	640	500	540	1500	1100	5100	2600	1600	2800	-	-	1600	-	-	260	-

Notes
Concentrations expressed as ng/g of dry sediment

RSD = Relative standard deviation
QCC = Quality and Conformity Council
NOAA = National Oceanic and Atmospheric Administration
ERL = Effects range low
ERM = Effects range median
* = The total US EPA 16 PAH values were treated as absolute values when calculating summary statistics

Key:	Below Sediment Standards	Above Sediment Standard for General Use Areas	Above Sediment Standard for Marine Protected Areas

J. Sediment Polychlorinated Biphenyls

J.1 Sediment Individual Polychlorinated Biphenyl (PCB) Congener Concentrations

Sediment Individual Polychlorinated Biphenyl (PCB) Congener Concentrations													
Station	PCB 77	PCB 81	PCB 105	PCB 114	PCB 118	PCB 123	PCB 126	PCB 156	PCB 157	PCB 167	PCB 169	PCB 189	PCB WHO12 Congeners
R2_ENV_009	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_010	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_011	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_012	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.062	< 0.020	< 0.020	< 0.282
R2_ENV_013	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_014	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_015	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_016	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_017	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_018	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_019	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_021	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_022	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240

Sediment Individual Polychlorinated Biphenyl (PCB) Congener Concentrations													
Station	PCB 77	PCB 81	PCB 105	PCB 114	PCB 118	PCB 123	PCB 126	PCB 156	PCB 157	PCB 167	PCB 169	PCB 189	PCB WHO12 Congeners
R2_ENV_023	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_024	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_025	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_027	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_028	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_029	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_030	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_031	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_032	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_033	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_034	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_035	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_036	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_037	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240

Sediment Individual Polychlorinated Biphenyl (PCB) Congener Concentrations													
Station	PCB 77	PCB 81	PCB 105	PCB 114	PCB 118	PCB 123	PCB 126	PCB 156	PCB 157	PCB 167	PCB 169	PCB 189	PCB WHO12 Congeners
R2_ENV_038	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_039	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_040	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_041	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_042	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_043	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_044	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_045	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_046	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_047	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_048	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_049	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_050	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_051	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240

Sediment Individual Polychlorinated Biphenyl (PCB) Congener Concentrations													
Station	PCB 77	PCB 81	PCB 105	PCB 114	PCB 118	PCB 123	PCB 126	PCB 156	PCB 157	PCB 167	PCB 169	PCB 189	PCB WHO12 Congeners
R2_ENV_052	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_053	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_055	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_056	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_057	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_058	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_062	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_063	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_064	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_066	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_067	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_068	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_069	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_070	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240

Sediment Individual Polychlorinated Biphenyl (PCB) Congener Concentrations													
Station	PCB 77	PCB 81	PCB 105	PCB 114	PCB 118	PCB 123	PCB 126	PCB 156	PCB 157	PCB 167	PCB 169	PCB 189	PCB WHO12 Congeners
R2_ENV_071	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_072	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_073	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_074	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_075	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_076	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_077	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_078	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_079	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_080	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_081	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_082	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_083	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_084	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240

Sediment Individual Polychlorinated Biphenyl (PCB) Congener Concentrations													
Station	PCB 77	PCB 81	PCB 105	PCB 114	PCB 118	PCB 123	PCB 126	PCB 156	PCB 157	PCB 167	PCB 169	PCB 189	PCB WHO12 Congeners
R2_ENV_085	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_086	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_087	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_093	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.041	< 0.020	< 0.020	< 0.261
R2_ENV_096	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.097	< 0.020	< 0.020	< 0.317
R2_ENV_097	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.046	< 0.020	< 0.020	< 0.266
R2_ENV_103	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_105	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.026	< 0.020	< 0.020	< 0.246
R2_ENV_106	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_107	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_109	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_110	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_111	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_112	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240

Sediment Individual Polychlorinated Biphenyl (PCB) Congener Concentrations

Station	PCB 77	PCB 81	PCB 105	PCB 114	PCB 118	PCB 123	PCB 126	PCB 156	PCB 157	PCB 167	PCB 169	PCB 189	PCB WHO12 Congeners
R2_ENV_113	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_114	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_115	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_116	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_117	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_118	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_119	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_120	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_121	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_122	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_123	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_124	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_125	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_126	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240

Sediment Individual Polychlorinated Biphenyl (PCB) Congener Concentrations													
Station	PCB 77	PCB 81	PCB 105	PCB 114	PCB 118	PCB 123	PCB 126	PCB 156	PCB 157	PCB 167	PCB 169	PCB 189	PCB WHO12 Congeners
R2_ENV_127	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_128	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_129	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_130	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_131	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_132	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_133	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
R2_ENV_134	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
Minimum	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.240
Maximum	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.097	< 0.020	< 0.020	< 0.317
Sediment Standards (QCC, 2017)													
General use areas	-	-	-	-	-	-	-	-	-	-	-	-	22.0*
Marine protected areas	-	-	-	-	-	-	-	-	-	-	-	-	22.0*

Sediment Individual Polychlorinated Biphenyl (PCB) Congener Concentrations													
Station	PCB 77	PCB 81	PCB 105	PCB 114	PCB 118	PCB 123	PCB 126	PCB 156	PCB 157	PCB 167	PCB 169	PCB 189	PCB WHO12 Congeners

Notes
Concentrations expressed as ng/g dry sediment
PCB WHO 12 Congeners, as specified by the World Health Organisation (WHO)
PCB = Polychlorinated biphenyls

-PentaCB
-PentaCB
-PentaCB

PCB 118 = -PentaCB
-PentaCB
-PentaCB

-PentaCB
-PentaCB
-PentaCB

-PentaCB
-PentaCB
-PentaCB

RSD = Relative standard deviation
QCC = Abu Dhabi Quality and Conformity Council
* = Total PCB concentration. PCB congeners not specified

Key:	Below Sediment Standards	Above Sediment Standard for General Use Areas	Above Sediment Standard for Marine Protected Areas

K. Sediment Metals

K.1 Summary of Sediment Metals Analysis

Summary of Sediment Metals Analysis													
Station	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Ni	Pb	V	Zn
R2_ENV_009	1330	3.28	< 0.00700	11.7	< 0.0800	7.14	1.52	1420	< 0.0400	4.38	0.823	6.61	2.76
R2_ENV_010	1010	3.48	< 0.00700	11.1	< 0.0800	5.93	1.22	1250	< 0.0400	3.17	0.950	7.38	1.81
R2_ENV_011	1300	3.89	< 0.00700	12.5	< 0.0800	7.64	1.54	1390	< 0.0400	4.40	0.903	6.65	2.54
R2_ENV_012	896	4.97	< 0.00700	9.74	< 0.0800	5.68	1.24	1320	< 0.0400	2.96	1.04	8.02	1.99
R2_ENV_013	2120	5.25	0.00744	14.7	< 0.0800	9.51	2.60	2320	< 0.0400	6.62	1.44	9.12	4.68
R2_ENV_014	3370	3.49	0.0107	18.2	< 0.0800	14.2	4.56	3090	< 0.0400	10.9	1.58	12.6	8.47
R2_ENV_015	2940	3.56	0.0111	17.1	< 0.0800	11.8	3.91	2820	< 0.0400	8.84	1.27	11.9	6.81
R2_ENV_016	2660	4.22	0.00840	16.5	< 0.0800	11.0	3.51	2660	< 0.0400	8.05	1.38	10.7	6.75
R2_ENV_017	3930	3.37	0.0144	19.3	< 0.0800	16.6	5.78	3530	< 0.0400	12.4	1.77	14.1	10.6
R2_ENV_018	4890	3.22	0.0147	20.4	< 0.0800	21.7	9.93	4080	< 0.0400	16.7	1.98	17.7	13.9
R2_ENV_019	1160	4.00	< 0.00700	11.1	< 0.0800	6.02	1.88	1410	< 0.0400	4.81	0.799	6.82	3.05
R2_ENV_020	1060	7.13	< 0.00700	11.0	< 0.0800	5.68	1.42	1570	< 0.0400	4.24	0.899	7.49	1.95
R2_ENV_021	1610	6.42	< 0.00700	13.0	< 0.0800	7.38	2.06	1910	< 0.0400	5.57	1.09	7.24	3.57
R2_ENV_022	3370	3.59	0.00908	16.4	< 0.0800	13.9	4.83	2970	< 0.0400	11.0	1.43	12.1	7.58
R2_ENV_023	920	5.17	< 0.00700	11.9	< 0.0800	5.23	1.23	1120	< 0.0400	4.03	0.687	4.79	1.88
R2_ENV_024	766	3.16	< 0.00700	10.8	< 0.0800	4.51	0.968	909	< 0.0400	2.93	0.635	4.58	1.13
R2_ENV_025	1090	3.50	< 0.00700	11.5	< 0.0800	5.79	1.28	1300	< 0.0400	3.90	0.720	5.44	2.03
R2_ENV_026	1880	5.20	< 0.00700	13.6	< 0.0800	8.75	2.67	2190	< 0.0400	7.46	1.44	7.66	4.07
R2_ENV_027	2170	4.09	< 0.00700	13.1	< 0.0800	9.70	2.54	2480	< 0.0400	7.46	1.29	8.13	4.18

Summary of Sediment Metals Analysis

Station	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Ni	Pb	V	Zn
R2_ENV_028	2160	4.35	< 0.00700	14.3	< 0.0800	10.3	2.72	2480	< 0.0400	7.87	1.58	8.37	4.37
R2_ENV_029	1800	5.94	< 0.00700	12.8	< 0.0800	8.08	1.93	2570	< 0.0400	5.71	1.21	8.54	4.45
R2_ENV_030	1880	4.40	< 0.00700	12.4	< 0.0800	8.17	2.31	2540	< 0.0400	6.17	1.19	8.61	3.56
R2_ENV_031	2760	3.95	0.00965	15.8	< 0.0800	10.6	3.15	3290	< 0.0400	8.77	1.29	9.58	5.11
R2_ENV_032	1370	4.55	< 0.00700	13.9	< 0.0800	5.91	1.52	2330	< 0.0400	3.91	1.22	10.1	3.33
R2_ENV_033	735	3.09	< 0.00700	9.09	< 0.0800	3.61	0.919	1370	< 0.0400	2.39	0.652	6.36	1.60
R2_ENV_034	776	3.58	< 0.00700	8.29	< 0.0800	3.82	0.981	1500	< 0.0400	2.37	0.667	7.30	1.52
R2_ENV_035	2160	5.97	< 0.00700	17.3	< 0.0800	9.62	2.65	2960	< 0.0400	7.54	1.44	9.02	4.25
R2_ENV_036	2120	6.66	0.00730	19.7	< 0.0800	8.78	2.34	3280	< 0.0400	6.96	1.63	8.74	4.12
R2_ENV_037	2350	8.18	< 0.00700	19.7	< 0.0800	9.87	2.47	3830	< 0.0400	7.79	1.77	9.36	4.52
R2_ENV_038	3170	7.30	0.00818	34.2	< 0.0800	11.9	3.47	4670	< 0.0400	10.4	2.12	10.8	6.65
R2_ENV_039	2690	5.55	0.00745	26.2	< 0.0800	11.5	3.23	4120	< 0.0400	9.50	1.65	8.31	6.10
R2_ENV_040	4300	4.59	0.00868	47.7	< 0.0800	15.3	5.12	5370	< 0.0400	13.2	2.19	13.3	8.95
R2_ENV_041	2890	6.05	< 0.00700	32.4	< 0.0800	10.9	2.97	4370	< 0.0400	9.50	1.96	9.50	5.79
R2_ENV_042	4510	6.04	0.0109	56.1	< 0.0800	14.7	4.55	5900	< 0.0400	12.9	2.51	14.3	10.3
R2_ENV_043	1360	11.5	< 0.00700	26.2	< 0.0800	7.70	1.83	3560	< 0.0400	4.84	1.90	14.6	3.39
R2_ENV_044	3430	4.37	0.00844	108	< 0.0800	13.3	3.78	4250	< 0.0400	11.4	2.59	9.97	8.42
R2_ENV_045	1140	11.2	< 0.00700	170	< 0.0800	6.99	1.87	1870	< 0.0400	4.47	2.61	8.48	3.70
R2_ENV_046	2610	4.49	0.00749	131	< 0.0800	9.60	2.83	3490	< 0.0400	8.25	2.81	8.98	6.33

Summary of Sediment Metals Analysis													
Station	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Ni	Pb	V	Zn
R2_ENV_047	1160	4.16	0.0405	173	< 0.0800	5.48	1.55	1880	< 0.0400	7.72	2.24	8.58	3.57
R2_ENV_048	1080	6.65	< 0.00700	55.3	< 0.0800	5.42	1.69	2310	< 0.0400	5.54	2.34	9.40	3.69
R2_ENV_049	1230	7.89	< 0.00700	78.4	< 0.0800	6.81	1.95	2440	< 0.0400	5.58	2.28	10.1	3.10
R2_ENV_050	1140	6.42	< 0.00700	104	< 0.0800	7.05	1.66	1850	< 0.0400	5.39	2.19	7.41	3.06
R2_ENV_051	2380	7.04	0.00902	95.6	< 0.0800	11.8	3.17	3410	< 0.0400	10.1	2.95	8.65	6.23
R2_ENV_052	1340	9.77	< 0.00700	135	< 0.0800	7.00	1.72	3330	< 0.0400	4.77	3.55	12.8	3.96
R2_ENV_053	2070	4.78	0.00816	487	< 0.0800	8.55	2.15	2690	< 0.0400	7.43	4.38	7.84	4.66
R2_ENV_055	1360	7.86	< 0.00700	246	< 0.0800	6.89	1.65	2790	< 0.0400	4.47	3.16	11.9	3.61
R2_ENV_056	1350	6.19	< 0.00700	197	< 0.0800	6.26	1.54	2400	< 0.0400	5.14	3.18	8.93	3.45
R2_ENV_057	1850	3.67	0.0128	226	< 0.0800	7.47	3.27	2300	< 0.0400	9.35	10.5	8.35	9.25
R2_ENV_058	1570	5.57	< 0.00700	153	< 0.0800	7.17	2.99	2420	< 0.0400	10.1	2.69	9.44	7.92
R2_ENV_060	643	4.62	< 0.00700	21.7	< 0.0800	3.81	1.27	1220	< 0.0400	2.04	1.22	6.52	2.22
R2_ENV_062	1840	2.72	0.00703	47.0	< 0.0800	7.83	3.27	2280	< 0.0400	9.73	1.84	6.98	8.47
R2_ENV_063	1470	3.19	< 0.00700	37.7	< 0.0800	6.64	2.62	2000	< 0.0400	8.26	1.64	5.48	6.99
R2_ENV_064	578	2.41	< 0.00700	13.3	< 0.0800	2.79	< 0.800	853	< 0.0400	1.98	0.637	5.14	1.52
R2_ENV_066	767	3.64	0.0135	18.8	< 0.0800	4.86	2.18	1220	< 0.0400	6.58	1.48	6.89	5.50
R2_ENV_067	904	3.40	< 0.00700	19.9	< 0.0800	4.00	0.863	1230	< 0.0400	3.43	0.790	5.45	1.78
R2_ENV_068	1290	3.26	0.115	26.7	< 0.0800	6.60	2.81	1450	< 0.0400	8.47	1.48	5.70	7.21
R2_ENV_069	1300	3.30	< 0.00700	29.4	< 0.0800	6.82	2.67	1470	< 0.0400	8.54	1.40	5.48	6.86

Summary of Sediment Metals Analysis													
Station	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Ni	Pb	V	Zn
R2_ENV_070	945	3.97	< 0.00700	24.9	< 0.0800	4.88	2.42	1190	< 0.0400	7.62	1.20	5.18	6.18
R2_ENV_071	481	1.94	< 0.00700	13.6	< 0.0800	2.85	< 0.800	696	< 0.0400	3.29	0.592	4.81	1.73
R2_ENV_072	587	2.01	< 0.00700	15.6	< 0.0800	3.62	2.00	802	< 0.0400	5.78	1.20	4.42	4.98
R2_ENV_073	613	2.05	< 0.00700	14.9	< 0.0800	3.19	< 0.800	751	< 0.0400	1.75	0.751	4.43	1.18
R2_ENV_074	756	2.05	< 0.00700	20.8	< 0.0800	4.00	0.836	839	< 0.0400	2.42	0.704	4.70	1.31
R2_ENV_075	881	3.10	< 0.00700	24.5	< 0.0800	4.91	0.938	1060	< 0.0400	3.05	0.809	5.15	1.58
R2_ENV_076	686	2.77	< 0.00700	20.0	< 0.0800	3.77	< 0.800	859	< 0.0400	2.31	0.643	4.90	1.08
R2_ENV_077	978	2.96	< 0.00700	33.7	< 0.0800	5.13	1.15	1080	< 0.0400	3.35	0.758	4.77	1.92
R2_ENV_078	890	3.84	< 0.00700	26.3	< 0.0800	6.00	1.19	1090	< 0.0400	3.54	0.893	5.04	2.30
R2_ENV_079	959	1.89	< 0.00700	36.3	< 0.0800	5.90	1.40	962	< 0.0400	4.17	0.871	3.87	2.66
R2_ENV_080	920	2.52	< 0.00700	30.1	< 0.0800	5.11	1.13	1050	< 0.0400	3.61	1.43	4.19	1.81
R2_ENV_081	1540	1.66	< 0.00700	72.4	< 0.0800	6.27	2.01	1430	< 0.0400	4.78	1.08	5.94	3.22
R2_ENV_082	993	2.99	< 0.00700	35.2	< 0.0800	5.81	1.21	1160	< 0.0400	3.55	1.98	5.05	1.92
R2_ENV_083	1580	1.89	0.00823	52.9	< 0.0800	6.79	1.92	1540	< 0.0400	5.29	1.35	6.47	3.86
R2_ENV_084	1860	1.56	< 0.00700	77.8	< 0.0800	7.95	2.17	1780	< 0.0400	6.02	1.77	7.20	4.23
R2_ENV_085	951	2.47	< 0.00700	25.6	< 0.0800	5.01	1.16	1220	< 0.0400	3.02	1.30	5.81	1.76
R2_ENV_086	1010	3.08	< 0.00700	32.5	< 0.0800	5.94	1.47	1180	< 0.0400	3.76	1.38	6.09	2.42
R2_ENV_087	934	2.91	< 0.00700	34.6	< 0.0800	6.63	1.45	1080	< 0.0400	3.66	1.36	4.99	2.29
R2_ENV_093	436	1.71	0.0140	18.0	< 0.0800	3.98	1.13	518	< 0.0400	1.67	0.981	2.80	1.30

Summary of Sediment Metals Analysis													
Station	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Ni	Pb	V	Zn
R2_ENV_096	453	1.45	< 0.00700	24.7	< 0.0800	4.03	< 0.800	472	< 0.0400	1.76	0.951	2.47	1.23
R2_ENV_097	394	1.69	< 0.00700	19.7	< 0.0800	4.34	< 0.800	495	< 0.0400	1.88	0.972	2.63	1.20
R2_ENV_101	492	2.49	< 0.00700	22.9	< 0.0800	4.46	0.815	578	< 0.0400	1.80	1.05	3.99	2.74
R2_ENV_103	448	1.71	< 0.00700	19.7	< 0.0800	4.36	1.79	623	< 0.0400	5.67	1.21	3.38	4.75
R2_ENV_104	608	1.78	< 0.00700	25.7	< 0.0800	4.18	0.905	591	< 0.0400	1.94	1.16	3.88	1.43
R2_ENV_105	400	1.44	< 0.00700	19.3	< 0.0800	3.05	< 0.800	404	< 0.0400	1.33	0.822	2.94	0.890
R2_ENV_106	347	0.959	< 0.00700	13.4	< 0.0800	3.59	1.68	375	< 0.0400	5.39	1.44	2.57	4.39
R2_ENV_107	416	1.76	< 0.00700	16.0	< 0.0800	4.12	1.77	513	< 0.0400	5.46	1.35	3.28	4.75
R2_ENV_108	459	1.50	< 0.00700	22.3	< 0.0800	3.72	< 0.800	502	< 0.0400	1.60	0.907	2.67	1.15
R2_ENV_109	384	1.55	< 0.00700	15.6	< 0.0800	4.28	1.64	446	< 0.0400	5.27	1.23	2.61	5.12
R2_ENV_110	451	1.70	0.0390	16.1	< 0.0800	4.42	2.71	531	< 0.0400	2.51	0.813	2.98	1.82
R2_ENV_111	415	1.02	0.0388	12.7	< 0.0800	3.72	2.70	477	< 0.0400	2.18	0.872	2.72	1.94
R2_ENV_112	536	2.37	0.0348	11.3	< 0.0800	6.06	2.79	857	< 0.0400	2.66	1.20	5.96	1.64
R2_ENV_113	675	3.07	0.0388	12.0	< 0.0800	7.95	3.01	1090	< 0.0400	3.10	1.32	8.75	1.64
R2_ENV_114	281	1.58	< 0.00700	10.4	< 0.0800	3.96	< 0.800	447	< 0.0400	1.11	0.687	2.81	< 0.800
R2_ENV_115	610	2.28	0.0366	12.8	< 0.0800	5.67	2.93	924	< 0.0400	2.75	1.08	7.02	1.74
R2_ENV_116	977	2.78	0.0427	42.6	< 0.0800	6.38	3.42	1060	< 0.0400	4.59	1.38	4.29	3.00
R2_ENV_117	1120	2.10	0.0441	29.7	< 0.0800	7.12	3.41	1230	< 0.0400	4.63	1.32	5.55	2.84
R2_ENV_118	2000	1.81	0.0460	63.7	< 0.0800	8.97	4.21	1820	< 0.0400	7.02	1.27	6.91	4.58

Summary of Sediment Metals Analysis													
Station	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Ni	Pb	V	Zn
R2_ENV_119	2060	2.24	0.0435	74.9	< 0.0800	9.53	4.53	1820	< 0.0400	7.95	1.55	6.88	5.31
R2_ENV_120	2190	1.91	0.0453	80.5	< 0.0800	9.41	5.35	1980	< 0.0400	7.42	1.46	7.25	5.14
R2_ENV_121	1950	1.89	0.0407	53.5	< 0.0800	9.83	4.41	1740	< 0.0400	7.76	1.48	6.37	4.98
R2_ENV_122	1840	2.06	0.0615	61.1	< 0.0800	8.93	4.16	1680	< 0.0400	6.91	4.33	6.51	4.58
R2_ENV_123	636	5.45	0.0377	13.4	< 0.0800	7.59	2.86	1590	< 0.0400	2.88	1.38	9.35	2.02
R2_ENV_124	2580	3.56	0.00975	72.3	< 0.0800	11.3	2.87	2670	< 0.0400	9.96	1.79	8.46	7.68
R2_ENV_125	3110	2.29	0.00871	63.6	< 0.0800	13.1	3.34	2870	< 0.0400	10.1	1.93	7.75	7.72
R2_ENV_126	3050	1.97	0.00894	77.5	< 0.0800	14.0	3.77	2920	< 0.0400	11.1	2.21	9.36	8.16
R2_ENV_127	2510	2.41	0.0101	51.7	< 0.0800	11.8	3.05	2450	< 0.0400	8.78	1.88	7.50	6.81
R2_ENV_128	2130	2.69	0.00901	58.1	< 0.0800	12.8	3.35	2130	< 0.0400	9.57	1.98	6.62	7.40
R2_ENV_129	1700	2.04	0.0102	46.7	< 0.0800	11.5	3.06	1930	< 0.0400	9.04	1.81	5.52	6.91
R2_ENV_130	1070	2.22	0.0110	40.4	< 0.0800	10.8	2.81	1320	< 0.0400	7.81	1.96	4.51	6.15
R2_ENV_131	1360	2.80	0.00773	34.8	< 0.0800	9.79	2.45	1660	< 0.0400	6.61	1.71	5.07	6.04
R2_ENV_132	1750	1.75	< 0.00700	20.3	< 0.0800	6.31	1.53	1800	< 0.0400	3.59	1.45	5.72	3.25
R2_ENV_133	2480	2.36	0.00782	30.2	< 0.0800	7.85	2.07	2360	< 0.0400	5.58	1.60	7.39	5.03
R2_ENV_134	2610	1.57	< 0.00700	39.6	< 0.0800	9.27	2.48	2400	< 0.0400	6.28	2.04	7.79	6.95
Minimum	**281**	**0.959**	**< 0.00700**	**8.29**	**< 0.0800**	**2.79**	**< 0.800**	**375**	**< 0.0400**	**1.11**	**0.592**	**2.47**	**< 0.800**
Maximum	**4890**	**11.5**	**0.115**	**487**	**< 0.0800**	**21.7**	**9.93**	**5900**	**< 0.0400**	**16.7**	**10.5**	**17.7**	**13.9**
Mean	**1530**	**3.70**	**-**	**45.7**	**-**	**7.54**	**2.32**	**1890**	**-**	**5.90**	**1.60**	**7.10**	**4.22**

Summary of Sediment Metals Analysis													
Station	Al	As	Ag	Ba	Cd	Cr	Cu	Fe	Hg	Ni	Pb	V	Zn
Standard Deviation	988	2.09	-	62.3	-	3.43	1.41	1140	-	3.13	1.12	2.95	2.56
RSD [%]	64	56	-	136	-	45	61	60	-	53	70	42	60
Sediment Standards (QCC, 2017)													
General use areas	-	7.0	-	-	0.7	52	20.0	-	0.2	16.0	30.0	-	125.0
Marine protected areas	-	7.0	-	-	0.2	11	20.0	-	0.2	7.0	5.0	-	70.0
NOAA Assessment Criteria (Buchman, 2008)													
ERL	-	8.20	1.00	-	1.20	81.0	34.0	-	0.150	20.9	46.7	-	150
ERM	-	70.0	3.70	-	9.60	370	270	-	0.710	51.6	218	-	410

Notes

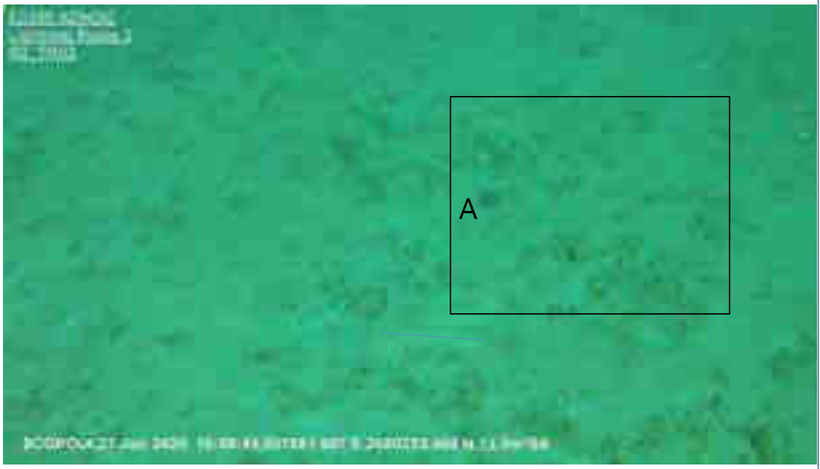
For statistical evaluation, results less than minimum reporting values (MRV) were treated as absolute values determined by MRV/2

Al = Aluminium; As = Arsenic; Ag = Silver; Ba = Barium; Cd = Cadmium; Cr = Chromium; Cu = Copper; Fe= Iron
Hg = Mercury; Pb = Lead; Ni=Nickel; V = Vanadium; Zn = Zinc
RSD = Relative standard deviation
QCC = Abu Dhabi Quality and Conformity Council
NOAA = National Oceanic and Atmospheric Administration
ERL = Effects range low
ERM = Effects range median

Key:	Below Sediment Standards	Above Sediment Standard for General Use Areas	Above Sediment Standard for Marine Protected Areas

L. Seabed Photographs

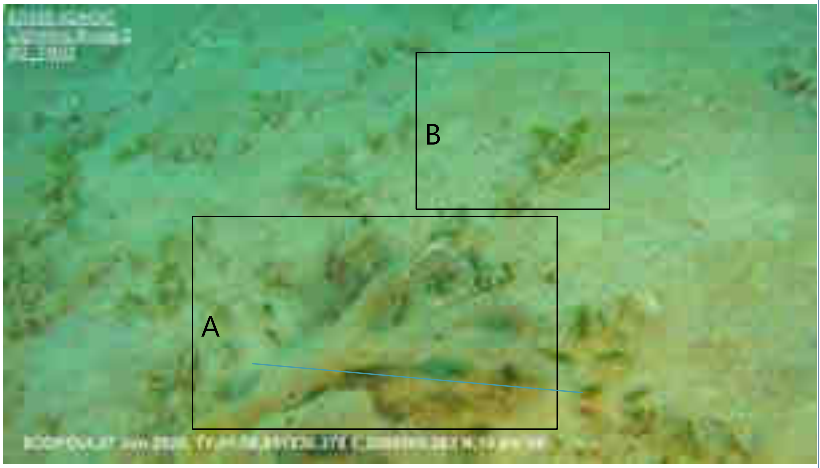
STATION TR01



Photograph: R2_TR01_001
Easting: 651 882.0 mE
Northing: 2 680 253.5 mN
Depth: 13.5 m BSL

Sediment Type:
Sand with shell fragment deposits

Fauna:
A: Seagrass (possible *Halophila stipulacea* and *Halophila ovalis* complex)



Photograph: R2_TR01_006
Easting: 651 836.4 mE
Northing: 2 680 260.2mN
Depth: 13.6 m BSL

Sediment Type:
Sand with shell fragment deposits

Fauna:
A: Branching sponge (Porifera
B: Seagrass (possible *Halophila stipulacea* and *Halophila ovalis* complex)

Photograph: R2_TR01_010
Easting: 651 810.2 mE
Northing: 2 680 263.2 mN
Depth: 13.7 m BSL

Sediment Type:
Sand with shell fragment deposits

Fauna:
A: Seagrass (possible *Halophila stipulacea* and *Halophila ovalis* complex)

Faunal burrows

STATION TR02

Photograph: R2_TR02_002
Easting: 651 348.7 mE
Northing: 2 688 493.4 mN
Depth: 16.0 m BSL

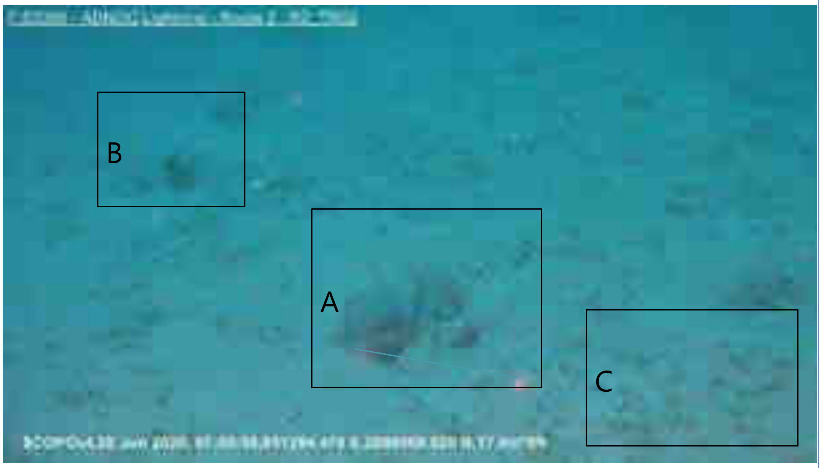
Sediment Type:
Sand with shell and coral rubble fragments

Fauna:
A: Hammer oysters (*Malleus* sp.)

Photograph: R2_TR02_013
Easting: 651 302.1 mE
Northing: 2 688 540.5 mN
Depth: 17.1 m BSL

Sediment Type:
Sand with shell

Fauna:
A: Seagrass (possible *Halophila stipulacea* and *Halophila ovalis* complex)

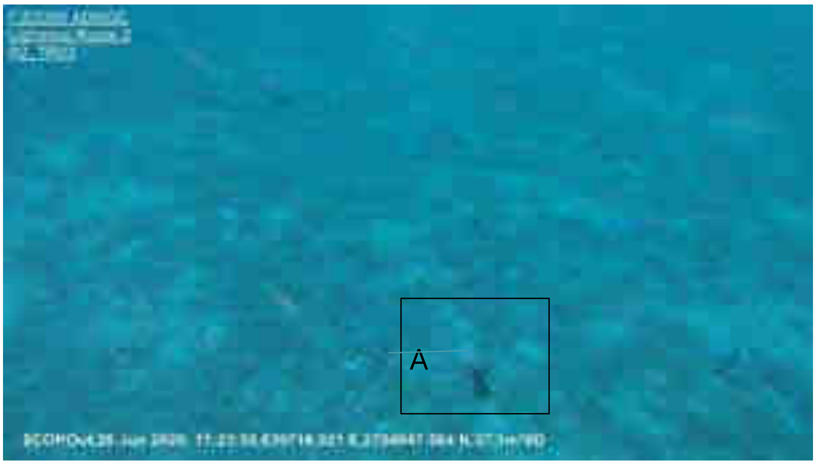


Photograph: R2_TR02_018
Easting: 651 284.5 mE
Northing: 2 688 560.8 mN
Depth: 17.9m BSL

Sediment Type:
Sand with shell and coral rubble fragments

Fauna:
A: Goby (*Amblygobius* sp.)
B: Peal oyster (*Pinctada* sp.)
C: Seagrass (possible *Halophila stipulacea* and *Halophila ovalis* complex)

STATION TR03



Photograph: R2_TR03_007
Easting: 639 716.9 mE
Northing: 2 704 947.6 mN
Depth: 37.1 m BSL

Sediment Type:
Gravelly sand with shell fragments and coral rubble veneer overlying calcarenite. Occasional calcarenite outcrops

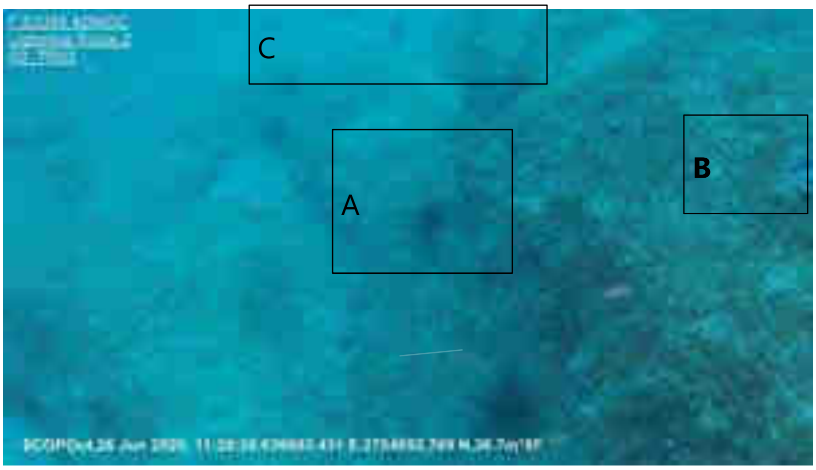
Fauna:
A: Ascidian (*Phallusia nigra*),

Algal turf (including Rhodophyta and Chlorophyta),

Photograph: R2_TR03_018
Easting: 6 396 668.7 mE
Northing: 2 704 951.8 mN
Depth: 36.8 m BSL

Sediment Type:
Calcarenite outcrops with gravelly sand, shell fragments and coral rubble veneer

Fauna:
A: Gorgonian coral (Plexauridae)
B: Worm tubes (Polychaeta)

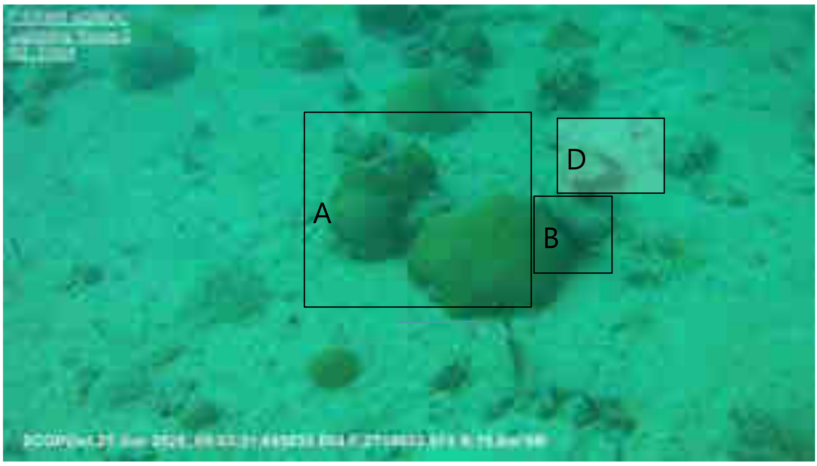


Photograph: R2_TR03_020
Easting: 639 663.4 mE
Northing: 2 704 952.8 mN
Depth: 36.7 m BSL

Sediment Type:
Calcarenite outcrops with gravelly sand, shell fragments and coral rubble veneer

Fauna:
A: Long spined sea urchins (*Diadema* sp.)
B: Encrusting sponges (Porifera)
C**:** Sea whip (*Junceella juncea*)

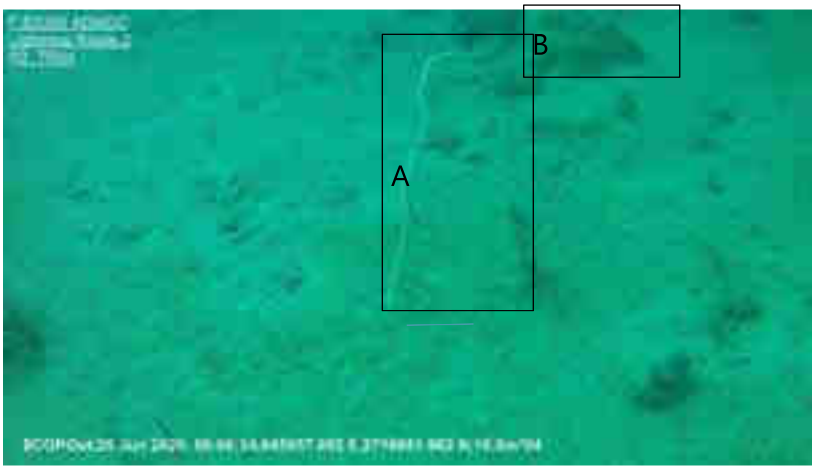
STATION TR04



Photograph: R2_TR04_007
Easting: 645 632.0 mE
Northing: 2 716 692.7 mN
Depth: 15.8 m BSL

Sediment Type:
Calcarenite with veneer of sand, shell fragments and coral outcrop

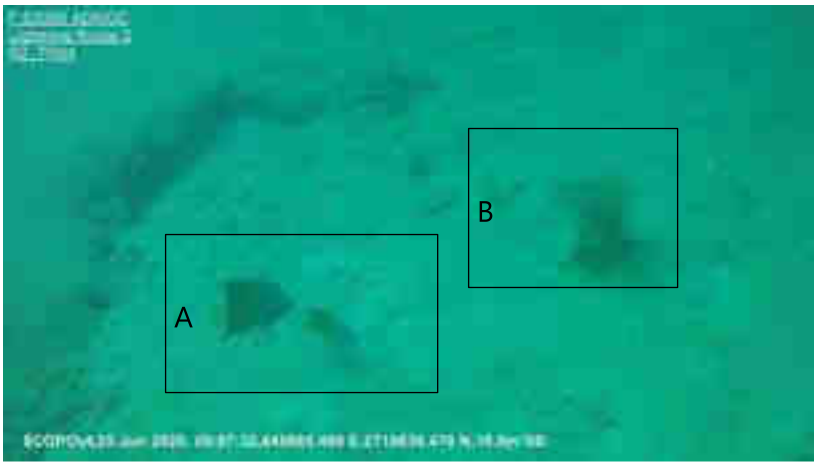
Fauna:
A: Boulder corals (*Favia* sp.)
B: Long spined sea urchins (*Diadema* sp.)
D: Finger corals (*Porites* sp.)



Photograph: R2_TR04_015
Easting: 645 657.9 mE
Northing: 2 716 651.9 mN
Depth: 18.8 m BSL

Sediment Type:
Calcarenite with veneer of sand, shell fragments and coral outcrop

Fauna:
A: Whip corals (*Junceella juncea*)
B: Boulder corals (Faviidae)



Photograph: R2_TR04_018
Easting: 645 665.5 mE
Northing: 2 716 638.5 mN
Depth: 19.8 m BSL

Sediment Type:
Calcarenite outcrop with veneer of sand and shell fragments

Fauna:
A: Yellowband angel fish (*Pomacanthus maculosus*)
B: Hydroids (Hydrozoa)

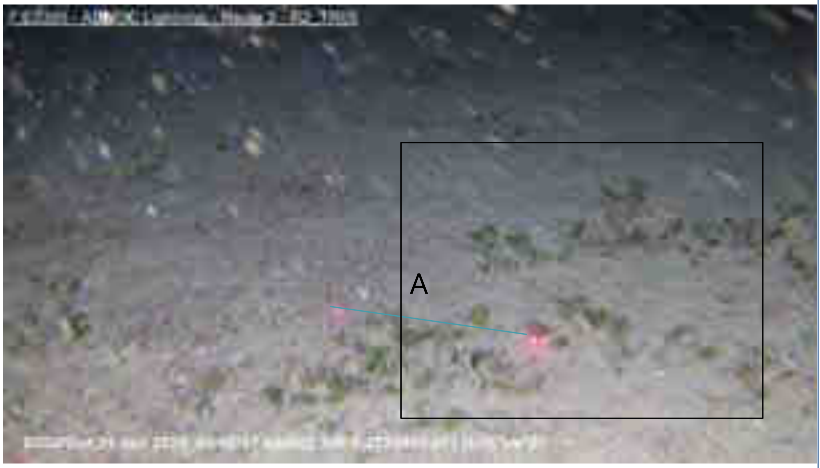
STATION TR05

Photograph: R2_TR05_005
Easting: 664 433.0 mE
Northing: 2 732 089.5 mN
Depth: 15.3 m BSL

Sediment Type:
Sand with shell fragments and coral rubble veneer overlying calcarenite outcrop

Fauna:
A: Pearl oysters (*Pinctada* sp.)
B: Sea urchins (*Echinometra mathei*)

Faunal burrows



Photograph: R2_TR05_010
Easting: 664 404.0 mE
Northing: 2 732 070.1 mN
Depth: 16.1 m BSL

Sediment Type:
Gravelly sand with shell deposits

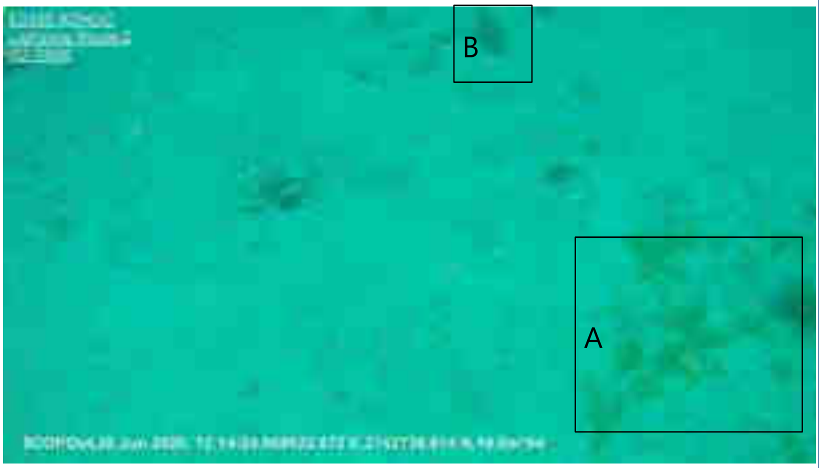
Fauna:
A: Seagrass (*Halophila ovalis* and *Halophila stipulacea*)

Photograph: R2_TR05_020
Easting: 664 335.3 mE
Northing: 2 732 025.4 mN
Depth: 19.1 m BSL

Sediment Type:
Gravelly sand with shell fragments and coral rubble veneer overlying calcarenite. Occasional calcarenite outcrops.

Fauna:
A: Gorgonians (Alcyonacea including *Euplexaura* sp., ?*Menella* sp.)
B: Hard coral (Scleractinia)
C: Hard coral (?*Siderastrea* sp.)
D: Sea whip (*Junceella juncea*)

STATION TR06

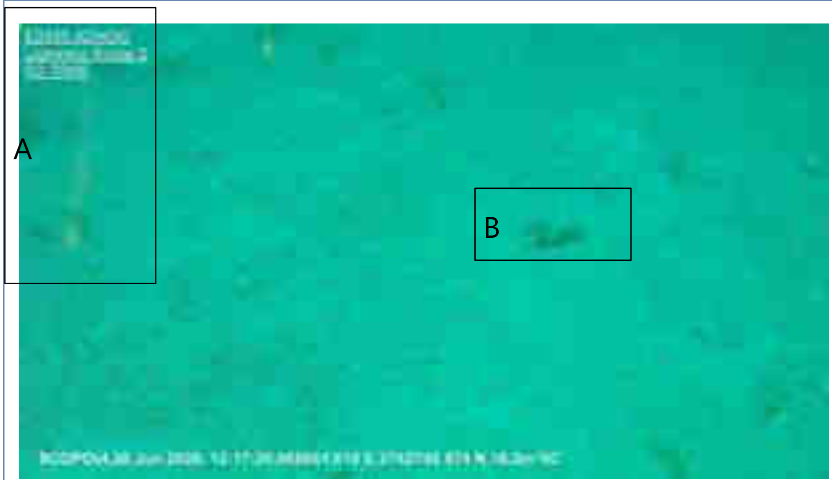


Photograph: R2_TR06_003
Easting: 668 622.9 mE
Northing: 2 742 738.0 mN
Depth: 19.0 m BSL

Sediment Type:
Gravelly sand with shell deposits

Fauna:
A: Seagrass (*Halophila ovalis* and ?*Halophila stipulacea*)
B: Fanshell (*Pinna muricata*)

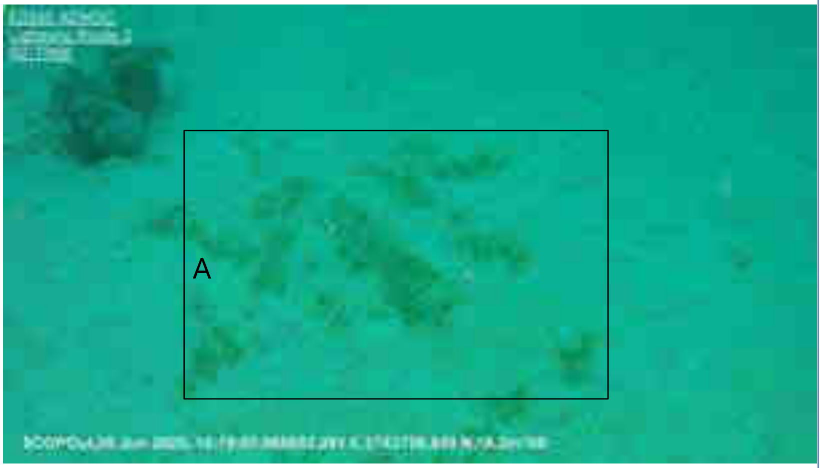
Faunal burrows



Photograph: R2_TR06_013
Easting: 668 661.7 mE
Northing: 2 742 748.9 mN
Depth: 18.2 m BSL

Sediment Type:
Gravelly sand with shell deposits

Fauna:
A: Seagrass (*Halophila ovalis* and ?*Halophila stipulacea*)
B: Goby (Gobiidae)

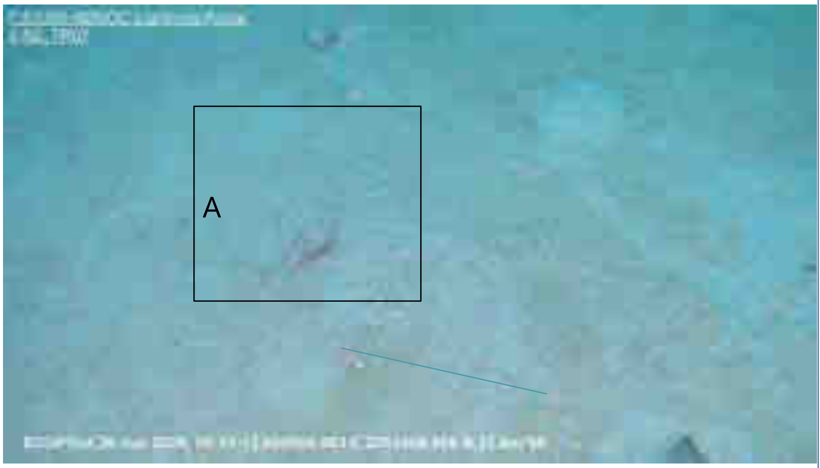


Photograph: R2_TR06_016
Easting: 668 683.3 mE
Northing: 2 742 756.8 mN
Depth: 18.2 m BSL

Sediment Type:
Gravelly sand with shell deposits and coral rubble

Fauna:
A: Seagrass (*Halophila ovalis* and ?*Halophila stipulacea*)

STATION TR07

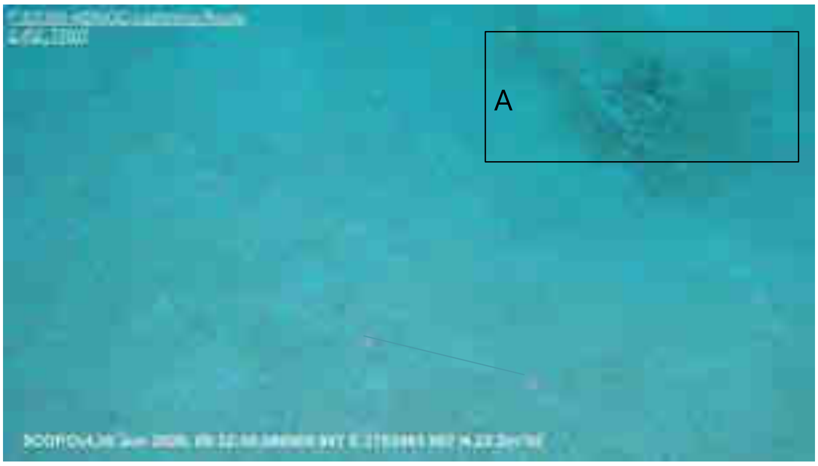


Photograph: R2_TR07_009
Easting: 680 980.9 mE
Northing: 2 763 469.9 mN
Depth: 22.4 m BSL

Sediment Type:
Sandy gravel with shell deposits

Fauna:
A: Hermit crabs (Paguridae),

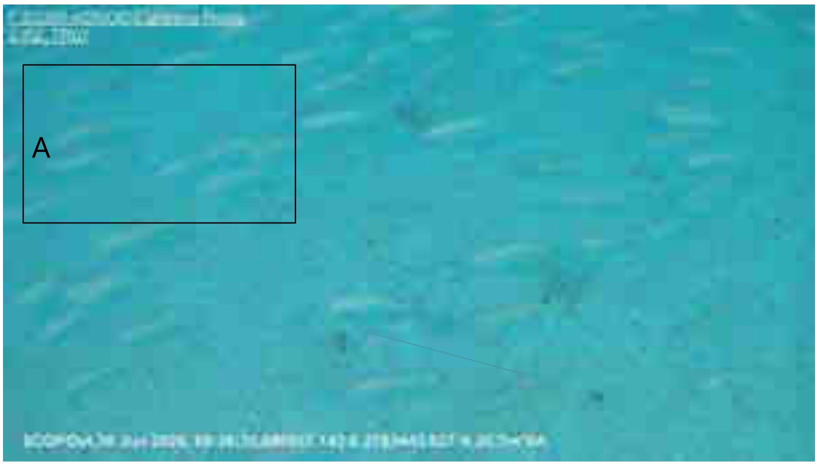
Faunal burrows
Faunal tracks



Photograph: R2_TR07_014
Easting: 680 969.9 mE
Northing: 2 763 461.1 mN
Depth: 22.2 m BSL

Sediment Type:
Sandy gravel with shell deposits

Fauna:
A: Sponge (Porifera)

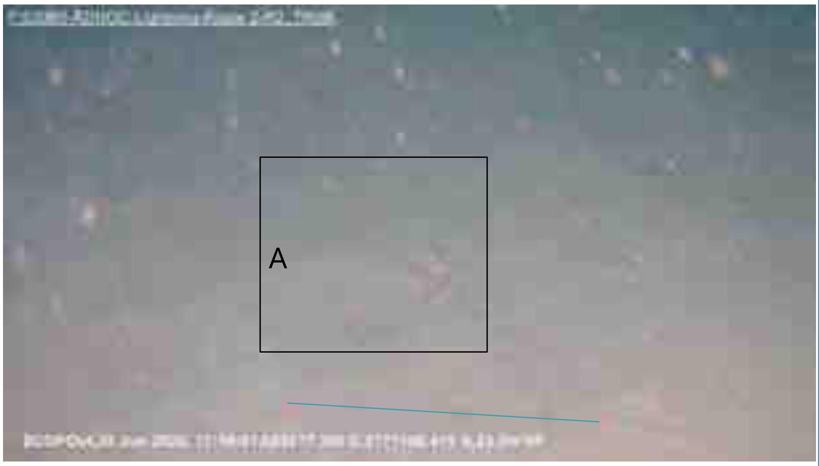


Photograph: R2_TR07_021
Easting: 680 937.1 mE
Northing: 2 763 443.6 mN
Depth: 20.7 m BSL

Sediment Type:
Sandy gravel with shell deposits

Fauna:
A: Unidentified fish (Pisces)

STATION TR08



Photograph: R2_TR08_005
Easting: 685 077.4 mE
Northing: 2 771 180.4 mN
Depth: 23.3 m BSL

Sediment Type:
Slightly gravelly sand with shell fragments

Fauna:
A: Hermit crabs (Paguridae)

Photograph: R2_TR08_013
Easting: 685 090.5 mE
Northing: 2 771 204.8 mN
Depth: 23.3 m BSL

Sediment Type:
Slightly gravelly sand with shell fragments

Fauna:
A: Hydroids (Hydrozoa)

Photograph: R2_TR08_022
Easting: 685 112.7 mE
Northing: 2 771 245.9 mN
Depth: 23.3 m BSL

Sediment Type:
Slightly gravelly sand with shell fragments

Fauna:
A: Ascidian (*Phallusia nigra*)

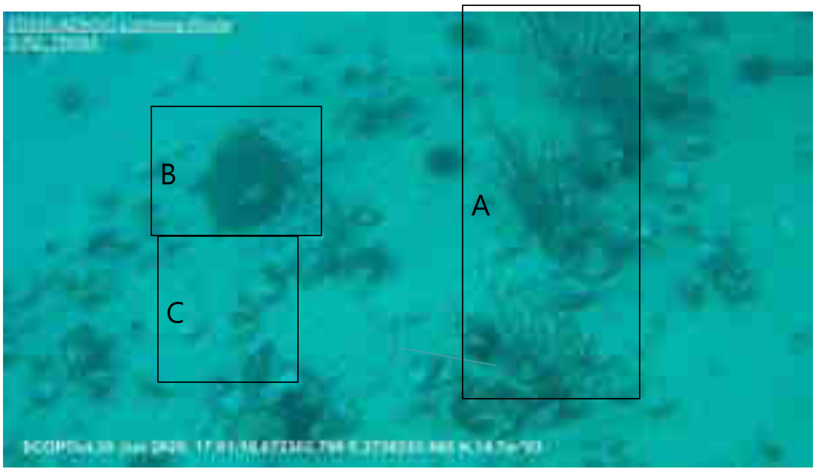
Faunal burrows

STATION TR08a

Photograph: R2_TR08a_007
Easting: 672 269.2 mE
Northing: 2 750 218.3 mN
Depth: 15.5 m BSL

Sediment Type:
Gravelly sand with shell fragments and coral rubble veneer over calcarenite. Occasional calcarenite outcrops.

Fauna:
A: Boulder corals (*Favia* sp.)
B: Pearl oysters (*Pinctada* sp.)
C: Sea urchins (*Echinometra mathei*)



Photograph: R2_TR08a_016
Easting: 672 302.8 mE
Northing: 2 750 253.9 mN
Depth: 14.7 m BSL

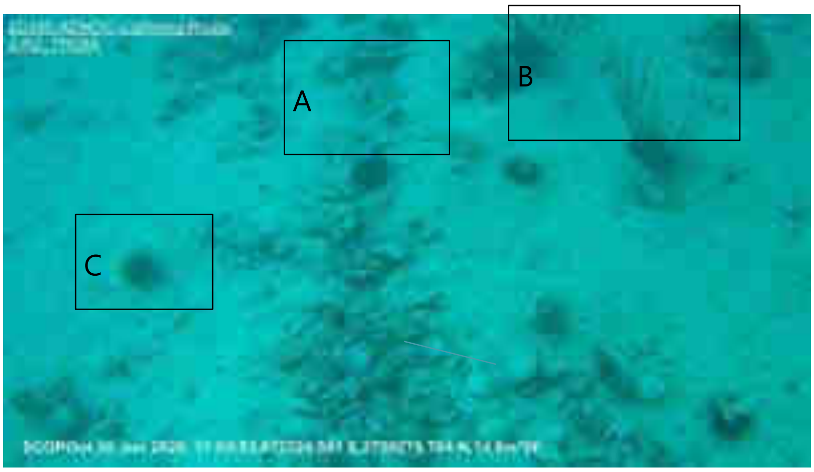
Sediment Type:
Gravelly sand with shell fragments and coral rubble veneer over calcarenite. Occasional calcarenite outcrops.

Fauna:
A: Gorgonian (Alcyonacea including Pleuxaridae)

B: Boulder corals (Faviidae)

C: Pearl oysters (*Pinctada* sp.)

D: Sea urchins (*Echinometra mathei*)



Photograph: R2_TR08a_022
Easting: 672 324.6 mE
Northing: 2 750 279.7 mN
Depth: 14.8 m BSL

Sediment Type:
Gravelly sand with shell fragments and coral rubble veneer over calcarenite. Occasional calcarenite outcrops.

Fauna:
A: Yellowstripe scad (*Selaroides leptolepis)*

B: Gorgonian (Alcyonacea including Pleuxaridae)

C: Sea urchins (*Echinometra mathei*)

STATION TR09

Photograph: R2_TR09_004
Easting: 687 795.5 mE
Northing: 2 779 024.5 mN
Depth: 23.3 m BSL

Sediment Type:
Gravelly sand with shell deposits

Fauna:
None observed

Photograph: R2_TR09_008
Easting: 687 785.8 mE
Northing: 2 779 021.9 mN
Depth: 23.4 m BSL

Sediment Type:
Gravelly sand with shell deposits

Fauna:
None observed

Faunal burrow

Photograph: R2_TR09_015
Easting: 687 747.5 mE
Northing: 2 779 002.7 mN
Depth: 24.3 m BSL

Sediment Type:
Gravelly sand with shell deposits

Fauna:
None observed

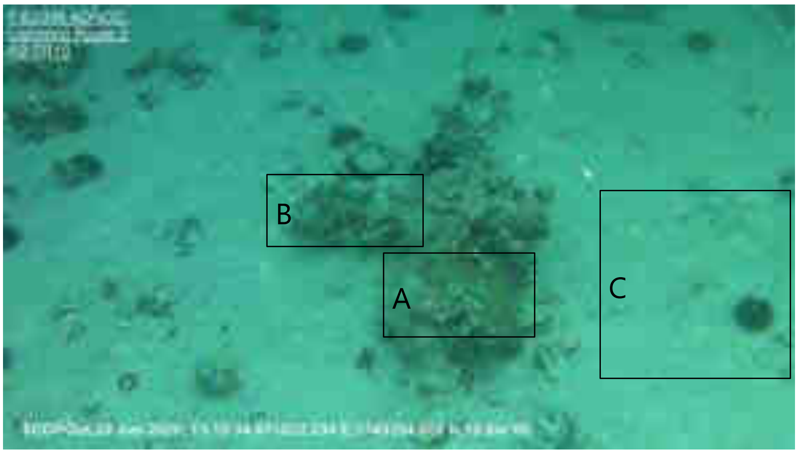
Faunal burrow

STATION TR10

Photograph: R2_TR10_008
Easting: 671 050.0 mE
Northing: 2 743 338.5 mN
Depth: 11.0 m BSL

Sediment Type:
Gravelly sand with shell fragments and coral rubble veneer overlying calcarenite. Occasional calcarenite outcrops

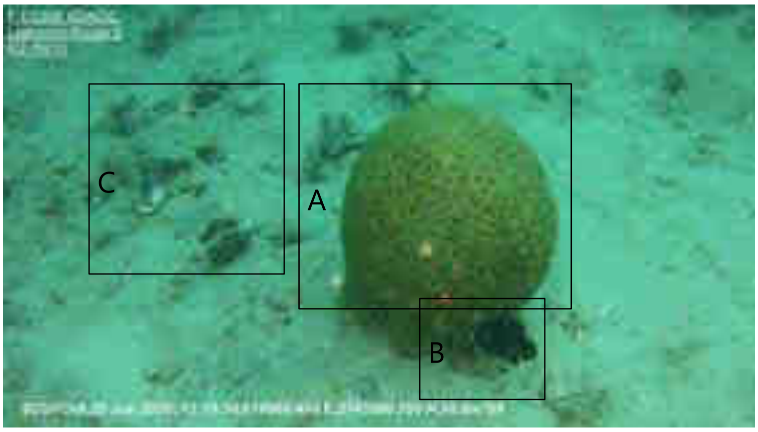
Fauna:
A: Yellow fin hind (*Cephalopholis hemistiktos)*
B: Sea urchins (*Echinometra mathei*)



Photograph: R2_TR10_015
Easting: 671 032 mE
Northing: 2 743 354.6 mN
Depth: 10.9 m BSL

Sediment Type:
Gravelly sand with shell fragments and coral rubble veneer overlying calcarenite. Occasional calcarenite outcrops

Fauna:
A: Boulder corals (*Favia* sp.)
B: Pearl oysters (*Pinctada* sp.)
C**:** Sea urchins (*Echinometra mathei*)



Photograph: R2_TR10_023
Easting: 670 988.5 mE
Northing: 2 743 390.8 mN
Depth: 10.8 m BSL

Sediment Type:
Gravelly sand with shell fragments and coral rubble veneer overlying calcarenite. Occasional calcarenite outcrops

Fauna:
A: Boulder corals (*Favia* sp.)
B: Ascidian (Phallusia nigra
C: Pearl oysters (*Pinctada* sp.)

Appendix 2.4 – WKC Marine Environmental Baseline Survey

Anthesis

Project Lightning

Marine Environmental Baseline Survey

Prepared for: Anthesis

Ref.: J22002

Date: 05/06/2022

Report Approval & Revision Record

Project:	Project Lightning
Document Title:	Marine Environmental Baseline Survey
Client:	Anthesis
Report Number:	J22002

Rev	Date	Prepared	Reviewed	Approved
01	06 June 2022	Ray N. Visitacion Senior Environmental Consultant Adrian Evans Environmental Consultant	Donald Afan Principal Consultant	

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Acronyms

AIMS	Australian Institute for Marine Sciences
ANZWQ	Australia and New Zealand Water Quality Standards
BOD	Biological Oxygen Demand
BRUV	Baited Remote Underwater Video
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CMREC	Coastal and Marine Ecological Classification Standard
COD	Chemical Oxygen Demand
DDV	Drop Down Video
DO	Dissolved Oxygen
DTV	Dutch Trigger Value
DW	Dry Weight
EAD	Environment Agency Abu Dhabi
EIA	Environmental Impact Assessment
GPS	Global Positioning System
IUCN	International Union for the Conservation of Nature
MDL	Minimum Detection Limit
MEBS	Marine Environmental Baseline Survey
MOOPAM	Manual of Oceanographic Observations and Pollutant Analysis Methods

ND	Not Detected (i.e., below the MDL)
NTU	Nephelometric Turbidity Units
OSME	Ornithological Society of the Middle East
PAH	Polynuclear Aromatic Hydrocarbons
RBS	Rose Bengal Stain
ROPME	Regional Organization for the Protection of the Marine Environment
TDS	Total Dissolved Solids
TKN	Total Kjeldahl Nitrogen
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbons
UAE	United Arab Emirates
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compounds
WKC	WKC Environment Consultancy
WQO	Water Quality Objectives

1 Introduction

1.1 Introduction

The Project intends to install a subsea cable from Mirfa to Al Ghallen island, Zakum known as Route 1 and Shuweihat to Das island known as Route 2. The Cable layout of route one will go through the Marawah Marine Protected Core Area and along the transition zone proceeding north to Zakum. This Project is known as the Abu Dhabi HVDC Lightning Project. The cable laying has the following specifications:

- Route 1 Cable Length

  A) Cable 1A = 131.98 Kms

  B) Cable 1B = 131.86 Kms

- Route 2 Cable Length:

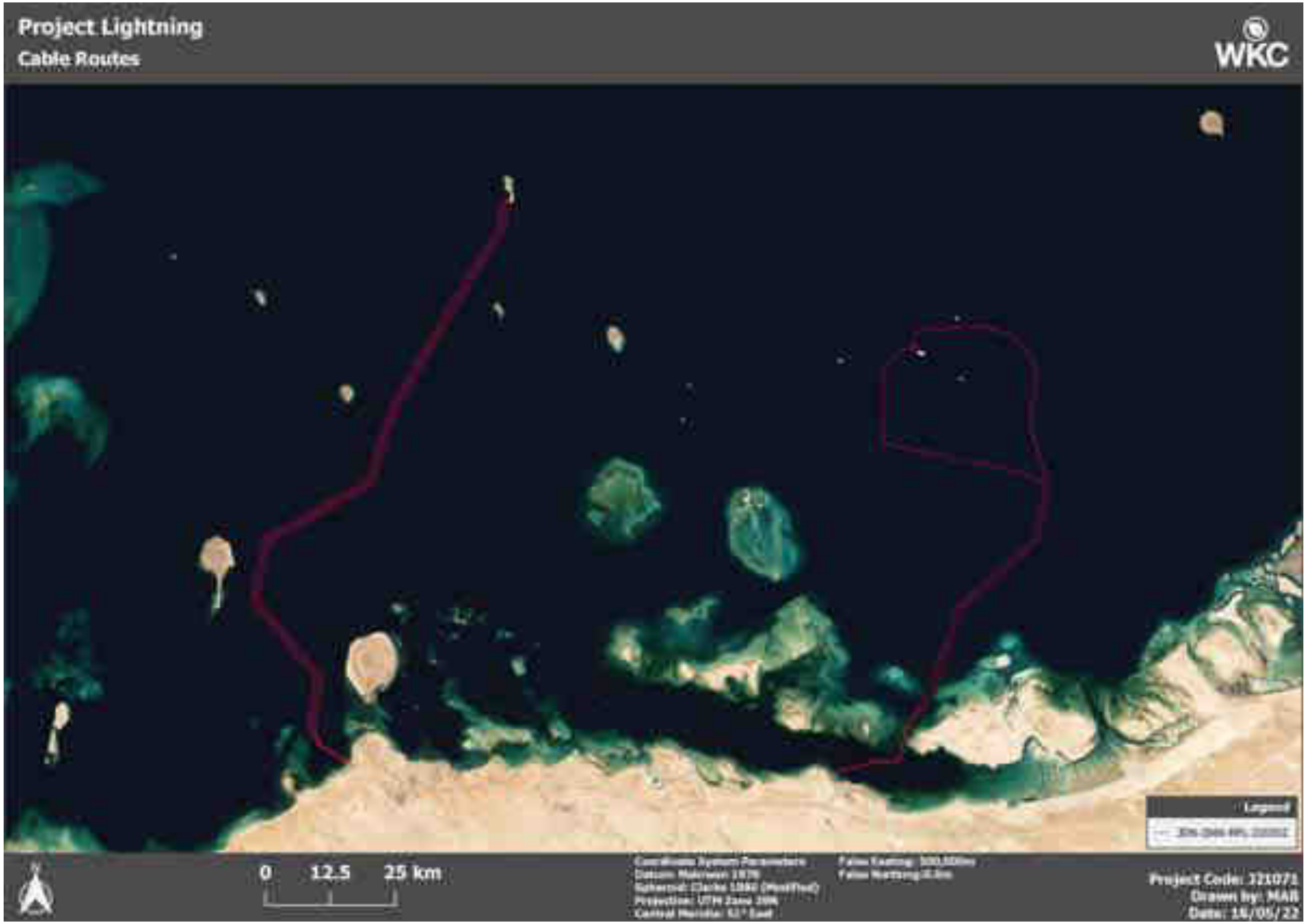
  A) Cable 2A = 135.74 Kms

  B) Cable 2 = 136.49 Kms

  C) Cable 2B = 136.28 Kms

WKC Environmental Consultancy (WKC) have been contracted by Anthesis to undertake marine ecology baseline surveys to fill in the survey gaps conducted by Fugro in 2020 during the design phase of the project. The results of this survey will used in the development of the EIA of the Project.

Figure 1-1 – HVDC Lightning Cable Route



2 Regulatory Review

2.1 Regulation for Protection of Maritime Environment

Protection of the marine environment is regulated under the ‘Regulation for the Protection of Maritime Environment’, UAE Cabinet [1]. The principal requirements of Chapter 3 of this regulation, pertaining to this scope of works, are as follows:

- No discharge of plastic materials including but not limited to, synthetic rope, synthetic fishing nets, plastic bags.
- No discharge of garbage including products, ceramics, glass and bottles, wood, lining and packing materials; and,
- Food leftovers generated from marine vessels, rigs, or barges, if to be disposed of into marine environment the discharge location must be as far as possible from land but not less than 12 nautical miles from the nearest shoreline.

In accordance with the Council of Ministers’ Decision No 37 – 2001 – Protection of the Marine Environment, following non-degradable pollutants / Illegal compounds to be discharged into marine environment:

Table 2-1 – Prohibited Substances for Discharge to Marine Environment [1]

Organ phosphorus Pesticides	**Polychlorinated Biphenyls**
Dimethoate	PCBs
Malathion	Aroclor
Organochlorine Pesticides	Tetrachlorobiphenyl
Aldrin	Trichlorobiphenyl
Dieldrin	**Polynuclear Aromatic Hydrocarbons (PAH)**
DDT	Benzo (a) pyrene and Naphthalene
Chlordane	Naphthalene
Eldrin	

The water quality standards released by the EAD, clearly defines the ambient marine water quality objectives (Table 2-2) and publish quantifiable physico-chemical limits for several parameters. The water quality objectives tables had no reference to salinity, however total dissolved solids (TDS) limit has been provided.

Although salinity and TDS are related it is important to differentiate the two as the relationship is not linear. Salinity is generally defined as the total concentration of all dissolved salts in water whilst TDS concentration is the sum of all ion particles that are smaller than 2 µm, and therefore includes the sum of all salt ions and organic solutes such as hydrocarbons and urea (the fraction of which varies by location and water quality).

Table 2-2 – EAD Marine Water Quality Objectives (EAD AWQS)

Indicators	Marine and Coastal Zone	Unit of Measurements
Floating Particles/ floatable/ debris	Nil	mg/m2
BOD_5	5	mg/l (5day at 20 degrees C)
Odour	Not Objectionable	Not objectionable
Colour	No Change from Background	No Change from Background
Chlorine, total residual	0.01	mg/l
Dissolved Oxygen	>4	mg/l
Nitrogen -ammonia (NH_3-N)	0.004	mg/l
Nitrogen – nitrate	95	microgram /l
Nitrogen- total	2.0	mg/l
Petroleum hydrocarbons	5	ppm or mg/l
Cyanide Cn	0.004	mg/l
Lead Pb	0.01	mg/l
Oil and Grease	Not visible	mg/l
Si-SiO3	890	microgram/ l
Phenols	0.001	mg/l
Phosphorus	0.001	mg/l
Phosphate	34	microgram/l

Indicators	Marine and Coastal Zone	Unit of Measurements
Sulphides (S)	0.004	mg/l
pH	6.5- 8.5	mg/l
Total Organic Carbon	2.5	mg/l
Temperature	+- 3	Delta degrees C of background Concentration
Nickel Ni	20	micro gram/l
Turbidity/Colour	10	NTU
Transparency	>= 10	Meter of Secchi depth
Vanadium V	9.4	microgram/ l
Total Suspended Solids	<33	mg/l
NO2	34	microgram/l
Arsenic	0.005	mg/l
Cadmium	0.001	mg/l
Chromium	0.01	mg/l
Copper	0.01	mg/l
Iron	0.3	mg/l
Zinc	0.01	mg/l
Biological Indicators		
Bacteria (E. Coli)	70	MPN/100ml

The Abu Dhabi Quality and Conformity Council (QCC) has published the Abu Dhabi Specifications for the recommend relevant and appropriate ambient marine water and sediment quality specifications to be considered as limits based on best international practices for the long-term protection of marine life and human health and taking into consideration available data at the EAD [2]. Any Project interaction with the marine water will therefore reference the recommended ambient marine water quality standards for general use areas as presented in Table 2-3.

Table 2-3 –Allowable Concentrations for Ambient Marine Water (ADQCC)

Parameter	Unit	General Use Areas	Marine Protected Use Areas
Cadmium (Cd)	µg/l	0.7	0.3
Chromium (Cr VI)	µg/l	0.2	0.2
Copper (Cu)	µg/l	3.0	3.0
Lead (Pb)	µg/l	2.2	2.2
Mercury (Hg)	µg/l	0.1	0.1
Nickel (Ni)	µg/l	7.0	3.0
Zinc (Zn)	µg/l	15.0	15.0
Total Petroleum Hydrocarbons (TPH)	µg/l	7.0	7.0
Total Polychlorinated Biphenyls (PCBs)	µg/l	0.03	0.03
Chlorophyll (a)	µg/l	1.0	0.7
Dissolved Oxygen (DO)*	mg/l	4.0	4.0
Enterococci	CFU or MPN/100 ml	35	35

Note: µg/l: micrograms per litre; mg/l: milligram per litre; CFU: Colony Forming Unit; MPN: Most Probable Number; *: minimum allowable concentration

The EAD developed standards and limits for marine water quality standards (AD QCC) have been adopted as provided in Table 2-4 and that which can be referenced as applicable.

Table 2-4 – Ambient Marine Water Quality Standards for Abu Dhabi (ADQCC)

Parameter		Maximum Concentration	Unit of Measurement
Physical Indicators			
1	Floating Particles/Floatable/debris	Nil	mg/m^2
2	Temperature	±3	Δ°C of background concentration

Parameter		Maximum Concentration	Unit of Measurement
3	Turbidity	10	Nephelometric Turbidity Unit (NTU)
	Transparency / Clarity	≥10	Meter of Secchi Depth
4	Salinity	<5	% of background concentration
5	BOD_5	5	mg/l (5day at 20°C Annual Average)
6	Odour	Not Objectionable	Not Objectionable
7	Colour	No Change from Background	No Change from Background
Chemical Indicators			
8	Ammonia (Free as N) or Ammonia (NH_3-N)	0.004	mg/L
9	Arsenic (As)	0.005	mg/L
10	Cadmium (Cd)	0.001	mg/L
11	Chlorine Residual (Cl_2)	0.01	mg/L
12	Chromium (Cr)	0.01	mg/L
13	Copper (Cu)	0.01	mg/L
14	Cyanide (Cn)	0.004	mg/L
15	Lead (Pb)	0.01	mg/L
16	Mercury (Hg)	-	-
17	Oil and Grease	Not Visible	mg/L
18	Petroleum Hydrocarbons	5	ppm or mg/l
19	Dissolved Oxygen (DO)	>4	mg/L
20	Total Suspended Solids (TSS)	<33	mg/L
21	Si-SiO_3	890	Microgram/L
22	pH	6.5 – 8.5	mg/l

Parameter		Maximum Concentration	Unit of Measurement
23	Phenols	0.001	mg/l
24	Phosphorous Total as (P)	0.001	mg/l
	Phosphate (PO_4)	34	μ/L
25	Sulphides (S)	0.004	mg/l
26	Total Organic Carbon (TOC)	2.5	mg/l
27	Zinc (Zn)	0.01	mg/l
28	Nickel (Ni)	20	μ/L
29	Iron (Fe)	0.3	mg/l
30	Vanadium (V)	9.4	μ/L
31	Nitrate (NO_3-N)	95	μ/L
32	NO_2	34	μ/L
Biological Indicators			
33	Total Coliform	70	MPN/100mL

Table 2-5 – Maximum Allowable Concentrations for Ambient Marine Sediments (ADQCC)

Parameter	Unit (DW)	General Use Areas	Marine Protected Use Areas
Arsenic (As)	mg/kg	7.0	7.0
Cadmium (Cd)	mg/kg	0.7	0.2
Chromium (Cr)	mg/kg	52.0	11.0
Copper (Cu)	mg/kg	20.0	20.0
Lead (Pb)	mg/kg	30.0	5.0
Mercury (Hg)	mg/kg	0.2	0.2
Nickel (Ni)	mg/kg	16.0	7.0

Parameter	Unit (DW)	General Use Areas	Marine Protected Use Areas
Zinc (Zn)	mg/kg	125.0	70.0
Total Polychlorinated Biphenyls (PCBs)	µg/kg	22.0	22.0
Total Polycyclic Aromatic Hydrocarbons (PAHs)	mg/kg	1.7	1.7

3 Marine Environmental Baseline Survey Methodology

3.1 Scope of Work

WKC Middle east Environment Consultancy has been appointed by Anthesis to undertake a Marine Environmental Baseline Survey to inform the Project Lightning located in the Emirate of Abu Dhabi, United Arab Emirates.

The scope of work, number of samples and locations were based on the Gap Analysis conducted by Mott Macdonald (AD41-90.0/27/26-G-25301 Rev 02) in accordance with the EAD Technical Guidance Document for Environmental Impact Assessment (EIA) and WKCs experience in conducting marine baseline surveys. For each landfall route and MMBR it was assumed 5 infauna locations was sufficient for the area being assessed. The scope of work was submitted to EAD by Anthesis on the 27th of September 2021.

The scope of work of this MEBS are as follows:

- Marine Water Quality
- Marine Sediment Quality
- Marine Ecology
    - Drop Down Video (DDV)
    - Photo-quadrats
    - Infauna
    - Fish Survey (Baited remote underwater video- BRUV)
    - Marine Mammal and Reptile Surveys
- Underwater Noise

Due to the large area and scope of work, the surveys have been separated into nearshore areas and offshore areas. The offshore area includes sample location within the oil and gas field:

Nearshore:

- Route 1 Landfall

- Route 2 Landfall
- Fugro Sampling Gaps Route 1

Offshore:

- Zakum Cluster 1A and 1B Re-route to Al Ghallen Island

4 Survey Summary

4.1 Nearshore Surveys

The nearshore surveys were conducted from the 3rd of April to the 8th of April 2022.

4.1.1 Route 1 (Mirfa) Landfall

The following surveys were conducted in this area:

- Water Quality (8 samples plus control, 9 in total)
- Sediment Quality (5 samples plus control, 6 in total)
- DDV drift transect (7 locations)
- Photo-quadrat transects (7 locations, one per each DDV transect)
- Fish survey (BRUV) (2 locations)
- Benthic Infauna (8 locations)

The details including the surveys that were undertaken per sampling locations at Route 1 (Mirfa) Landfall are provided in Table 4-1.

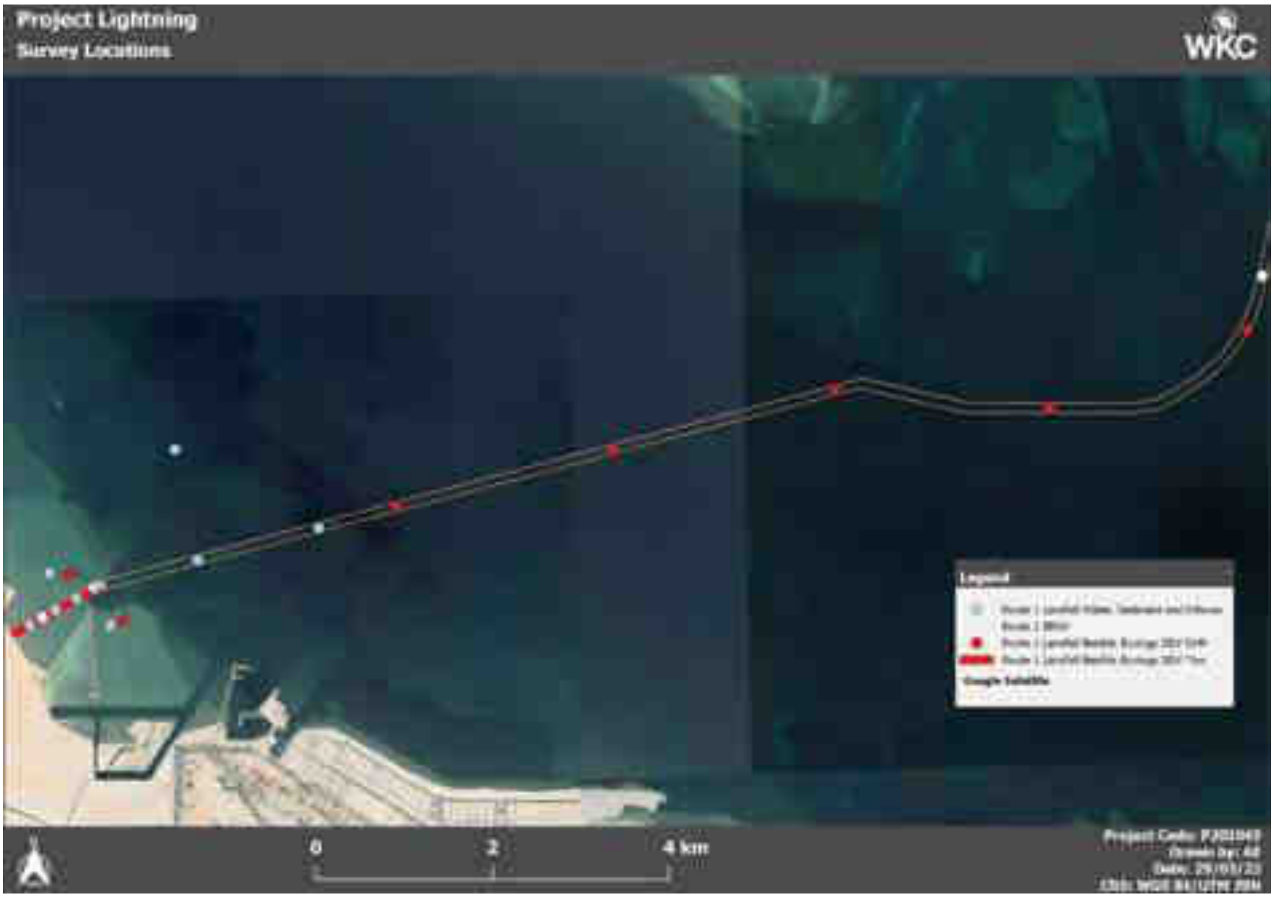
Table 4-1 – Details of Surveys per Sampling Location Undertaken at Route 1 (Mirfa) Landfall

Sl. No.	Point Id	Point Description	UTM Grid Co-ordinates	
			Easting (m)	Northing (m)
1	1	Water Sediment Infauna	750 508.379	2 668 599.535
2	2	Water Sediment Infauna	750 793.077	2 668 774.534
3	3	Water Sediment Infauna	751 035.176	2 668 904.533
4	4	Water Sediment Infauna	751 296.174	2 669 054.531
5	5	Water Sediment Infauna	750 730.878	2 669 193.531

Sl. No.	Point Id	Point Description	UTM Grid Co-ordinates	
			Easting (m)	Northing (m)
6	6	Water Sediment Infauna	751 420.073	2 668 599.534
7	7	Water Sediment Infauna	752 408.467	2 669 334.528
8	8	Water Sediment Infauna	753 779.558	2 669 700.524
9	9	Water Sediment Infauna	752 151.670	2 670 591.520
10	1	Drop Down Video	750 944.577	2 669 167.531
11	2	Drop Down Video	751 558.472	2 668 655.534
12	3	Drop Down Video	754 660.652	2 669 946.521
13	4	Drop Down Video	757 118.036	2 670 573.513
14	5	Drop Down Video	759 634.120	2 671 265.506
15	6	Drop Down Video	762 059.803	2 671 068.504
16	7	Drop Down Video	764 301.089	2 671 942.495
17	1	BRUV	750 645.778	2 668 686.535
18	2	BRUV	751 235.375	2 669 029.532

The locations of sampling points at Route 1 (Mirfa) landfall are presented in Figure 4-1.

Figure 4-1 – Route 1 (Mirfa) Landfall Sampling Locations



4.1.2 Route 2 (Shuweihat) Landfall

The following surveys will be conducted in this area:

- Water Quality (6 samples plus control, 7 in total)
- Sediment Quality (6 samples plus control, 7 in total)
- DDV towed transect (5km)
- DDV drift transect (6 locations)
- Fish survey (BRUV) (2 locations)
- Benthic Infauna (7 locations)

The details including the surveys that were undertaken per sampling locations at Route 2 (Shuweihat) Landfall are provided in Table 4-2.

Table 4-2 – Details of Surveys per Sampling Location Undertaken at Route 2 (Shuweihat) Landfall

Sl. No.	Point Id	Point Description	UTM Grid Co-ordinates	
			Easting (m)	Northing (m)
20	1	Water Sediment Infauna	657 990.116	2 671 000.613
21	2	Water Sediment Infauna	656 811.225	2 671 677.609
22	3	Water Sediment Infauna	655 720.032	2 671 635.610
23	4	Water Sediment Infauna	656 271.729	2 672 608.603
24	5	Water Sediment Infauna	655 478.135	2 672 487.604
25	6	Water Sediment Infauna	653 162.550	2 671 762.611
26	7	Water Sediment Infauna	654 093.645	2 673 459.599
27	1	Drop Down Video	657 260.521	2 671 004.613
28	2	Drop Down Video	657 679.319	2 671 615.609
29	3	Drop Down Video	655 328.135	2 672 122.607
30	4	Drop Down Video	655 716.133	2 672 762.602
31	5	Drop Down Video	653 943.946	2 673 606.598
32	6	Drop Down Video	652 293.658	2 674 722.591
33	1	BRUV	657 844.017	2 671 120.612

34	3	BRUV	652 064.660	2 675 100.589

The locations of sampling points at Route 2 (Shuweihat) Landfall are presented in Figure 4-2.

Figure 4-2 – Route 2 (Shuweihat) Landfall Sampling Locations

4.1.3 **Fugro Sampling Gaps Survey Route 1**

The following surveys will be conducted in this area:

- Sediment Quality (8 locations and 1 control)
- DDV drift samples (9 locations)
- Seagrass Photo Quadrats (9 transects, one for each DDV transect))
- Fish Survey BRUV (3 locations)

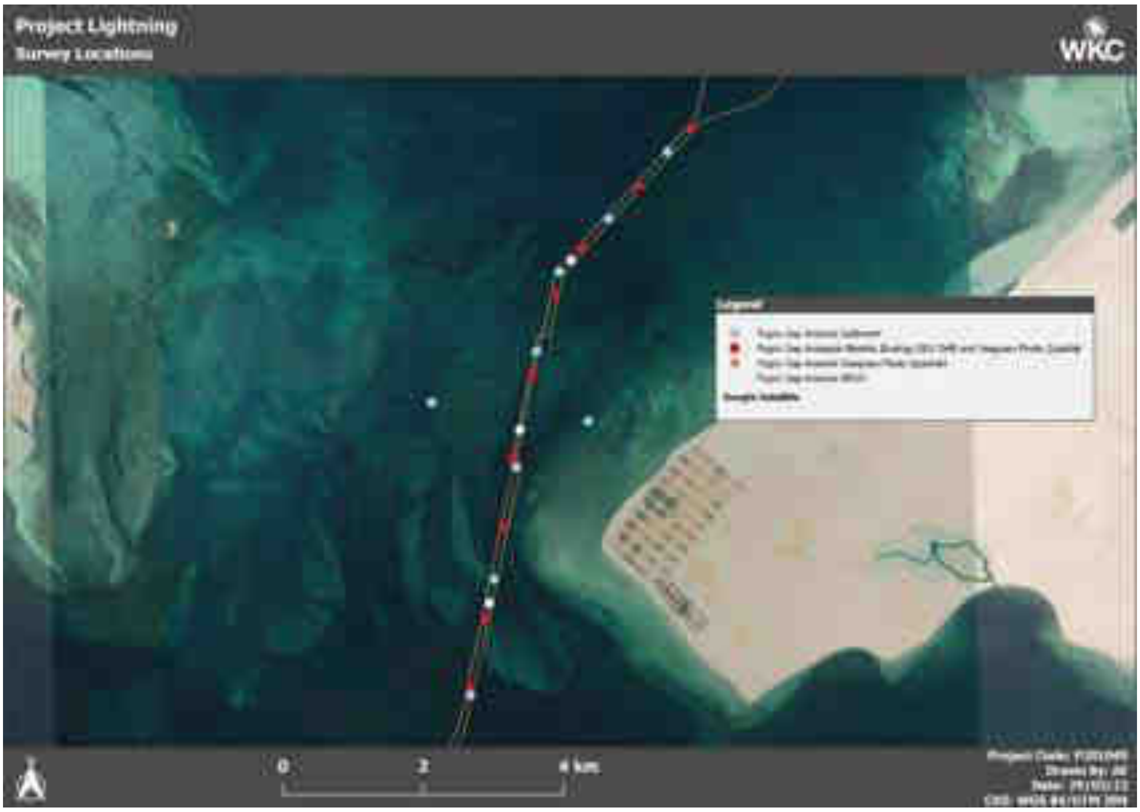
The details including the surveys that were undertaken per sampling locations for MMBR are provided in Table 4-3.

Table 4-3 – Sampling Locations for MMBR

Sl. No.	Point Id	Point Description	UTM Grid Co-ordinates	
			Easting (m)	Northing (m)
38	1	Sediment	764 525.988	2 672 704.719
39	2	Sediment	764 861.388	2 674 353.878
40	3	Sediment	765 179.188	2 675 952.756
41	4	Sediment	763 970.598	2 676 871.791
42	5	Sediment	766 201.582	2 676 601.050
43	6	Sediment	765 465.088	2 677 599.824
44	7	Sediment	765 792.888	2 678 733.496
45	8	Sediment	766 493.684	2 679 486.910
46	9	Sediment	767 334.479	2 680 439.563
47	1	Drop Down Video	764 524.388	2 672 798.489
48	2	Drop Down Video	764 744.888	2 673 779.482
49	3	Drop Down Video	764 990.888	2 675 087.472
50	4	Drop Down Video	765 143.389	2 676 092.465
51	5	Drop Down Video	765 395.188	2 677 267.457
52	6	Drop Down Video	765 727.588	2 678 408.449
53	7	Drop Down Video	766 125.386	2 679 064.444
54	8	Drop Down Video	766 909.682	2 679 950.437
55	9	Drop Down Video	767 662.278	2 680 765.430
56	1	BRUV	764 794.288	2 674 014.140
57	2	BRUV	765 229.488	2 676 481.272
58	3	BRUV	765 958.687	2 678 894.665

The locations of sampling points for MMBR are presented in Figure 4-3.

Figure 4-3 –MMBR Gap Survey Locations



4.2 Zakum Offshore Surveys

The offshore surveys will be conducted once all permissions to access the Oil and Gas fields have been finalised.

4.2.1 Zakum Cluster

The optional reroute of Route 1 has been proposed to approach Zakum from the southern side. The survey was conducted to assess water quality, sediment quality and marine ecology. The following surveys were undertaken in this area:

- Water Quality (20 locations)
- Sediment Quality (20 locations)
- DDV drift samples (20 locations)

The details including the surveys that were undertaken per sampling locations for Sampling Points at Zakum Reroute are provided in Table 4-4.

Table 4-4 – Locations of Sampling Points at Zakum Reroute

Sl. No.	Point Id	Point Description	UTM Grid Co-ordinates	
			Easting (m)	Northing (m)
69	1	Water Sediment	790 334.392	2 725 790.426
70	2	Water Sediment	786 305.523	2 727 198.928
71	3	Water Sediment	781 300.639	2 728 328.001
72	4	Water Sediment	776 624.737	2 729 193.795
73	5	Water Sediment	771 386.634	2 730 233.028
74	6	Water Sediment	766 781.853	2 731 299.799
75	7	Water Sediment	760 995.611	2 733 107.271
76	8	Water Sediment	760 958.840	2 739 367.346
77	9	Water Sediment	760 975.874	2 743 489.733
78	10	Water Sediment	762 491.757	2 748 668.942
79	11	Water Sediment	792 060.717	2 727 054.021
80	12	Water Sediment	790 896.571	2 731 007.626
81	13	Water Sediment	790 062.967	2 733 746.503
82	14	Water Sediment	789 552.074	2 738 164.683
83	15	Water Sediment	790 586.802	2 744 395.282
84	16	Water Sediment	789 116.249	2 749 881.351
85	17	Water Sediment	785 272.258	2 753 438.736
86	18	Water Sediment	779 415.126	2 755 003.957
87	19	Water Sediment	774 419.574	2 755 021.330
88	20	Water Sediment	768 497.666	2 754 482.518
89	1	Drop Down Video	790 659.856	2 725 394.162
90	2	Drop Down Video	786 600.903	2 727 148.788
91	3	Drop Down Video	781 585.945	2 728 230.580
92	4	Drop Down Video	777 045.221	2 729 293.511
93	5	Drop Down Video	771 796.600	2 730 325.296

Sl. No.	Point Id	Point Description	UTM Grid Co-ordinates	
			Easting (m)	Northing (m)
94	6	Drop Down Video	767 140.202	2 731 343.404
95	7	Drop Down Video	761 086.622	2 732 773.104
96	8	Drop Down Video	761 048.359	2 739 038.032
97	9	Drop Down Video	760 942.121	2 743 250.533
98	10	Drop Down Video	762 410.333	2 748 399.463
99	11	Drop Down Video	792 223.544	2 726 605.959
100	12	Drop Down Video	790 980.239	2 730 691.772
101	13	Drop Down Video	790 003.868	2 734 079.412
102	14	Drop Down Video	789 492.315	2 738 551.950
103	15	Drop Down Video	790 478.491	2 744 825.198
104	16	Drop Down Video	788 935.568	2 750 316.908
105	17	Drop Down Video	785 042.721	2 753 654.432
106	18	Drop Down Video	779 118.934	2 754 772.974
107	19	Drop Down Video	774 113.320	2 754 749.187
108	20	Drop Down Video	768 338.617	2 754 297.259

The locations of sampling points for Zakum reroute sampling locations are presented in Figure 4-4.

Figure 4-4 – Zakum Reroute Sampling Locations

4.3 Underwater Noise

Underwater noise measurements will be collected at 5 locations for route 1 in accordance with the Good Practice Guide No.133: Underwater Noise Measurement (Robinson, S.P.; Lepper, P. A.; Hazelwood, R.A. 2014). A 60-minute recording will be taken at each location provided in Table 4-5.

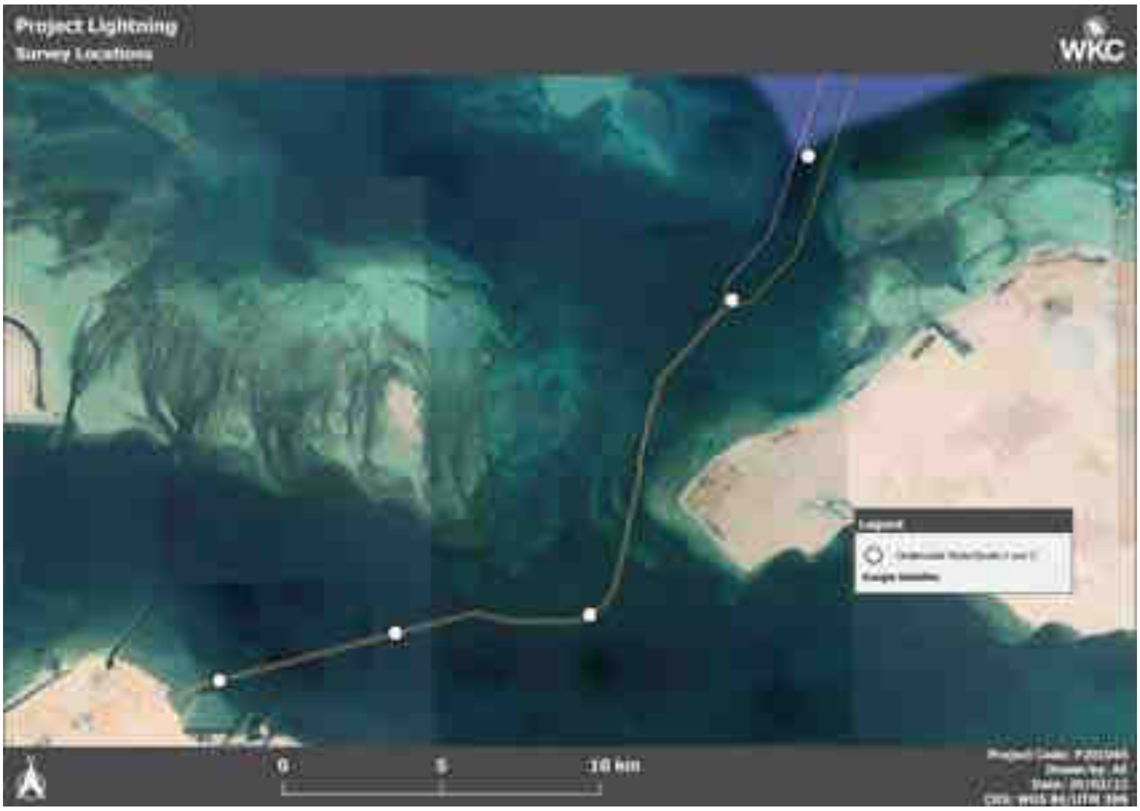
Table 4-5 – Locations for Underwater Noise Surveys

Sl. No.	Point Id	Point Description	UTM Grid Co-ordinates	
			Easting (m)	Northing (m)
59	1	Underwater Noise Route 1	751 881.128	2 669 200.926
60	2	Underwater Noise Route 1	757 438.714	2 670 697.219
61	3	Underwater Noise Route 1	763 575.992	2 671 277.389
62	4	Underwater Noise Route 1	768 058.924	2 681 204.404
63	5	Underwater Noise Route 1	770 473.528	2 685 762.220

The equipment was deployed on a mooring system with the hydrophone positioned around mid-depth for each location. Passive Acoustic Monitoring (PAM) was conducted to monitor for vocalising marine mammals. Observations of potential sources of noise was noted during each deployment. Data was analysed to provide information on the noise characteristics of each location as well as any biological sounds recorded.

The equipment used for the study will be a TR-Porpoise acoustic recorder fitted with a calibrated Geospectrum M36-900 hydrophone. The device was set up to record at a sampling rate of 96 KSPS and sensitivity of -154.4 dB re 1V/µPa. PAM was conducted using PAMGuard64 software, while the data was visualised into spectrograms on Raven Pro 1.6.1 and analysed in dBWav 1.3.4. Sampling locations for Route is presented in Figure 4-5.

Figure 4-5 – Underwater Noise Locations



5 Sampling Methodology

5.1 Marine Environmental Baseline Surveys

The marine environment surveys were conducted over a single seasonal visit by marine biologists / marine scientists within the project boundary only. Methodologies used to conduct the marine survey was taken and or adapted from the following survey standards:

- The Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden (PERSGA): Standard Survey Methods for Key Habitats and Key Species in the Red Sea and Gulf of Aden

- Australian Institute of Marine Science (AIMS): *Survey Manual for Tropical Marine Resources*

- Regional Organization for the Protection of the Marine Environment (ROPME): Manual of oceanographic observations and pollutant analyses methods (MOOPAM)

- Seagrass-watch: Manual for Mapping & Monitoring Seagrass Resources by Community (citizen) Volunteers (McKenzie et al 2003).

5.2 Water Quality

Water quality baseline conditions were measured both in-situ and ex-situ to assess both physical and chemical water quality parameters. Physical parameters (temperature, salinity, pH, etc.) were measured in-situ using a calibrated multi-parameter water quality probe. Chemical parameters (BOD, COD, metals etc.) were analysed ex-situ in an accredited testing laboratory. Measurements were taken throughout the water column using Aquaread 5000 probe or similar. The probe made measurements at 3 depths (1-m from surface, Mid water depth and +1 M from seabed) if overall depth is over 10 meters. If the water depth is less than 10 meters and more than 3 meters only two (2) depths along the water column will be taken (subsurface (-1.0m) and just above the seabed (+1.0m)) at each of the designated sampling sites. If the water column is less than 3 m at time of sampling, then only one sample was collected from mid-column.

In-situ water quality measurements were carried out using a multi-parameter probe (Aquaread AP-5000 or equivalent). The GPS location and depth of the sampling locations were recorded. The following physical water quality parameters were measured in situ:

- Dissolved oxygen (mg/l)

- pH

- Salinity
- Temperature (°C)
- Total Dissolved Solids (TDS)
- Turbidity (NTU)

Water quality samples for ex situ chemical analysis were collected at 3 depths (1-m from surface, Mid water depth and +1 M from seabed) if overall depth is over 10 meters. If the water depth is less than 10 meters and more than 3 meters only two (2) depths along the water column was taken (subsurface (-1.0m) and just above the seabed (+1.0m)) at each of the designated sampling location, using a horizontal Van Doorn sampler. Samples were transferred to clearly labelled sampling containers and stored in a cooler box with ice. Samples were sent to an accredited laboratory for analysis under strict chain of custody QA/QC procedures. Analysis was carried out for the parameters outlined in Table 5-1.

Table 5-1 – Ex-situ Water Quality Parameters

Total Hydrocarbon Content (THC)	Metals (aluminum, arsenic, barium, cadmium, chromium, copper, iron, lead, vanadium, mercury, and zinc)
BTEX	PAH
pH	Phenols

5.3 Sediment Quality

Sediment quality was undertaken by collection of sediment samples through use of a Van Veen grab and best practice (Manual of oceanographic observations and pollutant analyses methods - MOOPAM) sediment sampling procedures. Samples were transferred into clearly labelled sampling containers and stored in a cooler box with ice. Samples were analysed ex-situ in an EAD accredited testing laboratory.

Samples were collected for sediment quality analysis at the same locations as the water quality sampling locations. These samples will be sent to an EAD accredited laboratory for subsequent analysis of the parameters outlined in Table 5-2.

Table 5-2 – Ex-situ Sediment Quality Parameters

TOC	THC
PAH	BTEX
PCB	Metals (antimony, aluminum, arsenic, barium, cadmium, chromium, copper, iron, lead, molybdenum, manganese, mercury, nickel, silver, selenium, and zinc)
Oil and Grease	Silicon
Phosphorous	Total Cyanide
Total Nitrogen	Fluoride

Total Cyanide	Phosphate
Total Soluble Sulphate	PSA

5.3.1 Sample QA/ QC

Measurements were performed following all applicable standards in terms of equipment calibration before and after the measurements and trial data acquisition with all sensors in operation. The water quality probe(s) was calibrated at the start of the survey and at regular intervals thereafter in accordance with the manufacturer's instructions.

All marine surveys were conducted by personnel who are experienced in undertaking environmental marine measurements and surveys. All staff involved in the baseline survey was familiarised with a Standard Operating Procedure (SOP) for each individual component of the survey campaign. Each SOP contains the survey methodology, equipment requirements, and sample handling procedures.

A strict Chain of Custody (CoC) for each individual environmental media type was adhered to ensuring confidence in the sample integrity from capture to reporting of data analysis. Furthermore, water samples for ex-situ analysis were cold stored to retain sample integrity. The temperature of the samples was assessed on arrival at the appointed accredited laboratory to confirm sample viability. All analysis of environmental media (water and sediments) were undertaken using the most appropriate techniques available for these media types at the accredited laboratory employed.

5.4 Marine Ecology

The Marine surveys were conducted by qualified marine biologists/marine scientists at specific chosen locations within the impacted marine environment. The purpose of the surveys is to characterise and identify the marine ecology as described below:

- Benthic Habitat: Habitat description, current health status; distribution and abundance of each habitat and community type; and
- Marine Mammal and Reptiles: Encounters of either marine mammal (whale, dolphins and porpoises) and or marine reptiles (sea snakes, turtles) will be noted with species identified if possible.

5.4.1 Drop Down Video Drift and Towed Transects

Marine ecology surveys are critical to understanding the distribution and abundance of marine habitats and associated marine flora and fauna. WKC undertook the study using drop-down video camera (DDC) in areas along the proposed cable route. This methodology has been successfully employed on a number of projects and allows for greater coverage over a shorter timeframe throughout the project site. However, please note that such survey methodology only provides qualitative data, not quantitative.

Drop-down video surveys are non-diver lead and require use of a video camera operated from the survey vessel whilst towed transect videos are video capture along the proposed cable routes where the marine habitat, fauna and flora encountered can be documented. The drop-down camera be trolled along transect paths at low speed (0.5-1.5kts) between pre-selected GPS points.

The video footage captured were analysed real-time by marine biologists/ scientists and again on completion of the field surveys in a laboratory for more detailed analysis. The video/photograph shall be used to assess each component.

A DDV drift tow method was applied on areas of interest along and adjacent to the route. This method will deploy DDV for 5 minutes or for maximum 250 meters allowing current to dictate the movement of the camera underwater.

5.4.2 Photo Quadrat

To generate quantitative data from the marine benthic surveys, at each sampling location 5 photo quadrats were taken along the DDV transect routes (for both towed and drift transects). If sensitive habitats like corals or seagrass are observed in the DDV then a photo-quadrat sample were taken. On each location a steel frame 0.5m x 0.5m quadrat was lowered to on the seabed. A high-definition camera was attached to the frame and 5 representative photos taken for each transect. The benthic species composition was calculated as well as percentage covers. The report will document all species observed and record video/photographs of all species.

5.4.3 Benthic Infauna

Samples will be collected using a 0.025m^2 Van Veen grab. The samples were assessed for viability before sieving through a 500 µm stainless steel sieve and subsequent fixation with buffered formalin and Rose Bengal Stain. Infauna identification and enumeration were conducted by WKC, in-house, by an experienced marine biologist.

Statistical Analysis

For infauna assessment, diversity indices, such as number of species, abundance, species richness and Shannon-Wiener (log_e) diversity index, was applied. These indices consider the number of different species and the richness of each species to determine how each species contributes to the diversity within each sample.

5.4.4 Fish Survey

A desktop study on the current knowledge of fish species in the project area was conducted. Information is generally available regarding fisheries and species distribution and a dedicated fish survey will provide additional information of the fish species assemblage currently present at the time of the survey. Fish surveys were done through Baited Remote Underwater Video (BRUV) sample stations. This method provides a quantitative assessment to supplement the qualitative fish data from the DDV samples. The BRUV station is a simple set up of a square frame with a pole extending one meter from the camera to the bait. These stationary, seafloor camera stations record species attracted to the bait or swimming within camera shot. They are particularly suitable for observing fish although other marine life is sometimes observed. A baited BRUV were deployed at each monitoring site for a minimum of 1 hour.

5.4.5 Marine Mammals, Reptiles and Pelagic Birds

In addition to the video analysis, incidental observations of marine mammals, reptiles and pelagic birds were recorded throughout the duration of the marine ecology baseline survey from the survey vessel. On any sighting occurrence the GPS position and time of the sighting will be recorded along with an identification and or photograph of the animal, if possible, and description of behaviour.

5.5 **Underwater Noise**

The aim of the underwater survey was to determine a baseline of underwater noise in the project location including both natural and anthropogenic sounds (soundscape) and Passive Acoustic Monitoring for Marine Mammals. Underwater noise measurements were collected at 5 locations for both route 1 and 2. A 60-minute recording was taken at each location during daylight hours (06:00 to 17:00). The equipment was deployed using a mooring system with the hydrophone positioned around mid-depth for each location. Passive Acoustic Monitoring (PAM) was conducted to monitor for vocalising marine mammals. Observations of potential sources of noise was noted during each deployment. Data analysed to provide information on the noise characteristics of each location as well as any biological sounds recorded.

Equipment used for the study was a TR-Porpoise acoustic recorder fitted with a calibrated Geospectrum M36-900 hydrophone. The device was set to record at a sampling rate of 96 KSPS and sensitivity of -154.4 dB re 1V/µPa. PAM was conducted using PAMGuard64 software, while the data was visualised into spectrograms on Raven Pro 1.6.1 and analysed in dBWav 1.3.4.

6 Marine Baseline Survey Results

6.1 Route 1 (Mirfa) Landfall

The cable Route 1 starts from Mirfa, Abu Dhabi Western Region and ends at Al Ghallem Island inside Zakum Oilfield. The sampling sites are divided into two general area (Mirfa Landfall and the Zakum cluster). In between these general areas were sampled by Fugro surveys previously conducted. The sampling points for Route 1 (Mirfa) Landfall are presented in Figure 6-1.

6.1.1 Seawater Quality

6.1.1.1 In-situ Seawater quality

The in-situ water quality measurement results are provided in Table 6-1. Note that variation between sites was minimal across all parameters. Furthermore, all parameters are within the expected ranges and indicate high water quality. Parameters were qualified against the ADQCC and AWQO where applicable.

Figure 6-1 – Seawater Sampling Points for Route 1 (Mirfa) Landfall

Table 6-1 – In-Situ Water Quality in Route 1 (Mirfa) Landfall

Location	Temperature	Redox	pH	DO	Conductivity	TDS	Salinity	Turbidity	Depth	Water Clarity
Unit	**°C**	**mV**	**pH units**	**mg/L**	**µS/cm**	**g/L**	**ppt**	**NTU**	**m**	**m**
EAD AWQO	**±3** of background concentration	**-**	**6.5 – 8.5**	**>4**	**-**	**-**	**<5%** of background concentration	**10**		
R1-WSQ1 M	25.90	1.6	8.2	6.78	94.96	61.72	49.2	<0.1	-	-
R1-WSQ2 T	26.30	22.8	8.2	6.55	94.56	61.46	47.4	0.6	5.5	5.5
R1-WSQ2 B	25.90	36.2	8.2	6.62	94.46	61.40	48.3	2.4		
R1-WSQ3 T	26.40	34.3	8.2	6.50	93.79	60.96	48.3	0.3		
R1-WSQ3 M	25.90	45.7	8.2	6.60	94.74	61.58	48.3	1.2	12	4.5
R1-WSQ3 B	25.80	44.6	8.2	6.62	95.77	62.25	48.5	1.2		
R1-WSQ4 T	27.50	45.3	8.1	6.30	92.60	60.19	48.5	<0.1		
R1-WSQ4 M	25.90	39.6	8.3	6.63	94.43	61.37	48.4	0.3	9	6.75
R1-WSQ4 B	25.90	53.4	8.2	6.65	94.96	61.72	48.4	0.1		
R1-WSQ5 M	28.70	61.7	8.3	6.21	94.24	61.25	48.1	0.8	-	-
R1-WSQ6 M	28.20	125.6	8.2	6.22	93.89	61.03	48.3	0.7	-	-
R1-WSQ7 M	28.30	54.84	8.2	6.49	93.69	60.90	48.2	0.2	-	-
R1-WSQ8 M	28.20	68.15	8.2	6.25	94.07	61.15	48.4	<0.1	-	-
R1-WSQ9 M	28.00	37.14	8.2	6.45	93.67	60.89	48.2	0.9	-	-

The results of the in-situ water measurements are summarized below.

6.1.1.2 Ambient Marine Water Quality

Water quality included in-situ and ex-situ water quality samples. Sampling was conducted on 7th to 9th of April 2022 for Route 1(Mirfa) Landfall. Samples were sent to an accredited laboratory for analysis. The laboratory reports of the marine water ex-situ quality assessment are provided in Appendix A.

6.1.1.2.1 In-Situ Water Quality in Route 1 (Mirfa) Landfall

The in-situ water quality at Route 1 is summarised in Table 6-1. Results from the survey were qualified against the ADQCC. No parameters were in exceedance of the standards applied and results were within the expected range for the Arabian Gulf during the early summer season.

- Water temperature ranged from 25.80 °C at R1- WSQ3 B to 28.70 °C at R1- WSQ5 M with an average of 26.92 °C. Water temperatures were within the expected range for the Arabian Gulf during the early summer season. Differences in readings between locations and depths are attributed to the time of sampling since sampling commenced in the morning and was done subsequently throughout in the afternoon.

- All sampling stations had a positive redox ranging from 1.60 mV (R1- WSQ1 M) to 125.60 mV (R1-WSQ6 M). Redox potential above 100 mV implies an oxidised environment whilst reduced if below [3]. However, it should be noted that redox readings are relative and can be influenced by processes that involve oxygen and microorganisms.

- The pH levels had almost similar values ranging from 8.1 to 8.3 and within EAD AWQO's permissible range.

- DO concentrations of all sampling locations were compliant with the referenced standard (>5 mg/L) ranging from 6.21 mg/L (R1- WSQ5 M) to 6.78 mg/ (R1- WSQ1 M), with an average of 6.49 mg/L. Tidal flushing and good water exchange influenced the good DO concentrations in the project locations.

- Salinity ranged from 47.40 ppt (R1- WSQ2 T) to 49.20 ppt (R1-WSQ1 M). The related parameters such as conductivity and total dissolved solids (TDS) followed the same trend as salinity with little variation across sample locations. Conductivity ranged from 92.60 µS/cm (R1-WSQ4 T) to 95.77 µS/cm (R1-WSQ3 B) whilst TDS ranged from 60.19 g/L (R1- WSQ4 T) to 62.25 g/L (R1-WSQ3 B).

- Turbidity readings were very low ranging from <0.1 to 2.4 NTU, implying a high-water visibility.

- In shallow areas (R1-WSQ1 M, and R1-WSQ5 to R1-WSQ9 M), the water clarity was surface to bottom. In other locations, the clarity ranged from 4.5 m to 6.75 m. The water clarity across sampling locations were generally good.

6.1.1.3 Ex-Situ Water Quality

The recorded concentrations of ex-situ parameters were compared to the EAD AWQO [4] and ADQCC [5] where applicable. The survey site in Route 1 (Mirfa) Landfall is considered Marine Protected Use Area to which the standard was applied.

Ex-Situ Water Quality in Route 1 (Mirfa) Landfall

Ex-situ water quality results in Route 1 recorded exceedances in TOC, nitrate, total cyanide, and three metals (Cadmium, Copper, and Lead), as shown in Table 6-2. The summary of the results is discussed below:

- Among inorganic parameters, only TDS and total nitrogen had an active level whilst total cyanide had an exceedance.

- TDS was recorded in order of magnitude above MDL ranging from 49,600 mg/L (R1-WSQ2 T) to 52, 000 mg/L (R1-WSQ9 M), as compared to the MDL of 5 mg/L. This is expected because of high salinity levels in the Gulf.

- Active levels above MDL were recorded for total nitrogen, except in locations R1-WSQ3 T & B, R1-WSQ4 CNTR B (Control), and R1-WSQ5 M.

- Total cyanide was recorded in exceedance only at R1-WSQ1 M (0.020 mg/L), and active levels only at R1-WSQ2 T (0.002 mg/L) and R1-WSQ7 M (0.001 mg/L). Cyanide in the ocean is significantly atmospheric in source which could rapidly disintegrated in a few months or less. There is about less than 0.001 mg/L of cyanide in ocean water from atmospheric input [6].

- For anions, orthophosphate was below MDL whilst sulphate and chloride concentrations exceeded the MDL by order of magnitude. Sulphate ranged from 3,100 mg/L to 3,190 mg/L whilst chloride ranged from 25,500 mg/L to 26,200 mg/L. Sulphate concentration in the Arabian Gulf seawater has been reported between 3,200 mg/L and 3,271 mg/L whilst chloride is between 21,933 mg/L to 22, 014 mg/L [7].

- Exceedance in nitrate was recorded only in R1-WSQ4 CNTR T with 5.75 mg/L, against the EAD AQWO standard of 0.095 mg/L. Also, active concentrations were recorded in R1-WSQ3 T, R1-WSQ7 M, R1-WSQ8 M, and R1-WSQ9 M. The rest of the samples were below MDL. The exceedance of nitrate in only one sample could be attributed to contamination of blue-green algae in sample. In addition, nitrate concentration is generally higher in the surface layer because of nitrification. Summer season is likely to have lower nitrate concentration due to uptake of phytoplankton.

- COD and BOD were below MDL. TOC was similar across the project locations ranging from 1.5 mg/L to 1.7 mg/L, except only for the location at R1-WSQ4 CNTR T with 18.0 mg/L, which exceeded the EAD AWQO standard of 2.5 mg/L.

- Exceedances were recorded in three (3) of the metal parameters against ADQCC: Cadmium (Cd) exceeded in R1-WSQ1 M, R1-WSQ4 CNTR B, R1-WSQ5 M, R1-WSQ6 M, and R1-WSQ7 M; Copper (Cu) exceeded in R1-WSQ1 M, R1-WSQ3 T, and R1-WSQ5 M; and Lead (Pb) exceeded in R1-WSQ1 M, R1-WSQ2 B, R1-WSQ3 M, R1-WSQ8 M, and R1-WSQ9 M. Active metal levels above MDL were recorded for Arsenic (As), Barium (Ba), Vanadium (V), Zinc (Zn), and Chromium (Cr). Generally, the sources of metals in the Arabian Gulf are atmospheric inputs due to its unique geologic environmental setting.

- Petroleum hydrocarbons, BTEX, PAHs and phenols were detected below MDL for all sampling locations.

- Total coliform, a microbiological measure, was undetectable at all test locations.

Table 6-2 – Ex-Situ Water Quality in Route 1 (Mirfa) Landfall

Parameters	Units	MDL	ADQ CC	EAD AWQ O	R1-WSQ1	R1-WSQ2		R1-WSQ3			R1-WSQ5	R1-WSQ6	R1-WSQ7	R1-WSQ8	R1-WSQ9	R1-WSQ4 CNTR		
					M	T	B	T	M	B	M	M	M	M	M	T	M	B
Inorganic Parameters																		
Total Suspended Solids	mg/L	5		<33	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Total Dissolved Solids	mg/L	5			51400	49600	50800	50400	51200	51200	50700	50400	50900	51000	52000	50900	50700	50900
Dissolved & Emulsified Oil	mg/L	10			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Free Oil	% vol./vol.	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ammonia	mg/L	0.06			<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
Nitrogen (Ammonia)	mg/L	0.05			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ammonium	mg/L	0.064			<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064
Sulphide	mg/L	0.004		0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Total Nitrogen	mg/L	0.5			0.5	0.5	0.6	<0.5	0.5	<0.5	<0.5	0.5	0.5	0.5	0.5	1.4	0.5	<0.5
Total Cyanide	mg/L	0.001		**0.004**	0.020	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Anions																		
Nitrate	mg/L	0.04		0.095	<0.04	<0.04	<0.04	0.04	<0.04	<0.04	<0.04	<0.04	0.09	0.09	0.84	5.75	<0.04	<0.04
Orthophosphate	mg/L	0.06			<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
Sulphate	mg/L	5			3190	3100	3140	3150	3160	3160	3150	3170	3170	3160	3160	3150	3170	3170

Parameters	Units	MDL	ADQCC	EAD AWQO	R1-WSQ1	R1-WSQ2		R1-WSQ3			R1-WSQ5	R1-WSQ6	R1-WSQ7	R1-WSQ8	R1-WSQ9	R1-WSQ4 CNTR		
					M	T	B	T	M	B	M	M	M	M	M	T	M	B
Chloride	mg/L	2			26200	25500	26200	25900	25900	26200	25900	25900	25900	25900	26200	25900	25900	25900
Chemical Analysis																		
Chemical Oxygen Demand	mg/L	5			<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Total Organic Carbon	mg/L	1.0		2.5	1.7	1.7	1.6	1.5	1.6	1.6	1.7	1.6	1.5	1.6	1.6	18.0	1.6	1.5
Biochemical Oxygen Demand	mg/L	2		5	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Metals																		
Aluminum (Al)	mg/L	0.005	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Arsenic (As)	mg/L	0.0005	-	**0.005**	0.0033	0.0034	0.0034	0.0039	0.0039	0.0032	0.0029	0.0032	0.0045	0.0039	0.0040	0.0032	0.0037	0.0027
Barium (Ba)	mg/L	0.0005	-	-	0.0099	0.0090	0.0116	0.0091	0.0123	0.0095	0.0109	0.0134	0.0099	0.0101	0.0149	0.0074	0.0079	0.0106
Cadmium (Cd)	mg/L	0.0001	**0.0003**	0.001	0.0003	<0.0001	0.0001	<0.0001	0.0001	<0.0001	0.0003	0.0012	0.0013	0.0002	0.0001	0.0001	<0.0001	0.0004
Copper (Cu)	mg/L	0.0003	**0.003**	0.01	0.0037	0.0014	0.0024	0.0040	0.0022	0.0012	0.0073	0.0022	<0.0003	<0.0003	<0.0003	0.0017	0.0027	0.0004
Iron (Fe)	mg/L	0.02	-	**0.3**	<0.02	<0.02	0.06	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Lead (Pb)	mg/L	0.0002	**0.0022**	0.01	0.0022	0.0013	0.0036	0.0010	0.0045	0.0013	0.0003	0.0019	0.0016	0.0027	0.0033	0.0010	0.0014	0.0009

Parameters	Units	MDL	ADQCC	EAD AWQO	R1-WSQ1	R1-WSQ2		R1-WSQ3			R1-WSQ5	R1-WSQ6	R1-WSQ7	R1-WSQ8	R1-WSQ9	R1-WSQ4 CNTR		
					M	T	B	T	M	B	M	M	M	M	M	T	M	B
Mercury (Hg)	mg/L	0.0001	**0.0001**	0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Phosphorus (P)	mg/L	0.03	-	0.001	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Silver (Ag)	mg/L	0.0005	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Vanadium (V)	mg/L	0.0001	-	**0.0094**	0.0042	0.0037	0.0032	0.0034	0.0033	0.0034	0.0031	0.0037	0.0037	0.0036	00.41	0.0029	0.0033	0.0032
Zinc (Zn)	mg/L	0.002	**0.015**	0.1	0.003	0.008	0.003	<0.002	<0.002	<0.002	<0.002	0.002	<0.002	<0.002	<0.002	0.002	<0.002	<0.002
Silicon as SiO2	mg/L	2.8		-	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8
Chromium (Cr)	µg/L	0.3		10	0.9	<0.3	0.6	0.4	0.8	0.5	0.4	0.5	0.4	1.3	0.7	<0.3	0.5	0.8
BTEX																		
Benzene	µg/L	7			<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
Ethyl benzene	µg/L	7			<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
m&p-Xylene	µg/L	14			<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14
o-Xylene	µg/L	7			<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
Toluene	µg/L	7			<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
Hydrocarbons																		
EPH C10-C40	µg/L	7	**7**	-	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
VPH C5-C10	µg/L	7	**7**	-	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7

Parameters	Units	MDL	ADQCC	EAD AWQO	R1-WSQ1	R1-WSQ2		R1-WSQ3			R1-WSQ5	R1-WSQ6	R1-WSQ7	R1-WSQ8	R1-WSQ9	R1-WSQ4 CNTR		
					M	T	B	T	M	B	M	M	M	M	M	T	M	B
PAHs																		
Acenaphthene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Acenaphthylene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Anthracene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(b)fluoranthene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(g,h,i)perylene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(k)fluoranthene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chrysene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dibenzo(a,h)anthracene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluoranthene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluorene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-c,d)pyrene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Naphthalene	µg/L	0.02			<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Phenanthrene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Parameters	Units	MDL	ADQCC	EAD AWQO	R1-WSQ1	R1-WSQ2		R1-WSQ3			R1-WSQ5	R1-WSQ6	R1-WSQ7	R1-WSQ8	R1-WSQ9	R1-WSQ4 CNTR		
					M	T	B	T	M	B	M	M	M	M	M	T	M	B
Phenols																		
2,4,5-Trichlorophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,4,6-Trichlorophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,4-Dichlorophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,4-Dimethylphenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Chlorophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Methylphenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Nitrophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4-Chloro-3-methylphenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4-Methylphenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4-Nitrophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Pentachlorophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,3,4,6-Tetrachlorophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,3,5,6-Tetrachlorophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,6-Dichlorophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
3-Methylphenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Parameters	Units	MDL	ADQCC	EAD AWQO	R1-WSQ1	R1-WSQ2		R1-WSQ3			R1-WSQ5	R1-WSQ6	R1-WSQ7	R1-WSQ8	R1-WSQ9	R1-WSQ4 CNTR		
					M	T	B	T	M	B	M	M	M	M	M	T	M	B
Phenol	µg/L	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Microbiology																		
Total Coliform	CFU/100mL	10		70	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Note: Red values represent exceedance of the standard; Blue values represent above MDL; CNTR means control location; **ND** means not detected; **T** means top water layer, **B** for bottom and **M** for mid-water. The ADQCC values shown are allowable concentrations for Marine Protected Use Areas.

6.1.2 Sediment Quality

Sediment samples were collected on 7th to 9th of April for Route 1- (Mirfa) Landfall. Samples were sent to an accredited laboratory for analysis. The Sediment quality analysis results are in Table 6-3 and laboratory reports of the marine sediment ex-situ quality assessment are provided in Appendix A. The survey sites in Route 1 (Mirfa) Landfall and MMBR (MPA Transition Zone) are considered to constitute a Marine Protected Use Area.

The results obtained from the laboratory sediment analysis are presented in Table 6-3 and have been compared to the standards provided by the Abu Dhabi Quality and Conformity Council (ADQCC) [5]. Exceedances to the referenced standard were found in three (3) metals.

- pH ranged from 8.7 (R1-WSQ1 and R1 WSQ2) to 9.2 (R1-WSQ5 and R1-WSQ6).

- Oil and grease was detected below MDL across sampling locations.

- High levels of total nitrogen (TN) were detected in the sediments ranging from 194 mg/kg (R1-WSQ3) to 922 mg/kg (R1-WSQ2). These values were in order of magnitude above the MDL of 5 mg/kg. However, there is no referenced standard for TN.

- Active levels of silica concentration were detected in all locations with lowest value at R1-WSQ1 with 6.95 % by wt. whilst highest value at R1-WSQ5 with 28.2 % by wt. Orthophosphate was found to be below MDL, while fluoride and sulphate had active levels. Fluoride ranged from 1.1 mg/kg (R1-WSQ6) to 2.5 mg/kg (R1-WSQ4) whilst sulphate ranged from 0.40 %SO4 (R1-WSQ3) to 0.94 %SO4 (R1-WSQ2).

- Three (3) out of eighteen (18) trace metals analysed were recorded in exceedance of the ADQCC standards. Arsenic (As) exceeded only in R1-WSQ2 whilst the remaining locations had an active level; Chromium (Cr) and Nickel both exceeded in four locations (R1-WSQ1, R1-WSQ2, R1-WSQ3, and R1-WSQ4 CNTR)

  Cadmium (Ca), Selenium (Se), and Silver (Ag) were below their MDLs in all sampling locations. Molybdenum was detected only in R1-WSQ2 and Antimony (Sb) in R1-WSQ1, R1-WSQ2, R1-WSQ5, and R1-WSQ6. Aluminium (Al), Barium (Ba), Iron (Fe), Lead (Pb), Manganese (Mn), Phosphorus (P), Vanadium (V), and Mercury (Hg) all had active levels above MDL but below referenced standards for parameters where standards are provided. Al and Fe exceeded their MDL by order of magnitude.

- There were no hydrocarbons, PAHs, or PCBs found in any of the samples. The laboratory analysis, on the other hand, can only test to a certain degree of quantification. As a result, several of the parameters measured may exist in trace levels. The presence of these organic compounds in sediments is understood to indicate contamination from petroleum products and heavy industrial pollutants.

Table 6-3 – Sediment Quality in Route 1 (Mirfa) Landfall

Parameters	Unit	MDL	ADQCC	R1-WSQ1	R1-WSQ2	R1-WSQ3	R1-WSQ4 CNTR	R1-WSQ5	R1-WSQ6
Inorganic Parameters									
pH	pH units	0.1		8.7	8.7	9.0	8.9	9.2	9.2
Oil and Grease	%	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Nitrogen	mg/kg	5		880	922	194	869	419	373
Silica-SiO2	% by wt	0.01		6.95	11.1	18.1	13.1	28.2	13.6
Total Cyanide	mg/kg	0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Anions									
Orthophosphate	mg/kg	0.3		<0.3	0.5	<0.3	<0.3	<0.3	<0.3
Fluoride	mg/kg	0.5		1.8	2.3	2.2	2.5	1.4	1.1
Sulphate (Acid Soluble)	%SO4	0.01		0.69	0.94	0.40	0.64	0.48	0.48
Chemical Analysis									
Total Organic Carbon	%	0.1		1.4	2.1	0.4	1.4	0.3	0.3
Metals									
Cadmium (Cd)	mg/kg	0.5	0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Aluminum (Al)	mg/kg	130	-	3040	5170	5720	4080	1650	1200
Arsenic (As)	mg/kg	1.0	7	6.7	8.3	5.5	6.6	4.0	4.2
Barium (Ba)	mg/kg	3.0	-	16.1	24.2	11.8	17.2	11.9	11.6
Chromium (Cr)	mg/kg	1.0	11	11.7	20.1	24.1	15.8	7.6	6.2
Copper (Cu)	mg/kg	3.0	20	4.8	8.3	4.6	5.7	<3.0	<3.0
Iron (Fe)	mg/kg	70	-	2960	4980	5520	3870	1600	1170
Lead (Pb)	mg/kg	1.0	5	2.1	2.5	2.0	1.7	1.3	1.3
Manganese (Mn)	mg/kg	3.0	-	72.9	112	154	110	55.3	43.7
Molybdenum (Mo)	mg/kg	3.0	-	<3.0	3.1	<3.0	<3.0	<3.0	<3.0
Nickel (Ni)	mg/kg	1.0	7	11.2	18.4	16.9	15.2	4.9	3.6
Phosphorus (P)	mg/kg	50	-	236	267	223	268	110	112
Selenium (Se)	mg/kg	3.0	-	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

Parameters	Unit	MDL	ADQCC	R1-WSQ1	R1-WSQ2	R1-WSQ3	R1-WSQ4 CNTR	R1-WSQ5	R1-WSQ6
Silver (Ag)	mg/kg	10	-	<10	<10	<10	<10	<10	<10
Vanadium (V)	mg/kg	1.0	-	13.8	20.3	21.6	15.7	8.1	7.4
Zinc (Zn)	mg/kg	3.0	70	8.2	13.8	12.2	10.7	3.6	<3.0
Antimony (Sb)	mg/kg	1.0	-	1.1	1.5	<1.0	<1.0	1.1	1.7
Mercury (Hg)	mg/kg	0.010	0.2	0.021	0.018	0.013	0.018	0.011	0.011
Hydrocarbons									
VPH C5-C10	mg/kg	0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
EPH C10-C40	mg/kg	50		<50	<50	<50	<50	<50	<50
PAHs			Total PAHs=1.7						
Acenaphthene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Acenaphthylene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Anthracene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(b)fluoranthene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(g,h,i)perylene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(k)fluoranthene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chrysene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dibenzo(a,h)anthracene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluoranthene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluorene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-c,d)pyrene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Naphthalene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phenanthrene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCBs									

Parameters	Unit	MDL	ADQCC	R1-WSQ1	R1-WSQ2	R1-WSQ3	R1-WSQ4 CNTR	R1-WSQ5	R1-WSQ6
2,2`,3,3`,4,4` - Hexachlorobiphenyl (PCB 128)	mg/kg	0.01	Total PCBs=0.22	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,2`,3,3`,4,4`,5 - Heptachlorobiphenyl (PCB 170)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,2`,3,3`,4,4`,5,5`,6,6` - Decachlorobiphenyl	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,2`,3,3`,4,4`,5,5`,6-Nonachlorobiphenyl (PCB 206)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,2`,3,3`,4,4`,5,6 - Octachlorobiphenyl (PCB 195)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,2`,3,4`,5,5',6 - Heptachlorobiphenyl (PCB 187)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,2`,3,4,4`,5` - Hexachlorobiphenyl (PCB 138)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,2`,3,4,4`,5,5` - Heptachlorobiphenyl (PCB 180)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,2`,3,5` - Tetrachlorobiphenyl (PCB 44)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,2`,4,4`,5,5` - Hexachlorobiphenyl (PCB 153)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,2`,4,5,5` - Pentachlorobiphenyl (PCB 101)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,2`,5,5` - Tetrachlorobiphenyl (PCB 52)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,2`,5 - Trichlorobiphenyl (PCB 18)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
3,3`,4,4` - Tetrachlorobiphenyl (PCB 77)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Parameters	Unit	MDL	ADQCC	R1-WSQ1	R1-WSQ2	R1-WSQ3	R1-WSQ4 CNTR	R1-WSQ5	R1-WSQ6
3,3`,4,4`,5 - Pentachlorobiphenyl (PCB 126)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,3`,4,4` - Tetrachlorobiphenyl (PCB 66)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,3`,4,4`,5 - Pentachlorobiphenyl (PCB 118)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,3,3`,4,4` - Pentachlorobiphenyl (PCB 105)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,4` - Dichlorobiphenyl (PCB 8)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,4,4` - Trichlorobiphenyl (PCB 28)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Note: Red values represent exceedance of the standard; Blue values represent above MDL. **CNTR** means control location. The ADQCC values shown are allowable concentrations for Marine Protected Use Areas

6.2 Marine Ecology

6.2.1 Benthic Habitat

The marine habitats identified across the study area were classified using the Environment Agency Abu Dhabi (EAD) Habitat Classification [8] and Marine Ecological Classification Standard (CMREC) Scheme. Based on the results of the marine ecology surveys, four (4) core habitats are present in the survey area and as follows:

- Unconsolidated Bottom: 14000
- Dredged Seabed: 16100
- Seagrass Bed: 12000
- Macroalgae communities: 13010

The DDV survey locations are presented in Figure 6-2. The distribution of different habitats survey area is shown in Figure 6-3 whilst examples of the benthic habitat found during marine ecology surveys using DDVD method are presented in Figure 6-4. In addition, the description of each habitat type including associated flora and fauna is discussed in the sections below.

Figure 6-2 – DDV Survey sites at Route 1 (Mirfa) Landfall

Figure 6-3 – Habitat Map of Route 1 (Mirfa) Landfall

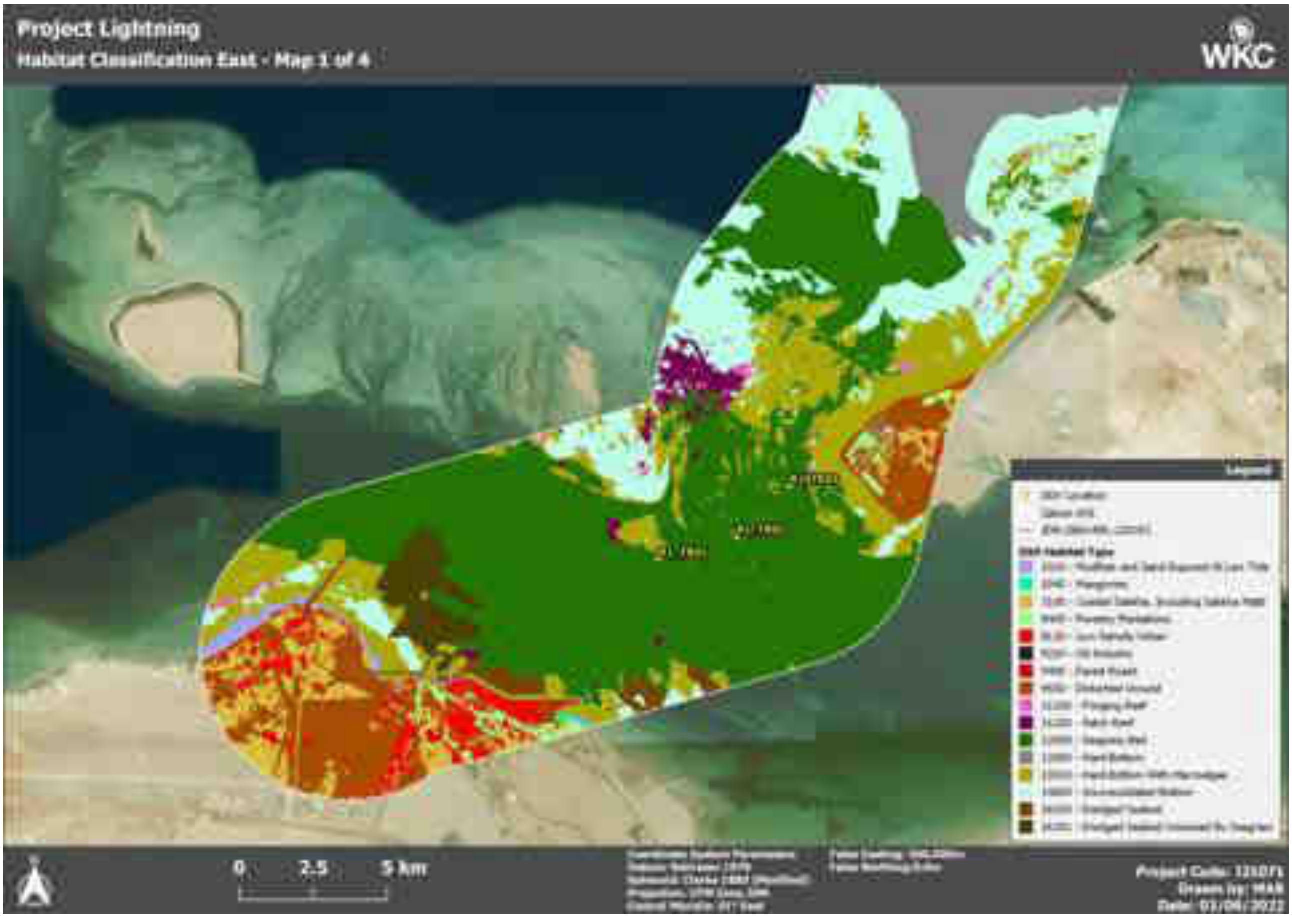


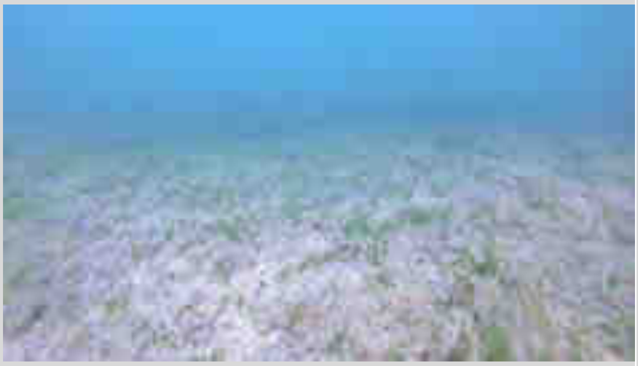
Figure 6-4 – Benthic Habitat at Route 1 (Mirfa) Landfall (DDV Drift)

DDV 1


DDV2




DDV3



DDV4

DDV5




DDV6



DDV7




The deployment of the photo quadrat revealed that most the area is covered by a healthy seagrass meadow with macro algal intermix in some location and fringing dead reef recorded hardbottom in this method application. There are patches of sand documented in between the seagrasses and the fringing reef.

Table 6-4 – Benthic Habitat at Route 1 (Mirfa) Landfall (Photo Quadrat)

Photo Quadrat Number	Seagrass (%)	Sand (%)	Hardbottom (%)	Rubbles and Shells (%)	Macro Algae (%)	Total (%)
PQ1	100	0	0	0	0	100

PQ2	100	0	0	0	0	100
PQ3	100	0	0	0	0	100
PQ4	93.7	0	0	0	6.3	100
PQ5	100	0	0	0	0	100
PQ6	100	0	0	0	0	100
PQ7	0	100	0	0	0	100

Figure 6-5 – Benthic Habitat at Route 1 (Mirfa) Landfall (Towed Transect)

6.2.1.1 Unconsolidated Bottom

The unconsolidated bottom habitat at nearshore shallow areas is characterized by fine sand to sandy sediments. In areas where isolated hard substrate is available it was noted that growth of macro algae (*Sargassum* sp.) and fouling epiphytic organisms was present (Figure 6-6). These open areas of sand are sometimes defined and not heavily colonised by seagrass or algae largely due wave movement that is demonstrated by ripple patterns in the sand.

These areas contain a lower abundance of marine life as fish and invertebrates prefer the more productive and sheltered environment provided by nearby seagrass and macroalgae beds. There are no subsea exposed hardbottom substrate or corals in the area surveyed. However, pelagic fishes and large vertebrates such as turtles and rays may be seen in these habitats as they range between foraging locations.

Figure 6-6 – Unconsolidated Bottom (Sandy)

6.2.1.2 Dredged Seabed

A dredged channel is located at the end of the towed transect, extending to a wider area with impressions assumed to be a borrow rather than a planned navigational channel. The extend of this dredged bed is shown in the habitat map generated for this report. The seabed is colonised by seagrasses mixed with macro algae and the substrate was made from fine silt to mud. The dredge seabed since it is deeper than the surrounding areas functioned as a fine sediment trap and accumulated as mud/silt. This could provide distinct opportunity for biased marine communities to colonise and use such as infaunal species and algae.

6.2.1.3 Seagrass Bed

Seagrasses are well represented throughout the survey Site. Areas range from dense seagrass meadows to sparse seagrass patches, see Figure 6-7. The three (3) species identified were *Halophila stipulacea*, *Halophila ovalis and Halodule uninervis*. These species are adept at colonising areas of unconsolidated bottom due to fast propagation rates and tolerance to varying environmental conditions.

The seagrass bed is dense, healthy, and wide. During the survey, grazing marks of dugong were seen and evidence that the area is used by this important endangered species as a foraging ground. Sea turtles on this area was also found to be in a population of high density indicating that seagrass in this area is an important support to the ecology of endangered species.

Figure 6-7 – Seagrass Bed, *Halodule uninervis*

Given favourable conditions, sparse seagrass can quickly develop into established seagrass beds. Seagrasses are considered ecosystem engineers, due to their ability to modify the existing unconsolidated bottom into a distinct habitat.

Sand sediments within seagrass beds support a greater diversity and abundance of benthic fauna than open sand substrates [9]. Many commercially important species such as fish, shrimps, and oysters also utilise seagrass beds as nursery and foraging grounds.

As seagrass expands, it creates an environment that is more productive and more habitable thus encouraging more diverse marine life. Seagrasses also provide a variety of ecosystem functions. The rhizome and root system of a seagrass bed stabilises loose sediment and organic materials. This leads to improved water clarity and reduced erosion. Seagrasses are highly productive photosynthetic plants and as such, they contribute significant amounts of oxygen that become available for consumption by other marine life.

Seagrasses are also a significant source of blue carbon, which has become increasingly prevalent in discussions on climate change mitigation. Through the process of photosynthesis, seagrasses sequester large amounts of atmospheric carbon dioxide that is ultimately stored in the sediment. Due to their wide distribution, seagrasses are the largest source of blue carbon storage in the UAE [10]. Seagrass beds are considered more valuable as they encourage a greater diversity of marine organisms and provide more beneficial ecosystem services.

6.2.1.4 Macroalgae Communities

A significant macroalgae communities was observed in several areas within the survey site, comprising of a mono species bed or mixed with of unconsolidated bottom structures and seagrass beds. An example of macroalgae meadow at the survey area is presented in Figure 6-8. This macroalgae community covers a wide area and contains many large macroalgae plants including a variety of species are present mainly from the groups Chlorophyta (green algae) and Phaeophycean (brown algae).

Macroalgae are more tolerant of pollutants and compete with seagrass for space and resources. Macroalgae meadow play a similar ecological role to seagrasses in that they provide shelter and foraging opportunities for marine creatures. However, unlike seagrasses, macroalgae are less effective at stabilising sediments and storing carbon [11].

Figure 6-8 – *Sargassum* sp.

6.2.1.5 Dredged Wall

In general, marine benthic formations are created after dredging activities. Formation of habitat typical commenced at the walls of the dredging footprint. The wall can be vertical or rapidly inclining in orientation. As water current move along these structures, scouring may happen creating crevices and crannies as well as exposing hard substrates. These hard structures undergo benthic community succession and could develop into a diverse habitat with sponges, corals, algae, bivalves etc.

Oftentimes along this dredge wall is a diverse aggregation of reef associated fish species. An ecologically developed dredge wall can be a proxy to a coral reef since a rich biomimicry substrate formation can be achieved.

6.2.2 Benthic Community (Flora and Fauna)

Table 6-5 provides a summary of the habitats investigated through DDV. The various benthic flora and fauna species as well as the natural benthic substrate observed through the survey methods are also included in the table below. No other major benthic community found except for seagrass and its allied species such as sponges and algae.

Table 6-5 – DDV Benthic Habitat Observations in Route 1 (Mirfa) Landfall

Location	Seagrass	Macro - algae	Description
DDV 1	X	X	Rich seagrass meadow
DDV 2	X		Rich Seagrass meadow
DDV 3	X	X	Rich Seagrass meadow
DDV 4	X		Rich Seagrass meadow
DDV 5	X		Rich Seagrass meadow
DDV 6	X	X	Rich Seagrass meadow
DDV 7	X		Rich Seagrass meadow

6.2.2.1 Seagrass

Three (3) species of seagrass were identified in the Project Site, *Halophila stipulacea*, *Halophila ovalis* and *Halodule uninervis* whilst both species were widely distributed, *H. uninervis* appears to be the dominant species. These seagrasses are three species that are known to thrive in Arabian Gulf, largely due to the high salinity and high temperatures experienced [12]. An example of seagrass meadow in the study area is presented in Figure 6-9.

Seagrass distribution is limited by sediment type, wave action, and light availability. *H. ovalis* and *H. uninervis* prefer soft sediments including sand and mud. The root system spreads throughout the sediment to anchor above ground shoots and leaves of the plant. As such, seagrasses prefer sheltered environments and cannot tolerate high wave energy. Light availability is influenced by depth and water clarity and is required by seagrass for photosynthesis. While these species are considered relatively hardy, they are sensitive to pollution and physical disturbances. Therefore, the presence of seagrass indicated stable marine conditions and high environmental quality [13].

Figure 6-9 – Seagrass Meadow with Filamentous Algae

H. stipulacea, H. ovalis and *H. uninervis* are widely distributed in tropical areas and are listed as Least Concern by the IUCN Red List. *H. ovalis* is characterised by a round leaf shape and is commonly known as spoon grass or paddle weed. *H. uninervis* is characterised by long, thin leaf blades like many terrestrial grasses. Both species are primary food sources for dugong and sea turtles [14].

6.2.2.2 Invertebrates

Various invertebrate species were observed in the rock wall area including sea urchins, gastropods, bivalves, sponges, and tunicates. In addition, burrows in seagrass beds provide evidence of invertebrate habitation, however, species identification was not possible in these areas. A summary of macro invertebrates observed is in the study area is provided in Table 6-6.

Table 6-6 – List of Invertebrates Found in the Study Area

Common Name	Scientific Name
Collectors Sea Urchin	*Tripneustes* sp.
Long Spined Sea Urchin	*Diadema setosum*
Sponge	Demospongiae
Tunicate	*Phallusia nigra*
Gastropods	Cerithriidae sp.
Pearl Oyster	*Pinctada radiata*

6.2.2.2.1 Sponges

Sponges are the simplest multi-cellular organism in the animal kingdom. Despite their simplicity, they are very diverse in size, structure, and colour. Sponges can be found in all marine environments with many species associated with coral reefs. Their primary functional role is in nutrient cycling, particularly silicon and nitrogen. They also act as sediment stabilisers and aid in reef creation through substrate consolidation [15]. Small marine organisms including juvenile fish and invertebrates benefit from the microhabitat provided by sponge aggregations. Small organisms are known to live inside and around sponges, utilising them for protection and as a food source.

6.2.2.2.2 Bivalves

The dominant bivalves found in Mirfa belongs to the Family Spondyllidae, these organisms attached to hard substrate and would heavily colonized and area forming a mat or bed. They are filter feeders, collecting food from seawater. These bivalves are primary feeders, filtering in organic materials and prefer to grow in areas with strong currents aiding in their feeding. This invertebrate is important in role as nutrient regulators and benthic structure engineering.

Other bivalves are borrowing and solitary individuals living among seagrasses and coral reef areas. An example is the pearl oyster (*Pinctada* sp.) which was noted to be present in the survey area.

6.2.3 Fish

A fish study was undertaken using Baited Remote Underwater Video (BRUVs) at locations shown in Figure 6-10. Most species identified were nearshore demersal seagrass-associated fishes and a Green turtle (*Chelonia mydas*).

Figure 6-10 – BRUV Locations at Route 1 (Mirfa) Landfall

Based on the results of sampling using BRUVs, DDVs and incidental recordings by marine biologists from on-board the vessels, fish species recorded on site included Honeycomb Whipray, Small-scaled terapon, and King mackerel. Table 6-7 and Figure 6-11 provide sample captured still footages of marine species at survey location BRUV 1 and BRUV 2 at Route 1, respectively. Among the fish species recorded, only the Honeycomb whipray (*Himantura undulata*) is listed as Endangered by the IUCN in their most recent global assessment [16].

Honeycomb whipray (*Himantura undulata*)[1] is a cartilaginous fish widespread in the Indo-Pacific in the Eastern and Western Indian and Western Central Pacific Oceans from South Africa to the Philippines [11]. During the survey, these rays were documented on two occasions with BRUV. These fishes are ovoviviparous and gives birth to a few live young pups. The ray can be identified with dark dorsal coloration with patterned white spots and with a plain white on the ventral side. Small fish, bivalves, and crustaceans are the common prey for this demersal feeder. They are predated upon by several shark species such as hammerhead, white tip, bull shark etc. This species is listed as "Endangered" by the IUCN [16] and are protected in the Great

Barrier Reef where efforts to conserve the species includes breeding in captivity. This species is currently not assessed locally and nationally in the UAE although it has been assessed as part of the regional assessment for the Arabian Sea and adjacent waters spearheaded by the EAD [17]. Based on this assessment, this species experiences significant declines in the eastern part of the region due to the intense and increasing fishing pressure but only limited mortality is recorded in the western part (for example the Gulf) where it also remains common. Based on the above, the species is assessed as a "Vulnerable" species [17].

BRUV recorded low number of fish and species at the time of the survey. This type of habitat normally provides shelter and foraging opportunities (seagrass) for fish that are generally herbivore. As such, it is assumed that the fish in the area could be attracted by the BRUV bait which is Sardine fish. As a result, survey have lower fish abundance and diversity. The summary of the fish observed through BRUVs are provided in Table 6-7.

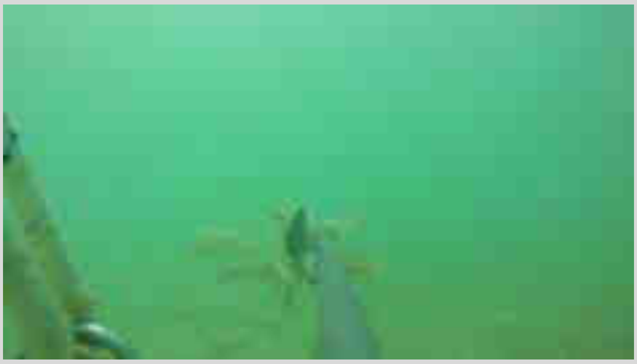
Table 6-7 – List of Fish Species Observed in Route 1 (Mirfa) Landfall

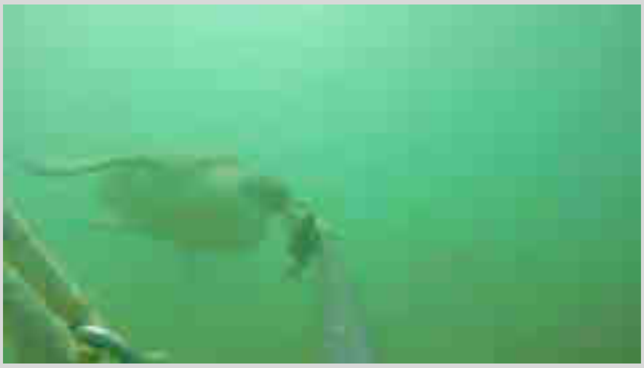
Common Name	Scientific Name	BRUV 1	BRUV 2
Small-Scaled Terapon	*Terapon puta*	X	X
King Mackerel	*Scomberomorus cavalla*		X
Honeycomb Whipray	*Himantura undulata*	X	

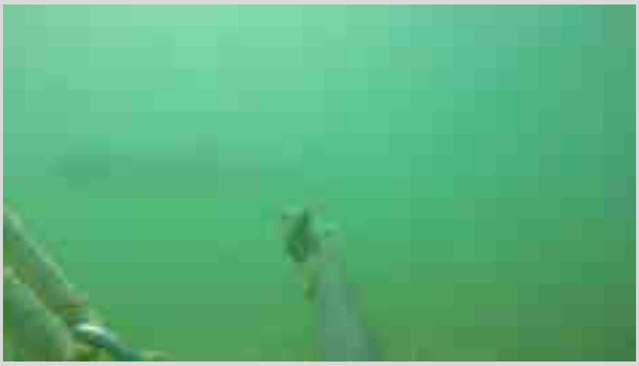
Figure 6-11 – Fish and Turtle Recorded by BRUV 1 and 2 at Route 1- (Mirfa) Landfall

BRUV 1

BRUV 2



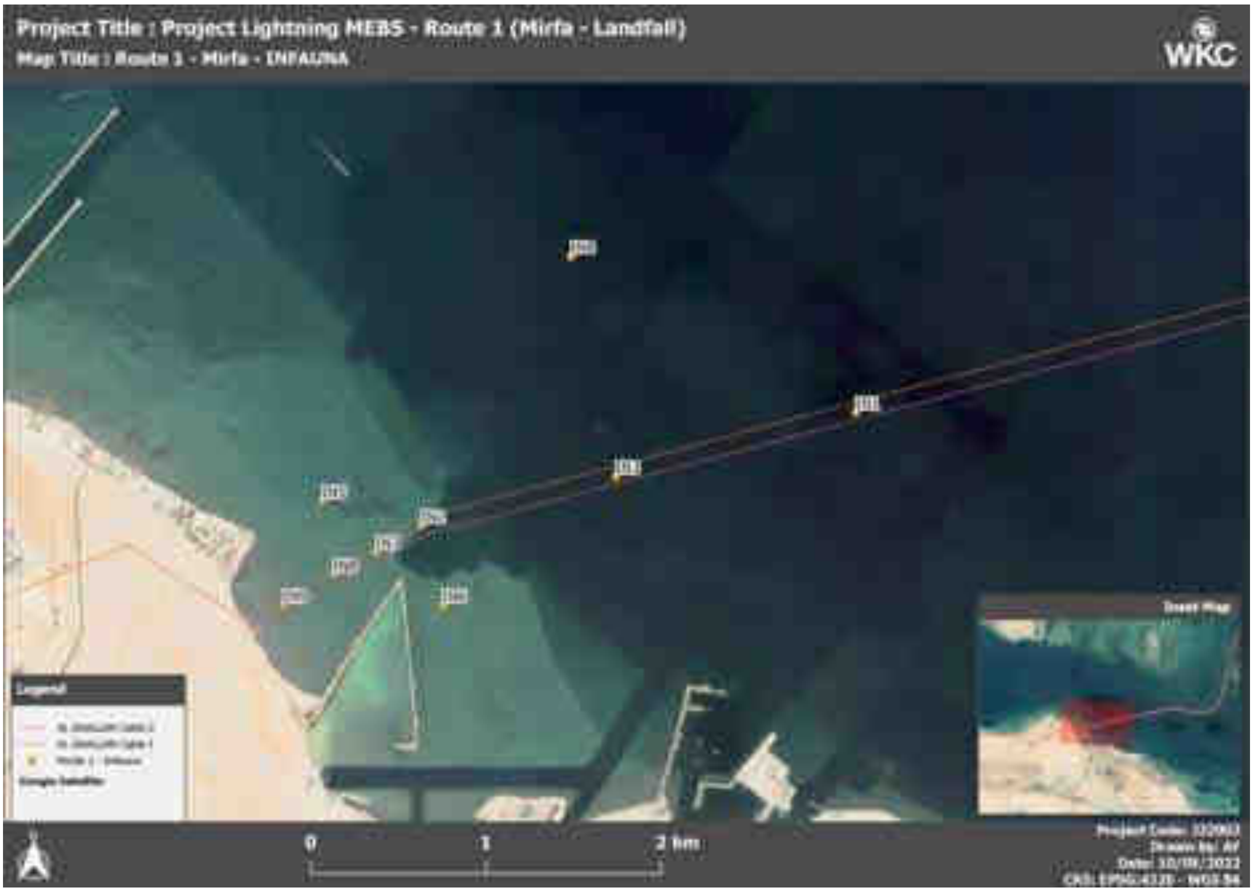




6.2.4 Benthic Infauna

Sediments were collected in Route 1- Mirfa with eight (8) infauna samples The summary of species diversity index is provided in Table 6-8 whilst the species identified, and enumerated are provided in Table 6-9. No Samples were taken at location IN7.

Figure 6-12 – Benthic Infauna Sampling Sites at Route 1 Mirfa Landfall



A total of 49 distinct taxa (family/genus/species) were recorded and identified at an average of 15.75 taxa per sample. The highest abundance was recorded in IN 8 with 94 individuals whilst lowest in IN 4 CNTR with 34 individuals. On the other hand, the highest species richness (S) was recorded at IN 8 with 24 taxa whilst IN 4 CNTR was the lowest with 7 taxa.

Diversity was found to be highest at location IN 8 (H=2.814; 1-D=0.9199) and lowest at location IN 4 CNTR (H=1.493; 1-D=0.692), as shown in Table 6-8.The infauna community in IN 9 had the second-highest diversity index (H=2.548; 1-D=0.8992) compared to IN 1 (H=2.429; 1-D=0.8585), although IN 1 recorded higher taxa. This can be explained by taxa that were being more evenly distributed in IN 9.

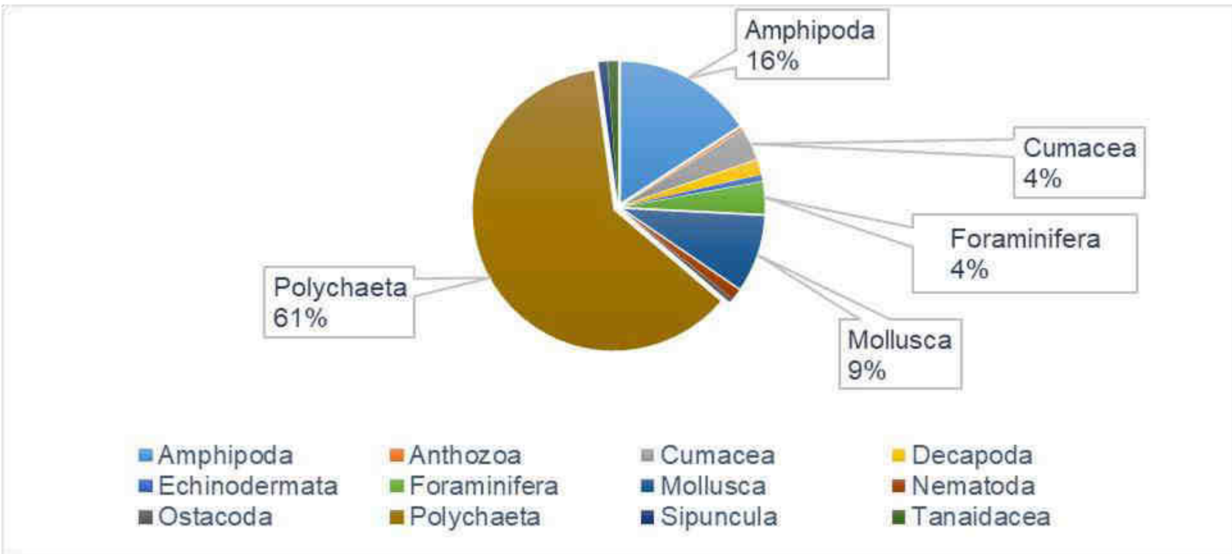
Table 6-8 – Infauna Diversity Index in Route 1-Mirfa Landfall

	IN1	IN2	IN3	IN4 CNTR	IN5	IN6	IN 8	IN9
Taxa_S	21	14	14	7	16	12	24	18
Individuals	62	36	48	34	36	45	94	56
Simpson_1-D	0.8585	0.8827	0.8698	0.692	0.8935	0.8217	0.9199	0.8992
Shannon_H	2.429	2.389	2.312	1.493	2.498	2.013	2.814	2.548
Evenness_e^H/S	0.5406	0.7788	0.721	0.6356	0.7601	0.624	0.6947	0.7099

The Evenness index showed that location IN 1 with 0.5406 and IN 4 0.6356 had the lowest values indicating an irregular species distribution due to the dominance of *Dorvillea* sp. and *Aricidea* sp. at these locations, respectively. Contrarily, even species distribution was documented in IN 2 (0.7788) and IN 5 (0.7601) which can be ascribed to having lower abundance but representing diverse infauna groups.

The abundance, composition, and diversity of infauna are influenced by different factors including organic/microbial pollution, sediment grain size, wave action, water quality, and habitat types. It should be noted that no single factor is associated with the pattern of the infauna community. The diversity index revealed that species richness could be high but low in abundance or high abundance but low species richness. The infauna community explored in this Project was taken near or within reef and seagrass areas, and presence of unconsolidated bottom with sandy to silty sedimentary structure. The composition of infauna present in the samples was relatively diverse and representative of the habitats in which they were collected. Taxa observed were mainly associated with low pollution and healthy macrofaunal communities.

Figure 6-13 – Infauna Species Composition



The infauna community was dominated by Polychaeta comprising 61% of the total number of individuals, seconded by Amphipoda (16%), see Figure 6-13.The most abundant polychaete species were *Aricidea* sp., Lumbrineridae, *Prionospio* spp.) and Hesionidae with 37, 22, 21, and 20 individuals, respectively. On the other hand, the most abundant species of Amphipoda was *Ampelisca* spp. with 50 individuals, which occurred in all samples except in IN 4 CNTR. It should be noted that other polychaete species were numerically dominant in some samples: *Dorvillea* sp. in IN 1; *Brada* sp. in IN 2; and *Syllis* sp. in IN 6. In addition, gastropod species (*Umbonium vestiarium*) dominated the sample in IN 9. Sample photos of the most abundant taxa are provided in Figure 6-35 to Figure 6-42.

Table 6-9 – Infauna Species List at Route 1- (Mirfa) Landfall

	IN1	IN2	IN3	IN4 CNTR	IN5	IN6	IN 8	IN9	Total
Amphipoda									
Ampelisca spp.	3	4	4		4	13	13	9	28
Caprella sp.						6			6
Ceradocus sp.		1	5						6
Urothoe sp.						3			3
Anthozoa									
Actiniaria sp.	1								1
Cumacea									
Cumopsis sp.			6		1	4	3	1	15
Decapoda									
cf *Diogenes* sp.					1		1	5	7
Echinodermata									
Asteroidea	1								1
Ophiuroidea	1	1							2
Foraminifera									
Peneroplis sp.	13	2							15
Mollusca									
Barbatia sp.							1		1
Mitrella blanda		1			1		2	3	7
Rhinoclavis sp.		3					2	5	10
Tellina sp.		1							1
Umbonium vestiarium							7	10	17
Nematoda									

	IN1	IN2	IN3	IN4 CNTR	IN5	IN6	IN 8	IN9	Total
Nematoda gen. spp.	2				1	1	1		5
Ostracoda									
Ostracod gen.spp.	2								2
Polychaeta									
Capitellidae	1	3	4	6					14
Chrysopetalidae (*Chrysopetalum* sp.)	4					1			5
Cirratulidae			4	1			2		7
Dorvilleidae *(Dorvillea* sp.)	17		1						18
Eunicidae							2	2	4
Flabelligeridae (*Pherusa* sp.)	1	2			1				4
Flabelligeridae (*Brada* sp.)		9							9
Glyceridae (*Glycera* sp.)		2			2	1	4	2	11
Hesionidae	1				2		16	1	20
Lumbrineridae	1	2	3	1	8		7		22
Magelonidae (*Magelona* sp.)						1			1
Maldanidae	1						7	2	10
Nephtyidae (*Nepthys* sp.)			2	3					5
Nephtyidae (*Aglaophamus* sp.)							3		3
Nereididae (*Nereis* sp.)	1						5		6
Oenidae	1			2					3
Opheliidae (*Armandia* sp.)					1			7	8
Opheliidae (*Ophelina* sp.)					1			1	2
Orbiniidae	1	4	1	4					10
Paraonidae (*Aricidea* sp.)	6		2	17	5	1	5	1	37
Phyllodocidae						1			1
Pilargidiidae		1					1	1	3
Polynoidae							1		1
Sabellidae			1		3	2	3		9
Serpulidae (*Hydroides* sp.)	1								1

	IN1	IN2	IN3	IN4 CNTR	IN5	IN6	IN 8	IN9	Total
Spionidae (*Aonides* sp.)			1						1
Spionidae (Prionospio spp.)			13		2		4	2	21
Syllidae (*Exogone* sp.)	1							1	2
Syllidae (*Syllis* spp.)						11	1	2	14
Trichobranchidae (*Terebellides* sp.)			1						1
Sipuncula									
Golfingia sp.					2		1	1	4
Tanaidacea									
cf *Apseudes* sp.	2				1		2		5
Total	62	36	48	34	36	45	94	56	389

6.2.5 Marine Mammals and Reptiles

The coverage of the Marine Mammals and Reptiles surveys, including incidental observations, from 5th to 9th 2022 are presented from Figure 6-14 to Figure 6-17. The survey includes the areas along the MMBR survey route.

Figure 6-14 – MMRO Observation at Route 1 (Mirfa) Landfall

Figure 6-15 – MMRO Observation Vantage Point 1 at Route 1 (Mirfa) Landfall

Figure 6-16 – MMRO Observation Vantage Point 2 at Route 1 (Mirfa) Landfall

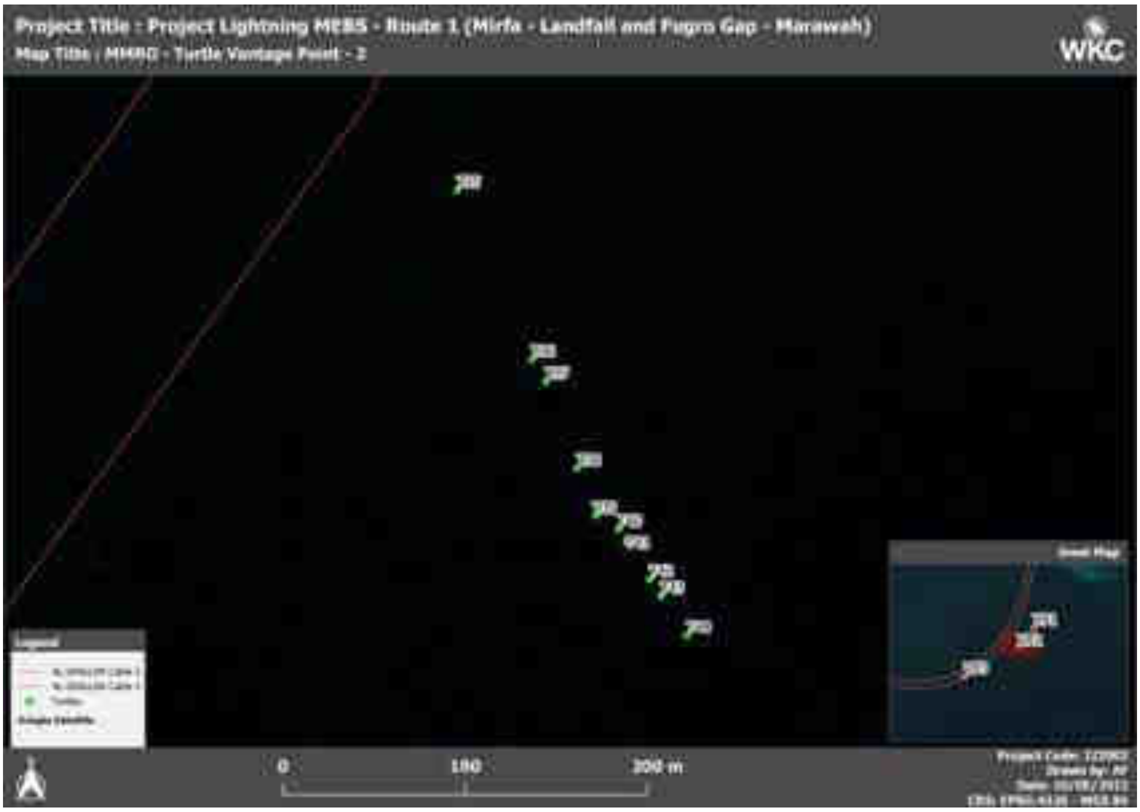
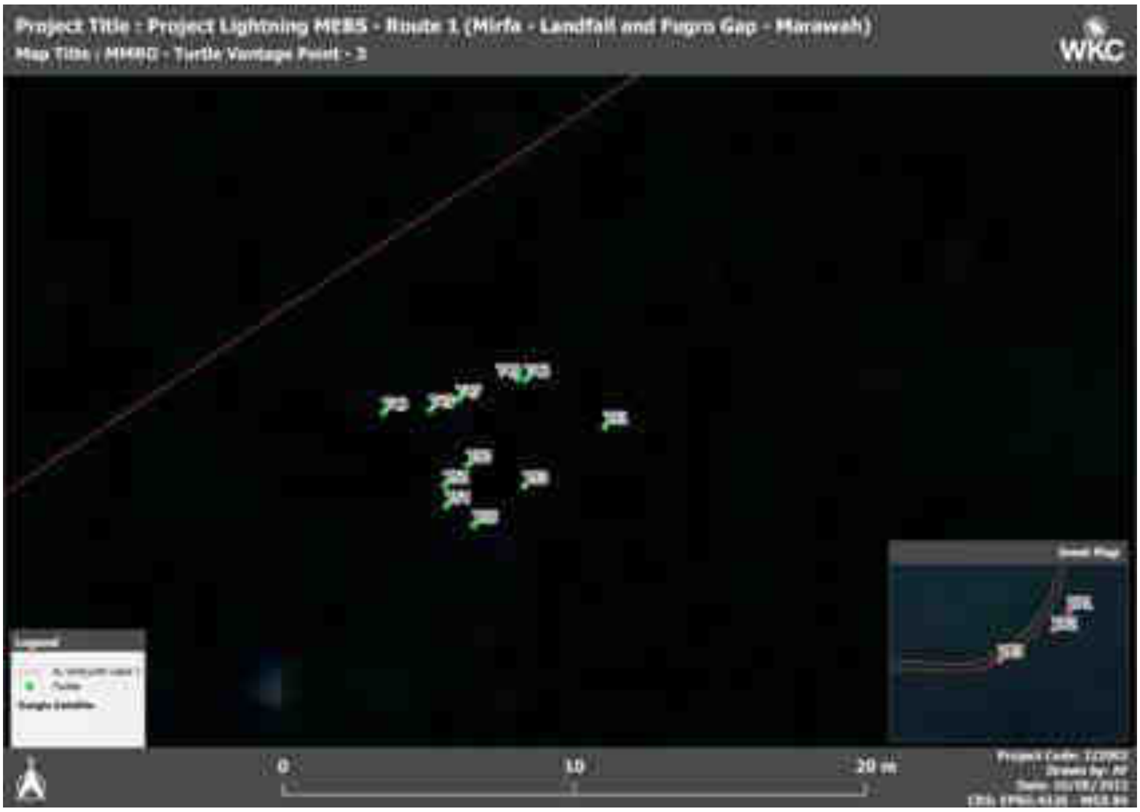


Figure 6-17 – MMRO Observation Vantage Point 3 at Route 1 (Mirfa) Landfall



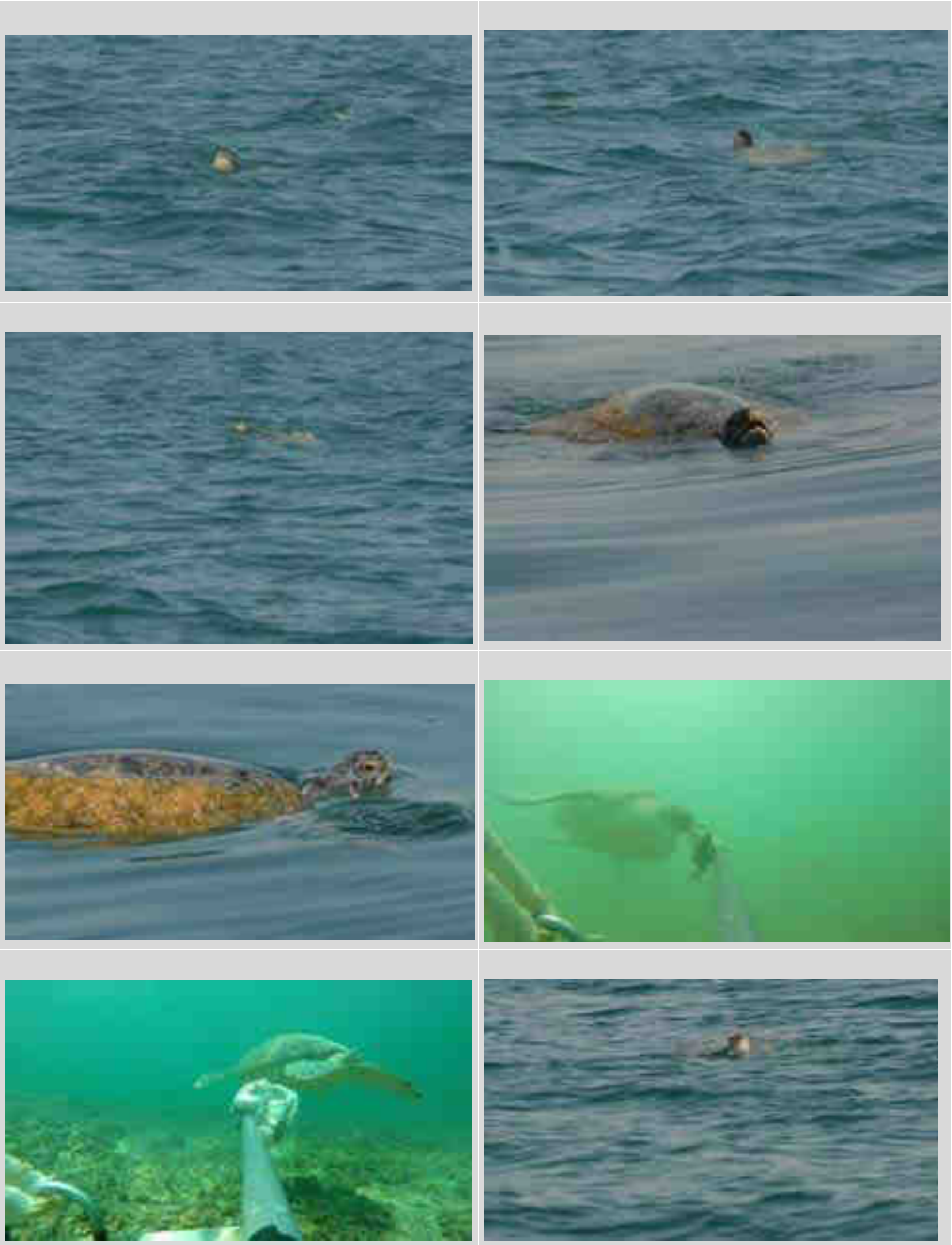
6.2.5.1 *Reptiles (Turtle Observations)*

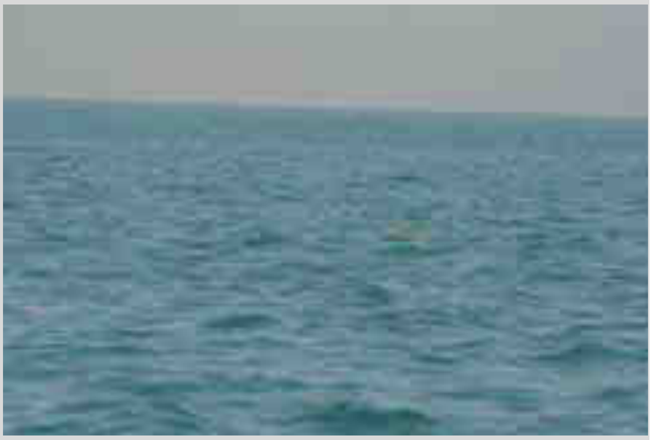
During the conduct survey at Route 1 (Mirfa) Landfall, significant sea turtle activity was observed. The predominant marine turtle species found in the UAE are the hawksbill turtle (*Eretmochelys imbricata*) and the green turtle (*Chelonia mydas*). Both species are known to use the UAE coastline for foraging and nesting with primary foraging habitat including shallow coastal areas near coral reefs and sea grasses. While it was previously believed that green turtles do not nest within the UAE, green turtle nests have been confirmed at Sir Bu Nair Island [18].

The IUCN Red List categorizes the hawksbill turtle as Critically Endangered and the Green Turtle as Endangered. This is due to significant and continuous global population decline. The main causes of reduced populations are over exploitation, incidental fishing mortality, and degradation of marine habitat and the nesting habitat.

A green sea turtle was documented at BRUV 2. Images from these recordings show that an individual turtle was attracted by the BRUV bait. At the same survey a total of 82 turtle sightings (including VPs) were noted. Because of the high presence of turtles in the area, the survey team established three (3) vantage points in order to ascertain the population level of the species. Vantage points are fixed observation stations with a 25-minute observation duration. During observation period all sightings of turtles are counted during the episode of the turtle's surface breaks when breathing. The results are as follows, VP1 with 24 sightings, VP2 with 10 and VP3 with 11 counts. This establishes that the area has high turtle population density. The examples of photos turtles taken during the survey are presented in Figure 6-18.

Figure 6-18 – Photos of Observed Turtles at Route 1 (Mirfa) Landfall



6.2.5.2 Marine Mammals

Three observers on board the vessel one of which is a certified JNCC certified MMRO and marine biologists. The team documented the marine mammal observation movements using the cable route as the transect line. The survey recorded two (2) sighting of Dugong and one (1) Unidentified Blackfish. The species were elusive thus no photographic documentation was possible.

6.2.6 Avifauna - Shorebirds

At the time of the survey a number of bird species (e.g., Socotra Cormorants (*Phalacrocorax nigrogularis*), Slender-Billed Gull (*Larus genei*), and Terns (*Sterna spp.*). Furthermore, a flocked, composing of at least 100 individuals of mature and sub-adult individuals, Socotra Cormorants (*P. nigrogularis)* was observed at the cable route located inside the MPA. This observation provides a good indication that the waters of the MPA serves an important foraging area for this locally, regionally, and internationally threatened bird species [16].

6.2.7 Incidental Large Vertebrates Sightings

A sighting of ray was documented from a vessel during the conduct transects surveys. The location was nearshore of the Mirfa landfall route. Also, during the deployment of the BRUV a Whipray was recorded.

6.3 Route 2 (Shuweihat) Landfall

The cable Route 2 starts from Shuweihat, Abu Dhabi western region and ends at Das island. The sampling sites are confined within the landfall areas only. Further along the cable route, the area was sampled by Fugro surveys previously conducted.

6.3.1 Seawater Quality

6.3.1.1 In situ Seawater Quality

The in-situ water quality sampling sites are presented in Figure 6-19 whilst measurement results are provided in Table 6-10. Note that variation between sites was minimal across all parameters. Furthermore, all parameters are within the expected ranges and indicate high water quality. Parameters were qualified against the EAD AWQO where applicable [4]. The results of the in-situ water measurements are summarized below.

Figure 6-19 – Water and Sediment Sampling Points at Route 2 (Shuweihat) Landfall

In-Situ Water Quality in Route 2 (Shuweihat) Landfall

The in-situ water quality in Route 2 results is summarised in Table 6-10. Results from the survey were qualified against the EAD AWQO [4]. All the parameters were compliant with their applicable referenced standards and within the expected range for the Arabian Gulf during the season transition between winter to summer.

- Water temperature was consistent across the sampling locations, ranging from 22.80 °C (R2- WSQ1 M & B) to 24.40 °C (R2- WSQ6 B).
- Redox potentials varied between locations and depths with a positive value ranging from 22.50 mV (R2-WSQ1 T) to 151.20 mV (WSQ7 B).
- The pH levels were relatively similar ranging from 8.0 to 8.2 and within the permissible range of EAD AWQO.
- DO concentrations were compliant with the referenced standard (>5 mg/L) with a range between 6.67 mg/L (R2-WSQ7 B) to 7.40 mg/ (R2- WSQ3 B). The project location is highly influenced by tidal flushing and good water exchange resulting in good DO concentrations.
- Salinity averaged 47.92 ppt, which is typical in the UAE. The salinity was consistent across the sampling locations, with a range from 47.50 ppt (R2-WSQ1 T) to 48.10 ppt (R2-WSQ3 T, R2-WSQ5 B, and R2-WSQ7 B). The related parameters such as conductivity and total dissolved solids (TDS) followed the same trend as salinity. The average conductivity was 89.93 µS/cm whilst TDS was 58.45 g/L.
- Turbidity values were very minimal ranging from <0.1 NTU to 2.5 NTU, compared to the referenced standard of 10 NTU.
- Water clarity in R2-SQ4 M was surface to bottom. The rest of the locations ranged from 5 m to 8 m. The clarity was generally good considering the location depths ranging to 7.5 m to 12 m.

Table 6-10 – In-Situ Water Quality Profile in Route 2 (Shuweihat) Landfall

Location	Temperature	Redox	pH	DO	Conductivity	TDS	Salinity	Turbidity	Depth	Water Clarity
Unit	**°C**	**mV**	**pH units**	**mg/L**	**µS/cm**	**g/L**	**ppt**	**NTU**	**M**	**m**
EAD AWQO	**±3** of background concentration	**-**	**6.5 – 8.5**	**>4**	**-**	**-**	**<5%** of background concentration	**10**	**-**	**-**
R2- WSQ1 T	22.90	22.5	8.1	7.20	91.01	59.16	47.5	0.5	12	7.5
R2- WSQ1 M	22.80	79.3	8.1	7.23	90.79	59.01	47.8	<0.1		
R2-WSQ1 B	22.80	63.8	8.1	7.28	91.27	59.32	47.9	2.5		
R2- WSQ2 T	23.30	112.8	8.0	7.14	91.59	59.53	47.9	<0.1	11	7.5
R2- WSQ2 M	23.00	124.1	8.1	7.21	91.36	59.38	48.0	1.0		
R2- WSQ2 B	23.20	124.4	8.1	7.25	91.29	59.34	48.0	0.4		

R2- WSQ3 T	24.20	150.6	8.1	6.97	91.49	59.47	48.1	0.3	9	7.25
R2-WSQ3 B	23.50	144.3	8.2	7.40	91.61	59.55	47.9	<0.1		
R2- WSQ4 M	23.30	113.5	8.2	7.04	67.52	43.89	47.8	<0.1	-	-
R2- WSQ5 T	23.40	57.8	8.1	7.18	91.56	59.51	48.0	0.3	11	8
R2- WSQ5 M	23.50	58.4	8.0	7.21	91.35	59.38	47.8	<0.1		
R2- WSQ5 B	23.60	55.9	8.1	7.28	91.95	59.77	48.1	0.3		
R2-WSQ6 T	23.70	106.4	8.1	7.08	91.41	59.42	47.9	<0.1	8	6
R2-WSQ6 B	24.40	110	8.1	7.08	90.93	59.10	47.9	0.5		
R2- WSQ7 T	24.00	146.9	8.1	6.90	91.59	59.53	48.0	<0.1	7.5	5
R2- WSQ7 B	24.00	151.2	8.1	6.67	92.08	59.85	48.1	0.3		

6.3.1.2 Ex-situ Seawater Quality

The results of ex-situ analysis of seawater quality at Route 2 Shuweihat Landfall indicate that most of the parameters were in compliance with their applicable limits of ADQCC and EAD AWQO standards, except for nitrate, total cyanide, two (2) trace metals, and hydrocarbon (EPH C10-C40), as shown in Table 6-11. The summary of the results is discussed below:

- TDS values across sampling locations were above the MDL, ranging from 49,600 mg/L to 50,000 mg/L, as compared to the MDL of 5 mg/L. This is expected because of high salinity levels in the Gulf.
- Active levels above MDL of total nitrogen were recorded only in four (4) locations at WSQ1 B, WSQ3 CNTR B, WSQ5 M, and WSQ7 T, with values of 0.5 mg/L, 0.5 mg/L, 2.5 mg/L, and 7.08 mg/L, respectively. The remaining of the sampled locations were below the MDL.
- Total cyanide was only detected in WSQ2 T with 0.008 mg/L, exceeding the EAD AWQO standard of 0.004 mg/L.
- Orthophosphate was below the MDL whilst sulphate and chloride concentrations exceeded the MDL by order of magnitude ranging from 3,090 mg/L to 3,120 mg/L 25,200 mg/L to 25,500 mg/L, respectively. Sulphate concentration in the Arabian Gulf seawater has been reported between 3,200 mg/L and 3,271 mg/L whilst chloride is between 21,933 mg/L to 22, 014 mg/L [7].
- Exceedances in nitrate were detected at three locations: WSQ5 T (10.6 mg/L); WSQ7 T (7.08 mg/L); and WSQ2 B (0.22 mg/L). The standard of EAD AWQO for nitrate is 0.095 mg/L. Active levels above the MDL were recorded for WSQ1 M & B, and WSQ3 CNTR B.
- COD and BOD were below the MDL. TOC was similar across R2 locations ranging from 1.5 mg/L to 1.7 mg/L.
- Exceedances were recorded in three of the metal parameters. Copper (Cu) exceeded ADQCC in most of the locations, except in WSQ4 M, WSQ5 T, and WSQ7 T. Lead (Pb) exceeded ADQCC at WSQ1 T & B, WSQ2 M & B, WSQ3 CNTR T, WSQ5 T, M & B, and

WSQ7 B. On the other hand, Zinc (Zn) exceeded EAD AWQO specifications at WSQ1 T & M.

- Active metal levels above MDL were recorded for Cadmium (Cd), Vanadium (V), and Chromium (Cr) but with no exceedances of the referenced standards. Whereas, Iron (Fe), Phosphorus (P), Silver (Ag), Mercury (Hg), and Silicon (as SiO_3) were below the MDL.

- Petroleum hydrocarbons were detected only in exceedance at WSQ7 T, with 9 µg/L of EPH C10-C40 was exceedance of the permissible limit of 7 µg/L. The remaining samples were below the MDL. The exceedance of EPH C10-C40 in one sample could be attributed to contamination of fuel oils.

- PAH – Acenaphthylene was active but not in exceedance at WSQ1 in all sampling depths. This compound is used in making soaps, pesticides, and plastics. The location of the sampled site is the farthest from the shoreline.

- BTEX, PAHs (except Acenaphthylene at WQS1), and Phenols (except for EPH C10-C40 at WQS7T) were below MDL for all R2 sampling points throughout the survey.

- The microbial parameter, total coliform was undetected across all sampled locations.

Table 6-11 – Ex-situ Water Quality in Route 2 (Shuweihat) Landfall

Parameters	Units	MDL	ADQCC	EADAWQO	R2-WSQ1			R2-WSQ2			R-2WSQ4	R2-WSQ5			R2-WSQ6		R2-WSQ7		R2-WSQ3 CNTR	
					T	M	B	T	M	B	M	T	M	B	T	B	T	B	T	B
Inorganic Parameters																				
Total Suspended Solids	mg/L	5		<33	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Total Dissolved Solids	mg/L	5			49600	49800	49600	49600	49900	49700	49900	49600	49600	49700	49600	49700	49800	50000	49700	49700
Dissolved & Emulsified Oil	mg/L	10			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Free Oil	% vol./vol.	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ammonia	mg/L	0.06			<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
Nitrogen (Ammonia)	mg/L	0.05			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ammonium	mg/L	0.064			<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064
Sulphide	mg/L	0.004		**0.004**	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Total Nitrogen	mg/L	0.5			<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.5	<0.5	<0.5	<0.5	1.6	<0.5	<0.5	0.5
Total Cyanide	mg/L	0.001		**0.004**	<0.001	<0.001	<0.001	0.008	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Anions																				

Parameters	Units	MDL	ADQCC	EADAWQO	R2-WSQ1			R2-WSQ2			R-2WSQ4	R2-WSQ5			R2-WSQ6		R2-WSQ7		R2-WSQ3 CNTR	
					T	M	B	T	M	B	M	T	M	B	T	B	T	B	T	B
Nitrate	mg/L	0.04		**0.095**	<0.04	0.09	0.04	<0.04	<0.04	0.22	<0.04	<0.04	10.6	<0.04	<0.04	<0.04	7.08	<0.04	<0.04	0.04
Orthophosphate	mg/L	0.06			<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
Sulphate	mg/L	5			3120	3100	3110	3100	3110	3110	3100	3120	3110	3090	3100	3100	3120	3120	3100	3100
Chloride	mg/L	2			25500	25200	25500	25200	25500	25500	25500	25500	25500	25500	25500	25200	25500	25500	25200	25500
Chemical Analysis																				
Chemical Oxygen Demand	mg/L	5			<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Total Organic Carbon	mg/L	1.0		**2.5**	1.7	1.6	1.7	1.7	1.7	1.6	1.6	1.6	1.6	1.6	1.5	1.7	1.6	1.6	1.6	1.6
Biochemical Oxygen Demand	mg/L	2		**5**	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Metals																				
Aluminum (Al)	mg/L	0.005	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Arsenic (As)	mg/L	0.0005	-	**0.005**	0.0022	0.0026	0.0028	0.0025	0.0030	0.0020	0.0033	0.0028	0.0029	0.0020	0.0027	0.0021	0.0029	0.0018	0.0036	0.0027
Barium (Ba)	mg/L	0.0005	-	-	0.0094	0.0093	0.0103	0.0216	0.0124	0.0124	0.0133	0.0235	0.0116	0.0192	0.0147	0.0117	0.0118	0.0123	0.0225	0.0116
Cadmium (Cd)	mg/L	0.0001	**0.0007**	0.001	<0.0001	0.0001	0.0001	<0.0001	0.0001	0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	0.0002

Parameters	Units	MDL	ADQCC	EADAWQO	R2-WSQ1			R2-WSQ2			R-2WSQ4	R2-WSQ5			R2-WSQ6		R2-WSQ7		R2-WSQ3 CNTR	
					T	M	B	T	M	B	M	T	M	B	T	B	T	B	T	B
Copper (Cu)	mg/L	0.0003	**0.003**	0.01	0.0037	0.0085	0.0069	0.0043	0.0032	0.0062	0.0025	0.0062	0.0058	0.0023	0.0037	0.0041	0.0019	0.0049	0.0200	0.0062
Iron (Fe)	mg/L	0.02	-	**0.3**	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Lead (Pb)	mg/L	0.0002	**0.0022**	0.01	0.0029	0.0017	0.0058	0.0010	0.0056	0.0038	0.0010	0.0044	0.0037	0.0029	0.0011	0.0015	0.0017	0.0030	0.0061	0.0017
Phosphorus (P)	mg/L	0.03	-	0.001	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Silver (Ag)	mg/L	0.0005	-	-	<0.0005	<0.0005	<0.0005	0.0076	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Vanadium (V)	mg/L	0.0001	-	**0.0094**	0.0034	0.0036	0.0038	0.0033	0.0032	0.0041	0.0040	0.0040	0.0041	0.0037	0.0040	0.0045	0.0038	0.0037	0.0043	0.0037
Zinc (Zn)	mg/L	0.002	0.015	**0.01**	0.011	0.012	0.008	0.008	0.003	0.004	0.007	<0.002	<0.002	0.004	0.002	<0.002	<0.002	<0.002	0.003	<0.002
Mercury (Hg)	µg/L	0.10	0.1	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Silicon as SiO2	mg/L	2.8		-	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8
Chromium (Cr)	µg/L	0.3		10	0.9	0.5	1.6	0.5	0.6	0.9	0.4	1.3	1.0	1.4	0.8	0.5	0.6	1.1	1.7	1.1
BTEX																				
Benzene	µg/L	7			<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
Ethyl benzene	µg/L	7			<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
m&p-Xylene	µg/L	14			<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14

Parameters	Units	MDL	ADQCC	EAD AWQO	R2-WSQ1			R2-WSQ2			R-2WSQ4	R2-WSQ5			R2-WSQ6		R2-WSQ7		R2-WSQ3 CNTR	
					T	M	B	T	M	B	M	T	M	B	T	B	T	B	T	B
o-Xylene	µg/L	7			<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
Toluene	µg/L	7			<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
Hydrocarbons																				
EPH C10-C40	µg/L	7	7		<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	9	<7	<7	<7
VPH C5-C10	µg/L	7	7		<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
PAHs																				
Acenaphthene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Acenaphthylene	µg/L	0.01			0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Anthracene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(b)fluoranthene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(g,h,i)perylene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(k)fluoranthene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chrysene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Parameters	Units	MDL	ADQ CC	EAD AW QO	R2-WSQ1			R2-WSQ2			R-2WSQ4	R2-WSQ5			R2-WSQ6		R2-WSQ7		R2-WSQ3 CNTR	
					T	M	B	T	M	B	M	T	M	B	T	B	T	B	T	B
Dibenzo(a,h)anthracene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluoranthene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluorene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-c,d)pyrene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Naphthalene	µg/L	0.02			<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Phenanthrene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phenols																				
2,4,5-Trichlorophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,4,6-Trichlorophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,4-Dichlorophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,4-Dimethylphenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Chlorophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Parameters	Units	MDL	ADQCC	EADAWQO	R2-WSQ1			R2-WSQ2			R-2WSQ4	R2-WSQ5			R2-WSQ6		R2-WSQ7		R2-WSQ3 CNTR	
					T	M	B	T	M	B	M	T	M	B	T	B	T	B	T	B
2-Methylphenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Nitrophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4-Chloro-3-methylphenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4-Methylphenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4-Nitrophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Pentachlorophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,3,4,6-Tetrachlorophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,3,5,6-Tetrachlorophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,6-Dichlorophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
3-Methylphenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Phenol	µg/L	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Microbiology																				
Total Coliform	CFU/100mL	10		70	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Note: Red values represent exceedance of the standard; Blue values represent above MDL; **CNTR** means control location; **ND** means not detected; **T** means top water layer, **B** for bottom, and **M** for mid-water. The ADQCC values shown are allowable concentrations for General Use Areas.

6.3.2 Sediment Quality

The results of laboratory sediment analysis for Route 2 are presented in Table 6-12 and have been compared to the standards provided by the Abu Dhabi Quality and Conformity Council (ADQCC) [5]. No exceedances to the referenced standard were found in any of the parameters.

- pH ranged from 8.7 at R2-WSQ5 to 9.9 at R2-WSQ3 CNTR.

- Oil and grease concentrations was below the MDL for all locations.

- High levels of total nitrogen (TN) were detected in the sediments ranging from 298 mg/kg (R2-WSQ2) to 422 mg/kg (R2-WSQ5). TN is considered an effluent parameter because it is the sum NO_3-N, $N0_2$-N, NH_3-N, and other organically bonded nitrogen. However, there is no existing permissible limit for TN.

- High variation in silica concentration was detected among locations, ranging to lowest value of 0.63 % by wt. (R2-WSQ1) to the highest value of 20.3 % by wt. (R2-WSQ6).

- Cyanide level not detected for all locations.

- Of the three anions tested, orthophosphate was below MDL whilst active levels were detected for fluoride and sulphate. Fluoride ranged from 1.1 mg/kg (R2-WSQ1) to 2.2 mg/kg (R2-WSQ5) whilst sulphate ranged from 0.35 %SO4 (R2-WSQ1) to 0.61 %SO4 (R2-WSQ7).

- No exceedances were detected for the 18 trace metals analysed. Cadmium (Ca), Copper (Cu), Molybdenum (Mo), Selenium (Se), Silver (Ag), and Zinc (Zn) were below their MDLs. Aluminum (Al), Arsenic, Barium (Ba), Chromium (Cr), Iron (Fe), Lead (Pb), Manganese (Mn), Nickel (Ni), Phosphorus (P), Vanadium (V), Antimony (Sb), and Mercury (Hg) all had active levels above MDL but below referenced standards for parameters where standards are provided. Pb was detected only in R2-WSQ1 and R2-WSQ2, Sb in R2-WSQ1 and R2-WSQ3 CNTR, whilst Hg in R2-WSQ1, R2-WSQ2 and R2-WSQ3 CNTR.

- Hydrocarbons, PAHs, and PCBs were below the MDL for all sampled locations.

Table 6-12 – Sediment Quality in Route 2 (Shuweihat) Landfall

Parameters	Unit	MDL	ADQCC	R2-WSQ1	R2-WSQ2	R2-WSQ3 CNTR	R2-WSQ4	R2-WSQ5	R2-WSQ6	R2-WSQ7
Inorganic Parameters										
pH	pH units	0.1		9.7	9.2	9.9	9.8	8.7	9.2	9.5
Oil and Grease	%	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Nitrogen	mg/kg	5		400	298	319	328	422	316	420
Silica-SiO2	% by wt	0.01		0.63	1.51	1.48	0.70	9.02	20.3	0.69
Total Cyanide	mg/kg	0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Anions										
Orthophosphate	mg/kg	0.3		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Fluoride	mg/kg	0.5		1.1	1.8	1.2	1.7	2.2	1.5	1.4
Sulphate (Acid Soluble)	%SO4	0.01		0.35	0.51	0.46	0.58	0.45	0.42	0.61
Chemical Analysis										
Total Organic Carbon	%	0.1		0.2	0.3	0.2	0.3	0.4	0.3	0.2
Metals										
Cadmium (Cd)	mg/kg	0.5	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Aluminum (Al)	mg/kg	130	-	587	922	514	388	1520	975	432
Arsenic (As)	mg/kg	1.0	7	3.7	3.9	2.0	4.3	4.6	2.4	4.3
Barium (Ba)	mg/kg	3.0	-	9.1	9.7	9.2	9.9	11.7	8.1	9.5
Chromium (Cr)	mg/kg	1.0	52	3.3	4.5	2.9	2.4	7.0	4.7	2.1

Parameters	Unit	MDL	ADQCC	R2-WSQ1	R2-WSQ2	R2-WSQ3 CNTR	R2-WSQ4	R2-WSQ5	R2-WSQ6	R2-WSQ7
Copper (Cu)	mg/kg	3.0	20	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Iron (Fe)	mg/kg	70	-	637	882	516	353	1520	936	444
Lead (Pb)	mg/kg	1.0	30	1.5	1.4	<1.0	1.1	<1.0	<1.0	<1.0
Manganese (Mn)	mg/kg	3.0	-	17.0	26.7	13.8	17.2	51.1	31.2	17.1
Molybdenum (Mo)	mg/kg	3.0	-	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Nickel (Ni)	mg/kg	1.0	16	1.9	2.9	1.6	1.2	4.9	2.5	1.4
Phosphorus (P)	mg/kg	50	-	205	223	136	176	201	156	185
Selenium (Se)	mg/kg	3.0	-	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Silver (Ag)	mg/kg	10	-	<10	<10	<10	<10	<10	<10	<10
Vanadium (V)	mg/kg	1.0	-	4.0	4.6	4.1	3.4	6.8	5.3	3.3
Zinc (Zn)	mg/kg	3.0	125	<3.0	<3.0	<3.0	<3.0	3.5	<3.0	<3.0
Antimony (Sb)	mg/kg	1.0		1.7	<1.0	1.2	<1.0	<1.0	<1.0	<1.0
Mercury (Hg)	mg/kg	0.010	0.2	0.098	0.017	0.013	<0.010	0.013	<0.010	<0.010
Hydrocarbons										
VPH C5-C10	mg/kg	0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
EPH C10-C40	mg/kg	50		<50	<50	<50	<50	<50	<50	<50
PAHs			Total PAHs=1.7							
Acenaphthene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Acenaphthylene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Parameters	Unit	MDL	ADQCC	R2-WSQ1	R2-WSQ2	R2-WSQ3 CNTR	R2-WSQ4	R2-WSQ5	R2-WSQ6	R2-WSQ7
Anthracene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(b)fluoranthene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(g,h,i)perylene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(k)fluoranthene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chrysene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dibenzo(a,h)anthracene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluoranthene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluorene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-c,d)pyrene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Naphthalene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phenanthrene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCBs			Total PCBs=0.22							
2,2`,3,3`,4,4` - Hexachlorobiphenyl (PCB 128)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,2`,3,3`,4,4`,5 - Heptachlorobiphenyl (PCB 170)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Parameters	Unit	MDL	ADQCC	R2-WSQ1	R2-WSQ2	R2-WSQ3 CNTR	R2-WSQ4	R2-WSQ5	R2-WSQ6	R2-WSQ7
2,2`,3,3`,4,4`,5,5`,6,6` - Decachlorobiphenyl	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,2`,3,3`,4,4`,5,5`,6- Nonachlorobiphenyl (PCB 206)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,2`,3,3`,4,4`,5,6 - Octachlorobiphenyl (PCB 195)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,2`,3,4`,5,5',6 - Heptachlorobiphenyl (PCB 187)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,2`,3,4,4`,5` - Hexachlorobiphenyl (PCB 138)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,2`,3,4,4`,5,5` - Heptachlorobiphenyl (PCB 180)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,2`,3,5` - Tetrachlorobiphenyl (PCB 44)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,2`,4,4`,5,5` - Hexachlorobiphenyl (PCB 153)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,2`,4,5,5` - Pentachlorobiphenyl (PCB 101)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,2`,5,5` - Tetrachlorobiphenyl (PCB 52)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,2`,5 - Trichlorobiphenyl (PCB 18)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Parameters	Unit	MDL	ADQCC	R2-WSQ1	R2-WSQ2	R2-WSQ3 CNTR	R2-WSQ4	R2-WSQ5	R2-WSQ6	R2-WSQ7
3,3`,4,4` - Tetrachlorobiphenyl (PCB 77)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
3,3`,4,4`,5 - Pentachlorobiphenyl (PCB 126)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,3`,4,4` - Tetrachlorobiphenyl (PCB 66)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,3`,4,4`,5 - Pentachlorobiphenyl (PCB 118)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,3,3`,4,4` - Pentachlorobiphenyl (PCB 105)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,4` - Dichlorobiphenyl (PCB 8)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,4,4` - Trichlorobiphenyl (PCB 28)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Note: Red values represent exceedance of the standard; Blue values represent above MDL. CNTR means control location.The ADQCC values shown are allowable concentrations for General Use Areas.

6.4 Marine Ecology

6.4.1 Benthic Habitat

The marine habitats identified across the study area were classified using the Environment Agency Abu Dhabi (EAD) Habitat Classification [8] and Marine Ecological Classification Standard (CMREC) Scheme. Based on the results of the marine ecology surveys, four (4) core habitats are present in the survey area and as follows:

- Unconsolidated Bottom: 14000
- Seagrass Bed: 12000
- Macroalgae communities: 13010
- Fringing Reef: 11100

The locations of DDVT and DVDD sampling points are presented in Figure 6-20.

Figure 6-20 –DDVT and DVDD Sampling Points in Route 2 (Shuweihat) Landfall

The distribution of different habitats in the survey area are shown in Figure 6-21 and Figure 6-22 whilst examples of the benthic habitat found during marine ecology surveys using DDVT and DVDD method. In addition, the description of each habitat type including associated flora and fauna is discussed in the sections below.

Figure 6-21 – Habitat Map of Route 2 (Shuweihat) Landfall

Figure 6-22 – Habitat Map of Route 2 Shuweihat Nearshore

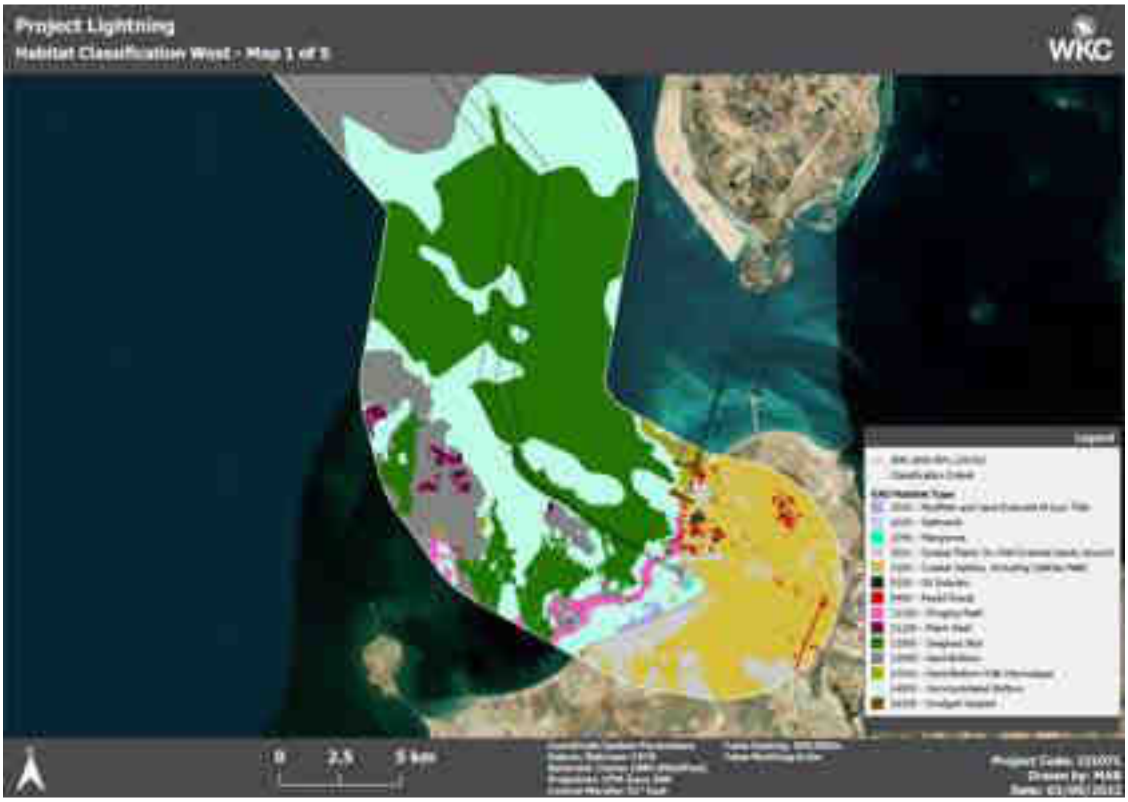


Figure 6-23 – DDV Transect Results at Shuweihat Fringing Reef

Few Surviving Coral Colonies

Fringing Reef Condition at Route 2 Shuweihat Landfall











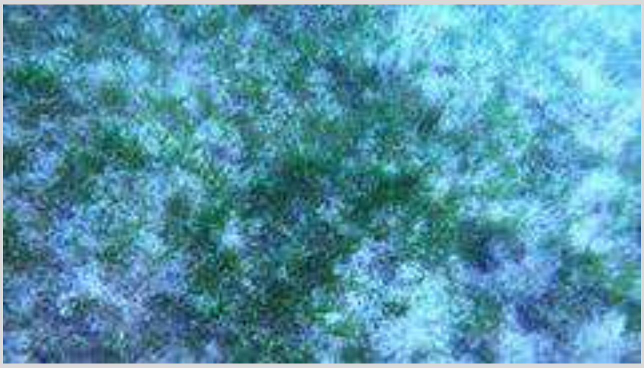




Conditions at the Outer Boundary of the Fringing Reef

DDV1

DDV2

DDV3

DDV4

DDV5

DDV6

6.4.1.1 Unconsolidated Bottom

The unconsolidated bottom habitat in this area is characterized by coarse sand often intermixed with shells fragments and rubbles, see Figure 6-24. These open areas of sand are sometimes defined and not heavily colonised by seagrass or macro algae.

These areas contain a lower abundance of marine life as fish and invertebrates prefer the more productive environment seagrass, reefs, and hard bottom areas. On these areas sparse hard substrates sometimes appear and colonized by fouling organisms which may be a combination of ascidians, macro algae, and molluscan bivalves. Sea urchin may be attracted to these benthic structures and aggregate.

Figure 6-24 – Unconsolidated Bottom (Sandy)

6.4.1.2 Seagrass Bed

Seagrasses are well represented throughout the survey Site. Areas range from dense seagrass meadows to sparse seagrass patches particularly on the meadow boundaries, Figure 6-25. The three (3) species identified were *Halophila stipulacea*, *Halophila ovalis and Halodule uninervis*. These species are adept at colonising areas of unconsolidated bottom due to fast propagation rates and tolerance to varying environmental conditions.

Seagrass can quickly develop into established seagrass beds. As ecosystem engineers, their ability to modify the existing unconsolidated bottom into a distinct habitat is related to the scale mass of core seabed present. This habitat provides foraging for many organisms including endangered species such as sea turtles and dugongs. Sand sediments within seagrass beds support a greater diversity and abundance of benthic infauna than open sand substrates [9]. Many commercially important species such as fish, shrimps, and oysters also utilise seagrass beds as nursery and foraging grounds.

Seagrasses also provide a variety of ecosystem functions. The rhizome and root system of a seagrass bed stabilises loose sediment and organic materials. This leads to improved water clarity and reduced erosion. Seagrasses are highly productive photosynthetic plants and as such, they contribute significant amounts of oxygen that become available for consumption by other marine life.

Figure 6-25 – Seagrass Bed mixed with Macro Algae

6.4.1.3 Macroalgae Communities

A significant macroalgae meadow mixed with seagrasses was observed in several areas within the survey location, colonizing a mixed substrates of unconsolidated bottom, reef structures and seagrass beds. An example of macroalgae meadow at the survey area is presented in Figure 6-26. This macroalgae community covers a wide area particularly on the identified fringing reef and contains many macroalgae and filamentous algae including a variety of species are present mainly from the groups Chlorophyta (green algae) and Phaeophycean (brown algae).

Figure 6-26 – Macroalgae Bed Filamentous Algae Mixed with Seagrass Beds

6.4.1.4 Fringing Reef

During the survey, a fringing reef was identified nearshore of Shuweihat landfall. The structure observed was developed by corals, but present state of the reef can be assigned to be a on critical health conditions as most of the corals are dead. There are young colonies of corals seen growing but they are sparse and too few in between. An example of the fringing reef habitats is presented extensively by photo data in previous sections (Figure 6-27). This habitat type is devoid of seagrasses and has a well-defined boundary. In addition, sessile marine organisms were noted to colonise the substrate like macro algae, corals, tunicates, and bivalves.

The fringing reef substrates still provide opportunity for coral growth thus considered an important natural marine habitat. This habitat also provide stability to the seabed that will facilitate continuity of benthic succession until a final form of the reef is achieved.

Figure 6-27 – Example of Fringing Reef

6.4.2 Benthic Community (Flora and Fauna)

Table 6-13 provides a summary of the habitats investigated through DDV. The various benthic flora and fauna species as well as the natural benthic substrate observed through the survey methods are also included in the table below.

Table 6-13 – DDVD Benthic Habitat Observations

Location	Unconsolidated Bottom (Sandy)	Seagrass	Reef	Macro - algae	Description
DDV 1	X	X			Rich seagrass meadow with population of pearl oysters. Sandy bottom in patches and extended areas. Unconsolidated bottom with hard outcrops colonized by fouling species.
DDV 2		X		X	Rich Seagrass meadow mixed with filamentous macro algae
DDV 3		X		X	Rich Seagrass meadow mixed with filamentous macro algae.
DDV 4		X		X	Rich Seagrass meadow mixed with filamentous macro algae
DDV 5		X	X	X	Defined Rich seagrass meadow mixed with filamentous macro algae and areas of dead fringing reef covered with turf algae
DDV 6			X	X	Fringing reef with macro algae

6.4.2.1 Invertebrates

Various invertebrate species were observed in the area including sea urchins, sea snails, bivalves, sponges, and tunicates. In addition, burrows in seagrass beds provide evidence of invertebrate habitation, however, species identification was not possible in these areas. A summary of macro invertebrates observed is in the study area is provided in Table 6-14.

Table 6-14 – List of Invertebrates Found in Route 2 (Shuweihat) Landfall

Common Name	**Scientific Name**
Collectors Sea Urchin	*Tripneustes* sp.
Long Spined Sea Urchin	*Diadema setosum*
Sponge	Demospongiae
Tunicate	*Phallusia nigra*
Gastropods	*Cerithriidae* sp.
Pearl Oyster	*Pinctada radiata*

6.4.2.1.1 Sea Urchin

The dominant invertebrate observed in the study area were sea urchins. The two species of urchins: Collector sea urchin *(Tripneustes* sp.) and Long spine urchin (*Diadema setosum)*) were found in the area. *Tripneustes* sp., are algae eaters. They live on open sea bottom and uses collected pebbles to conceal themselves from predators. Sea Urchin are commercially important in other countries as it is sought for their roe. There is no known direct fishery for this species in UAE. In right conditions these species tend to be prolific and produce the hundreds of thousands of eggs which stays in the water column during larval stage.

Sea urchins are ecologically important due to their herbivorous behaviour. Most of their life cycle is spent crawling along hard substrates consuming vast amounts of turf algae, allowing other organisms, such as corals, to settle and propagate. Shrimps and small fishes are often seen sheltering amongst the spines of sea urchins. This provides protection from predators and a food source as the spines trap food particles floating in the water column. Sea urchins are also associated with parasitic snails that adhere to the urchin's body to absorb fluids and nutrients.

6.4.2.1.2 Sponges

Sponges are the simplest multi-cellular organism in the animal kingdom. Despite their simplicity, they are very diverse in size, structure, and colour. Sponges can be found in all marine environments with many species associated with coral reefs. Their primary functional role is in nutrient cycling, particularly silicon and nitrogen. They also act as sediment stabilisers and aid in reef creation through substrate consolidation [15]. Small marine organisms including juvenile fish and invertebrates benefit from the microhabitat provided by sponge aggregations. Small organisms are known to live inside and around sponges, utilising them for protection and as a food source.

6.4.2.1.3 Bivalves

The dominant bivalves found in Shuweihat belongs to the Family Spondyllidae, these organisms attached to hard substrate and would heavily colonized and area forming a mat or bed. They are filter feeders, collecting food from seawater. This invertebrate is important in its role as nutrient regulators and benthic structure engineering.

Other bivalves are borrowing and solitary individuals living among seagrasses and coral reef areas. An example is the pearl oyster (*Pinctada sp.*) which was noted to be present in the survey area.

6.4.2.1.4 Corals

Coral are colonial organisms found throughout tropical and sub-tropical oceans. Each coral is comprised of hundreds, or thousands of individual animals called polyps. The polyps use tentacles with stinging cells called nematocysts to catch prey that drift past in the water column. However, shallow water corals typically derive most of their energy and nutrients from a symbiotic relationship with photosynthetic single-celled organisms known as zooxanthellae. The zooxanthellae live within the tissues of the coral and photosynthesize to provide the polyps with nutrients such as glucose and amino acids. Many types of corals are ecosystem engineers as they are primarily responsible for reef building. As these corals grow, they produce hard calcium carbonate skeletons, which become the framework of the reef. The complex habitat created by corals provides a range of ecological niches that encourages biodiversity. The examples of current conditions of fringing reefs at the survey sites are presented in Figure 6-28 and Figure 6-29.

Figure 6-28 – Dead Corals

Figure 6-29 – Surviving Corals

Coral Mortality

Evidence of coral bleaching, algal overgrowth and sedimentation was also observed in locations of the fringing reef. The bright colours exhibited by many corals are caused by zooxanthellae. When corals undergo stress from environmental changes such as increased temperature or pollution the zooxanthellae are expelled, hence the coral turns a bright white colour. This phenomenon is known as coral bleaching. A bleached coral is not dead as the polyps can still obtain energy by feeding on plankton. However, this can only be sustained for a short time before the coral becomes nutrient deficient and starves or is overcome by algae growth. If the environmental stress is reduced, it is possible for the zooxanthellae to recolonise the coral and the polyps may recover. The cumulative impact of persistent bleaching events generally reduces the resilience of corals and leads to a loss of diversity and overall abundance [19].

The other probable cause of coral mortality observed in the Project Site was sedimentation. Sediments that are disturbed, through wave action, settle on and around corals. The sediment particles cause physical damage to the polyp and impede light penetration to the zooxanthellae. This causes the coral to become nutritionally deficient and vulnerable to algae overgrowth.

Corals and algae are constantly competing for space in the reef environment. Healthy corals can fend off algae using stinging cells on the polyp tentacles. However, a coral undergoing environmental stress such as sedimentation is less able to prevent algae growth.

6.4.3 Fish

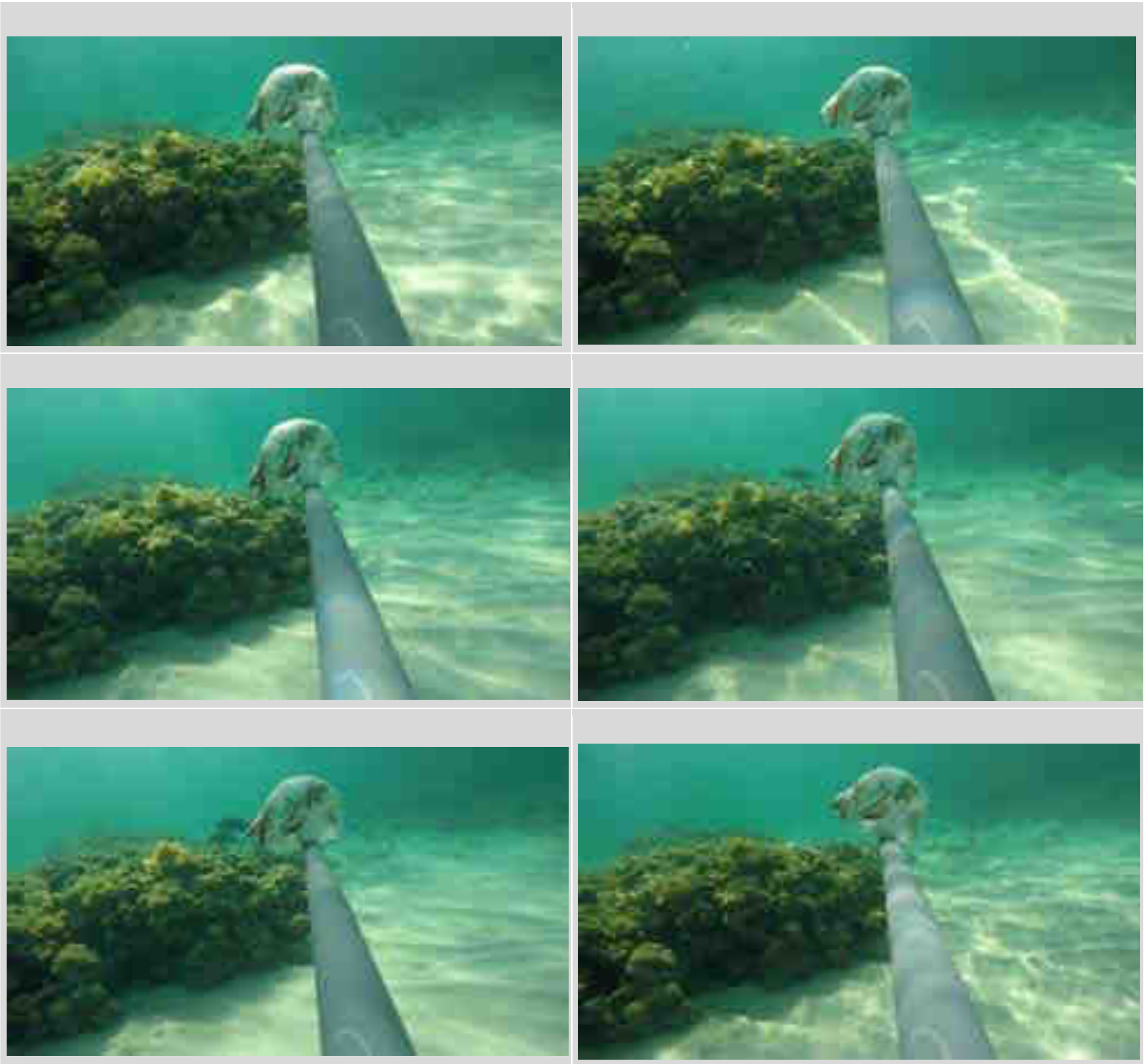
A fish study was undertaken using Baited Remote Underwater Video (BRUVs). The of sampling locations for BRUV survey are presented in Figure 6-30. Most species identified were pelagic and reef-associated fishes. A number of these species are considered commercially important in the UAE.

Figure 6-30 – (BRUVs) at Route 2 (Shuweihat) Landfall

The examples of pictures taken during BRUVs sampling are presented in Figure 6-31 and Figure 6-32.

Figure 6-31 –BRUV 1 Installed at Route 2 (Shuweihat) Landfall

Figure 6-32 – Fish Species BRUV 3 at Route 2- (Shuweihat) Landfall



Fish species that were identified during the survey includes the Grouper, King mackerel and Orange-spotted trevally. Table 6-15 provides a list of all species identified at each survey location. According to the IUCN Red List categorisation, no threatened or endangered fish species were identified during this survey. Several species of commercial importance were identified including Orange-spotted trevally, Grouper, and King mackerel. Also, there is a high population of blue swimmer crab documented in the area. BRUV recorded high number of fish and species at the time of the survey. Fringing reef and seagrass habitat normally provides shelter and foraging opportunities for fish species.

Table 6-15 – List of Fish Species Observed in Route 2 Shuweihat Landfall

Common Name	Scientific Name	BRUV 1	BRUV 3
Yellow Bar Angelfish	*Pomacanthus maculosus*		X
Orange-Spotted Grouper	*Ephinephelus coioides*		X
Ehrenberg Snapper	*Lutjanus ehrenbergii*		X
Wrasse	*Halichoeres sp.*		X
Orange-Spotted Trevally	*Carangoides bajad*		X
Grunt	*Haemulon plumierii*		X
Two Bar Seabream	*Acanthopagrus bifasciatus*		X
Stripped Terapon	*Pelates sexlineatus*		X
Silver Biddy	*Gerres subfasciatus*		X
King Mackerel	*Scomberomorus cavalla*	X	
Blacktip Shark	*Carcharinus limbatus*	X	
Giant Sea Catfish	*Arius gigas*	X	
Tawny Nurse Shark	*Nebrius ferrugineus*	X	

Commercial Fish Species

Commercial fisheries in the UAE has grown rapidly over the last decade. Growing populations and increased tourism have greatly escalated the demand for seafood and aquarium fish. EAD reports there are at least thirteen species of fish that are currently exploited at unsustainable levels in the UAE. The UAE Sustainable Fisheries Program is currently being implemented to gain a greater understanding fish stocks and implement management strategies to achieve a sustainable fishery by 2030 [20].

Of the overexploited species, three (3) have been observed within the Project Site. The diverse habitat within the Project Site, including the presence of corals, bivalve beds, and seagrass, provides an environment that attracts these valued species. These critical areas provide feeding grounds, nesting areas, and nursery habitats. The presence of commercially important species highlights the significance of reef habitats in the Gulf region.

Table 6-16 provides a list of the commercially important fish species that have been identified during surveys. This also includes various statistics provided by EAD [21]. Of the commercially important species observed within the Project site, Hamour (*Epinephelus coioides*) is the most valuable.

Table 6-16 – Commercial Fish Species Landing 2014

Common name	Species Name	Average Price per kilo 2016 (AED)	Total landings Abu Dhabi 2016 (megatons)	Status (Year of Assessment)
Orange-Spotted Trevally	*Carangoides bajad*	29.0	143	Overexploited (2014)
Hamour	*Epinephelus coioides*	45.5	609	Overexploited (2014)
Ehrenberg Snapper	*Lutjanus ehrenbergii*	19.0	53	Underexploited (2009)
Yellow Bar Angelfish	*Pomacanthus maculosus*	-	-	Underexploited (2007)
Two Bar Seabream	*Acanthopagrus bifasciatus*	15.0	10	Underexploited (2014)

In 2016, Abu Dhabi reported 609 megatons of Hamour landed with an average price of 45.5 AED per kilo. This species is currently exploited beyond sustainable limits. The Orange-spotted trevally, Talang Queen fish, and Ehrenberg snapper are on low abundance throughout the survey site as assessed through BRUV and DDV transects. These species are commercially important and various fishery is active within the region.

6.4.4 Benthic Infauna

Infauna in Route 2 (Shuweihat) Landfall

The infauna samples collected from seven (7) locations belong to 49 distinct taxa (family/genus/species) at an average of 15.1 taxa per sample, see Table 6-17. The highest diversity was 28 taxa at location IN 2 and the lowest was 9 taxa per sample at IN 3.

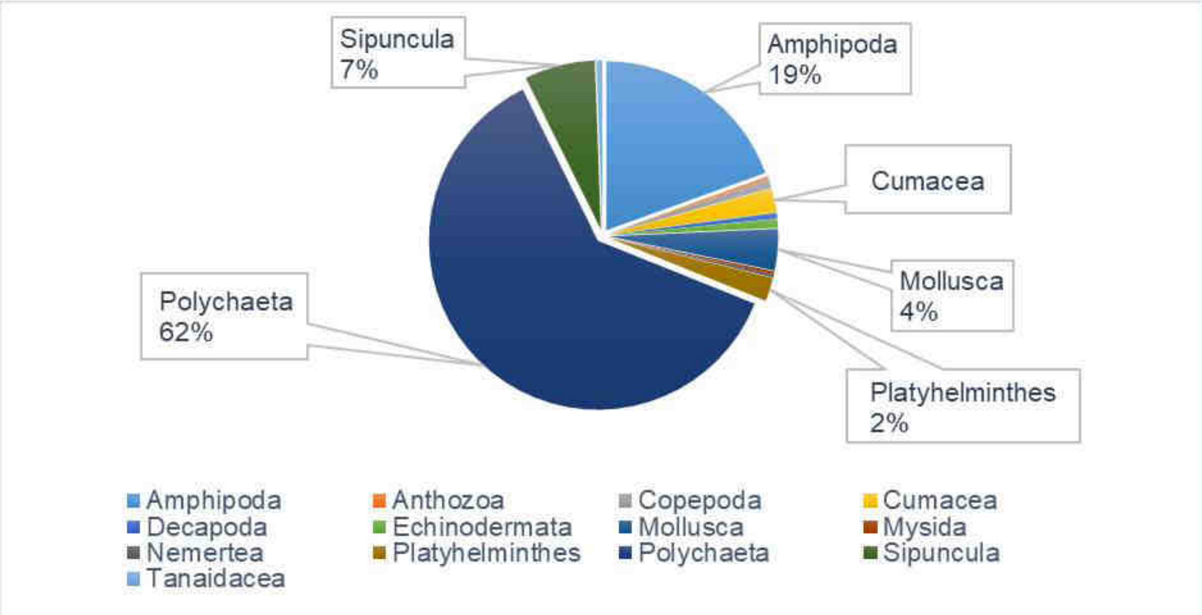
Table 6-17 – Infauna Diversity Index in Route 2-Shuweihat

	IN1	IN2	IN3	IN4	IN5	IN6	IN7
Taxa_S	12	28	9	11	15	16	15
Individuals	20	107	46	32	46	48	55
Simpson_1-D	0.885	0.9279	0.7892	0.7578	0.8856	0.8898	0.8648
Shannon_H	2.32	2.902	1.78	1.843	2.392	2.445	2.307
Evenness_e^H/S	0.8476	0.6504	0.6589	0.5742	0.7288	0.7209	0.6698

As shown in Figure 6-33 , the Diversity index was found to be highest at location IN 2 (H=2.902; 1-D=0.9279) and lowest at location IN 3 (H=1.78; 1-D=0.7892. The IN 1 infauna community had one of the lowest abundances, resulting in a more uniform distribution of organisms and a higher diversity index as a result. The Evenness index showed that location IN1 had the highest value of 0.8476 indicating a more even distribution in abundance with location IN 4 having the lowest evenness of 0.475 due to the dominance of Amphipod (*Urothoe* sp.) at this location.

The infauna community was dominated by Polychaeta making up 62% of the total number of individuals. Amphipoda was the next most abundant with 19% and Sipuncula with 7%. Other groups contributed less than 5% to the total number of individuals, see Figure 6-33**Error! Reference source not found.**. The most common species was the amphipod species (*Ampelisca* spp.) with 45 individuals followed by the polychaete species: *Prionospio* spp. (36); *Syllis* sp. (36); and *Chrysopetalum* sp. (25).

Figure 6-33 – Percent Composition of Benthic Infauna in Route 2-Shuweihat



The infauna communities found in the samples were diverse and reflective of the unconsolidated substrate and seagrass habitats from which they were taken. The samples were similar throughout the study area, apart from samples with seagrass present and grain size. The taxa that were found were mostly linked to low pollution and healthy macrofaunal populations.

The infauna sampling locations for Route 2 (Shuweihat) Landfall are presented in Figure 6-34.

Figure 6-34 – Benthic Infauna Sampling Sites

Benthic infauna analysis showed a total of 354 individuals with an average of 50.6 individuals per sample with the highest abundance at IN 2 with 107 individuals and lowest at Inf 1 with 20 individuals, see Table 6-18.

Table 6-18 – Infauna List and Enumeration in Route 2 (Shuweihat) Landfall

Taxa	IN1	IN2	IN3	IN4	IN5	IN6	IN7	Total
Amphipoda								
Ampelisca spp.	1	9	5	4	10	10	6	45
Caprella sp.		1				1		2
Ceradocus sp.		1			1	2		4
Leucothoe sp.					1			1
Urothoe sp.				14	1	1	1	17
Anthozoa								
Actiniaria sp.					1			1
Copepoda								
Calanoid	3							3

Cumacea								
Cumopsis sp.		6	1		1			8
Decapoda								
cf *Diogenes* sp.				1				1
cf *Petrolisthes* sp.						1		1
Echinodermata								
Ophiuroidea		1				2		3
Mollusca								
Acrosterigma sp.		1						1
Bassina sp.	1							1
Niso sp.		1						1
Paphia sp.		1						1
Rhinoclavis sp.	1							1
Tellina sp.	1	5	1	1	1			9
Mysida								
Gastrosaccus sp.		1						1
Nemertea								
Nemertea gen.spp.						1		1
Platyhelminthes								
Acoelomorpha gen.spp		3			4	1		8
Polychaeta								
Ampharetidae		1					3	4
Capitellidae	1	4						5
Chrysopetalidae (*Chrysopetalum* sp.)		15			2	7	1	25
Dorvilleidae (*Dorvillea* sp.)					6		3	9
Flabelligeridae (*Pherusa* sp.)		6						6
Hesionidae				1	1	1		3
Lumbrineridae			1				1	2
Magelonidae (*Magelona* sp.)	2		10	2				14
Nephtyidae (*Nepthys* sp.)		1	1		5	5		12

Nereididae (*Nereis* sp.)							2	2
Opheliidae (*Armandia* sp.)				1				1
Opheliidae (*Ophelia* sp.)	1	1						2
Orbiniidae				1			2	3
Paraonidae (*Aricidea* sp.)		14		1				15
Phyllodocidae		1				3		4
Pilargidiidae		1						1
Poecilochaetidae	1							1
Polynoidae		6						6
Sabellidae		8				2	2	12
Serpulidae (*Hydroides* sp.)		2			6	4		12
Spionidae (*Aonides* sp.)							1	1
Spionidae (*Prionospio* spp.)	3	5	6		3	6	13	36
Spionidae (*Scolelepis* sp.)							1	1
Syllidae (*Exogone* sp.)	1						3	4
Syllidae (*Syllis* spp.)		3	16	5			12	36
Trichobranchidae (*Terebellides* sp.)		1						1
Sipuncula								
Golfingia sp.	4	7	5		3		4	23
Phascolion sp.						1		1
Tanaidacea								
cf *Apseudes* sp.		1		1				2
Total	20	107	46	32	46	48	55	354

Sample pictures of the most common taxa are from Figure 6-35 to Figure 6-42.

Figure 6-35 – Amphipoda *(Ampelisca* sp.)

Figure 6-36 – Spionidae (*Prionospio* sp.)

Figure 6-37 – Paraonidae (*Aricidea* sp.)

Figure 6-38 – Syllidae (*Syllis* sp.)

Figure 6-39 – Hesionidae

Figure 6-40 – Flabelligerdae (*Brada* sp.)

Figure 6-41 – Dorvilleidae *(Dorvillea* sp.)

Figure 6-42 – Chrysopetallid*ae (Chrysopetalum* sp.)

6.4.5 Marine Mammals and Reptiles

The coverage of the Marine Mammals and Reptiles surveys, including incidental observations, from 2nd to 4th 2022 are presented in Figure 6-43.

Figure 6-43 – MMRO Observation Tracks at Route 2 (Shuweihat) Landfall

6.4.5.1 MMRO Observation

During survey, no significant sea turtle activity was observed in the area except for three (3) surface breaks created when turtle takes a breath. The predominant marine turtle species found in the UAE are the hawksbill turtle (*Eretmochelys imbricata*) and the green turtle (*Chelonia mydas*). Both species are known to use the UAE coastline for foraging and nesting with primary foraging habitat including shallow coastal areas near coral reefs and sea grasses.

The IUCN Red List categorises the hawksbill turtle as ''Critically Endangered'' and the Green Turtle as ''Endangered''. This is due to significant and continuous global population decline. The main causes of reduced populations are over exploitation, incidental fishing mortality, and degradation of marine habitat and the nesting habitat.

Dolphins

A small pod of dolphins, with an estimated 5-8 individuals was observed during the conduct of the survey. Three observers on board the vessel one of which is JNCC certified MMRO marine biologists. The team noted the dolphin's movement but too far to take photograph documentation. The dolphins were identified as Indian Ocean Humpback dolphins (*Sousa plumbea*).

The Indian Ocean humpback dolphin, *S. plumbea*, is a dolphin species specific to Africa and the Arabian Peninsula. The most recent investigation estimates an *S. plumbea* population of 701 individuals within Abu Dhabi waters [22]. This is the largest reported population in the world. *S. plumbea* have highly specific habitat requirements, only occurring in shallow, near-shore environments. Due to this restricted habitat, *S. plumbea* are highly vulnerable to anthropogenic impacts.

S. plumbea is categorised by the IUCN Red List as ''Endangered''. As with other cetaceans, *S. plumbea* have slow reproduction rates, making populations highly sensitive to anthropogenic induced mortalities. Incidental catch and habitat degradation are the greatest threats to this species as fishing pressure and coastal development has intensified throughout its range.

Turtles

There was a total of three (3) sightings of turtles all throughout the survey in the area. All three were seen doing a quick surface break. Due to the quickness of events during the sightings, no photographic documentation was possible. The number of sightings may be considered low.

6.5 MMBR Area

The cable Route 1 starts from Mirfa, Abu Dhabi western region and ends at Al Ghallan island. The sampling sites are confined along the areas that were assessed as Gaps during the Fugro survey at MMBR. Further along the cable route, the areas were sampled by Fugro surveys previously conducted. Figure 6-44 shows the sediment sampling point along the cable route.

Figure 6-44 – Marine Sediment Quality Sampling Points at MMBR

6.5.1 Sediment Quality

6.5.1.1 Sediment Quality at MMBR

The results of laboratory sediment analysis for MMBR are presented in Table 6-19 and have been compared to the standards provided by the Abu Dhabi Quality and Conformity Council (ADQCC) [5]. Two (2) trace metals were in exceedance to the referenced standard. Sediment sampling in MMBR S5 was not undertaken because the area is consistently hardbottom.

- pH ranged from 8.8 at S2 to 9.2 at S3.
- Oil and grease, and total cyanide were below MDL whilst TN and silica were above MDL. High levels of TN ranged from 314 mg/kg (S8) to 925 mg/kg (S9). Whereas S7 had the lowest silica with 1.54 % by wt., and the highest level was 14.9 % by wt. at S6.
- Active levels above MDL were detected for fluoride and sulphate at all sampling locations. Fluoride was highest at S4 and S9 with 2.3 mg/kg and lowest at S8 with 1.3 mg/kg. Sulphate ranged from 0.51% (S8) to 0.84 % (S7). Whilst orthophosphate was detected above the MDL only at S3.
- TOC averaged at 0.65 %, with lowest value of 0.3 % at S3 and S8, and the highest value at S6 at 0.9 %.

- Of the eighteen (18) trace metals analysed, two (2) were recorded in exceedance of the ADQCC, and eleven (11) were recorded above the MDL.

- Exceedance in Arsenic (As) was detected only in S2 with 7.1 mg/kg. Two (2) locations, S6 and S9 had an exceedance with Nickel at 7.1 mg/kg and 8.2 mg/kg, respectively.

- In all sampling locations, Aluminum (Al), Barium (Ba), Chromium (Cr), Iron (Fe), Lead (Pb), Manganese (Mn), Phosphorus (P), Vanadium (V), and Mercury were detected above MDL and below the referenced standards where applicable. Whereas Cadmium (Cd), Selenium (Se), and Silver (Ag) were below MDL.

- Copper (Cu) was detected above the MDL in two (2) locations (S6 and S9), Molybdenum (Mo) in S9, Nickel (Ni) in six (6) locations (S1, S2, S3, S4, S7 and S8), Antimony (Sb) in three (3) locations (S1, S6 and S9), and Arsenic (As) in all locations except S2.

- Hydrocarbons, PAHs and PCBs were below the MDL for all sampling locations.

Table 6-19 –Sediment Quality in MMBR

Parameters	Unit	MDL	ADQCC	S1	S2	S3	S4	S5	S6	S7	S8	S9
Inorganic Parameters								No Sample				
pH	pH units	0.1		9.0	8.8	9.2	9.0		8.8	9.0	9.1	8.9
Oil and Grease	%	0.01		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01
Total Nitrogen	mg/kg	5		540	564	340	533		500	430	314	925
Silica-SiO2	% by wt	0.01		7.69	8.07	3.64	3.57		14.9	1.54	2.45	7.12
Total Cyanide	mg/kg	0.5		<0.5	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5
Anions												
Orthophosphate	mg/kg	0.3		<0.3	<0.3	0.3	<0.3		<0.3	<0.3	<0.3	<0.3
Fluoride	mg/kg	0.5		1.8	1.8	1.4	2.3		2.0	1.6	1.3	2.3
Sulphate (Acid Soluble)	%SO4	0.01		0.53	0.59	0.55	0.69		0.54	0.84	0.51	0.74
Chemical Analysis												
Total Organic Carbon	%	0.1		0.6	0.8	0.3	0.6		0.9	0.5	0.3	1.2
Metals												
Cadmium (Cd)	mg/kg	0.5	0.2	<0.5	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5
Aluminum (Al)	mg/kg	130	-	1140	1340	750	493		1850	232	816	2020
Arsenic (As)	mg/kg	1.0	7	6.9	7.1	2.2	4.6		5.6	3.9	4.9	6.3
Barium (Ba)	mg/kg	3.0	-	16.0	16.3	11.0	10.0		14.5	9.2	12.0	13.4
Chromium (Cr)	mg/kg	1.0	11	6.2	6.5	4.3	2.4		8.0	1.4	4.4	8.3
Copper (Cu)	mg/kg	3.0	20	<3.0	<3.0	<3.0	<3.0		3.2	<3.0	<3.0	4.1

Parameters	Unit	MDL	ADQCC	S1	S2	S3	S4	S5	S6	S7	S8	S9
Iron (Fe)	mg/kg	70	-	1240	1440	704	491		1850	286	892	2010
Lead (Pb)	mg/kg	1.0	5	1.2	1.4	1.1	1.4		1.7	1.2	1.4	1.4
Manganese (Mn)	mg/kg	3.0	-	41.9	45.8	29.8	23.2		59.9	19.0	37.7	51.1
Molybdenum (Mo)	mg/kg	3.0	-	<3.0	<3.0	<3.0	<3.0		<3.0	<3.0	<3.0	3.6
Nickel (Ni)	mg/kg	1.0	7	4.5	5.4	2.6	2.1		7.1	1.3	3.0	8.2
Phosphorus (P)	mg/kg	50	-	263	261	253	258		272	279	251	224
Selenium (Se)	mg/kg	3.0	-	<3.0	<3.0	<3.0	<3.0		<3.0	<3.0	<3.0	<3.0
Silver (Ag)	mg/kg	10	-	<10	<10	<10	<10		<10	<10	<10	<10
Vanadium (V)	mg/kg	1.0	-	6.9	7.5	6.1	3.6		9.3	2.1	5.8	9.0
Zinc (Zn)	mg/kg	3.0	70	4.0	4.5	<3.0	<3.0		5.3	<3.0	<3.0	6.0
Antimony (Sb)	mg/kg	1.0		1.1	<1.0	<1.0	<1.0		1.4	<1.0	<1.0	1.0
Mercury (Hg)	mg/kg	0.010	0.2	0.015	0.015	0.011	0.012		0.015	0.012	0.012	0.021
Hydrocarbons												
VPH C5-C10	mg/kg	0.05		<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05	<0.05
EPH C10-C40	mg/kg	50		<50	<50	<50	<50		<50	<50	<50	<50
PAHs			Total PAHs=1.7									
Acenaphthene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01
Acenaphthylene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01
Anthracene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01

Parameters	Unit	MDL	ADQCC	S1	S2	S3	S4	S5	S6	S7	S8	S9
Benzo(a)pyrene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01
Benzo(b)fluoranthene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01
Benzo(g,h,i)perylene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01
Benzo(k)fluoranthene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01
Chrysene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01
Dibenzo(a,h)anthracene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01
Fluoranthene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01
Fluorene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-c,d)pyrene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01
Naphthalene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01
Phenanthrene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01
Pyrene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01
PCBs			Total PCBs=0.22									
2,2`,3,3`,4,4` - Hexachlorobiphenyl (PCB 128)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01
2,2`,3,3`,4,4`,5 - Heptachlorobiphenyl (PCB 170)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01
2,2`,3,3`,4,4`,5,5`,6,6` - Decachlorobiphenyl	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01

Parameters	Unit	MDL	ADQCC	S1	S2	S3	S4	S5	S6	S7	S8	S9
2,2`,3,3`,4,4`,5,5`,6-Nonachlorobiphenyl (PCB 206)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01
2,2`,3,3`,4,4`,5,6 - Octachlorobiphenyl (PCB 195)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01
2,2`,3,4`,5,5',6 - Heptachlorobiphenyl (PCB 187)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01
2,2`,3,4,4`,5` - Hexachlorobiphenyl (PCB 138)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01
2,2`,3,4,4`,5,5` - Heptachlorobiphenyl (PCB 180)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01
2,2`,3,5` - Tetrachlorobiphenyl (PCB 44)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01
2,2`,4,4`,5,5` - Hexachlorobiphenyl (PCB 153)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01
2,2`,4,5,5` - Pentachlorobiphenyl (PCB 101)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01
2,2`,5,5` - Tetrachlorobiphenyl (PCB 52)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01
2,2`,5 - Trichlorobiphenyl (PCB 18)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01
3,3`,4,4` - Tetrachlorobiphenyl (PCB 77)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01

Parameters	Unit	MDL	ADQCC	S1	S2	S3	S4	S5	S6	S7	S8	S9
3,3`,4,4`,5 - Pentachlorobiphenyl (PCB 126)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01
2,3`,4,4` - Tetrachlorobiphenyl (PCB 66)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01
2,3`,4,4`,5 - Pentachlorobiphenyl (PCB 118)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01
2,3,3`,4,4` - Pentachlorobiphenyl (PCB 105)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01
2,4` - Dichlorobiphenyl (PCB 8)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01
2,4,4` - Trichlorobiphenyl (PCB 28)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01

Note: Red values represent exceedance of the standard; Blue values represent above MDL. The ADQCC values shown are allowable concentrations for Marine Protected Use Areas

6.6 Marine Ecology

6.6.1 Benthic Habitat

The marine habitats identified across the study area were classified using the Environment Agency Abu Dhabi (EAD) Habitat Classification [8] and Marine Ecological Classification Standard (CMREC) Scheme. Based on the results of the marine ecology surveys, five (5) core habitats are present in the survey area and as follows:

- Unconsolidated Bottom: 14000
- Dredged Seabed: 16100
- Seagrass Bed: 12000
- Macroalgae communities: 13010
- Hardbottom: 13000

The distribution of different habitats in the survey area is shown in Figure 6-46 whilst examples of the benthic habitat found during marine ecology surveys using DDVD method are presented in Table 6-20. In addition, the description of each habitat type including associated flora and fauna is discussed in the sections below.

Figure 6-45 – DDV Deployment Location at MMBR

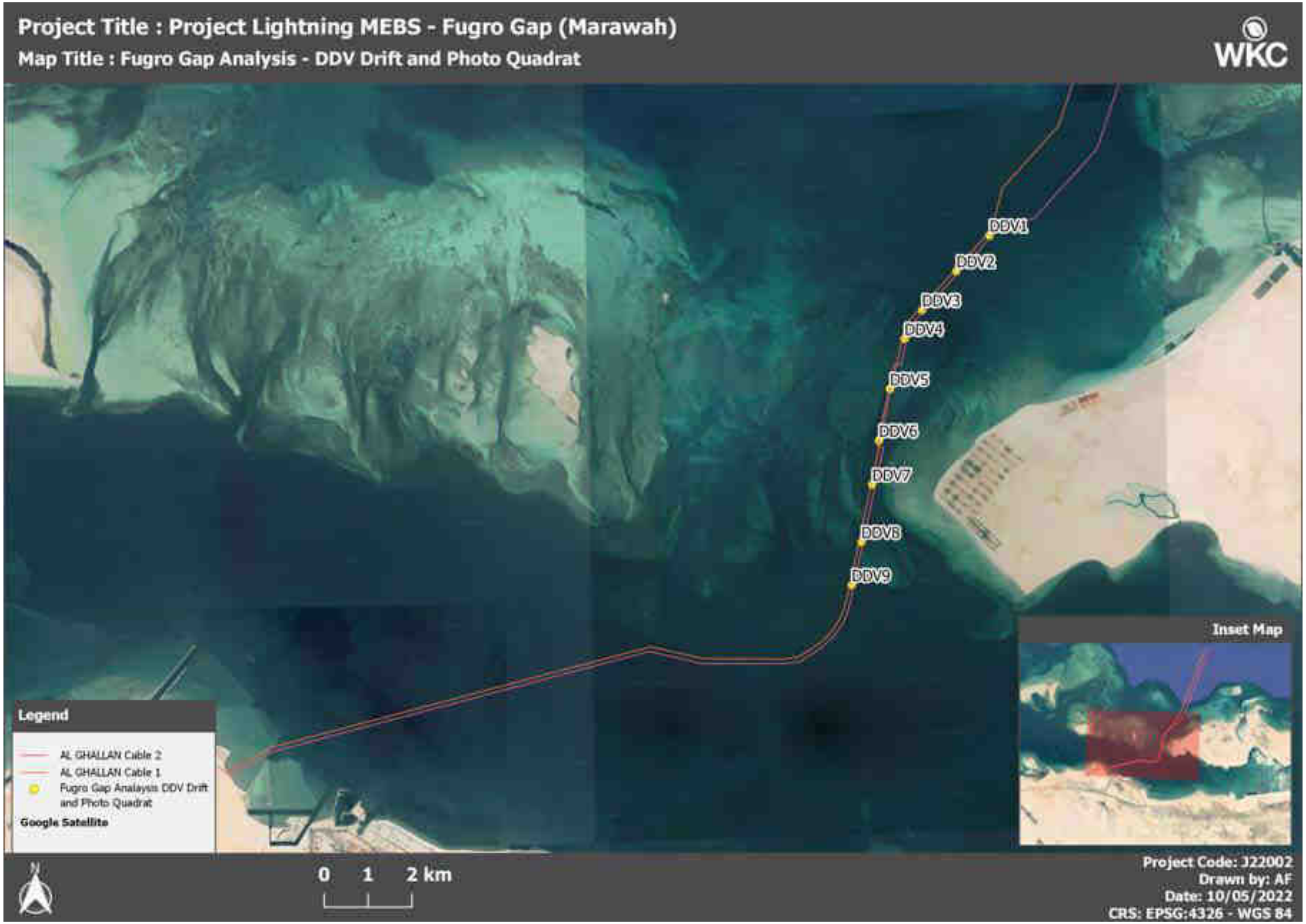


Table 6-20 – DDV Results at MMBR

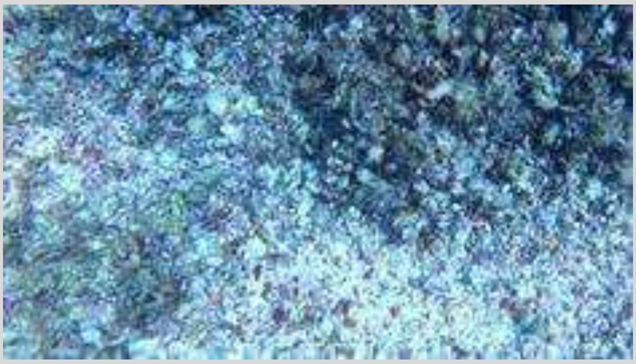
DDV1	
	
	
DDV2	
	

DDV3

DDV4




DDV 5

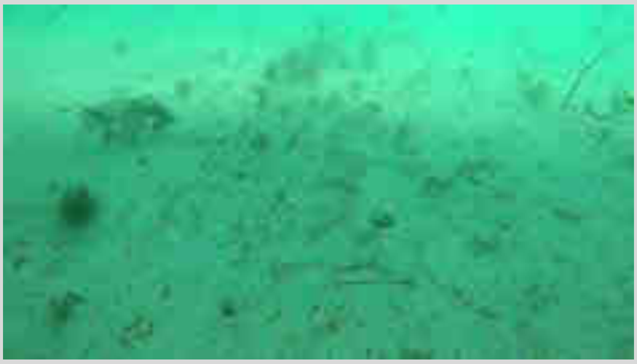
DDV6

DDV 7


DDV8


DDV9

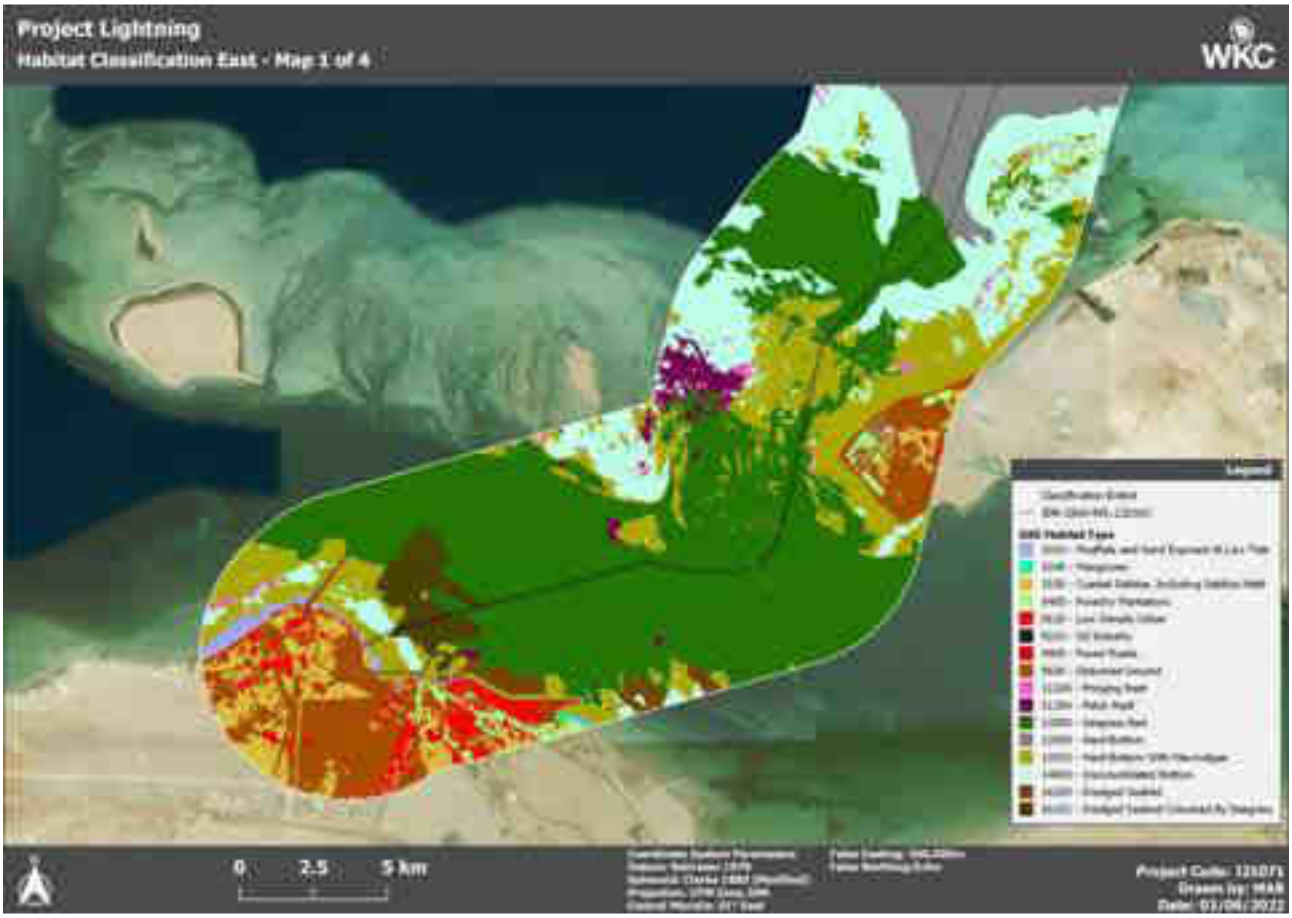



The results of the photo quadrat are provided in Table 6-21.

Table 6-21 – MMBR Photo Quadrat Results

Photo Quadrat Number	Seagrass (%)	Sand (%)	Hardbottom (%)	Rubbles and Shells (%)	Macro Algae (%)	Total (%)
PQ1	100	0	0	0	0	100
PQ2	78.65	20.1	1.25	0	15	100
PQ3	100	0	0	0	0	100
PQ4	0	10.93	89.06	0	0	100
PQ5	0	0	100	100	0	100
PQ6	0	0	64.06	0	35.93	100
PQ7	0	100	0	0	0	100
PQ8	0	100	70	0	0	100
PQ9	73	24	3	0	0	100

Figure 6-46 –Habitat Map of MMBR and Surrounding areas



6.6.1.1 Unconsolidated Bottom

The unconsolidated bottom habitat in this area is characterized by coarse sand often intermixed with shells fragments and rubbles, see Figure 6-47. These open areas of sand are sometimes defined and not heavily colonised by seagrass or algae largely due current movement that is demonstrated by ripple streak patterns in the sand.

These areas contain a lower abundance of marine life as fish and invertebrates prefer the more productive and sheltered environment provided by nearby seagrass and macroalgae and hard bottom areas.

Figure 6-47 – Unconsolidated Bottom (Sandy)

6.6.1.2 Dredged Seabed

A dredged channel is located on a water way, extending Mirfa channel trough between a shoal and an island going north to Zakum. An example of Dredged Seabed in the Project area is presented in Figure 6-48. The current navigational channel is providing vessel access to the landing crafts, and private boats. DDVs and sediment analysis in this area confirmed substrate typical of dredged seabed. The sediment ranges from a sand to coarse sand substrate. Areas of this dredged channel is void of marine invertebrates including bivalves, sponges, algae, and corals.

Figure 6-48 – Dredged Seabed

6.6.1.3 Seagrass Bed

Seagrasses are well represented throughout the survey Site. Areas range from dense seagrass meadows to sparse seagrass patches. Grazing marks made by dugong are found in the seagrass bed of this area, Figure 6-49. The three (3) species identified were *Halophila stipulacea*, *Halophila ovalis and Halodule uninervis*. These species are adept at colonising areas of unconsolidated bottom due to fast propagation rates and tolerance to varying environmental conditions. The seagrass beds are often inter-mixed with macro algae and sparse sponges.

Figure 6-49 – Seagrass Bed

This ecologically valuable habitat provides foraging for many organisms including endangered species such as sea turtles and dugongs. Sand sediments within seagrass beds support a greater diversity and abundance of benthic fauna than open sand substrates [9]. Many commercially important species such as fish, shrimps, and oysters also utilise seagrass beds as nursery and foraging grounds.

The rhizome and root system of a seagrass bed stabilises loose sediment and organic materials. This leads to improved water clarity and reduced erosion. Seagrasses are highly productive photosynthetic plants and as such, they contribute significant amounts of oxygen that become available for consumption by other marine life.

6.6.1.4 Macroalgae Communities

A significant macroalgae meadow was observed in several areas within the survey site, comprising of a mono species bed or mixed with seagrass beds. An example of macroalgae meadow at the survey area is presented in Figure 6-50. This macroalgae community covers a wide area and contains many large macroalgae plants including a variety of species are present mainly from the groups Chlorophyta (green algae) Rhodophyta (Red algae) and Phaeophyceae (brown algae). *Sargassum sp.* was observed to be a dominant species in certain sites of the surveyed area.

Figure 6-50 – Hardbottom with Macroalgae Bed

6.6.1.5 Dredged Wall

In general, marine benthic formations are created after dredging activities. Formation of habitat typical commenced at the walls of the dredging footprint. The wall can be vertical or rapidly inclining in orientation. As water current move along these structures, scouring may happen creating crevices and crannies as well as exposing hard substrates. These hard structures undergo benthic community succession and will develop into a diverse habitat with sponges, corals, algae, bivalves etc. The dredge wall was seen along DDV location.

Oftentimes along this dredge wall is a diverse aggregation of reef associated fish species. An ecologically developed dredge wall can be a proxy to a coral reef since a rich biomimicry substrate formation can be achieved. During the survey bivalves is the dominant marine invertebrate observed.

6.6.1.6 Hardbottom

During the survey hardbottom substrates were observed in various areas of the bay. An examples hardbottom habitats are presented in Figure 6-51. This habitat type is devoid of seagrasses and has a well-defined boundary. In addition, sessile marine organisms were noted to colonise the substrate like macro algae, corals, tunicates, and bivalves. Hard bottom substrates provide opportunity for coral growth thus considered an important natural marine habitat. This habitat also provide stability to the seabed that will facilitate continuity of benthic colonization until climax community is achieved.

Table 6-22 – DDVD Benthic Habitat Observations at MMBR

Location	Unconsolidated Bottom (Sandy)	Seagrass	Corals	Macro - algae	Bivalve Bed	Hard Bottom	Description
DDV 1		X		X			Rich seagrass meadow intermixed with macroalgae with population of pearl oysters. Grazing tracks seen produced by dugong.
DDV 2		X		X			Rich seagrass meadow intermixed with macroalgae

Location	Unconsolidated Bottom (Sandy)	Seagrass	Corals	Macro - algae	Bivalve Bed	Hard Bottom	Description
							with population of pearl oysters. Grazing tracks seen produced by dugong.
DDV 3		X		X			Rich seagrass meadow intermixed with macroalgae with population of pearl oysters. Grazing tracks seen produced by dugong.
DDV 4	X	X		X	X	X	A Mosaic of Hard bottom with seagrass colonizing open sand patches, corals and coral structures were observed
DDV 5			X	X	X	X	Bivalve beds and Hardbottom with rocks colonized by bivalves. A coral and coral structures were observed
DDV 6			X	X	X	X	Hardbottom with bivalve beds and macro algal community. Coral and coral structures were observed
DDV 7	X						Hard sand bottom
DDV 8	X						Sandy bottom with shell fragments
DDV 9	X	X					Seagrass bed with open patches of sand

Figure 6-51 – Hardbottom with Bivalve Bed

6.6.2 Benthic Community (Flora and Fauna)

Table 6-22 provides a summary of the habitats investigated through DDV. The various benthic flora and fauna species as well as the natural benthic substrate observed through the survey methods are also included in the table below.

6.6.2.1 Seagrass

At the survey area inside MMBR, three (3) species of seagrass were identified, *Halophila stipulacea*, *Halophila ovalis* and *Halodule uninervis* whilst both species were widely distributed, *H. uninervis* appears to be the dominant species. The seagrass beds are widely distributed west side of the route line. On these seagrass meadows Dugong grazing marks are noted.

H. stipulacea, H. ovalis and *H. uninervis* are widely distributed in tropical areas and are listed as Least Concern by the IUCN Red List. *H. ovalis* is characterised by a round leaf shape and is commonly known as spoon grass or paddle weed. *H. uninervis* is characterised by long, thin leaf blades like many terrestrial grasses. Both species are primary food sources for dugong and sea turtles [14].

6.6.2.2 Invertebrates

Invertebrate species were observed along the dredge wall and the shallow hard bottom habitat found east of the cable route. Species include sea urchins, gastropods, bivalves, sponges, and tunicates. A summary of macro invertebrates observed is in the study area is provided in Table 6-23.

Table 6-23 – List of Invertebrates Found in the MMBR Study Area

Common Name	Scientific Name
Collectors Sea Urchin	*Tripneustes* sp.
Long Spined Sea Urchin	*Diadema setosum*
Sponge	Demospongiae

Tunicate	*Phallusia nigra*
Gastropods	*Cerithriidae sp.*
Pearl Oyster	*Pinctada radiata*

6.6.2.2.1 Sponges

Sponges are the simple multi-cellular organism that are very diverse in size, structure, and colour. Sponges in the study area are well distributed colonizing both the Seagrass habitat and the Hard bottom habitat of the study area. One of their ecological function is acting as sediment stabilisers and aid in reef creation through substrate consolidation [15]. Aso, juvenile fish and invertebrates benefit from the microhabitat provided by sponge aggregations utilising them for protection and as a food source.

6.6.2.2.2 Bivalves

Bivalves found in the MMBR study area belongs to the Family Spondyllidae, these organisms attached to hard substrate and would heavily colonized and area forming a mat or bed. They are found east of the cable channel and the colony has a wide expanse on the hard bottom substrate provided. These bivalves are primary feeders, filtering in organic materials and prefer to grow in areas with strong currents which prevails at the study site.

Borrowing and solitary bivalves living among seagrasses were found on the surveyed site. One of these is the pearl oyster (*Pinctada* sp.) which was noted to be present in the survey area. Pinctada is an important bivalve in the region as it is entwined with UAE's pearling culture history.

6.6.2.2.3 Sea Urchin

The two species of urchins: Collector sea urchin *(Tripneustes* sp.) and Long spine urchin (*Diadema setosum)*) were found in the area. *Tripneustes* sp., are algae eaters. They live on open sea bottom and uses collected pebbles to conceal themselves from predators. During the survey, *Diadema setosum* urchins were seen aggregating in large numbers. This could be a spawning period for these species. Sea urchins are ecologically important due to their herbivorous behaviour consuming vast amounts of turf algae, allowing other organisms, such as corals, to settle and propagate.

6.6.3 Fish

A fish study was undertaken using Baited Remote Underwater Video (BRUVs) as presented in Figure 6-52. Most species identified were pelagic and reef-associated fishes. A number of these species are considered commercially important in the UAE.

Figure 6-52 – BRUV Deployment Location at MMBR

Fish species that were identified during the survey includes the Grouper, King mackerel and Orange-spotted trevally. Table 6-24 provides a list of all species identified at each survey location. Also, there is a high population of blue swimmer crab observed in the area. BRUV recorded low number of fish and species at the time of the survey. These habitat types (Hardbottom and Seagrass) typically provide shelter and foraging opportunities.

Table 6-24 – List of Fish Species Observed at MMBR

Common Name	Scientific Name	BRUV 1	BRUV 2	BRUV 3
Yellow Bar Angelfish	*Pomacanthus maculosus*		X	
Orange-Spotted Grouper	*Ephinephelus cocoides*		X	
Ehrenberg Snapper	*Lutjanus ehrenbergii*		X	
Orange-Spotted Trevally	*Carangoides bajad*	X	X	
Grunt	*Haemulon plumierii*		X	
Two Bar Seabream	*Acanthopagrus bifasciatus*		X	
Silver Biddy	*Gerres subfasciatus*		X	
Blue Swimmer Crab	*Portunus pelagicus*			X
Reticulate Whipray or Coach	*Himantura uarnak*	X		

Fish species documented through BRUV at MMBR are presented in Table 6-25.

Table 6-25 – BRUV Results at MMBR

BRUV 1	
	


BRUV 2







BRUV 3


6.6.4 Marine Mammals and Reptiles

Marine Mammal and Reptiles condition at MMBR survey points were discussed together with in the MMRO Route 1 (Mirfa) Landfall survey section.

6.7 Zakum Cluster

6.7.1 Seawater Quality

Water quality included in-situ and ex-situ water quality samples. Sampling was conducted on 20th to 22nd of May 2022. Samples were sent to an accredited laboratory for analysis. The laboratory reports of the marine water ex-situ quality assessment are provided in Appendix A.

6.7.1.1 In-situ Seawater Quality

The in-situ water quality sampling sites are presented in Figure 6-53 whilst measurement results are provided in Table 6-26 and Table 6-27. Note that variation between sites was minimal across all parameters. Furthermore, all parameters are within the expected ranges and indicate high water quality. Parameters were qualified against the EAD AWQO where applicable [4]. The results of the in-situ water measurements are summarized below.

Figure 6-53 –Seawater and Sediment Sampling Locations at Zakum Cluster Rerouting Areas

Zakum Cluster Route 1-A (Rerouting Area)

The in-situ water quality in Zakum Cluster Route 1-A is summarised in Table 6-26. Results from the survey were qualified against the EAD AWQO [4]. All the parameters were compliant with their applicable referenced standards and within the expected range for the Arabian Gulf during the summer season.

- Water Temperature was similar over the sampling area with little difference with depth. Temperature ranged from 27.30 °C at WSQ5 B to 28.90 °C at WSQ1 T, with an average of 27.83 °C. Water temperature was within the range expected for the Arabian Gulf during summer season. The temperature in Arabian Gulf fluctuates as much as 15 °C between winter and summer. The stability in readings suggest the absence of thermocline but rather of a well-mixed water column.

- Redox Potential had positive values for all readings with an average of 67.40 mV, ranging from 25.80 mV to 110.70 mV. A positive redox potential is an indicator of good water quality with higher values indicating better water conditions.

- pH was similar for all locations with an average of 8.10 which is within the expected range.

- Dissolved oxygen was high in all recordings ranging from 6.08 mg/L at WSQ9 M to 6.42 at WSQ8 B. The project location is highly influenced by tidal currents and good water exchange resulting in good DO concentrations.

- Salinity levels were consistent across locations and depth with an average of 40.77 ppt, which is within the expected range for the Arabian Gulf. The salinity levels in the region range between 39-50 ppt and can reach up to 60 ppt in areas such as isolated lagoons during summer season. Similar with the temperature profile, the absence of salinity stratification suggests a well-mixed water column.

  The related parameters such as conductivity and total dissolved solids (TDS), showed similar results to salinity with little differences between sites and depths.

- Turbidity readings were very low ranging from <0.1 to 2.70 NTU and within the reference standard value, implying a good-water visibility.

- The deepest sampled area was at WSQ5 and shallowest at WSQ8. All the sampled areas are more than 10 meters thus 3 levels along the water column were sampled. In deploying the Secchi Disc the highest water clarity was recorded at WSQ9 with 7.6 metersd and the least clarity was at WSQ5 at 6.5 meters. Water clarity in the area was high, typical of Arabian Gulf offshore waters.

Table 6-26 – In-situ Water Quality Profile at Zakum Cluster Route 1-A

Location		Temperature	Redox	pH	DO	Conductivity	TDS	Salinity	Turbidity	Depth	Water Clarity
Unit		**°C**	**mV**	**pH units**	**mg/L**	**µS/cm**	**g/L**	**ppt**	**NTU**	**m**	**m**
EAD AWQO		**±3** of background concentration	**-**	**6.5 – 8.5**	**>4**	**-**	**-**	**<5%** of background concentration	**10**		
WSQ1	T	28.90	51.60	8.20	6.15	85.36	55.48	40.80	0.5	18	7.5
	M	27.90	66.20	8.20	6.26	85.46	55.55	40.80	0.5		
	B	27.80	69.20	8.10	6.26	86.49	56.22	40.50	1.2		

	T	28.60	55.80	8.20	6.18	85.52	55.59	40.40	1.4		
WSQ2	M	28.00	61.20	8.10	6.24	85.49	55.57	40.50	0.8	16	7.0
	B	27.80	63.90	8.10	6.25	86.62	56.30	41.10	0.8		
	T	28.50	25.80	7.80	6.18	85.17	55.36	40.60	2.7		
WSQ3	M	27.80	33.30	8.00	6.25	86.41	56.17	40.90	1.3	16	7.2
	B	27.60	37.00	8.10	6.22	87.04	56.57	41.00	1.6		
	T	28.10	27.90	8.10	6.22	85.62	55.65	40.60	2.4		
WSQ4	M	27.80	33.80	8.10	6.26	86.24	56.05	40.70	0.8	18	7.0
	B	27.60	37.60	8.10	6.27	87.03	56.57	41.40	0.8		
	T	28.00	101.00	8.10	6.24	85.65	55.67	40.60	0.4		
WSQ5	M	27.40	100.90	8.10	6.18	87.52	56.89	40.60	0.7	21	6.5
	B	27.30	100.70	8.10	6.18	87.73	57.03	41.10	0.7		
	T	27.80	110.70	8.10	6.25	85.44	55.53	41.20	1.2		
WSQ6	M	27.60	110.40	8.20	6.30	85.89	55.83	40.40	0.9	16	7.0
	B	27.50	109.70	8.10	6.30	86.19	56.02	40.70	1.1		
	T	27.60	86.50	8.10	6.27	86.16	56.00	40.70	1.5		
WSQ7	M	27.50	85.80	8.10	6.28	86.55	56.26	40.60	1.6	14	7.1
	B	27.50	86.10	8.10	6.26	86.67	56.33	40.70	0.5		
	T	27.90	80.20	8.00	6.39	80.01	52.01	40.80	2.5		
WSQ8	M	27.60	85.80	8.10	6.39	85.92	55.84	40.70	0.3	13	6.8
	B	27.50	86.00	8.10	6.42	86.35	56.12	40.60	0.9		
	T	27.50	86.60	8.10	6.31	86.12	55.97	40.70	0.7		
WSQ9	M	28.50	42.90	8.10	6.08	85.27	55.42	40.70	1	15	7.6
	B	28.00	45.70	8.10	6.17	86.15	55.99	41.00	1.1		
	T	27.60	50.00	8.10	6.24	86.74	56.38	41.10	<0.1		
WSQ10	M	28.00	43.60	8.10	6.19	85.98	55.89	40.70	<0.1	16	7.2
	B	27.60	46.00	8.10	6.24	86.63	56.31	40.80	<0.1		
Average		27.83	67.40	8.10	6.25	85.98	55.89	40.77	1.11	16.3	7.09
Minimum		27.30	25.80	7.80	6.08	80.01	52.01	40.40	<0.1	13	6.5
Maximum		28.90	110.70	8.20	6.42	87.73	57.03	41.40	2.70	21	7.5

Zakum Cluster Route 1-B (Rerouting Area)

Results from the survey were qualified against the EAD AWQO [4] where applicable. In Situ Marine water quality measurements at Zakum Cluster Route 1-B are provided in Table 6-27. No parameters were in exceedance of the EAD AWQO and results were within the expected range for the Arabian Gulf during summer.

- Temperature profiles for the area ranged from 27.30 at WSQ 13 T & M to 28.90 °C at WSQ12 T, with an average of 27.75 °C. The readings of all the sampling locations revealed generally stable temperature. The recorded temperature range was expected normal for the sampling season.

- Redox Potential had positive values for all readings ranging from 10.60 mV (WSQ15 B) to 114.50 mV (WSQ17 M), with an average of 69.54 mV. A positive redox potential is an indicator of good water quality with higher values indicating better water conditions

- pH levels were in the compliant range for the site with an average of 8.11.

- Dissolved Oxygen (DO) is compliant with the referenced standard with an average of 6.29 mg/L

- Salinity profiles ranged between 40.20 ppt to 41.10 ppt across the sampling locations, with an average of 40.56 ppt. Salinity was generally similar with minimal variations the salinity range in the study site is considered normal for the time of sampling.

  The salinity related parameters such as conductivity and total dissolved solids (TDS), followed the same trend. The averages of these monitoring parameters are as follows: conductivity with 85.31 µS/cm and TDS with 55.45 g/L.

- Turbidity values were very minimal ranging from <0.1 NTU to 2.70 NTU, compared to the referenced standard of 10 NTU. This implies a good water visibility and light penetration.

- The shallowest sampled site was at WSQ20 at 15 meters and deepest at WSQ14 at 24 meters. All the sampled areas are more than 10 meters thus three levels along the water column were sampled. Water clarity was highest at 7.8 meters and the lowest clarity measurements was at WSQ17 at 6.7 meters. There were no observed algal blooms that may affect water clarity thus the high Secchi disc measurement reading.

Table 6-27 – In-situ Water Quality Profile at Zakum Cluster Route 1-B

Location		**Temperature**	**Redox**	**pH**	**DO**	**Conductivity**	**TDS**	**Salinity**	**Turbidity**	**Depth**	**Water Clarity**
Unit		**°C**	**mV**	**pH units**	**mg/L**	**µS/cm**	**g/L**	**ppt**	**NTU**	**m**	**m**
EAD AWQO		**±3** of background concentration	**-**	**6.5 – 8.5**	**>4**	**-**	**-**	**<5%** of background concentration	**10**		
WSQ11	T	28.80	30.30	8.10	6.15	85.56	55.61	40.30	<0.1		

	M	28.10	37.90	8.10	6.20	86.01	55.91	40.40	<0.1	18	7.4
	B	27.90	40.70	8.10	6.22	86.83	56.44	41.10	<0.1		
WSQ12	T	28.90	91.80	8.20	6.17	84.84	55.14	40.30	0.4	22	7.8
	M	27.90	98.80	8.10	6.29	85.89	55.82	40.40	<0.1		
	B	27.70	100.30	8.10	6.31	86.74	56.38	40.90	<0.1		
WSQ13	T	27.30	70.10	8.10	6.46	85.62	55.65	40.50	0.5	21	7.1
	M	27.30	71.40	8.10	6.46	86.34	56.12	40.70	2.7		
	B	27.40	73.30	8.20	6.46	86.77	56.40	40.80	0.1		
WSQ14	T	27.70	30.90	8.10	6.29	85.41	55.52	40.50	0.8	24	6.8
	M	27.60	36.60	8.20	6.34	86.21	56.03	40.30	0.9		
	B	27.40	43.30	8.10	6.30	87.19	56.67	40.90	0.5		
WSQ15	T	28.00	16.40	8.10	6.28	84.71	55.06	40.20	0.8	19	7.1
	M	27.90	12.20	8.10	6.29	84.34	54.82	40.50	0.6		
	B	27.80	10.60	8.10	6.27	86.39	56.15	40.50	0.6		
WSQ16	T	27.90	56.20	8.10	6.68	64.58	41.97	40.50	<0.1	22	7.0
	M	27.80	57.30	8.10	6.27	85.64	55.66	40.50	1.4		
	B	27.80	57.50	8.10	6.27	85.67	55.68	40.50	1		
WSQ17	T	27.80	99.30	8.10	6.22	85.98	55.88	40.50	<0.1	16	6.7
	M	27.50	114.50	8.10	6.34	85.10	55.31	40.50	<0.1		
	B	27.50	111.90	8.10	6.30	85.58	55.62	40.40	<0.1		
WSQ18	T	27.50	109.60	8.10	6.26	86.57	56.27	40.60	<0.1	14	7.2
	M	28.10	100.40	8.10	6.18	85.46	55.54	40.60	0.9		
	B	27.80	99.70	8.10	6.21	85.96	55.87	40.60	1.5		
WSQ19	T	27.60	104.40	8.10	6.25	86.46	56.20	40.60	<0.1	18	7.2
	M	27.40	103.90	8.10	6.29	86.85	56.45	40.60	1		
	B	27.60	103.80	8.10	6.26	86.35	56.13	40.70	<0.1		
WSQ20	T	27.40	48.70	8.10	6.27	86.96	56.52	40.80	1	15	7.4
	M	27.40	49.10	8.10	6.27	86.97	56.53	40.70	2.5		
	B	27.80	105.20	8.10	6.20	86.20	56.03	40.50	<0.1		
Average		27.75	69.54	8.11	6.29	85.31	55.45	40.56	1.01	18.9	7.17
Minimum		27.30	10.60	8.10	6.15	64.58	41.97	40.20	0.10	14	6.7

Maximum	28.90	114.50	8.20	6.68	87.19	56.67	41.10	2.70	24	7.8

6.7.1.2 Ex-situ Seawater Quality

The recorded concentrations of ex-situ parameters were compared to the EAD AWQO [4] and ADQCC [5] where applicable. The survey locations at Zakum Cluster Rerouting Areas are considered to constitute a Marine Protected Use Area.

Zakum Cluster Route 1-A (Rerouting Area)

The results of ex-situ analysis of seawater quality at Zakum Cluster Route 1-A indicate that most of the parameters were in compliance with their applicable limits, except for nitrate and three (3) trace metals (Copper, Lead and Zinc) as shown in Table 6-28 (for locations SWQ1-WSQ5) and Table 6-29 (for locations WSQ6 -WSQ10Table 6-11. The summary of the results is discussed below:

- Among inorganic parameters, only Total Dissolved Solids (TDS) and Total Nitrogen (TN) had an active level. TDS was recorded in order of magnitude above MDL ranging from 45,500 mg/L to 46,400 mg/L, as compared to the MDL of 5 mg/L. This is expected because of high salinity levels in the Gulf. Whereas TN were recorded below and above MDL ranging from <0.5 mg/L to 5.3 mg/L.

- For anions, orthophosphate was below MDL whilst sulphate and chloride concentrations exceeded the MDL by order of magnitude. Sulphate ranged from 3,060 mg/L to 3,120 mg/L whilst chloride ranged from 22,700 mg/L to 23,800 mg/L. Sulphate concentration in the Arabian Gulf seawater has been reported between 3,200 mg/L and 3,271 mg/L whilst chloride is between 21,933 mg/L to 22, 014 mg/L [7].

  Nitrate concentrations ranged from <0.04 mg/L to 18.6 mg/L. Exceedances were recorded against the EAD AQWO standard of 0.095 mg/L. Exceedances were recorded at eight (8) sampling locations such as: WSQ2 M; WSQ3 T& M; 5 T; WSQ WSQ4 T & B; WSQ6 B; WSQ7 T, WSQ8 T; and WSQ10 B. Summer season is likely to have lower nitrate concentration due to uptake of phytoplankton, and mostly available in the surface layer due to nitrification. The recorded exceedances may be attributed sample contamination with nitrogen-fixing organisms and/or other sources such as aerosols/atmospheric nitrate and diffusive mixing that transports nitrate.

- BOD was below MDL and its referenced standard whilst COD ranged from <5 mg/L to 30 mg/L, although there no existing standard for COD. On the other hand, TOC was similar across the project locations ranging from 1.4 mg/L to 2.0 mg/L.

- Exceedances were recorded in three (3) of the metal parameters against ADQCC: Copper (Cu) exceeded in all sampling locations; Lead (Pb) exceeded in WSQ1, WSQ2 M & B, WSQ3, WSQ4, WSQ5 M, WSQ6 B, WSQ7, WSQ8 T, WSQ9 M & B, and WSQ10; and Zinc (Zn) in WSQ6 M and top layers in WSQ7, WSQ8 and WSQ10.

  Active metal levels above MDL were recorded for Arsenic (As), Barium (Ba), Cadmium (Cd), Chromium (Cr), and Vanadium (V). Generally, the sources of metals in the Arabian Gulf are atmospheric inputs due to its unique geologic environmental setting. Whereas Aluminum (Al), Iron (Fe), Mercury (Hg), Phosphorus (P), Silicon (as SO_2), and Silver (Ag) were below MDL

- Petroleum hydrocarbons, BTEX, PAHs and Phenols were detected below MDL for all sampling locations.
- Total coliform, a microbiological measure, was undetectable in all test locations, indicating little to no pollution from sewage sources.

Table 6-28 – Ex-situ Water Quality Profile at Zakum Cluster Route 1-A (Location WSQ1- WSQ5)

Parameter Name		Unit	MDL	ADQ CC	EADA WQO	WQS1			WSQ2			WSQ3			WQS4			WSQ5		
						T	M	B	T	M	B	T	M	B	T	M	B	T	M	B
Inorganic Parameters																				
Total Cyanide		mg/L	0.01		**0.004**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ammonia		mg/L	0.06			<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
Ammonium		mg/L	0.064			<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064
Nitrogen (Ammonia)		mg/L	0.05			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Nitrogen		mg/L	0.5			<0.5	<0.5	<0.5	<0.5	5.3	<0.5	2.8	1.3	<0.5	0.6	<0.5	0.6	0.5	<0.5	<0.5
Dissolved & Emulsified Oil		mg/L	10			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Free Oil		% vol./vol.	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Dissolved Solids		mg/L	5			45500	45700	45800	45400	45800	46000	45900	46400	46300	45800	46100	46400	45800	46300	46300
Total Suspended Solids		mg/L	5			<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Sulphide		mg/L	0.004		**0.004**	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Anions																				
Chloride		mg/L	2			23000	23400	23400	22700	23400	23400	23400	23800	23800	23400	23800	23800	23400	23800	23800
Nitrate		mg/L	0.04		**0.095**	0.04	0.04	0.04	<0.04	18.6	0.04	6.64	1.73	0.04	0.13	<0.04	0.49	0.13	0.04	0.04

Parameter Name		Unit	MDL	ADQ CC	EADA WQO	WQS1			WSQ2			WSQ3			WQS4			WSQ5		
						T	M	B	T	M	B	T	M	B	T	M	B	T	M	B
Orthophosphate		mg/L	0.06			<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
Sulphate		mg/L	5			3080	3090	3070	3060	3080	3090	3080	3110	3120	3090	3080	3120	3070	3110	3090
Chemical Analysis																				
Biochemical Oxygen Demand		mg/L	2		5	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Chemical Oxygen Demand		mg/L	5			8	<5	<5	<5	30	6	22	18	8	10	<5	10	8	<5	6
Total Organic Carbon		mg/L	1		2.5	1.5	1.6	1.5	1.5	1.6	1.5	1.7	1.6	1.6	1.7	1.4	1.6	1.6	1.6	1.7
Metals																				
Aluminium (Al)		mg/L	0.005	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Arsenic (As)		mg/L	0.0005	-	**0.005**	0.0028	0.0016	0.0018	0.0031	0.0024	0.0026	0.0024	0.0019	0.0028	0.0021	0.0016	0.0028	0.0024	0.0026	0.0033
Barium (Ba)		mg/L	0.0005	-	-	0.007	0.0027	0.0038	0.0077	0.0088	0.0099	0.0073	0.0065	0.0091	0.0082	0.012	0.0082	0.0059	0.0088	0.0078
Cadmium (Cd)		mg/L	0.0001	**0.0007**	0.001	0.0003	0.0001	0.0001	<0.0001	0.0002	0.0002	0.0001	0.0001	0.0001	0.0002	0.0012	0.0002	0.0001	0.0001	0.0002
Chromium (Cr)		µg/L	0.3	-	**10**	0.9	0.6	0.6	0.5	1.1	1.9	1.8	0.5	1.5	1.2	3	1.1	0.8	1.7	1
Copper (Cu)		mg/L	0.0003	**0.003**	0.01	0.0047	0.003	0.0038	0.0043	0.0091	0.0529	0.0117	0.0047	0.0048	0.0088	0.0048	0.0039	0.0048	0.0055	0.005
Iron (Fe)		mg/L	0.02		**0.3**	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Lead (Pb)		mg/L	0.0002	**0.0022**	0.01	0.0029	0.0024	0.0024	0.002	0.004	0.0079	0.0029	0.0029	0.0038	0.0023	0.0059	0.0033	0.0014	0.004	0.0014

Parameter Name		Unit	MDL	ADQ CC	EADA WQO	WQS1			WSQ2			WSQ3			WQS4			WSQ5		
						T	M	B	T	M	B	T	M	B	T	M	B	T	M	B
Mercury (Hg)		mg/L	0.0001	**0.1**	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Phosphorus (P)		mg/L	0.03	-	0.001	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Silicon as SiO2		mg/L	2.8	-	-	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8
Silver (Ag)		mg/L	0.0005	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Vanadium (V)		mg/L	0.0001	-	**0.0094**	0.0033	0.0032	0.0036	0.0028	0.0036	0.0038	0.0037	0.0032	0.0037	0.0036	0.0039	0.0037	0.0036	0.0038	0.0037
Zinc (Zn)		mg/L	0.002	0.015	**0.01**	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.006	<0.002	<0.002	0.006	<0.002	<0.002	<0.002	<0.002	<0.002
BTEX																				
Benzene		µg/L	7			<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
Ethyl benzene		µg/L	7			<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
Toluene		µg/L	7			<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
m&p-Xylene		µg/L	14			<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14
o-Xylene		µg/L	7			<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
Hydrocarbons																				
VPH C5-C10		µg/L	7	**7**	-	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
EPH C10-C40		µg/L	7	**7**	-	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
PAHs																				
Acenaphthene		µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Parameter Name		Unit	MDL	ADQ CC	EADA WQO	WQS1			WSQ2			WSQ3			WQS4			WSQ5		
						T	M	B	T	M	B	T	M	B	T	M	B	T	M	B
Acenaphthylene		µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Anthracene		µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene		µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene		µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(b)fluoranthene		µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(g,h,i)perylene		µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(k)fluoranthene		µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chrysene		µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dibenzo(a,h)anthracene		µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluoranthene		µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluorene		µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-c,d)pyrene		µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Naphthalene		µg/L	0.02			<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Phenanthrene		µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene		µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phenols																				

Parameter Name		Unit	MDL	ADQ CC	EADA WQO	WQS1			WSQ2			WSQ3			WQS4			WSQ5		
						T	M	B	T	M	B	T	M	B	T	M	B	T	M	B
2,3,4,6-Tetrachlorophenol		µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,3,5,6-Tetrachlorophenol		µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,4,5-Trichlorophenol		µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,4,6-Trichlorophenol		µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,4-Dichlorophenol		µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,4-Dimethylphenol		µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,6-Dichlorophenol		µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Chlorophenol		µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Methylphenol		µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Nitrophenol		µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
3-Methylphenol		µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4-Chloro-3-methylphenol		µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Parameter Name		Unit	MDL	ADQ CC	EADA WQO	WQS1			WSQ2			WSQ3			WQS4			WSQ5		
						T	M	B	T	M	B	T	M	B	T	M	B	T	M	B
4-Methylphenol		µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4-Nitrophenol		µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Pentachlorophenol		µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Phenol		µg/L	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Microbiology																				
Total Coliform		CFU/100mL	10			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Note: Red values represent exceedance of the standard; Blue values represent above MDL; **ND** means not detected; **T** means top water layer, **B** for bottom, and **M** for mid-water. The ADQCC values shown are allowable concentrations for General Use Areas.

Table 6-29 – Ex-situ Water Quality Profile at Zakum Cluster Route 1-A (Locations WSQ6- WSQ10)

Parameter Name	Unit	MDL	ADQ CC	EADA WQO	WQS6			WSQ7			WSQ8			WQS9			WSQ10		
					T	M	B	T	M	B	T	M	B	T	M	B	T	M	B
Inorganic Parameters																			
Total Cyanide	mg/L	0.01		**0.004**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ammonia	mg/L	0.06			<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
Ammonium	mg/L	0.064			<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064
Nitrogen (Ammonia)	mg/L	0.05			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Nitrogen	mg/L	0.5			<0.5	<0.5	<0.5	0.7	0.5	<0.5	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3.6

Parameter Name	Unit	MDL	ADQ CC	EADA WQO	WQS6			WSQ7			WSQ8			WQS9			WSQ10		
					T	M	B	T	M	B	T	M	B	T	M	B	T	M	B
Dissolved & Emulsified Oil	mg/L	10			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Free Oil	% vol./vol.	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Dissolved Solids	mg/L	5			45800	45600	45900	45900	46000	46000	45800	45700	45700	46000	45900	45900	46100	45900	45800
Total Suspended Solids	mg/L	5			<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Sulphide	mg/L	0.004		**0.004**	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Anions																			
Chloride	mg/L	2			23400	23400	23400	23400	23400	23400	23400	23000	23000	23400	23400	23400	23800	23400	23400
Nitrate	mg/L	0.04		**0.095**	0.04	<0.04	0.13	0.13	0.04	<0.04	0.13	0.04	0.04	<0.04	0.04	<0.04	0.04	0.04	6.2
Orthophosphate	mg/L	0.06			<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
Sulphate	mg/L	5			3080	3090	3090	3070	3060	3070	3070	3090	3090	3100	3110	3090	3080	3090	3090
Chemical Analysis																			
Biochemical Oxygen Demand	mg/L	2		5	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Chemical Oxygen Demand	mg/L	5			<5	<5	<5	12	8	10	<5	<5	<5	<5	<5	<5	<5	<5	22
Total Organic Carbon	mg/L	1		2.5	1.6	1.6	1.5	2	1.6	1.5	1.8	1.5	1.6	1.6	1.5	1.4	1.6	1.7	1.5
Metals																			

Parameter Name	Unit	MDL	ADQ CC	EADA WQO	WQS6			WSQ7			WSQ8			WQS9			WSQ10		
					T	M	B	T	M	B	T	M	B	T	M	B	T	M	B
Aluminium (Al)	mg/L	0.005	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Arsenic (As)	mg/L	0.0005	-	**0.005**	0.0028	0.0027	0.0023	0.0032	0.0025	0.0023	0.0025	0.0032	0.0032	0.0021	0.0037	0.0039	0.0025	0.0032	0.0032
Barium (Ba)	mg/L	0.0005	-	-	0.0078	0.0073	0.0073	0.0108	0.0091	0.0101	0.0107	0.0082	0.0081	0.0081	0.0108	0.0141	0.0155	0.014	0.0136
Cadmium (Cd)	mg/L	0.0001	**0.000 7**	0.001	0.0001	0.0001	0.0002	0.0005	0.0003	<0.0001	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	<0.0001
Chromium (Cr)	µg/L	0.3	-	**10**	1.3	0.8	1.1	1	1.1	1.1	1.2	0.6	1.1	0.8	4	2.2	2.1	1.4	1.5
Copper (Cu)	mg/L	0.0003	**0.003**	0.01	0.008	0.0053	0.0037	0.0101	0.0066	0.0047	0.0271	0.011	0.0139	0.0081	0.0123	0.0067	0.0096	0.0066	0.0074
Iron (Fe)	mg/L	0.02		**0.3**	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Lead (Pb)	mg/L	0.0002	**0.002 2**	0.01	0.0017	0.0015	0.0022	0.0048	0.0028	0.0022	0.0032	0.0017	0.0018	0.0017	0.0029	0.005	0.0058	0.0028	0.0028
Mercury (Hg)	mg/L	0.0001	**0.1**	-	<0.000 1	<0.0001	<0.0001	<0.000 1	<0.0001	<0.0001	<0.000 1	<0.0001	<0.0001	<0.000 1	<0.0001	<0.0001	<0.000 1	<0.0001	<0.0001
Phosphorus (P)	mg/L	0.03	-	0.001	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Silicon as SiO2	mg/L	2.8	-	-	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8
Silver (Ag)	mg/L	0.0005	-	-	<0.000 5	<0.0005	<0.0005	<0.000 5	<0.0005	<0.0005	<0.000 5	<0.0005	<0.0005	<0.000 5	<0.0005	<0.0005	<0.000 5	<0.0005	<0.0005
Vanadium (V)	mg/L	0.0001	-	**0.0094**	0.0038	0.0037	0.0041	0.0041	0.0039	0.0034	0.004	0.0036	0.0033	0.0037	0.0041	0.0043	0.0046	0.0039	0.0041
Zinc (Zn)	mg/L	0.002	0.015	**0.01**	0.003	0.01	<0.002	0.017	0.002	<0.002	0.047	0.008	0.009	0.008	0.008	<0.002	0.013	0.008	<0.002
BTEX																			
Benzene	µg/L	7			<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
Ethyl benzene	µg/L	7			<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7

Parameter Name	Unit	MDL	ADQ CC	EADA WQO	WQS6			WSQ7			WSQ8			WQS9			WSQ10		
					T	M	B	T	M	B	T	M	B	T	M	B	T	M	B
Toluene	µg/L	7			<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
m&p-Xylene	µg/L	14			<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14
o-Xylene	µg/L	7			<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
Hydrocarbons																			
VPH C5-C10	µg/L	7	**7**	-	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
EPH C10-C40	µg/L	7	**7**	-	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
PAHs																			
Acenaphthene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Acenaphthylene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Anthracene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(b)fluoranthene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(g,h,i)perylene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(k)fluoranthene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chrysene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dibenzo(a,h)anthracene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Parameter Name	Unit	MDL	ADQ CC	EADA WQO	WQS6			WSQ7			WSQ8			WQS9			WSQ10		
					T	M	B	T	M	B	T	M	B	T	M	B	T	M	B
Fluoranthene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluorene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-c,d)pyrene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Naphthalene	µg/L	0.02			<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Phenanthrene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phenols																			
2,3,4,6-Tetrachlorophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,3,5,6-Tetrachlorophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,4,5-Trichlorophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,4,6-Trichlorophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,4-Dichlorophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,4-Dimethylphenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,6-Dichlorophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Parameter Name	Unit	MDL	ADQ CC	EADA WQO	WQS6			WSQ7			WSQ8			WQS9			WSQ10		
					T	M	B	T	M	B	T	M	B	T	M	B	T	M	B
2-Chlorophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Methylphenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Nitrophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
3-Methylphenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4-Chloro-3-methylphenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4-Methylphenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4-Nitrophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Pentachlorophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Phenol	µg/L	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Microbiology																			
Total Coliform	CFU/100mL	10			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Note: Red values represent exceedance of the standard; Blue values represent above MDL; **ND** means not detected; **T** means top water layer, **B** for bottom, and **M** for mid-water. The ADQCC values shown are allowable concentrations for General Use Areas.

Zakum Cluster Route 1-B (Rerouting Area)

Ex-situ water quality results in Zakum Cluster Route 1-B recorded exceedances in TOC, nitrate, total cyanide, and three metals (Cadmium, Copper, and Lead), as shown in Table 6-2.Table 6-30 (for location WSQ11-WSQ15) and Table 6-31 (for locations WSQ16-WSQ20). The summary of the results is discussed below:

- Of the inorganic parameters, only TDS and TN were detected above MDL. TDS values across sampling locations were in order of magnitude above MDL, ranging from 45,00 mg/L to 46,100 mg/L, as compared to the MDL of 5 mg/L. This is expected because of high salinity levels in the Gulf. Active levels above MDL of total nitrogen were recorded only in six (6) locations at WSQ11 T, WSQ13 T, WSQ14T, WSQ15, WSQ16 T & B, and WSQ18 B. The remaining of the sampling locations were below MDL.

- Orthophosphate was below MDL. Sulphate and chloride concentrations exceeded the MDL by order of magnitude ranging from 3,040 mg/L to 3,110 mg/L and 22,700 mg/L to 23,400 mg/L, respectively. Sulphate concentration in the Arabian Gulf seawater has been reported between 3,200 mg/L and 3,271 mg/L whilst chloride is between 21,933 mg/L to 22, 014 mg/L [7].

- Exceedances in nitrate were detected at four (4) locations: WSQ13 T; WSQ14 T, WSQ15 T &B, and WSQ16 T. Exceedances in nitrate concentration can be ascribed to aerosol nitrate contamination, since the locations are offshore and from far domestic and riverine inputs.

- BOD was below MDL whilst COD ranged from <5 mg/L to 8 mg/L. Exceedance was recorded in one location (WSQ17 M) with 2.9 mg/L, against the standard of 2.5 mg/L. The rest of TOC values were above MDL but below the referenced standard.

- Exceedances were recorded in four (4) of the metal parameters. Copper (Cu) exceeded ADQCC at WSQ11, WSQ12 T &M, WSQ13 M, WSQ14 T & M, and WSQ15. Lead (Pb) exceeded ADQCC at most of the locations, at WSQ11, WSQ12 T &M, WSQ13 M, WSQ14, WSQ15, WSQ16 T & B, WSQ17, WSQ18 M & B, WSQ19 T & M, and WSQ20 M. Cadmium (Cd) exceeded ADQCC only at WSQ16 T & B. On the other hand, Zinc (Zn) exceeded EAD specifications at WSQ11 B and WSQ16 T.

  Active metal levels above MDL were recorded for Arsenic (As), Barium (Ba), Vanadium (V), and Chromium (Cr) but with no exceedances of the referenced standards where applicable. Whereas, Aluminum (Al), Iron (Fe), Phosphorus (P), Silver (Ag), Mercury (Hg), and Silicon (as SiO_3) were below MDL.

- BTEX, hydrocarbons, PAHs and Phenols were below MDL for all sampling points throughout the survey.

- The microbial parameter, total coliform was undetected across all sampling locations

Table 6-30 – Ex-situ Water Quality Profile at Zakum Cluster Route 1-B (Locations WSQ11- WSQ15)

Parameter Name	Unit	MDL	ADQ CC	EADA WQO	WQS11			WSQ12			WSQ13			WQS14			WSQ15		
					T	M	B	T	M	B	T	M	B	T	M	B	T	M	B
Inorganic Parameters																			
Total Cyanide	mg/L	0.01		**0.004**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ammonia	mg/L	0.06			<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
Ammonium	mg/L	0.064			<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064
Nitrogen (Ammonia)	mg/L	0.05			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Nitrogen	mg/L	0.5			0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	0.5	<0.5	<0.5	1.1	0.5	0.7
Dissolved & Emulsified Oil	mg/L	10			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Free Oil	% vol./vol.	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Dissolved Solids	mg/L	5			45600	45800	46000	45400	45600	45800	45700	45800	45700	45600	45600	46100	45000	45500	45500
Total Suspended Solids	mg/L	5			<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Sulphide	mg/L	0.004		**0.004**	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Anions																			
Chloride	mg/L	2			22700	23000	23400	22700	23400	23400	23000	23400	23400	23000	23400	23400	22700	23000	23000
Nitrate	mg/L	0.04		**0.095**	0.04	<0.04	0.04	<0.04	0.04	<0.04	0.13	0.04	<0.04	0.13	<0.04	0.04	0.62	0.09	0.4
Orthophosphate	mg/L	0.06			<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06

Parameter Name	Unit	MDL	ADQ CC	EADA WQO	WQS11			WSQ12			WSQ13			WQS14			WSQ15		
					T	M	B	T	M	B	T	M	B	T	M	B	T	M	B
Sulphate	mg/L	5			3090	3070	3080	3080	3110	3090	3090	3080	3090	3110	3070	3090	3040	3090	3090
Chemical Analysis																			
Biochemical Oxygen Demand	mg/L	2		5	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Chemical Oxygen Demand	mg/L	5			8	<5	6	<5	6	<5	8	<5	<5	6	<5	<5	6	<5	6
Total Organic Carbon	mg/L	1		2.5	1.5	1.5	1.5	1.5	1.6	1.4	1.8	1.7	1.5	1.8	1.4	1.7	2	1.5	1.6
Metals																			
Aluminium (Al)	mg/L	0.005	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Arsenic (As)	mg/L	0.0005	-	0.005	0.0025	0.002	0.0025	0.0021	0.0021	0.0018	0.0021	0.0029	0.0022	0.0028	0.0027	0.0018	0.0021	0.0028	0.0018
Barium (Ba)	mg/L	0.0005	-	-	0.0107	0.0113	0.007	0.01	0.0074	0.006	0.0062	0.0099	0.0044	0.0073	0.0073	0.0058	0.0078	0.0054	0.0097
Cadmium (Cd)	mg/L	0.0001	**0.0007**	0.001	0.0003	0.0002	0.0002	0.0001	0.0006	0.0001	0.0001	0.0002	<0.0001	0.0002	0.0001	0.0004	0.0006	0.0005	0.0001
Chromium (Cr)	µg/L	0.3	-	**10**	2.2	1.6	1	1.1	0.5	<0.3	0.5	1.3	<0.3	0.5	0.9	<0.3	<0.3	<0.3	1
Copper (Cu)	mg/L	0.0003	**0.003**	0.01	0.0125	0.0106	0.0317	0.0078	0.0045	0.0024	0.0067	0.0044	0.0028	0.0124	0.0033	0.0026	0.003	0.0036	0.0041
Iron (Fe)	mg/L	0.02		**0.3**	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Lead (Pb)	mg/L	0.0002	**0.0022**	0.01	0.0059	0.0049	0.0023	0.0044	0.0141	0.0015	0.0021	0.0048	0.0007	0.0026	0.0025	0.0029	0.0039	0.0047	0.0047
Mercury (Hg)	mg/L	0.0001	**0.1**	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Phosphorus (P)	mg/L	0.03	-	0.001	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

Parameter Name	Unit	MDL	ADQ CC	EADA WQO	WQS11			WSQ12			WSQ13			WQS14			WSQ15		
					T	M	B	T	M	B	T	M	B	T	M	B	T	M	B
Silicon as SiO2	mg/L	2.8	-	-	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	37.9	<2.8	<2.8	<2.8	<2.8	<2.8
Silver (Ag)	mg/L	0.0005	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0006	<0.0005	<0.0005	<0.0005
Vanadium (V)	mg/L	0.0001	-	**0.0094**	0.0041	0.0024	0.0023	0.003	0.0027	0.0017	0.0019	0.0032	0.0021	0.0024	0.003	0.0024	0.0024	0.0025	0.0023
Zinc (Zn)	mg/L	0.002	0.015	**0.01**	0.003	0.009	0.01	<0.002	<0.002	<0.002	0.008	<0.002	<0.002	<0.002	<0.002	<0.002	0.009	<0.002	<0.002
BTEX																			
Benzene	µg/L	7			<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
Ethyl benzene	µg/L	7			<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
Toluene	µg/L	7			<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
m&p-Xylene	µg/L	14			<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14
o-Xylene	µg/L	7			<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
Hydrocarbons																			
VPH C5-C10	µg/L	7	**7**	-	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
EPH C10-C40	µg/L	7	**7**	-	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	41	<7	<7	<7
PAHs																			
Acenaphthene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Acenaphthylene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Anthracene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Parameter Name	Unit	MDL	ADQ CC	EADA WQO	WQS11			WSQ12			WSQ13			WQS14			WSQ15		
					T	M	B	T	M	B	T	M	B	T	M	B	T	M	B
Benzo(a)anthracene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(b)fluoranthene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(g,h,i)perylene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(k)fluoranthene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chrysene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dibenzo(a,h)anthracene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluoranthene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluorene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-c,d)pyrene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Naphthalene	µg/L	0.02			<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Phenanthrene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phenols																			
2,3,4,6-Tetrachlorophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,3,5,6-Tetrachlorophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Parameter Name	Unit	MDL	ADQ CC	EADA WQO	WQS11			WSQ12			WSQ13			WQS14			WSQ15		
					T	M	B	T	M	B	T	M	B	T	M	B	T	M	B
2,4,5-Trichlorophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,4,6-Trichlorophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,4-Dichlorophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,4-Dimethylphenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,6-Dichlorophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Chlorophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Methylphenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Nitrophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
3-Methylphenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4-Chloro-3-methylphenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4-Methylphenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4-Nitrophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Pentachlorophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Phenol	µg/L	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Parameter Name	Unit	MDL	ADQ CC	EADA WQO	WQS11			WSQ12			WSQ13			WQS14			WSQ15		
					T	M	B	T	M	B	T	M	B	T	M	B	T	M	B
Microbiology																			
Total Coliform	CFU/100mL	10			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Note: Red values represent exceedance of the standard; Blue values represent above MDL; **ND** means not detected; **T** means top water layer, **B** for bottom, and **M** for mid-water. The ADQCC values shown are allowable concentrations for General Use Areas.

Table 6-31 – Ex-situ Water Quality Profile at Zakum Cluster Route 1-B (Locations WSQ16-WSQ20)

Parameter Name	Unit	MDL	ADQ CC	EADA WQO	WQS16			WSQ17			WSQ18			WQS19			WSQ20		
					T	M	B	T	M	B	T	M	B	T	M	B	T	M	B
Inorganic Parameters																			
Total Cyanide	mg/L	0.01		**0.004**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ammonia	mg/L	0.06			<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
Ammonium	mg/L	0.064			<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064	<0.064
Nitrogen (Ammonia)	mg/L	0.05			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Nitrogen	mg/L	0.5			0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dissolved & Emulsified Oil	mg/L	10			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Free Oil	% vol./vol.	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Dissolved Solids	mg/L	5			45600	45700	45700	45700	45600	45300	45800	45500	45900	45800	45900	45800	46000	45800	45800

Parameter Name	Unit	MDL	ADQ CC	EADA WQO	WQS16			WSQ17			WSQ18			WQS19			WSQ20		
					T	M	B	T	M	B	T	M	B	T	M	B	T	M	B
Total Suspended Solids	mg/L	5			<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Sulphide	mg/L	0.004		**0.004**	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Anions																			
Chloride	mg/L	2			23000	23000	23000	23000	23000	23000	23000	23000	23000	23400	23400	23400	23400	23400	23000
Nitrate	mg/L	0.04		**0.095**	0.18	0.04	0.04	0.04	0.04	<0.04	<0.04	0.04	0.04	<0.04	<0.04	<0.04	0.04	<0.04	<0.04
Orthophosphate	mg/L	0.06			<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
Sulphate	mg/L	5			3080	3080	3090	3100	3100	3090	3090	3070	3100	3110	3080	3090	3050	3090	3090
Chemical Analysis																			
Biochemical Oxygen Demand	mg/L	2		**5**	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Chemical Oxygen Demand	mg/L	5			<5	<5	6	<5	<5	<5	<5	<5	6	<5	<5	<5	<5	<5	<5
Total Organic Carbon	mg/L	1		**2.5**	1.7	1.6	1.6	1.4	2.9	1.4	1.5	1.7	1.6	1.5	1.4	1.5	1.4	1.6	1.6
Metals																			
Aluminium (Al)	mg/L	0.005	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Arsenic (As)	mg/L	0.0005	-	**0.005**	0.0017	0.0028	0.0027	0.0018	0.003	0.0034	0.0031	0.0019	0.0027	0.002	0.0033	0.0032	0.0026	0.0021	0.0031
Barium (Ba)	mg/L	0.0005	-	-	0.0057	0.0055	0.0079	0.0076	0.0056	0.0072	0.0072	0.0095	0.0191	0.0074	0.0067	0.0055	0.0073	0.0071	0.0024
Cadmium (Cd)	mg/L	0.0001	**0.0007**	0.001	0.0018	<0.0001	0.001	<0.0001	0.0001	0.0002	0.0002	0.0002	0.0001	0.0001	<0.0001	0.0003	<0.0001	0.0002	0.0001

Parameter Name	Unit	MDL	ADQ CC	EADA WQO	WQS16			WSQ17			WSQ18			WQS19			WSQ20		
					T	M	B	T	M	B	T	M	B	T	M	B	T	M	B
Chromium (Cr)	μg/L	0.3	-	**10**	1.4	<0.3	0.4	0.7	<0.3	<0.3	0.8	0.3	1.7	0.5	0.7	<0.3	<0.3	<0.3	<0.3
Copper (Cu)	mg/L	0.0003	**0.003**	0.01	0.0038	0.0063	0.006	0.0049	0.0046	0.0041	0.0115	0.0141	0.012	0.0041	0.0096	0.0036	0.0028	0.004	0.0047
Iron (Fe)	mg/L	0.02		**0.3**	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Lead (Pb)	mg/L	0.0002	**0.0022**	0.01	0.0222	0.0019	0.0142	0.0022	0.0038	0.0033	0.0021	0.0045	0.0045	0.0027	0.0057	0.0019	0.0016	0.0112	0.0008
Mercury (Hg)	mg/L	0.0001	**0.1**	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Phosphorus (P)	mg/L	0.03	-	0.001	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Silicon as SiO2	mg/L	2.8	-	-	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8
Silver (Ag)	mg/L	0.0005	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Vanadium (V)	mg/L	0.0001	-	**0.0094**	0.0023	0.0022	0.0023	0.0026	0.0022	0.0022	0.0025	0.0022	0.0028	0.0026	0.0026	0.0023	0.0024	0.0022	0.0021
Zinc (Zn)	mg/L	0.002	0.015	**0.01**	0.021	0.006	<0.002	0.004	<0.002	<0.002	0.002	<0.002	<0.002	<0.002	0.005	<0.002	0.007	0.005	0.008
BTEX																			
Benzene	μg/L	7			<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
Ethyl benzene	μg/L	7			<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
Toluene	μg/L	7			<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
m&p-Xylene	μg/L	14			<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14
o-Xylene	μg/L	7			<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
Hydrocarbons																			

Parameter Name	Unit	MDL	ADQ CC	EADA WQO	WQS16			WSQ17			WSQ18			WQS19			WSQ20		
					T	M	B	T	M	B	T	M	B	T	M	B	T	M	B
VPH C5-C10	µg/L	7	**7**	-	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
EPH C10-C40	µg/L	7	**7**	-	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
PAHs																			
Acenaphthene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Acenaphthylene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Anthracene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(b)fluoranthene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(g,h,i)perylene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(k)fluoranthene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chrysene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dibenzo(a,h)anthracene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluoranthene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluorene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-c,d)pyrene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Naphthalene	µg/L	0.02			<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02

Parameter Name	Unit	MDL	ADQ CC	EADA WQO	WQS16			WSQ17			WSQ18			WQS19			WSQ20		
					T	M	B	T	M	B	T	M	B	T	M	B	T	M	B
Phenanthrene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phenols																			
2,3,4,6-Tetrachlorophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,3,5,6-Tetrachlorophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,4,5-Trichlorophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,4,6-Trichlorophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,4-Dichlorophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,4-Dimethylphenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,6-Dichlorophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Chlorophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Methylphenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Nitrophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
3-Methylphenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Parameter Name	Unit	MDL	ADQ CC	EADA WQO	WQS16			WSQ17			WSQ18			WQS19			WSQ20		
					T	M	B	T	M	B	T	M	B	T	M	B	T	M	B
4-Chloro-3-methylphenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4-Methylphenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4-Nitrophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Pentachlorophenol	µg/L	1			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Phenol	µg/L	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Microbiology																			
Total Coliform	CFU/100mL	10			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Note: Red values represent exceedance of the standard; Blue values represent above MDL; **ND** means not detected; **T** means top water layer, **B** for bottom, and **M** for mid-water. The ADQCC values shown are allowable concentrations for General Use Areas.

6.7.2 Sediment Quality

Sediment samples were collected on 20th to 22nd of May 2022. Samples were sent to an accredited laboratory for analysis. The sediment quality analysis results are in Table 6-32 and Table 6-33, and laboratory reports of the marine sediment ex-situ quality assessment are provided in Appendix A. The survey sites are considered to constitute a General Use Area.

Zakum Cluster Route 1-A Rerouting Area

The results obtained from the laboratory sediment analysis are presented in Table 6-32Table 6-3 and have been compared to the standards provided by the Abu Dhabi Quality and Conformity Council (ADQCC) [5]. Exceedances to the referenced standard were found in two (2) metals, the Chromium (Cr) and Nickel (Ni). It should be noted that among the 10 sampling locations in Zakum Cluster Route 1-A, the five (5) locations were not sampled due to solid hardbottom characteristic of these areas. There locations were WSQ2, WSQ7, WSQ8, WSQ9, and WSQ10. The summary of results below represents the sediment quality at WSQ1, WSQ3, WSQ4, WSQ5, and WSQ6.

- pH ranged from 8.2 (WSQ1) to 8.7 (WSQ4).

- Oil and Grease was detected below MDL across sampling locations.

- High levels of total nitrogen (TN) were detected in the sediments ranging from 530 mg/kg (WSQ3) to 968 mg/kg (WSQ5). These values were in order of magnitude above the MDL of 5 mg/kg. However, there is no referenced standard for TN.

- Active levels of silica concentration were detected in all locations with lowest value at WSQ3 with 2.53 % by wt. whilst highest value at WSQ1 with 4.81 % by wt. Orthophosphate, fluoride and sulphate were had an active level above MDL. Orthophosphate ranged from 0.8 mg/kg (WSQ4) to 12.3 (WSQ1). Fluoride ranged from 1.4 mg/kg (WSQ1) to 3.3 mg/kg (WSQ5). Sulphate ranged from 0.78 %SO4 (WSQ6) to 0.95 %SO4 (WSQ5).

- Two (2) out of eighteen (18) metals analysed were recorded in exceedance of the ADQCC standards. Chromium (Cr) exceeded at WSQ4 and WSQ5 whilst the remaining locations had an active level. Whereas Nickel (Ni) exceeded at WSQ4, WSQ5 and WSQ1, with the remaining locations at an active levels.

  Aluminum (Al), Arsenic (As), Barium (Ba), Iron (Fe), Lead (Pb), Manganese (Mn), Phosphorus (P), Vanadium (V) and Zinc (Zn) had active levels in all locations above MDL but below referenced standards for parameters where standards are provided. Similarly, Mercury (Hg) and Copper (Cu) were above MDL but below the referenced standard except at WSQ1 and WSQ6 for Hg and WSQ3 for Cu.

  Antimony (Sb), Cadmium (Cd), Molybdenum (Mo), Selenium (Se) and Silver (Ag) were detected below their respective MDLs.

- There were no hydrocarbons, PAHs, or PCBs found in any of the samples. The presence of these organic compounds in sediments is understood to indicate contamination from petroleum products and heavy industrial pollutants.

Table 6-32 – Sediment Quality Profile at Zakum Cluster Route 1-A

Parameters	Unit	MDL	ADQCC	WSQ1	WSQ2	WSQ3	WSQ4	WSQ5	WSQ6	WSQ7	WSQ8	WSQ9	WSQ10
Inorganic Parameters					No sample					No sample	No sample	No sample	No sample
pH	pH units	0.1	-	8.2		8.6	8.7	8.6	8.5				
Oil and Grease	%	0.01	-	<0.01		<0.01	<0.01	<0.01	<0.01				
Total Nitrogen	mg/kg	5	-	751		530	908	968	942				
Silica-SiO2	% by wt	0.01	-	4.81		2.53	4.31	4.04	2.56				
Total Cyanide	mg/kg	0.5	-	<0.5		<0.5	<0.5	<0.5	<0.5				
Anions													
Orthophosphate	mg/kg	0.3	-	12.3		2	0.8	1.1	2.1				
Fluoride	mg/kg	0.5	-	1.4		2.5	2.8	3.3	2.2				
Sulphate (Acid Soluble)	%SO4	0.01	-	0.9		0.84	0.93	0.95	0.78				
Chemical Analysis													
Total Organic Carbon	%	0.1	-	1.4		0.6	1.1	1.1	0.6				
Metals													
Mercury (Hg)	mg/kg	0.01	0.2	<0.010		0.017	0.016	0.015	<0.010				
Aluminium (Al)	mg/kg	130	-	2090		1200	2820	2560	1050				
Antimony (Sb)	mg/kg	1	-	<1.0		<1.0	<1.0	<1.0	<1.0				
Arsenic (As)	mg/kg	1	7	3.9		3.5	3	3.3	4.2				
Barium (Ba)	mg/kg	3	-	140		51.8	229	426	417				

Parameters	Unit	MDL	ADQCC	WSQ1	WSQ2	WSQ3	WSQ4	WSQ5	WSQ6	WSQ7	WSQ8	WSQ9	WSQ10
Cadmium (Cd)	mg/kg	0.5	0.2	<0.2		<0.2	<0.2	<0.2	<0.2				
Chromium (Cr)	mg/kg	1	11	9.4		6.6	11.9	11.3	5.6				
Copper (Cu)	mg/kg	3	20	4.8		<3.0	5.7	5.7	3.2				
Iron (Fe)	mg/kg	70	-	2180		1700	2700	2450	1100				
Lead (Pb)	mg/kg	1	5	3.5		2.9	3.9	4.5	3.8				
Manganese (Mn)	mg/kg	3	-	38.4		26.8	46.6	41.1	19.7				
Molybdenum (Mo)	mg/kg	3	-	<3.0		<3.0	<3.0	<3.0	<3.0				
Nickel (Ni)	mg/kg	1	7	8		4.3	11.1	10.2	4				
Phosphorus (P)	mg/kg	50	-	601		593	572	534	408				
Selenium (Se)	mg/kg	3	-	<3.0		<3.0	<3.0	<3.0	<3.0				
Silver (Ag)	mg/kg	10	-	<10		<10	<10	<10	<10				
Vanadium (V)	mg/kg	1	-	8		5.7	9.8	9.3	4.8				
Zinc (Zn)	mg/kg	3	70	9.7		6	10.9	10.7	5.8				
Hydrocarbons													
VPH C5-C10	mg/kg	0.05		<50		<50	<50	<50	<50				
EPH C10-C40	mg/kg	50		<0.05		<0.05	<0.05	<0.05	<0.05				
PAHs			Total PAHs=1.7										
Acenaphthene	mg/kg	0.01		<0.01		<0.01	<0.01	<0.01	<0.01				
Acenaphthylene	mg/kg	0.01		<0.01		<0.01	<0.01	<0.01	<0.01				
Anthracene	mg/kg	0.01		<0.01		<0.01	<0.01	<0.01	<0.01				

Parameters	Unit	MDL	ADQCC	WSQ1	WSQ2	WSQ3	WSQ4	WSQ5	WSQ6	WSQ7	WSQ8	WSQ9	WSQ10
Benzo(a)anthracene	mg/kg	0.01		<0.01		<0.01	<0.01	<0.01	<0.01				
Benzo(a)pyrene	mg/kg	0.01		<0.01		<0.01	<0.01	<0.01	<0.01				
Benzo(b)fluoranthene	mg/kg	0.01		<0.01		<0.01	<0.01	<0.01	<0.01				
Benzo(g,h,i)perylene	mg/kg	0.01		<0.01		<0.01	<0.01	<0.01	<0.01				
Benzo(k)fluoranthene	mg/kg	0.01		<0.01		<0.01	<0.01	<0.01	<0.01				
Chrysene	mg/kg	0.01		<0.01		<0.01	<0.01	<0.01	<0.01				
Dibenzo(a,h)anthracene	mg/kg	0.01		<0.01		<0.01	<0.01	<0.01	<0.01				
Fluoranthene	mg/kg	0.01		<0.01		<0.01	<0.01	<0.01	<0.01				
Fluorene	mg/kg	0.01		<0.01		<0.01	<0.01	<0.01	<0.01				
Indeno(1,2,3-c,d)pyrene	mg/kg	0.01		<0.01		<0.01	<0.01	<0.01	<0.01				
Naphthalene	mg/kg	0.01		<0.01		<0.01	<0.01	<0.01	<0.01				
Phenanthrene	mg/kg	0.01		<0.01		<0.01	<0.01	<0.01	<0.01				
Pyrene	mg/kg	0.01		<0.01		<0.01	<0.01	<0.01	<0.01				
PCBs			Total PCBs=0.22										
2,2`,3,3`,4,4` - Hexachlorobiphenyl (PCB 128)	mg/kg	0.01		<0.01		<0.01	<0.01	<0.01	<0.01				
2,2`,3,3`,4,4`,5 - Heptachlorobiphenyl (PCB 170)	mg/kg	0.01		<0.01		<0.01	<0.01	<0.01	<0.01				
2,2`,3,3`,4,4`,5,5`,6,6` - Decachlorobiphenyl	mg/kg	0.01		<0.01		<0.01	<0.01	<0.01	<0.01				
2,2`,3,3`,4,4`,5,5`,6-Nonachlorobiphenyl (PCB 206)	mg/kg	0.01		<0.01		<0.01	<0.01	<0.01	<0.01				
2,2`,3,3`,4,4`,5,6 - Octachlorobiphenyl (PCB 195)	mg/kg	0.01		<0.01		<0.01	<0.01	<0.01	<0.01				
2,2`,3,4`,5,5',6 - Heptachlorobiphenyl (PCB 187)	mg/kg	0.01		<0.01		<0.01	<0.01	<0.01	<0.01				

Parameters	Unit	MDL	ADQCC	WSQ1	WSQ2	WSQ3	WSQ4	WSQ5	WSQ6	WSQ7	WSQ8	WSQ9	WSQ10
2,2`,3,4,4`,5` - Hexachlorobiphenyl (PCB 138)	mg/kg	0.01		<0.01		<0.01	<0.01	<0.01	<0.01				
2,2`,3,4,4`,5,5` - Heptachlorobiphenyl (PCB 180)	mg/kg	0.01		<0.01		<0.01	<0.01	<0.01	<0.01				
2,2`,3,5` - Tetrachlorobiphenyl (PCB 44)	mg/kg	0.01		<0.01		<0.01	<0.01	<0.01	<0.01				
2,2`,4,4`,5,5` - Hexachlorobiphenyl (PCB 153)	mg/kg	0.01		<0.01		<0.01	<0.01	<0.01	<0.01				
2,2`,4,5,5` - Pentachlorobiphenyl (PCB 101)	mg/kg	0.01		<0.01		<0.01	<0.01	<0.01	<0.01				
2,2`,5,5` - Tetrachlorobiphenyl (PCB 52)	mg/kg	0.01		<0.01		<0.01	<0.01	<0.01	<0.01				
2,2`,5 - Trichlorobiphenyl (PCB 18)	mg/kg	0.01		<0.01		<0.01	<0.01	<0.01	<0.01				
3,3`,4,4` - Tetrachlorobiphenyl (PCB 77)	mg/kg	0.01		<0.01		<0.01	<0.01	<0.01	<0.01				
3,3`,4,4`,5 - Pentachlorobiphenyl (PCB 126)	mg/kg	0.01		<0.01		<0.01	<0.01	<0.01	<0.01				
2,3`,4,4` - Tetrachlorobiphenyl (PCB 66)	mg/kg	0.01		<0.01		<0.01	<0.01	<0.01	<0.01				
2,3`,4,4`,5 - Pentachlorobiphenyl (PCB 118)	mg/kg	0.01		<0.01		<0.01	<0.01	<0.01	<0.01				
2,3,3`,4,4` - Pentachlorobiphenyl (PCB 105)	mg/kg	0.01		<0.01		<0.01	<0.01	<0.01	<0.01				
2,4` - Dichlorobiphenyl (PCB 8)	mg/kg	0.01		<0.01		<0.01	<0.01	<0.01	<0.01				
2,4,4` - Trichlorobiphenyl (PCB 28)	mg/kg	0.01		<0.01		<0.01	<0.01	<0.01	<0.01				

Note: Red values represent exceedance of the standard; Blue values represent above MDL. The ADQCC values shown are allowable concentrations for Marine Protected Use Areas

Zakum Cluster Route 1-B Rerouting Area

The results of laboratory sediment analysis at Zakum Cluster Route 1-B are presented in Table 6-33 and have been compared to the standards provided by the Abu Dhabi Quality and Conformity Council (ADQCC) [5]. Exceedances to the referenced standard were found in three (3) metal parameters (Chromium, Lead and Nickel). It should be noted that sediments in three (3) sampling locations were not sampled due to solid hardbottom characteristic of the areas (WSQ16, WSQ18, and WSQ19). Furthermore, some tests were not carried in WSQ20 due to insufficient sample. The summary of results is presented below.

- pH ranged from 7.8 at WSQ17 to 8.6 at WSQ13 and WSQ14.
- Oil and grease was detected in active level above MDL at WSQ11, WSQ12, and WSQ15.
- High levels of total nitrogen (TN) were detected in the sediments ranging from 843 mg/kg WSQ12) to 1,240 mg/kg (WSQ15). TN is considered an effluent parameter because it is the sum NO3-N, N02-N, NH3-N, and other organically bonded nitrogen. However, there is no existing permissible limit for TN.
- Active level of silica was detected among locations, ranging to lowest value of 2.13 % by wt. (WSQ12) to the highest value of 4.92 % by wt. (WSQ14).
- Total Cyanide was detected below MDL for all locations.
- The three anions tested, orthophosphate, fluoride and sulphate were above MDL: Orthophosphate ranged from 0.6 mg/kg (WSQ12) to 6.4 mg/kg (WSQ17); No fluoride was detected in WSQ17 whilst other locations ranged from 1.1 mg/kg (WSQ12) to 3.6 mg/kg (WSQ15); and sulphate ranged from 0.49 %SO4 (WSQ13) to 0.95 %SO4 (WSQ15).
- Three (3) metals were in exceedances to their respective referenced standard. Chromium was in exceedance only at WSQ14 (13.1 mg/kg) against ADCCC's standard of 11 mg/kg whilst the remaining locations had an active level. Lead was in exceedance at three (3) locations (WSQ14, WSQ15,and WSQ17) with a value of 6.8 mg/kg, 8.9 mg/kg and 5.5 mg/kg, respectively against the standard of 5 mg/kg. Nickel (Ni) was in exceedance at WSQ14 (11.4 mg/kg) and WSQ15 (8.6 mg/kg) against 7 mg/kg standard value. The remaining of the locations had an active level.

  No exceedances were detected for Antimony (Sb), Cadmium (Cd), Molybdenum (Mo), Selenium (Se), and Silver (Ag). Whereas Arsenic (As), Barium (Ba), Iron (Fe), Manganese (Mn), Phosphorus (P), Vanadium (V) and Zinc (Zn) all had active levels above MDL but below referenced standards for parameters where standards are provided. Similarly, active level Mercury was detected at WSQ11, WSQ13, WSQ14, and WSQ15 whilst Copper (Cu) at WSQ13, WSQ14, WSQ15, and WSQ20.
- Hydrocarbons, PAHs, and PCBs were below MDL for all sampling locations.

.

Table 6-33 – Sediment Quality Profile at Zakum Cluster Route 1-B

Parameters	Unit	MDL	ADQCC	WSQ11	WSQ12	WSQ13	WSQ14	WSQ15	WSQ16	WSQ17	WSQ18	WSQ19	WSQ20
Inorganic Parameters									No sample		No sample	No sample	
pH	pH units	0.1	-	8.2	8.4	8.6	8.6	8.4		7.8			*
Oil and Grease	%	0.01	-	0.02	0.01	<0.01	<0.01	0.01		<0.01			*
Total Nitrogen	mg/kg	5	-	996	843	847	1100	1240		988			*
Silica-SiO2	% by wt	0.01	-	2.64	2.13	2.85	4.92	3.46		2.19			*
Total Cyanide	mg/kg	0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5			*
Anions													
Orthophosphate	mg/kg	0.3	-	2.5	0.6	2.5	1.2	2.3		6.4			*
Fluoride	mg/kg	0.5	-	1.8	1.1	1.4	2.8	3.6		<0.5			*
Sulphate (Acid Soluble)	%SO4	0.01	-	0.76	0.8	0.49	0.94	0.95		0.74			*
Chemical Analysis													
Total Organic Carbon	%	0.1		0.7	0.8	0.6	1.4	1.1		0.9			*
Metals													
Mercury (Hg)	mg/kg	0.01	0.2	0.012	<0.010	0.012	0.018	0.019		<0.010			<0.010
Aluminium (Al)	mg/kg	130	-	1230	1110	1420	2980	2160		371			369
Antimony (Sb)	mg/kg	1	-	<1.0	<1.0	<1.0	<1.0	<1.0		<1.0			<1.0
Arsenic (As)	mg/kg	1	7	6	3.7	4.6	4.8	3.8		2.8			2.4
Barium (Ba)	mg/kg	3	-	69.4	84.6	205	580	768		162			58.6

Parameters	Unit	MDL	ADQCC	WSQ11	WSQ12	WSQ13	WSQ14	WSQ15	WSQ16	WSQ17	WSQ18	WSQ19	WSQ20
Cadmium (Cd)	mg/kg	0.5	0.2	<0.2	<0.2	<0.2	<0.2	<0.2		<0.2			<0.2
Chromium (Cr)	mg/kg	1	11	7	6.1	9	13.1	10.3		2.9			2.5
Copper (Cu)	mg/kg	3	20	<3.0	<3.0	3.4	5.7	5.3		<3.0			13.6
Iron (Fe)	mg/kg	70	-	1480	1190	1760	2830	2200		445			380
Lead (Pb)	mg/kg	1	5	2.1	2.7	3.9	6.8	8.9		5.5			3.5
Manganese (Mn)	mg/kg	3	-	28.2	25.5	29.6	47.7	35.9		15.9			12.9
Molybdenum (Mo)	mg/kg	3	-	<3.0	<3.0	<3.0	<3.0	<3.0		<3.0			<3.0
Nickel (Ni)	mg/kg	1	7	4.7	4.2	5.2	11.4	8.6		1.8			1.6
Phosphorus (P)	mg/kg	50	-	509	479	555	590	529		385			348
Selenium (Se)	mg/kg	3	-	<3.0	<3.0	<3.0	<3.0	<3.0		<3.0			<3.0
Silver (Ag)	mg/kg	10	-	<10	<10	<10	<10	<10		<10			<10
Vanadium (V)	mg/kg	1	-	5.6	5	7.3	10.3	8.6		3.5			2.9
Zinc (Zn)	mg/kg	3	70	4.6	4.7	6.7	12.6	11.9		7.8			5.2
Hydrocarbons													
VPH C5-C10	mg/kg	0.05		<50	<50	<50	<50	<50		<50			<50
EPH C10-C40	mg/kg	50		<0.05	<0.05	<0.05	<0.05	<0.05		<0.05			*
PAHs			Total PAHs=1.7										
Acenaphthene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01		<0.01			<0.01
Acenaphthylene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01		<0.01			<0.01
Anthracene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01		<0.01			<0.01

Parameters	Unit	MDL	ADQCC	WSQ11	WSQ12	WSQ13	WSQ14	WSQ15	WSQ16	WSQ17	WSQ18	WSQ19	WSQ20
Benzo(a)anthracene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01		<0.01			<0.01
Benzo(a)pyrene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01		<0.01			<0.01
Benzo(b)fluoranthene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01		<0.01			<0.01
Benzo(g,h,i)perylene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01		<0.01			<0.01
Benzo(k)fluoranthene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01		<0.01			<0.01
Chrysene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01		<0.01			<0.01
Dibenzo(a,h)anthracene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01		<0.01			<0.01
Fluoranthene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01		<0.01			<0.01
Fluorene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01		<0.01			<0.01
Indeno(1,2,3-c,d)pyrene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01		<0.01			<0.01
Naphthalene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01		<0.01			<0.01
Phenanthrene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01		<0.01			<0.01
Pyrene	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01		<0.01			<0.01
PCBs			Total PCBs=0.22										
2,2`,3,3`,4,4` - Hexachlorobiphenyl (PCB 128)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01		<0.01			<0.01
2,2`,3,3`,4,4`,5 - Heptachlorobiphenyl (PCB 170)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01		<0.01			<0.01
2,2`,3,3`,4,4`,5,5`,6,6` - Decachlorobiphenyl	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01		<0.01			<0.01
2,2`,3,3`,4,4`,5,5`,6-Nonachlorobiphenyl (PCB 206)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01		<0.01			<0.01

Parameters	Unit	MDL	ADQCC	WSQ11	WSQ12	WSQ13	WSQ14	WSQ15	WSQ16	WSQ17	WSQ18	WSQ19	WSQ20
2,2`,3,3`,4,4`,5,6 - Octachlorobiphenyl (PCB 195)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01		<0.01			<0.01
2,2`,3,4`,5,5',6 - Heptachlorobiphenyl (PCB 187)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01		<0.01			<0.01
2,2`,3,4,4`,5` - Hexachlorobiphenyl (PCB 138)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01		<0.01			<0.01
2,2`,3,4,4`,5,5` - Heptachlorobiphenyl (PCB 180)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01		<0.01			<0.01
2,2`,3,5` - Tetrachlorobiphenyl (PCB 44)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01		<0.01			<0.01
2,2`,4,4`,5,5` - Hexachlorobiphenyl (PCB 153)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01		<0.01			<0.01
2,2`,4,5,5` - Pentachlorobiphenyl (PCB 101)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01		<0.01			<0.01
2,2`,5,5` - Tetrachlorobiphenyl (PCB 52)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01		<0.01			<0.01
2,2`,5 - Trichlorobiphenyl (PCB 18)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01		<0.01			<0.01
3,3`,4,4` - Tetrachlorobiphenyl (PCB 77)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01		<0.01			<0.01
3,3`,4,4`,5 - Pentachlorobiphenyl (PCB 126)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01		<0.01			<0.01
2,3`,4,4` - Tetrachlorobiphenyl (PCB 66)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01		<0.01			<0.01
2,3`,4,4`,5 - Pentachlorobiphenyl (PCB 118)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01		<0.01			<0.01
2,3,3`,4,4` - Pentachlorobiphenyl (PCB 105)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01		<0.01			<0.01
2,4` - Dichlorobiphenyl (PCB 8)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01		<0.01			<0.01
2,4,4` - Trichlorobiphenyl (PCB 28)	mg/kg	0.01		<0.01	<0.01	<0.01	<0.01	<0.01		<0.01			<0.01

Note: Red values represent exceedance of the standard; Blue values represent above MDL. The ADQCC values shown are allowable concentrations for Marine Protected Use Areas. Asterisk (*) implies test not carried out due to insufficient sample.

6.8 Marine Ecology

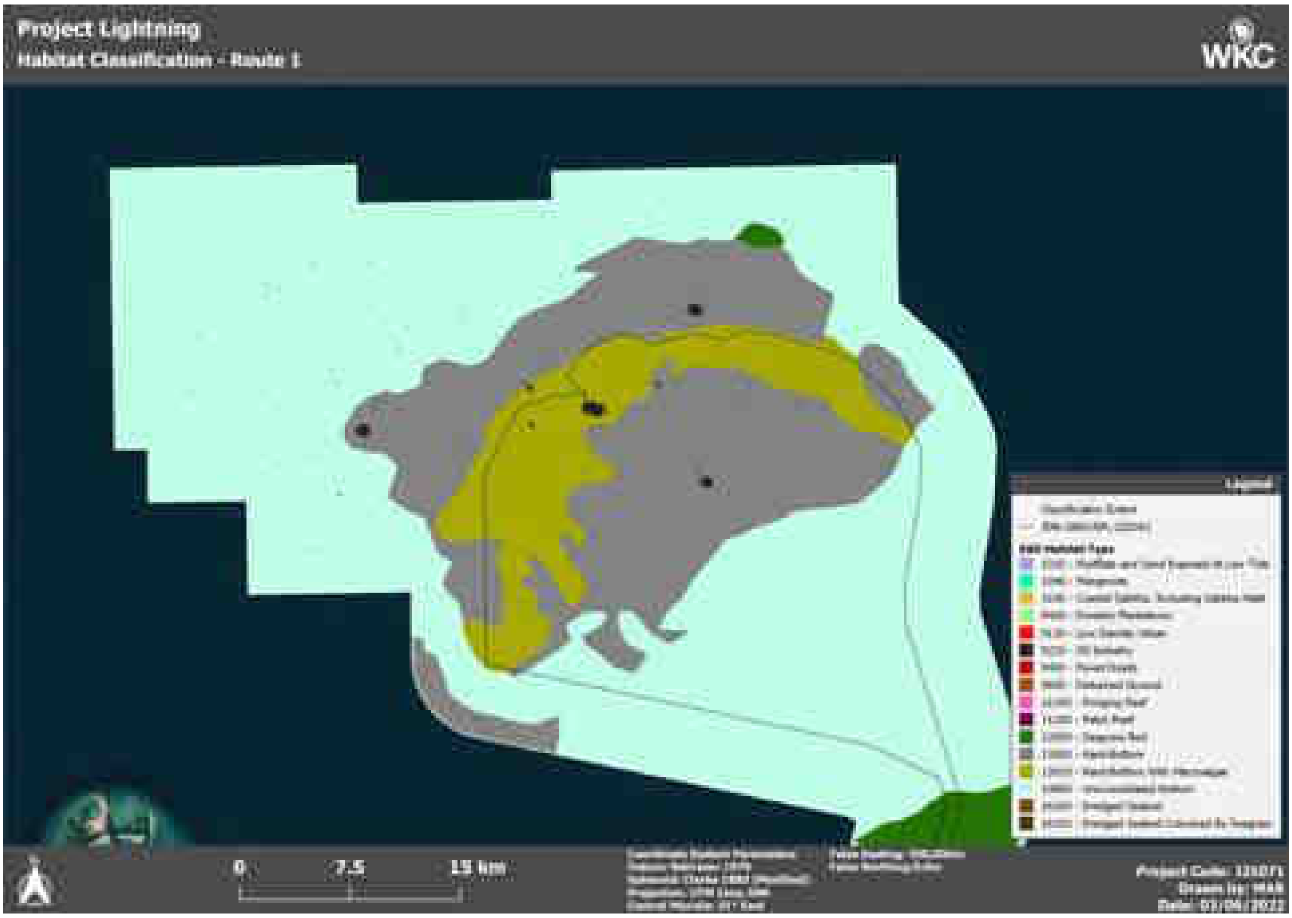
6.8.1 Benthic Habitat

The marine habitats identified across the study area were classified using the Environment Agency Abu Dhabi (EAD) Habitat Classification [23] and Marine Ecological Classification Standard (CMREC) Scheme. Based on the results of the marine ecology surveys, three (3) core habitats were present in Zakum:

- Patch Reef: 11200
- Hardbottom: 13000
- Unconsolidated Bottom: 14000

The offshore survey was conducted at the site from 20th to 23rd of May 2022 and revealed that the benthic community documented was mainly hardbottom with coarse to fine sandy particles made up of calcium carbonate rocks, coral rubbles, molluscan shells, sparse coral colonies, and dead coral framework. Unconsolidated bottom areas have also been recorded. Interestingly, hardbottom areas are mostly located within the oil and gas fields whilst unconsolidated bottom areas are recorded mostly outside the fields.

Figure 6-54 – Zakum Cluster Habitat Map

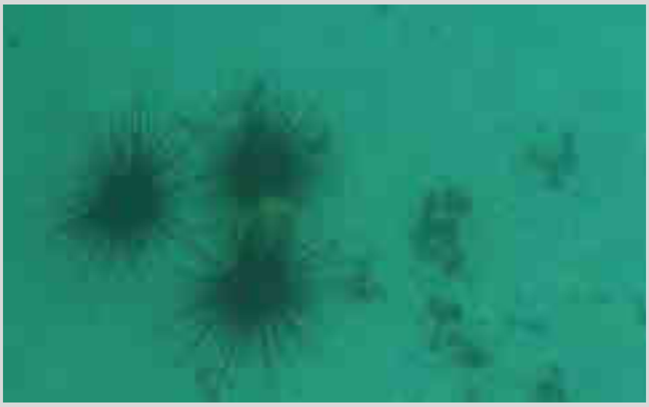


Drop Down Video results from the 20 sites investigated are presented below;

Figure 6-55 –Zakum Cluster Route 1A and 1B Re Routing Area DDV Results

DDV 1

DDV2



DDV3

DDV4


DDV5



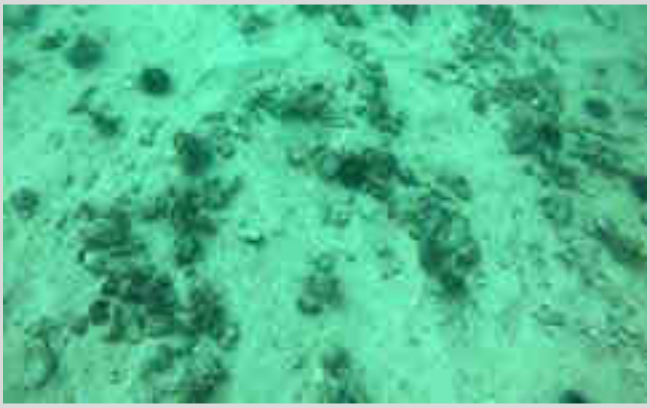

DDV6



DDV7

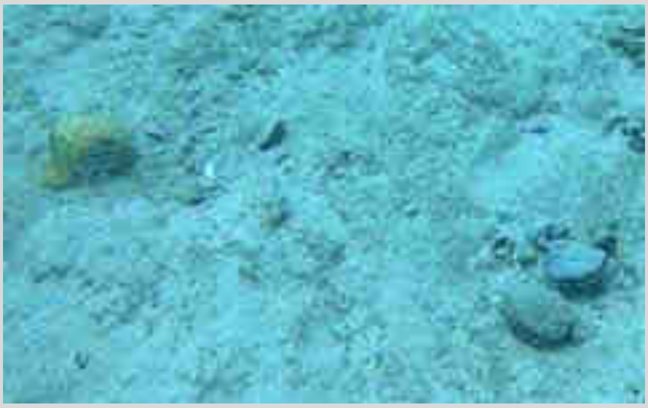


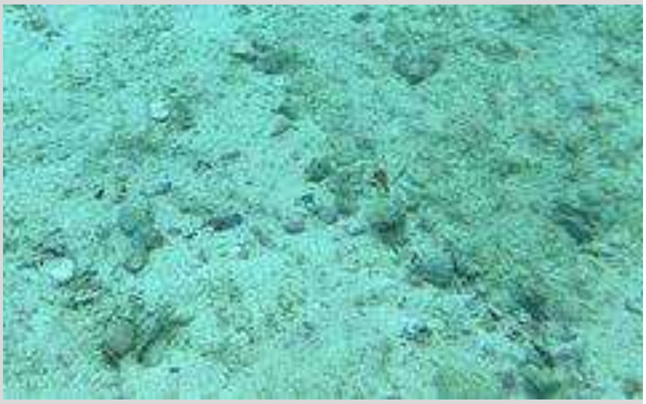

DDV8




DDV9

DDV10



DDV11




DDV12




DDV13




DDV14

DDV15

DDV16




DDV17

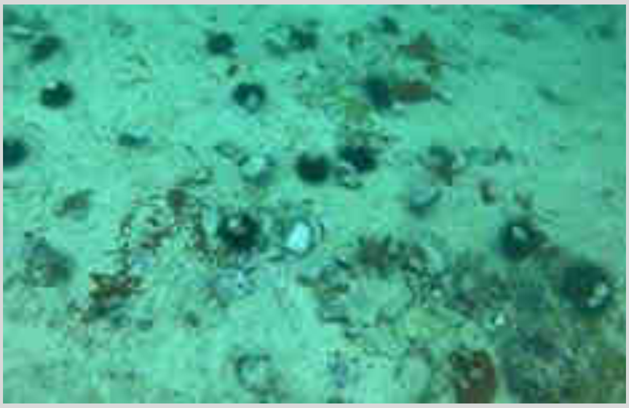



DDV18




DDV19



DDV20

6.8.1.1 Unconsolidated Bottom

The unconsolidated bottom area at Zakum is well delineated and defined at sampling area WSQ 3,4,5,6, 11,12,13,14 and 15. Most of these areas are outside of Zakum oilfield. The site is in deeper waters than the surrounding areas therefore the mud and silt deposits were accumulated through the years of natural erosion and sediment transport. The marine organisms within are assigned to Gastropods, borrowing species and infaunal communities. The area is void of seagrass and coral structures.

6.8.1.2 Hardbottom

The Hardbottom Habitat at Zakum cluster is mainly concentrated within the Zakum oilfield. The substrate is characterised by sparse colonies of bivalves and other fouling species such as sponges, tunicates, and macro algae. Widely distributed are populations of sea urchin both the long spined and the short spined urchins. These species graze on algal cover help the substrate maintain viable area for coral growth. The Coral colonies seen are young and developing but it is estimated that a large number was impacted by bleaching episodes and high-water temperature during summer in the region. A few corals were seen to survive but density is low.

6.8.1.3 Patch Reef

The growth of young coral colonies in the area are confined within the Zakum oilfield which have vast hard bottom cover. The water depth and light penetration was found to be ideal for coral growth, but surveys shows that the colonies seen to occupy the area were from a narrow recruitment period. The estimated age of corals seen in the area is at < 5 years old. There was no old reef or colonies found during the conduct of underwater video documentation. The coral distribution and density would not significantly constitute a patch reef but presence of live corals indicate that reef is starting to take form.

6.8.2 Benthic Community (Flora and Fauna)

Table 6-34 provides a summary of the habitats investigated through DDV. The various benthic flora and fauna species as well as the natural benthic substrate observed through the survey methods are also included in the table below.

Invertebrate species seen were mainly, high population of sea urchins and bivalves. Sponges and macro algae were also present anchoring from hard bottom substrates. Collectively the invertebrates found comprises the fouling species group. Pinctada spp. which is pearl oyster is regionally important as history tells us that the coastal communities of this country depended on fisheries and pearling activity.

6.8.2.1 Seagrass

There were no seagrass beds encountered in all survey at Zakum Cluster. The softbottom substrate is located on deeper waters and is beyond seagrass growth zones. The shallower areas are dominated by Hard bottom substrates which is not ideal for seagrass colonization.

6.8.2.2 Invertebrates

Most invertebrate species were observed on hard bottom substrate these includes sea urchins, gastropods, bivalves, sponges, and tunicates. In addition, Sea pens were seen on soft bottom substrates along with gastropods species. A summary of macro invertebrates observed is in the study area and its distribution is provided in Table 6-35.

6.8.2.2.1 Sponges

Sponges are very diverse in size, structure, and colour. Sponges can be found in all marine environments with many species associated with coral reefs. There are a number of these species observed during the survey but can only be classified based on colour and form. This is a limitation of the approved methods employed. The ecological function of sponges is in nutrient cycling, particularly silicon and nitrogen. Sea turtles and Nudibranchs are observed feeding on some species of sponges. The structure provide refuge for smaller fishes and juveniles.

6.8.2.2.2 Bivalves

There are 11 known species of bivalves in the region. One of the group belongs to the Family Spondyllidae, which were found in the surveyed area. These organisms attached to hard substrate and would heavily colonized and area forming a mat or bed. Bivalves are filter feeders, therefore functions as nutrient regulators and benthic structure engineering.

Other bivalves are borrowing and solitary individuals living among seagrasses and coral reef areas. An example is the pearl oyster (*Pinctada* sp.) which was noted to be present in the survey area.

6.8.2.2.3 Sea Urchin

The two species of urchins: Collector Sea Urchin *(Tripneustes* sp.) and Long Spine Urchin (*Diadema setosum)*) were found in the area. *Tripneustes* sp., are algae eaters. They live on open sea bottom and uses collected pebbles to conceal themselves from predators. Sea Urchin are commercially important in other countries as it is sought for their roe but there is no known direct fishery for this species in UAE. In right conditions these species tend to be prolific and produce the hundreds of thousands of eggs which stays in the water column during larval stage.

Sea urchins are ecologically important due to their herbivorous behaviour. Most of their life cycle is spent crawling along hard substrates consuming vast amounts of turf algae, allowing other organisms, such as corals, to settle and propagate.

Table 6-34 – Summary of Substrate Type

DDV Point	Hardbottom	Unconsolidated Bottom	Rocks, Rubbles, and Molluscan Shells	Corals	Description
DDV1	X		X		Hardbottom with sediment constituent comprised of mostly of coarse-to-fine sand, and complemented with trifling rocks, rubbles and remains of mollusc shell.
DDV2	X		X	X	Hardbottom with rich fouling bivalves (mussel-like) from sand and few coral colonies of *Porite*s sp. Also, with the presence of sea urchins (*Echinometra mathei* and *Diadema setosum*) and sponge (cf. *Dysidea* sp.).
DDV3		X			Unconsolidated bottom (silt/mud) with presence of Sea pens (Pennatulacea)
DDV4		X			Unconsolidated bottom (silt/mud) with presence of Sea pens (Pennatulacea)
DDV5		X			Unconsolidated bottom (silt/mud) with presence of Sea pens (Pennatulacea)
DDV6		X			Unconsolidated bottom (sandy)
DDV7	X		X	X	Hardbottom comprised of *Pinctada* spp., remains of dead coral framework, and some colonies with partly alive section. *Echinomerta* mathei is also present.
DDV8	X		X	X	Hardbottom comprised of *Pinctada* spp., remains of dead coral framework, and some colonies with partly alive section. *Echinomerta mathei* and *Diadema setosum* are also present.
DDV9	X		X	X	Hardbottom comprised mainly of Pinctada spp., with few occurring coral colonies of Poriti*s* and Merulinids, and with the presence of sea urchins (*Echinometra mathei*

DDV Point	Hardbottom	Unconsolidated Bottom	Rocks, Rubbles, and Molluscan Shells	Corals	Description
					and *Diadema setosum*) and sponge (cf. *Dysidea* sp.). Previous coral mortality is evident with the incidence of dead corals with algae.
DDV10	X		X	X	Hardbottom comprised mainly of Pinctada spp., with few occurring coral colonies of Poritids and Merulinids, and with the presence of sea urchins (*Echinometra mathei* and *Diadema setosum*) and sponge (cf. *Dysidea* sp.). Previous coral mortality is evident with the incidence of dead corals with algae.
DDV11		X	X		Unconsolidated bottom (mud/silt/sand)
DDV12		X	X		Unconsolidated bottom (mud/silt/sand)
DDV13		X	X		Unconsolidated bottom (mud/silt/sand)
DDV14		X			Unconsolidated bottom (silt/mud) with presence of Sea pens (Pennatulacea)
DDV15		X			Unconsolidated bottom (silt/mud) with presence of Sea pens (Pennatulacea)
DDV16	X		X	X	Hardbottom comprised mainly of Pinctada spp., with few occurring coral colonies of Poritids and Merulinids, and with the presence of sea urchins (*Echinometra mathei* and *Diadema setosum*) and sponge (cf. *Dysidea* sp.). Previous coral mortality is evident with the incidence of dead corals with algae.
DDV17	X		X	X	Hardbottom comprised mainly of Pinctada spp., with few occurring coral colonies of Poritids and Merulinids, and with the presence of sea urchins (*Echinometra mathei* and *Diadema setosum*) and sponge (cf. *Dysidea* sp.). Previous coral mortality is evident with the incidence of dead corals with algae.

DDV Point	Hardbottom	Unconsolidated Bottom	Rocks, Rubbles, and Molluscan Shells	Corals	Description
DDV18	X				Hardbottom comprised mainly of Pinctada spp., with few occurring coral colonies of Poritid*s* and Merulinids, and with the presence of sea urchins (*Echinometra mathei* and *Diadema setosum*) and sponge (cf. *Dysidea* sp.). Previous coral mortality is evident with the incidence of dead corals with algae.
DDV19	X		X	X	Hardbottom comprised mainly of Pinctada spp., with few occurring coral colonies of Poritid*s* and Merulinids, and with the presence of sea urchins (*Echinometra mathei* and *Diadema setosum*) and sponge (cf. *Dysidea* sp.). Previous coral mortality is evident with the incidence of dead corals with algae. Hydroids growing on coral skeleton and on molluscan shells. Crustose coralline algae has also colonised some of the dead coral framework
DDV20	X		X	X	Hardbottom comprised mainly of Pinctada spp., with few occurring coral colonies of Poritid*s* and Merulinids, and with the presence of sea urchins (*Echinometra mathei* and *Diadema setosum*) and sponge (cf. *Dysidea* sp.). Previous coral mortality is evident with the incidence of dead corals with algae. Hydroids growing on coral skeleton and on molluscan shells. Crustose coralline algae has also colonised some of the dead coral framework

Table 6-35 – List of Invertebrates Observed through DDVs (Zakum Cluster)

Common Name	Scientific Name	DDV Location																			
		1	2	3	4	5	6	7	8	9	10	1 1	12	13	14	15	16	17	18	19	20
Short-spined Urchin	*Echinometra mathei*		X					X	X	X	X						X	X	X	X	X
Long-spined Urchin	*Diadema setosum*		X					X	X	X	X						X	X	X	X	X

Common Name	Scientific Name	DDV Location																			
		1	2	3	4	5	6	7	8	9	10	1 1	12	13	14	15	16	17	18	19	20
Pearl Oyster	*Pinctada* spp.							X	X	X	X						X	X	X	X	X
Marine Sponge	Demospongia (cf. *Dysidea* sp.		X							X	X						X	X	X	X	X
Sea Pen	Pennatulacea			X	X	X									X	X					

Note:
X denotes the presence of species

6.8.3 Fish

Fish observed during the surveys are limited through the use of DDV method. There was no direct fish population study but only by incidental observation from the video taken. The fish species observed were Breams, Grouper, Angel fish, and Gobies. These species are mainly seen on hard bottom substrates with colonies of fouling species such as sponges, bivalves, tunicates and Macro Algae. Corals were also seen forming a young patch reef.

Table 6-36 – List of Fish Observed through DDVs

Common Name	Scientific Name	DDV Location																			
		1	2	3	4	5	6	7	8	9	10	1 1	12	13	14	15	16	17	18	19	20
Bludger	*Carangoides gymnostethus*							X													
Yellow bar Angelfish	*Pomacanthus maculosos*								X	X											X
Orange-spotted Grouper	*Epinephelus coicoides*								X												
Black-streaked Monocle Bream	*Scolopsis taeniatus*															X				X	
Arabian Monocle Bream	*Scolopsis ghanam*																		X		
Goby	Gobiidae								X	X				X							

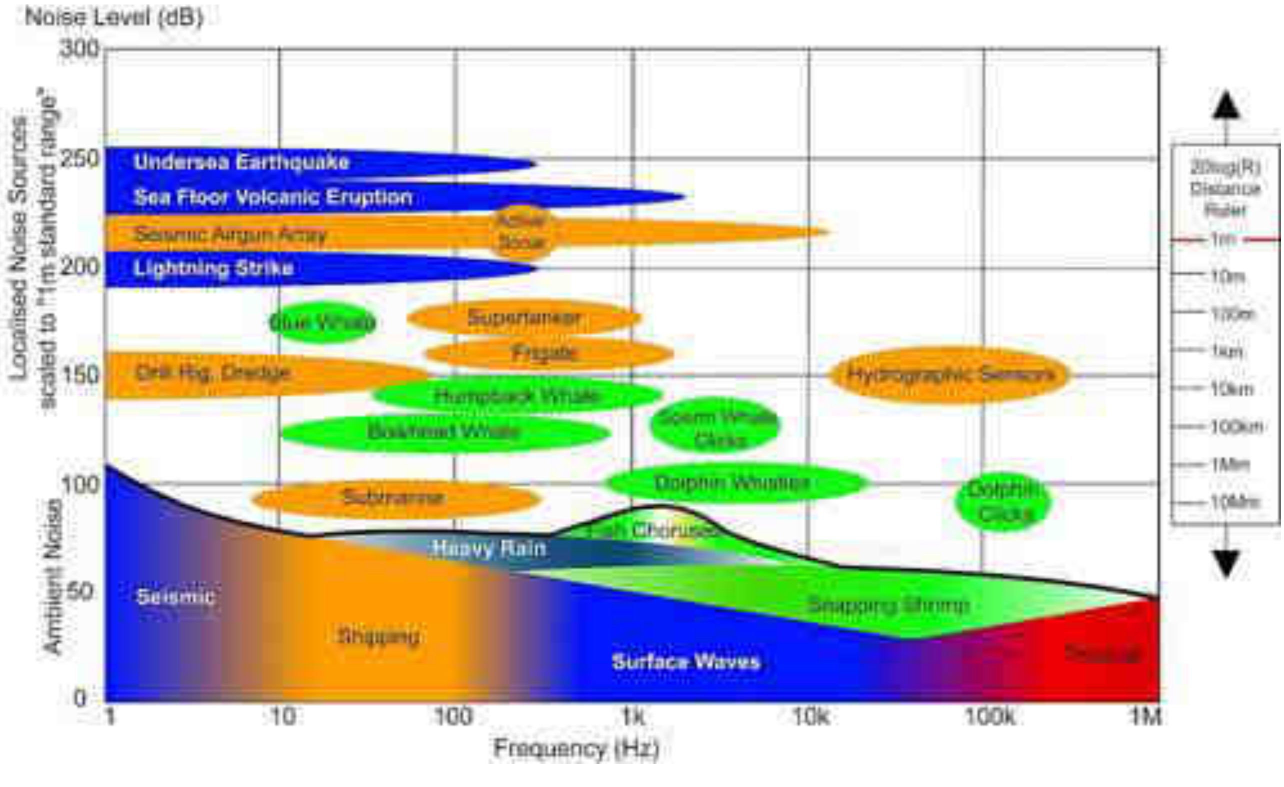
Note: X denotes the presence of species

6.9 Underwater Noise

Sound is described as the effect a vibrating object has on its surrounding environment [24]. These vibrations create sound pressure waves that travel through a medium. The sound pressure waves alternately compress and decompress the molecules in the medium as the sound wave travels. The compressions and decompressions associated with sound waves are detected as changes in pressure by biological hearing structures (e.g. ear in humans) as well as by listening devices like a hydrophone. As water is much denser than air sounds travels faster and has good propagation abilities [25]. Due to the enhanced properties of water for sound travel many marine animals have developed auditory capabilities and use sound to overcome the challenges of living in the sea.

Underwater sounds are generated by a number of natural sources including waves, rain, thermal vents, seismic events and biological sources. Anthropogenic noise can be from seismic surveys, pile driving, dredging and shipping noise. A diagram showing the noise level (intensity) and frequency of common types of noise in the marine environment is shown in Figure 6-56.

Figure 6-56 – Noise Level and Frequency of Sound in the Marine Environment



Source: https://www.ospar.org/work-areas/eiha/noise

Ambient noise is the combination of many different sounds, each differing in behaviour, spatially and temporally [26]. While there can be many sources of ambient noise the main components are from sea surface noise (wind, wave and rain noise), biological noise (fish, mammals and invertebrates), natural seismic/ geoacoustic noise and traffic noise [27].

Marine Mammals have evolved complex sound production and hearing abilities which they use to sense and communicate underwater where visibility is often limited [28]. Cetacean sounds can generally be divided into different categories like clicks (echolocation), burst-pulses (communication) and whistles/moans (communication) [28]. Concern for the effects of increased anthropogenic noise on marine mammals has increased in the last few decades with regulators and industry considering what the impact of various noises are on marine mammals [29]. While some high intensity noises from seismic surveys can potentially cause direct physical harm to marine mammals the effects of lower intensity sounds like shipping can also cause masking impacting the mammals ability to communicate and echolocate which in turn can effect behaviour and biology.

6.9.1 Underwater Noise

Underwater noise measurements were collected at 5 locations on the 7th and 8th of April 2022 (Figure 6-57). in accordance with the Good Practice Guide No.133: Underwater Noise Measurement [26]. A 60-minute recording was taken at each location during daytime (07:00 to 17:00). The equipment was deployed on a mooring system with the hydrophone positioned around mid-depth for each location which ranged from 5 -10m depending on location and tide state (Figure 6-58). Passive Acoustic Monitoring (PAM) was conducted to monitor for vocalising marine mammals. Observations of potential sources of noise were noted during each deployment. Data was analysed to provide information on the noise characteristics of each location as well as any biological sounds recorded.

Equipment used for the study was a TR-Porpoise acoustic recorder fitted with a calibrated Geospectrum M36-900 hydrophone. The device was set to record at a sampling rate of 96 KSPS and sensitivity of -154.4 dB re 1V/µPa. PAM was conducted using PAMGuard64 software, while the data was visualised into spectrograms on Raven Pro 2.0.3 and analysed in dBWav 1.3.4. The data was calibrated in the software using the known recording sensitivity [26].

Conditions on both days was calm with little to no wind. On the 7th April wind speed was 3-6 mph during the morning 8am - 1pm and increased to a maximum of 14 mph by 4pm (*Source: wudnerground.com*). On the 8th April wind was between 3-5 mph in the morning and increased to 16mph by 3pm in the afternoon (*Source: wunderground.com*). High tide was at 7:14am with low tide at 3:39pm on the 7th April. On the 8th April High tide was at 7:54am low tide at 4:39pm (*Source: tides4fishing.com*).

Data was successfully collected from each location for each sampling period. The only issue was at locations 1 and 2 where feedback/static was recorded. This could have been due to a loose connection of the hydrophone or from the hydrophone being in contact with the mooring system. However, while this will have influenced the overall soundscape for these locations it was still possible to use this data for PAM and sources of noise. A summary table indicating the date and time of each recording as well as the number of vessels recorded during each survey is provided in Table 6-37. To avoid any confounding effects the noise from survey vessel just after deployment and before retrieval have been excluded from the analysis.

Sound is a disturbance from a source that propagates through a medium (water or air) and propagates as compressions and expansions of the medium. A number of measures can be used to describe a sound wave, but the most common is sound pressure [26]. Sound pressure is defined as the difference between total pressure and equilibrium pressure which would exist in the absence of sound waves. As the recordings are of continuous sounds the results are focused on the Sound Pressure Level (SPL) as this is the most suitable metric for these types of sounds [26]. SPL is a time-averaged quantity and is commonly represented as a Root Mean Square (RMS) value [26]. All results are shown in dB relative to 1µPa, a common standard for reporting noise underwater.

Boat traffic was low in the study area ranging from 1 to 3 boats recorded during noise deployment. More boat traffic was recorded closer to the land area.

Figure 6-57 – Underwater Monitoring Locations MMBR Area

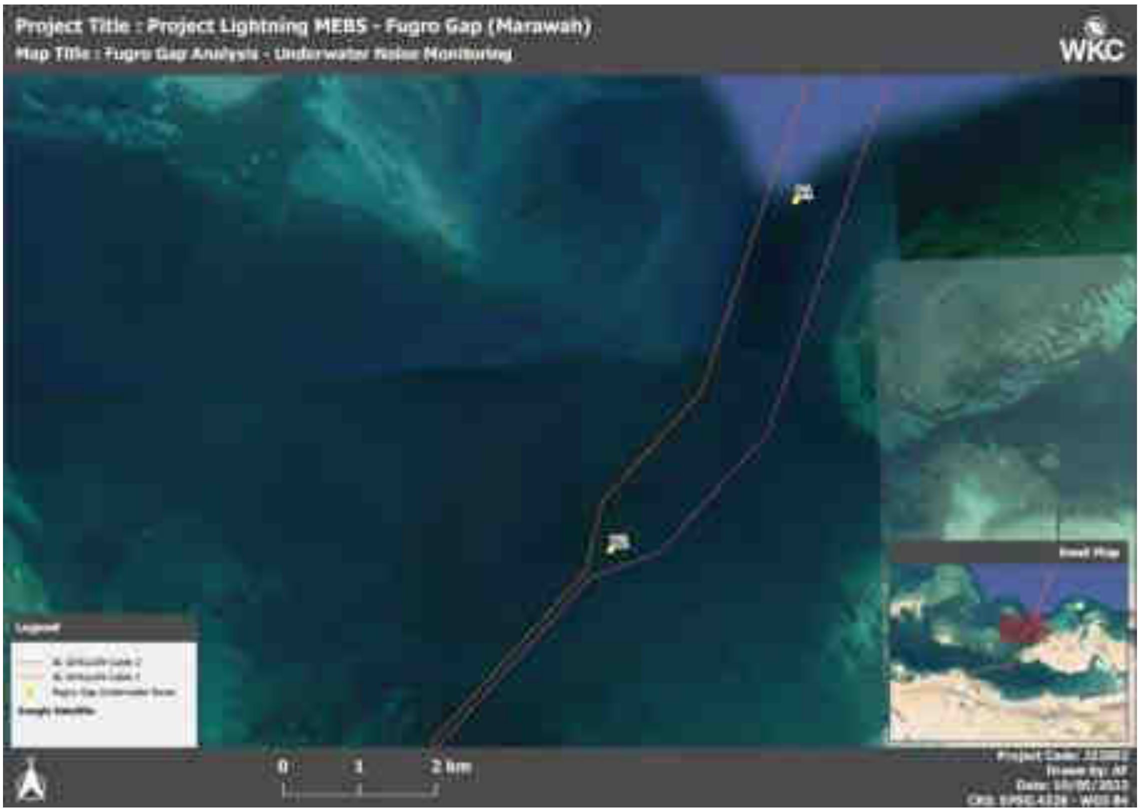


Figure 6-58 – Underwater Noise Locations Mirfa Landfall

Table 6-37 – Summary Table of Underwater Recordings and Boat Sightings

Location	Date	Depth	Deployed	Retrieved	Number of boats recorded
1	08/04/2022	10m	09:53	11:08	1
2	08/04/2022	8m	11:27	12:23	1
3	08/04/2022	5m	14:30	15:58	2
4	07/04/2022	6m	08:36	10:05	3
5	07/04/2022	9m	11:06	12:29	2

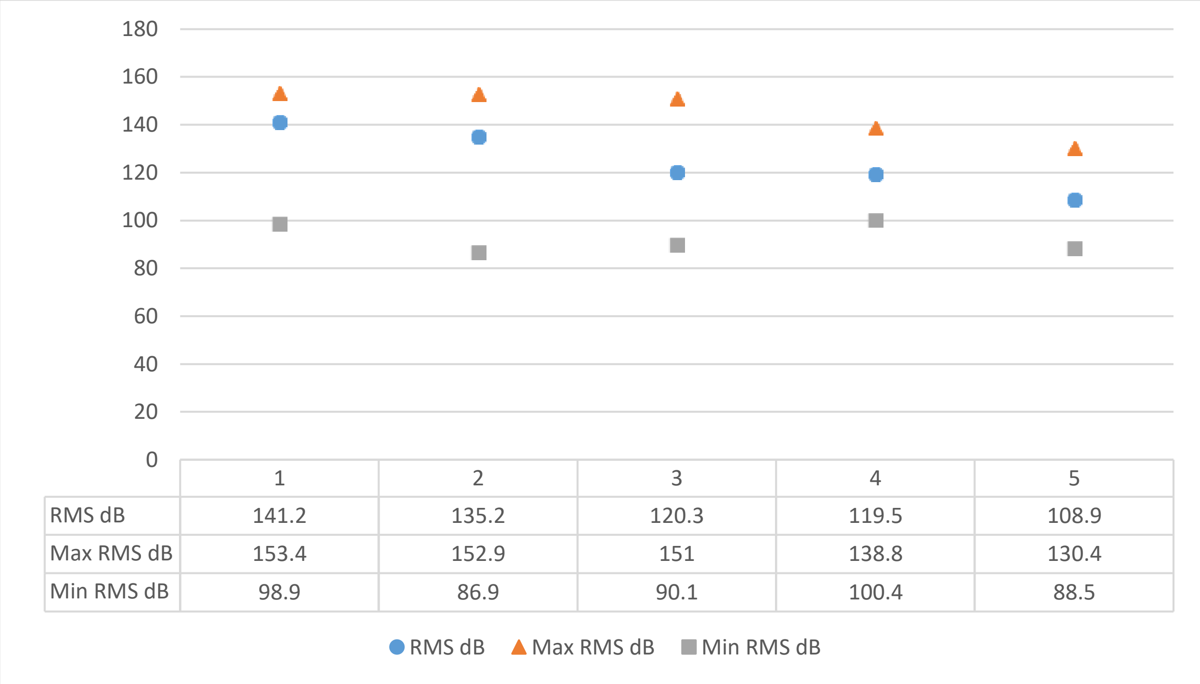
Noise analysis per recording/Soundscape

Sound analysis was conducted or the full duration of each recording (Table 6-38). Recordings were clipped at the beginning and end to eliminate any sounds from the survey vessel. The data shows that Mean and Max Sound Pressure Levels (SPL) root mean squared (RMS) in dB was highest at Location 1 and decreasing to be lowest at location 5. Mean RMS ranged from 141.2 dB at location 1 to 108.9 dB at location 5. The maximum and minimum RMS ranged from 88.5 at location 5 to 153.4 dB at location 1.

Table 6-38 – Noise Analysis for Each Recording

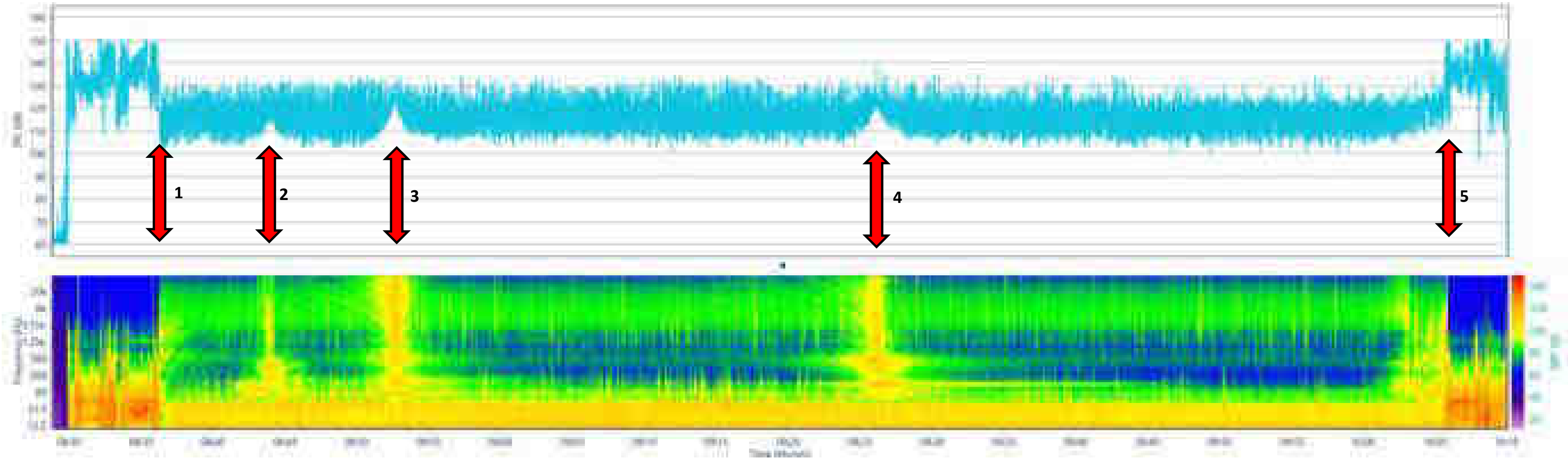
Location	Start Time	End Time	RMS dB	Max RMS dB	Min RMS dB	90% dB	50% dB	10% dB	Peak dB	SEL dB
1	08/04/2022 09:54	08/04/2022 11:07	141.2	153.4	98.9	147.1	119.2	110.8	155	177.6
2	08/04/2022 11:34	08/04/2022 12:22	135.2	152.9	86.9	122.9	99.1	92.3	154.8	169.6
3	08/04/2022 14:35	08/04/2022 15:55	120.3	151	90.1	120.9	109.8	101	154.6	157.1
4	07/04/2022 08:40	07/04/2022 10:00	119.5	138.8	100.4	122.7	116.6	110.9	154.4	156.3
5	07/04/2022 11:13	07/04/2022 12:24	108.9	130.4	88.5	112.7	105.1	97.9	147.4	145.2

Figure 6-59 – Graph Indicating the Mean, Maximum and Minimum RMS dB per Recording



	1	2	3	4	5
RMS dB	141.2	135.2	120.3	119.5	108.9
Max RMS dB	153.4	152.9	151	138.8	130.4
Min RMS dB	98.9	86.9	90.1	100.4	88.5

Figure 6-60 – Soundscape for Mirfa Noise 4 Illustrated in dBWav Software Showing Sound Levels (Top) and Spectrogram (Bottom)



Key:

1 – Deployment

2, 3 and 4 – Boat Noise

5 – Retrieval

Sources of Noise and Ambient Noise Analysis

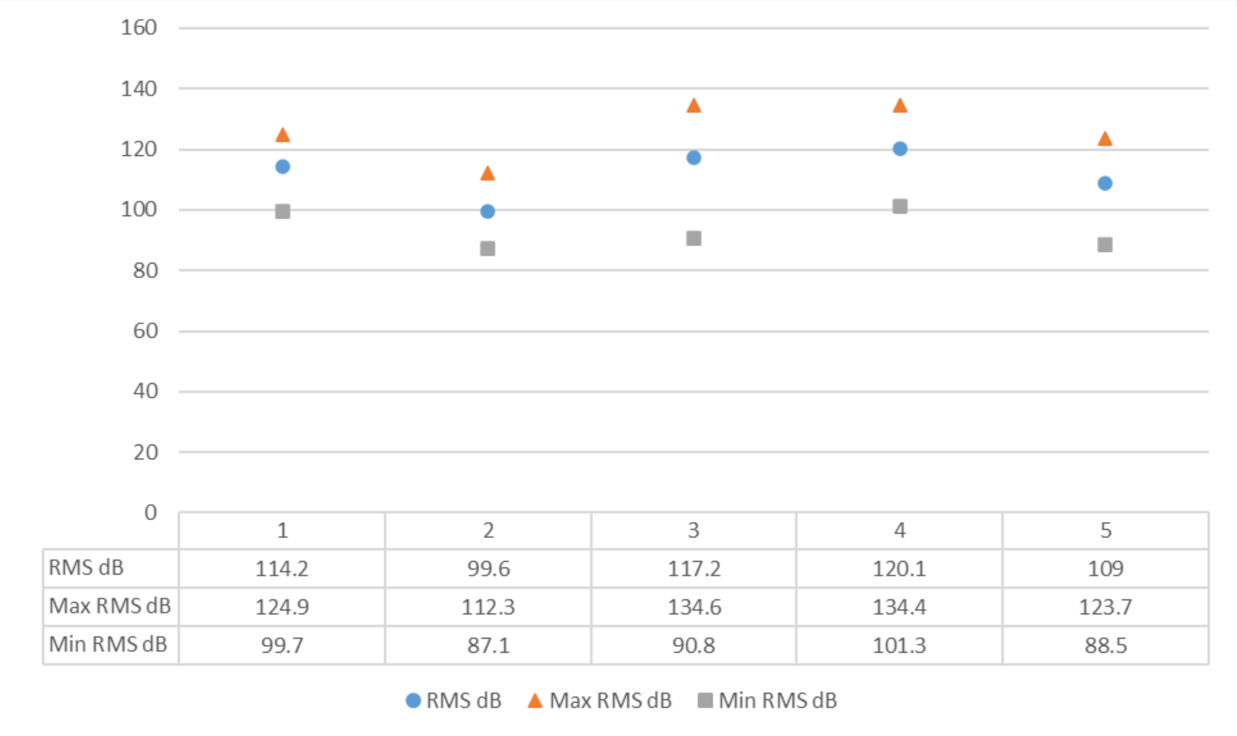
Ambient Noise Analysis

During each recorded a clip was selected to analyse the ambient noise. The clip was chosen during the recording when no anthropogenic noises (e.g., boats) were recorded. Each clip was analysed and is presented in table and chart form below (Table 6-39 and Figure 6-61). Ambient background noise was similar across the sampled locations being slightly higher at locations 3 and 4 with location 2 being the lowest. Mean RBS ranged from 99.6 dB at location 2 to 120.1 dB at location 4. A Spectrogram of ambient noise at location 3 is presented in Figure 6-62.This graph shows sound along time (x-axis) with sound shown in frequency (y-axis), the colour indicates sound level with higher sounds lighter in colour and dark indicating no sound.

Table 6-39 – Noise Analysis of Ambient Conditions for Each Recording

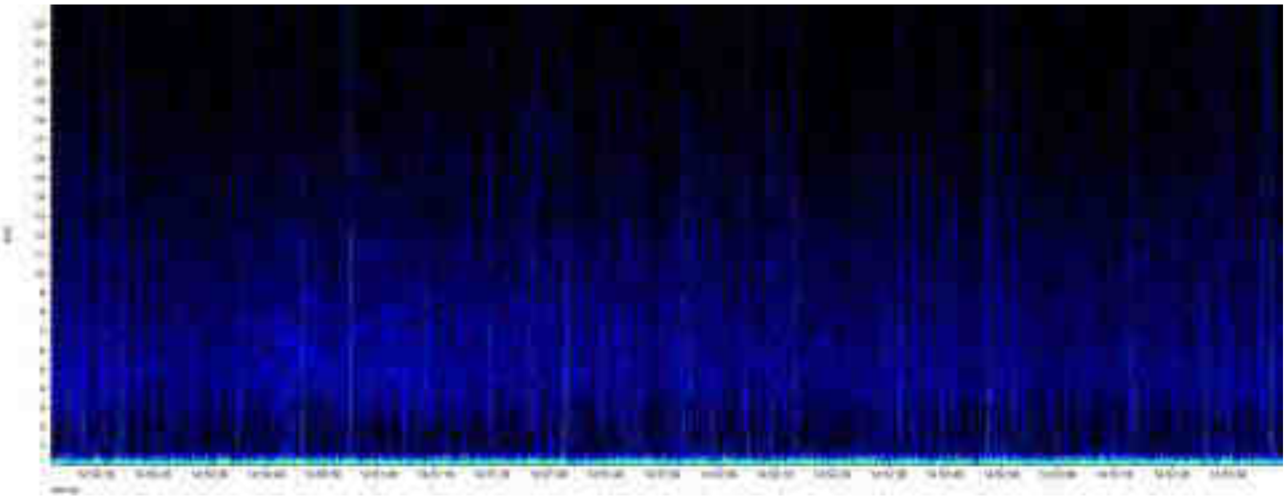
Recording	Start Time	End Time	RMS dB	Max RMS dB	Min RMS dB	90% dB	50% dB	10% dB	Peak dB	SEL dB
1	08/04/2022 10:28	08/04/2022 10:32	114.2	124.9	99.7	117.2	112.9	107.9	154.4	137.6
2	08/04/2022 12:08	08/04/2022 12:12	99.6	112.3	87.1	103.1	96.9	91.5	136.3	123
3	08/04/2022 14:46	08/04/2022 14:56	117.2	134.6	90.8	121	109.9	101.3	154.4	144.9
4	07/04/2022 09:00	07/04/2022 09:22	120.1	134.4	101.3	123.4	117.2	111.5	154.4	151.3
5	07/04/2022 11:30	07/04/2022 11:48	109	123.7	88.5	112.9	105.4	98.3	142.8	139.4

Figure 6-61 – Chart Showing Ambient Mean, Maximum and Minimum RMS dB of Background Noise for Each Recording



	1	2	3	4	5
RMS dB	114.2	99.6	117.2	120.1	109
Max RMS dB	124.9	112.3	134.6	134.4	123.7
Min RMS dB	99.7	87.1	90.8	101.3	88.5

Figure 6-62 – Spectrogram Example of Ambient Noise at Location 3 Illustrated in Raven Lite Software



Sources of Noise

A number of sources of noises were identified during the study and have been analysed in Table 6-40 with images of the spectrograms provided in Figure 6-63 to Figure 6-64. At location 1 during the survey a regular series of pulses was recorded and most likely from a seismic or geological survey being conducted in the area. The pulses occurred approximately every 13 seconds. The pulses were predominantly low frequency <4 kHz reaching a max RMS of 125.3 dB.

Boat traffic was recorded at each location and an example of a boat pass is shown from location 4 (Figure 6-64). A boat passing recorded a max RMS of 133.3 dB and a peak of 1545.3 dB. The spectrograms of boat noise (Figure 6-65) showed that peak sound levels were generally between 0 –

16 kHz, which overlaps the bandwidth which are known with dolphin communication (Figure 6-66), and indicates that increased boat traffic could have a masking effect on local dolphin populations.

The ambient background noise at each location was marked with invertebrate clicking and a sample from location 4 was included for analysis. The clicks recorded a maximum RMS of 132.8 dB with a mean RMS of 124.6 dB. The clicks showed a wide range in frequency from 0 to approximately 44 kHz.

Table 6-40 – Analysis of Specific Noise Sources

Description	Location	Duration (sec)	RMS dB	Max RMS dB	Min RMS dB	90% dB	50% dB	10% dB	Peak dB	SEL dB
Series of Pulses	1	38.2	117	124.6	104.1	120	115.6	110.4	149.1	132.9
Single Pulse	1	0.8	121.4	125.3	116.4	125.3	121.8	116.8	143.7	119.8
Boat	4	146.5	121.4	133.3	108.5	124.5	119.4	113.8	154.3	143.1
Invertebrate Click	4	0.8	124.6	127.8	120.7	127.8	124.3	123.1	132.8	123.1

Figure 6-63 – Series of Pulses Location 1

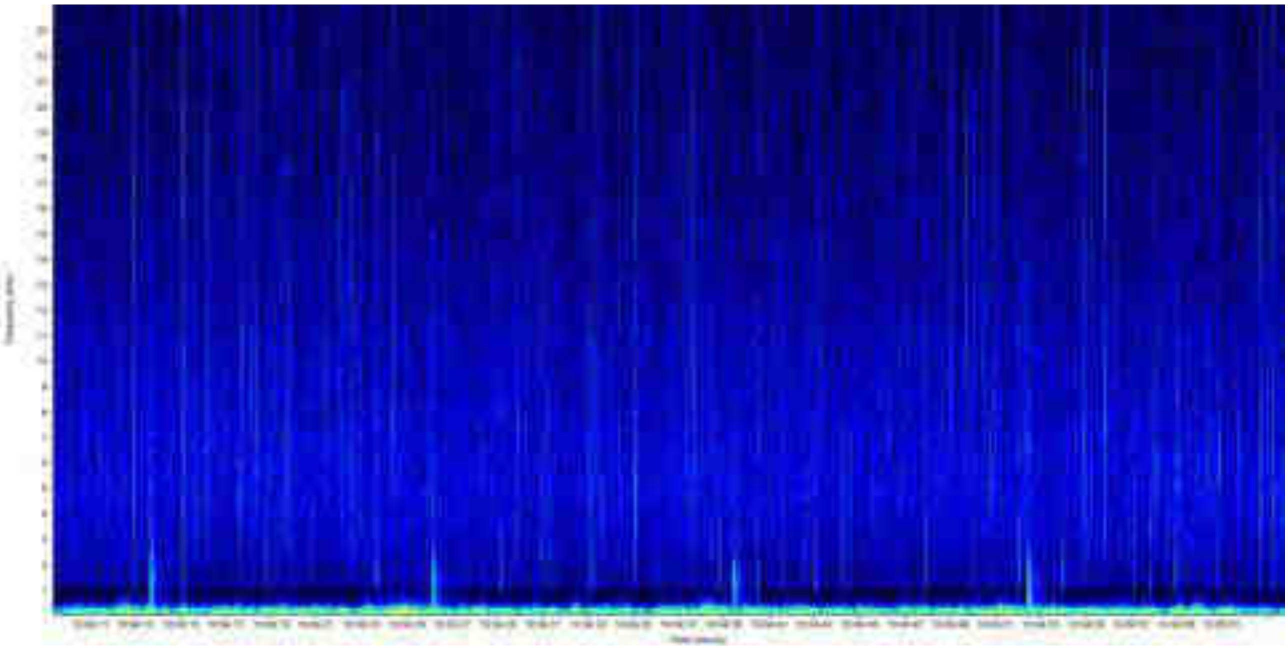


Figure 6-64 – Detailed Spectrogram of Single Pulse Location 1

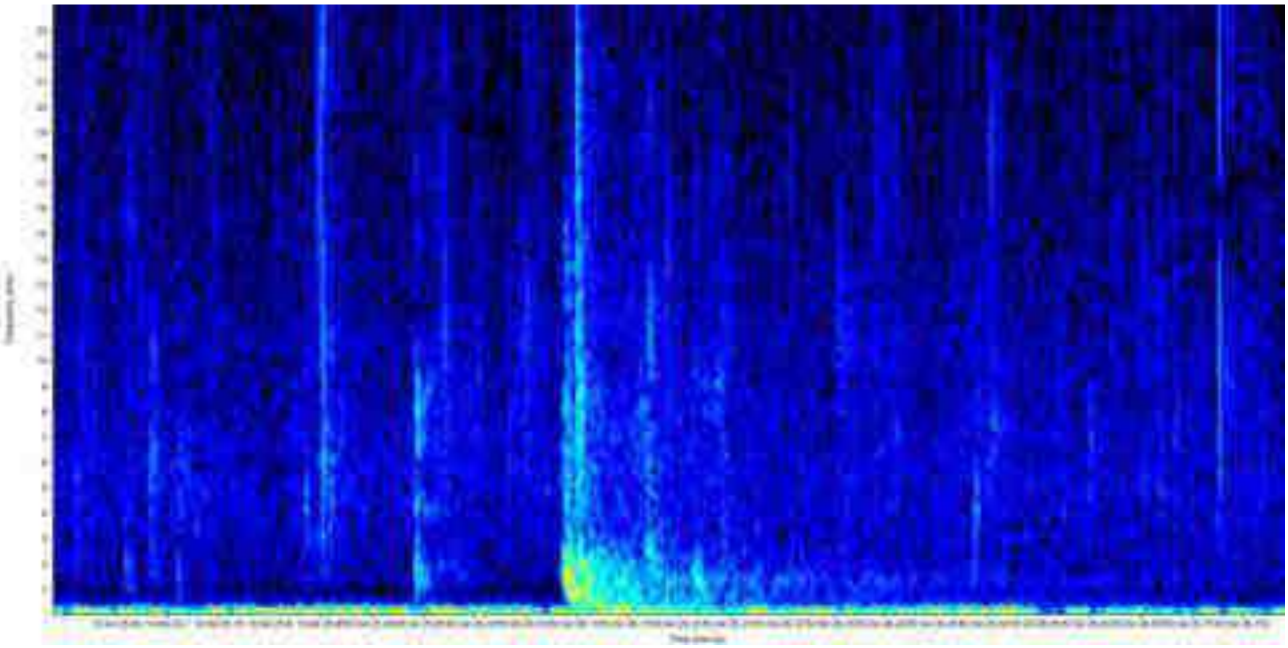


Figure 6-65 – Spectrogram Boat at Location 4

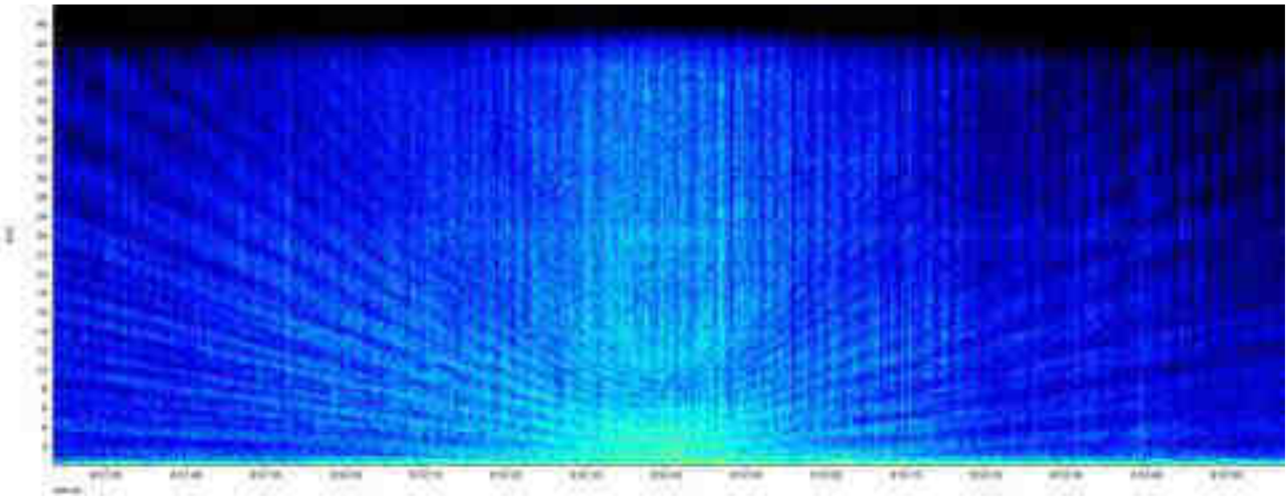
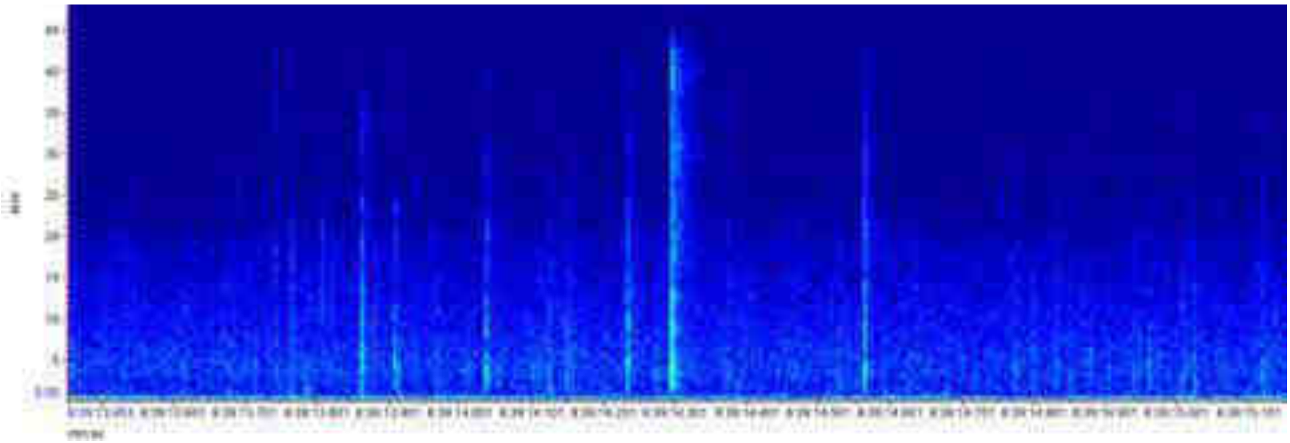


Figure 6-66 – Spectrogram of Invertebrate Clicks at Location 4



Marine Mammals (PAM)

Indian Ocean humpback dolphin (*Sousa plumbea*) and Indo-Pacific bottlenose dolphins (*Tursiops sp.*) are known to be present in the area. Historic sightings of dugongs (*Dugong dugon*), which are considered vulnerable by IUCN and protected by EAD, have also been noted utilising the habitat as evidence of grazing tracks are seen on seagrass beds and actual sighting of the species. Dugongs, dolphins, and porpoises in the area are assessed in previous studies to be resident species within the Marawah Marine Biosphere Reserve.

During the survey both dolphin and Dugong were observed, however the dolphin could not be identified to species level. In addition, the Passive Acoustic Monitoring vocalisations were identified at locations 2, 3 and 5. The vocalisations were short whistle and moan type. At location 2 a series of short whistles were recorded (Figure 6-67). The whistles were short concave shaped in the 5-6 kHz range. At location 3 a longer moan was recorded (Figure 6-68). The moan was longer in duration around 2 seconds with an ascending contour from around 1.5 kHz to 4 kHz. A further series of moans was detected later in the recording at location 3 with a slightly descending shape but in a similar frequency range (Figure 6-69). A series of whistles/moans were detected at location 5 (Figure 6-70). The chorus lasted 10 seconds and was between 3-4 kHz.

No direct information for the hearing threshold of Indian Ocean Humpback dolphins were available [30], but information is available for the Indo-Pacific Humpback dolphin (*Sousa chinensis*) species which would be expected to be similar. Bottlenose dolphins produce whistles in the range of 0.8-24 kHz while Indo-Pacific Humpback Dolphin produce whistles in the range of 1.2-16 kHz [31]. Dugong can produce short duration barks with a frequency of 0.5 to 22 kHz with a median frequency of 1.2kHz and short duration (126 ms) and long duration (1737 ms) calls with a frequency around 4 – 4.5 kHz [32].

The identification of the species making the vocalisations could not be determined and could be either dolphin or dugong as these species can produce a range of sounds within the frequencies recorded.

The vocalisations recorded during the survey and known hearing ranges are within the range of boat noise [33]. This indicates that increased boat traffic has the potential to mask communication in dolphins and dugongs.

Figure 6-67 – Series of Short Whistles Location 2

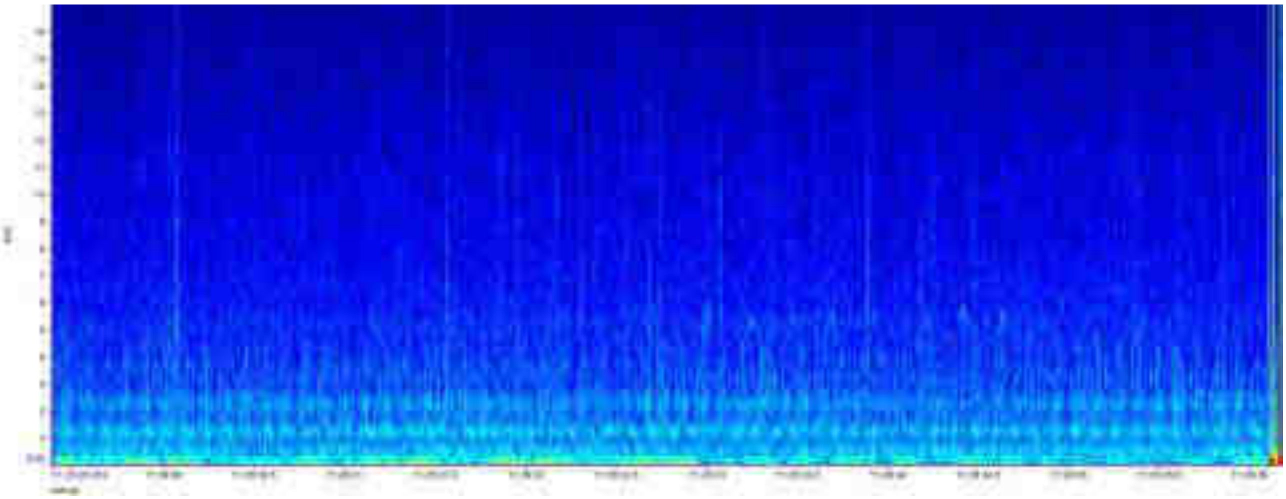


Figure 6-68 – Moan Type Vocalisation Location 3

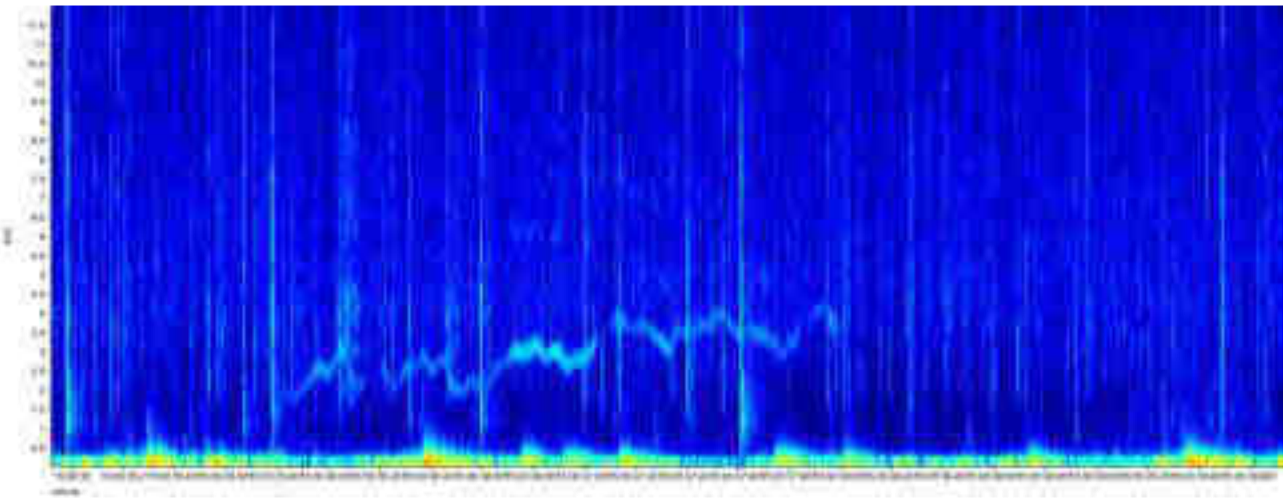


Figure 6-69 – Series of Moans Location 3

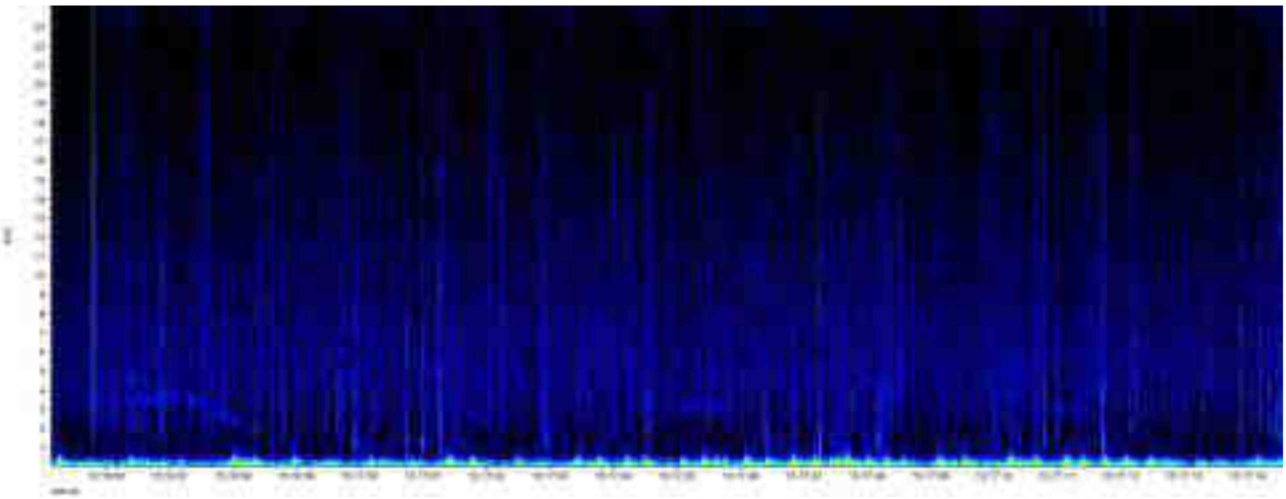


Figure 6-70 – Series of Moans Location 5

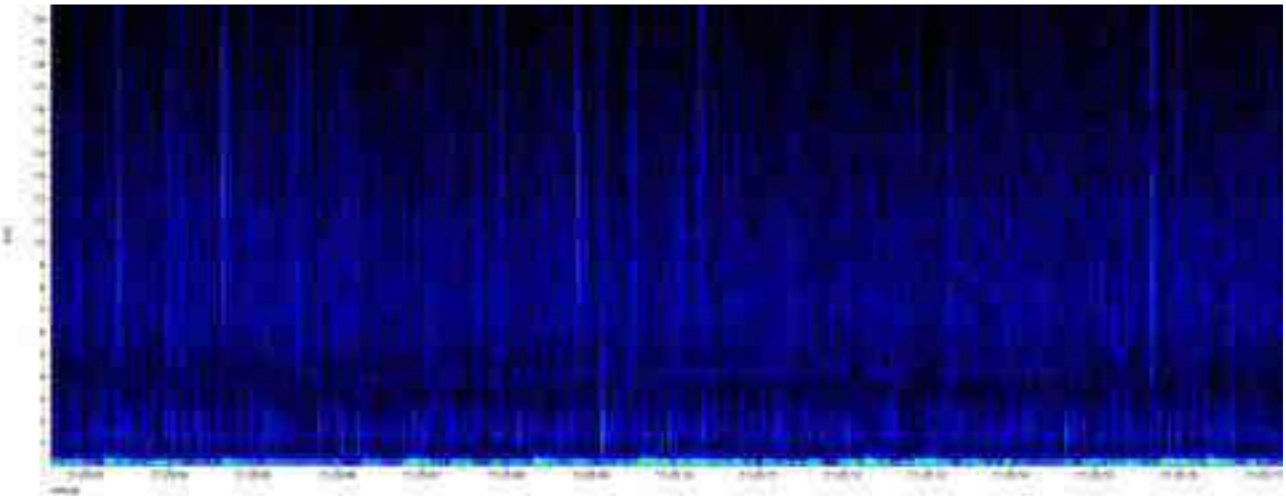


Figure 6-71 – Underwater Monitoring Locations MMBR Area

Figure 6-72 – Underwater Noise Locations Mirfa Landfall

7 Conclusions

7.1 Route 1 (Mirfa) – Fugro

7.1.1 Seawater and Sediment Quality

Water profiling identified an unstratified water column, in which the majority of parameters remained near constant from sea surface to seabed. Variation recorded for all water profile parameters sampled within the water column across the survey area can be attributed to seasonality differences within sampling regimes.

The concentrations of inorganic water quality parameters > MRV (TDS, sulphate, pH, chloride, total nitrogen, total cyanide, nitrate, total phosphorus, nitrite, turbidity and TOC) displayed low to moderate variability where statistics were available and were typical of marine water. The majority of inorganic water quality parameters were below their respective MRVs at all stations across the survey area.

Concentrations of volatile petroleum hydrocarbons, extractable petroleum hydrocarbons, polycyclic aromatic hydrocarbons, BTEX and phenols in the water samples were below their respective minimum reporting values in all samples, apart from naphthalene, phenanthrene and pyrene, where some samples had values above the MRV. However, the concentrations recorded are unlikely to be of environmental concern. Benzene, toluene and ethylbenzene were below the CCME guideline values and considered to be representative of background conditions.

Except for chromium, copper, lead and zinc, concentrations of all major and trace elements were below their respective ADS 18/2017 MACs, as well as the US EPA CCC and CMC values and considered to be of no environmental concern. Concentrations of chromium, copper, lead and zinc exceeded the ADS 18/2017 MACs for both general use areas and marine protected areas in 100, 17, 31 and 129 samples respectively. Copper and lead concentrations exceeded the US EPA CCC in 16 and 4 samples, respectively. Copper and zinc concentrations exceeded the US EPA CMC in 8 and 5 samples, respectively.

Using the Wentworth (1922) sediment description, stations along the Route 1 survey area comprised mainly sand and were classified as coarse sand to fine silt. No clear spatial patterns between depth and sediment type were apparent along Route 1. Total organic carbon content was low across the survey area and lower than previous studies in the region. Conversely, the carbonate content observed within sediments was higher than previously reported values.

All sediment nutrient concentrations demonstrated low to moderate variation across the survey area with no spatial patterns, demonstrating broadly homogenous sediments.

Concentrations of THC were low and typical of concentrations recorded around non-industrialised coastal environments distant from hydrocarbon inputs. Total PAH concentrations were below the ADS 18/2017 MAC.

The concentrations of BTEX in the current survey were below the MRV at all stations along the Route 1 survey area and lower than the values reported previously in the region.

The concentrations of PCBs in the current survey were below the MRV at most stations along the Route 1 survey area and lower than the values reported previously in the region. Total WHO12 PCB concentrations were below the ADS 18/2017 MAC.

All sediment metals concentrations recorded across the survey area were below their respective US National Oceanographic and Atmospheric Administration (NOAA) effects range low (ERL) and effects range median (ERM) threshold values. Except for chromium, lead and nickel, concentrations of all sediment metals were below their respective ADS 18/2017 MAC for both general use areas and marine protected areas. Concentrations of chromium and nickel exceeded the ADS 18/2017 MAC (QCC, 2017) for marine protected areas in numerous stations. Lead concentrations exceeded the ADS 18/2017 MAC (QCC, 2017) for marine protected areas in one station. Nickel concentrations also exceeded the ADS 18/2017 MAC (QCC, 2017) for general use areas in 4 stations. There was no clear spatial distribution pattern that would indicate a point source related to possible anthropogenic activities within the survey area, and the differences recorded are therefore most likely to be associated with natural sediment variations.

7.1.2 Marine Ecology

The seabed was heterogeneous across the survey area and encompassed three distinct habitats: ‘Sublittoral mixed deposit’, ‘Sublittoral sediment’ and ‘Seagrass bed’. ‘Sublittoral mixed deposit’ comprised a mainly flat substratum of calcarenite (cemented sand) with a veneer of sand sediment and occasional coral outcrops, mainly including finger corals (Porites sp.), plate corals (Turbinaria sp.) and boulder corals (Faviidae). ‘Sublittoral sediment’ encompasses predominantly sand sediment, with varying proportions of gravel, shell and coral fragments. ‘Seagrass bed’ comprised predominantly sand sediment seagrass of which Halodule uninervis is the dominant cover species and/or in places Halophila ovalis and Halophila stipulacea form an understorey. All habitats reported, and the taxa resident therein, were typical of areas of similar sediment and water depth in the southern Arabian Gulf.

7.2 Route 1 (Mirfa) Landfall – WKC

The Route 1 (Mirfa) Landfall Baseline Study for the was conducted between 7th to 9th of April 2022. The findings of the baseline survey are summarised below.

7.2.1 Seawater and Sediment Quality

Seawater quality parameters demonstrated expected seasonal condition of a transition period between winter and summer.

Water temperature ranged from 25.80 °C to 28.70 °C with an average of 26.92 °C. Water temperatures were within the expected range for the Arabian Gulf during the early summer season. The pH levels had almost similar values ranging from 8.1 to 8.3 and within EAD AWQO’s permissible range. DO concentrations of all sampling locations recorded were ranging from 6.21 mg/L to 6.78 mg/ with an average of 6.49 mg/L. Tidal flushing and good water exchange influenced the good DO concentrations at the survey sites. Salinity ranged from 47.40 ppt to 49.20 ppt whilst TDS ranged from 60.19 g/L to 62.25 g/L. Turbidity readings were very low ranging from <0.1 to 2.4 NTU, implying a high-water visibility. Water clarity ranged from 4.5 m to 6.65 m. The water clarity across sampling locations were generally good.

Among inorganic parameters, only TDS and total nitrogen had an active level whilst total cyanide had an exceedance. Total cyanide was recorded in exceedance only at R1-WSQ1 M (0.020 mg/L), and active levels only at R1-WSQ2 T (0.002 mg/L) and R1-WSQ7 M (0.001 mg/L). Exceedance in nitrate was recorded only in R1-WSQ4 CNTR T with 5.75 mg/L. The exceedance of nitrate in only one sample could be attributed to contamination of blue-green algae in sample. COD and BOD were below MDL. TOC was similar across the project locations ranging from 1.5 mg/L to 1.7 mg/L, except only for the location at R1-WSQ4 CNTR T with 18.0 mg/L, which exceeded the EAD AWQO standard of 2.5 mg/L. Exceedances were recorded in three (3) of the metal parameters against ADQCC: Cadmium (Cd) exceeded in R1-WSQ1 M, R1-WSQ4 CNTR B, R1-WSQ5 M, R1-WSQ6 M, and R1-WSQ7 M; Copper (Cu) exceeded in R1-WSQ1 M, R1-WSQ3 T, and R1-WSQ5 M; and Lead (Pb) exceeded in R1-WSQ1 M, R1-WSQ2 B, R1-WSQ3 M, R1-WSQ8 M, and R1-WSQ9 M. Generally, the sources of metals in the Arabian Gulf are atmospheric inputs due to its unique geologic environmental setting. Total coliform, a microbiological measure, was undetectable in all test location. Overall, the results show seawater and sediment values within expected ranges. Sediment quality remains stable and seawater quality experienced seasonal changes resulting in improved water quality.

7.2.2 Marine Ecology

The benthic habitat analysis identified the area is classified as Seagrass Bed with substantial macroalgae intermixed. Seagrass colonisation was extensive throughout the sand areas of the survey site. Seagrass beds are classified as critical habitat in EAD CMERC standards. There was no extensive Coral cover noted along the survey line.

Fish species were abundant on the seagrass areas. Species observed during the survey was seagrass associated and demersal, highlighting the survey was the video capture of coach whipray (*Himantura uarnak*) which is considered endangered by the IUCN.

7.2.3 Marine Mammals and Reptiles

Turtles

Sea turtles were observed on multiple occasions through incidental sighting and VP observations. There is a high turtle population as counted during records of surface breaks. Their presence may indicate that the turtles could be resident area, although, no direct study has been conducted to determine if these turtles are residents or transitory.

The green turtle (*Chelonia mydas*) and the hawksbill turtle (*Eretmochelys imbricata*) were directly documented within the Project Site. The IUCN Red List categorises the green turtle as Endangered and the hawksbill turtle as Critically Endangered. Marine turtles are protected, and UAE law and conservation efforts should be implemented to protect these species in this area.

Dolphins and Dugongs

There was single sighting of a dolphin species assigned as Black fish as identification during sighting was not possible. There were sightings of single dugong in two occasions. The species were elusive, and no photo documentation was possible. Presence of Dugong along the survey line is highly possible as grazing marks were noted on the seagrass beds. This species is categorised by the IUCN Red List as Endangered. Efforts should be made to preserve the area to protect dugong habitat.

7.3 Route 2 (Shuweihat) – Fugro

7.3.1 Seawater and Sediment Quality

Water temperatures within the survey area appeared more consistent in shallow waters, rather than deeper ones. In contrast, salinity values were generally observed to be consistent throughout the water column for most stations. A clear trend of increasing turbidity with water depth was observed at numerous water profiles, where the turbidity levels almost doubled compared to the rest of profiles obtained. A slight reduction in dissolved oxygen (DO) with increasing depth was observed at most of the water profiles sampled, with a sharp decrease of 10 % observed in 3 profiles at around 12 m depth. The pH values reported in the current survey were consistent across all profiles taken. Overall, minimal differences were observed at a few stations, hence the conditions encountered were considered typical for the region and season.

The water samples collected across the Route 2 survey area demonstrated no evidence of anthropogenic pollution with most parameters were below their respective MRVs.

Most water hydrocarbons recorded across the survey area were either comparable to, or below their respective MRV values. The concentrations of EPH in 4 samples exceeded the ADS 18/2017 MAC for both general use areas (7.0 µg/L) and marine protected areas (7.0 µg/L), however these values are considered to be potentially anomalous.

Except for cadmium, chromium, copper and zinc, concentrations of all major and trace elements for waters were below their respective ADS 18/2017 MACs, as well as the US EPA CCC and CMC values and considered to be of no environmental concern. The ADS 18/2017 MAC thresholds for both general use areas and marine protected areas were exceeded for zinc in 29 samples, for cadmium in 1 sample, for chromium in 162 samples and for copper in 4 samples. Zinc concentrations exceeded the US EPA CCC and the US EPA CMC thresholds, in sample R2_ENV_095-Middle. Copper concentrations exceeded the US EPA CCC threshold in four samples and the US EPA CMC threshold of 0.0048 mg/L in two samples.

Using the Wentworth (1922) sediment description, most stations along the Route 2 survey area comprised mainly sand and were classified as coarse sand to medium silt. No clear spatial patterns between depth and sediment type were apparent along Route 2. Total organic carbon content was low across the survey area, with a high carbonate content.

All sediment nutrient concentrations, except silicon, demonstrated low to moderate variation across the survey area with no spatial patterns, demonstrating broadly homogenous sediments. Phosphorus concentrations reported in the current survey were higher than those recorded previously in the Zakum oil field (Blue Sea Environmental Consultants, 2011).

Concentrations of THC were low and typical of concentrations recorded around non-industrialised coastal environments distant from hydrocarbon inputs. Total PAH concentrations were below the ADS 18/2017 MAC. The concentrations of BTEX in the current survey were below the MRV at all stations along the Route 2 survey area and lower than the values reported previously in the region.

The concentrations of individual PCBs were below the MRV at most stations along the Route 2 survey area. Total WHO12 PCB concentrations were below the ADS 18/2017 MAC.

The majority of the sediment metals concentrations were below their respective ERL values, except for arsenic at 3 stations. Arsenic concentrations also exceeded the ADS 18/2017 MAC threshold (7.0 µg/g) for both general use and marine protected areas at 9 stations. Concentrations of chromium and nickel exceeded the ADS 18/2017 MAC (QCC, 2017) for marine protected areas in numerous stations. Lead concentrations exceeded the ADS 18/2017 MAC for marine protected areas at one station. Nickel concentrations also exceeded the ADS 18/2017 MAC (QCC, 2017) for general use areas at station R2_ENV_018. There was no clear spatial distribution pattern that would indicate a point source related to possible anthropogenic activities within the survey area, and the differences recorded are therefore most likely to be associated with natural sediment variations.

7.3.2 Marine Ecology

The seabed was heterogeneous across the survey area and encompassed three distinct habitats: 'Sublittoral mixed deposit', 'Sublittoral sediment' and 'Seagrass beds'. 'Sublittoral mixed deposit' comprised a mainly flat substratum of calcarenite (cemented sand) with a veneer of sand sediment and occasional coral outcrops, mainly including finger corals (*Porites* sp.), plate corals (*Turbinaria* sp.) and boulder corals (Faviidae). 'Sublittoral sediment' encompasses predominantly sand sediment, with varying proportions of gravel, shell and coral fragments. 'Seagrass bed' comprised predominantly sand sediment with moderate density beds of *H. ovalis* and *H. stipulacea*. All habitats reported, and the taxa resident therein, were typical of areas of similar sediment and water depth in the southern Arabian Gulf.

7.4 Route 2 (Shuweihat) Landfall – WKC

Route 2 (Shuweihat) Landfall Marine Environmental Baseline Study was conducted between 3rd to 4th of April 2022. The findings of the baseline survey are summarised below.

7.4.1 Seawater and Sediment Quality

Water temperature was consistent across the sampling locations, ranging from 22.80 °C to 24.40 °C. The pH levels were relatively similar ranging from 8.0 to 8.2 and within the permissible range of EAD AWQO. DO concentrations were compliant with the referenced standard (>5 mg/L) with a range between 6.67 mg/L to 7.40 mg/L. The project location is highly influenced by tidal flushing and good water exchange resulting in good DO concentrations. Salinity averaged 47.92 ppt, which is typical in the UAE. The salinity was consistent across the sampling locations, with a range from 47.50 ppt to 48.10 ppt. The related parameters such as conductivity and total dissolved solids (TDS) followed the same trend as salinity.

Turbidity values were very minimal ranging from <0.1 NTU to 2.5 NTU, compared to the referenced standard of 10 NTU. Water clarity in R2-SQ4 M was surface to bottom. The rest of the locations ranged from 5 m to 8 m. The clarity was generally good considering the location depths ranging to 7.5 m to 12 m.

Total cyanide was only detected in WSQ2 T with 0.008 mg/L, exceeding the EAD AWQO standard of 0.004 mg/L. Exceedances in nitrate were detected at three locations: WSQ5 T (10.6 mg/L); WSQ7 T (7.08 mg/L); and WSQ2 B (0.22 mg/L). The standard of EAD AWQO for nitrate is 0.095 mg/L. Active levels above MDL were recorded for WSQ1 M & B, and WSQ3 CNTR B. COD and BOD were below MDL. TOC was similar across R2 locations ranging from 1.5 mg/L to 1.7 mg/L.

Exceedances were recorded in three of the metal parameters. Copper (Cu) exceeded ADQCC in most of the locations. Lead (Pb) exceeded ADQCC at WSQ1 T & B, WSQ2 M & B, WSQ3 CNTR T, WSQ5 T, M & B, and WSQ7 B. Aslo, Zinc (Zn) exceeded EAD specifications at WSQ1 T & M.

Petroleum hydrocarbons were detected only in exceedance at WSQ7 T, with 9 µg/L of EPH C10-C40 was exceedance of the permissible limit of 7 µg/L. The remaining samples were below MDL. The exceedance of EPH C10-C40 in one sample could be attributed to contamination of fuel oils.

PAH – Acenaphthylene was active but not in exceedance at WSQ1 in all sampling depths. This compound is used in making soaps, pesticides, and plastics. The location of the sampling site is the farthest from the shoreline.

BTEX, PAHs (except Acenaphthylene at WQS1), and Phenols (except for EPH C10-C40 at WQS7T) were below MDL for all R2 sampling points throughout the survey.

The microbial parameter, total coliform was undetected across all sampling locations.

Overall, the results show seawater and sediment values within expected ranges and exhibit high water quality.

7.4.2 Marine Ecology

There are two critical habitat (seagrass and fringing reef) found along the survey route and surrounding area. Seagrass bed is healthy and seen as an extensive meadow wide with a wide distribution. All three (3) species found in the UAE was documented to be present. These are *Halodule uninervis, Halophila ovalis* and *halophila stipulacea* indicating a climax community. The meadow is often seen intermix withy macro algae and sponges.

The fringing reef found on the area is located nearshore near Shuweihat Power plant. The condition of the reef is poor with sparse young coral colonies. The reef is covered with turf algae and other fouling species such as ascidians, bivalves and sponges. Although the health condition of the reef is poor, it still continue to function as refuge and feeding areas of multiple species of reef associated fish as well as wave protection of the inner intertidal areas.

Fish species were identified were both reef associated demersal fish and presence of commercially important species were also noted. During the fish study, Blacktip shark and Tawny Nurse Shark was documented. The presence of these species indicates a healthy marine ecosystem as sharks can be used as indicator species for a healthy marine system.

7.4.3 Marine Mammals and Reptiles

Turtles

Sea turtles were observed on few multiple occasions through records of surface breaks for breathing. Their presence and number could not be concluded that the turtles are resident in the area. The three (3) sightings were quick and no photos were taken and their species identification was likewise not possible.

Dolphins

A pod of dolphins was observed within the survey site. The dolphin species was identified as Indian Ocean humpback dolphins (*Sousa plumbea*). Approximately 5 to 8 individuals were observed, *S. plumbea* have highly specific habitat requirements, only occurring in shallow, near-shore environments. Due to this restricted habitat, *S. plumbea* are highly vulnerable to anthropogenic impacts, thus, this species is categorised by the IUCN Red List as Endangered. Efforts should be made to preserve the area to protect dolphin habitat.

7.5 MMBR–WKC

7.5.1 Sediment Quality

Active levels above MDL were detected for fluoride and sulphate at all sampling locations. TOC averaged at 0.65 %, with lowest value of 0.3 % at S3 and S8, and the highest value at S6 at 0.9 %. Two (2) were recorded in exceedance of the ADQCC, and eleven (11) were recorded above MDL.

Exceedance in Arsenic (As) was detected only in S2 with 7.1 mg/kg. Two (2) locations, S6 and S9 had an exceedance with Nickel at 7.1 mg/kg and 8.2 mg/kg, respectively. In all sampling locations, Aluminum (Al), Barium (Ba), Chromium (Cr), Iron (Fe), Lead (Pb), Manganese (Mn), Phosphorus (P), Vanadium (V), and Mercury were detected above MDL and below the referenced standards where applicable. Copper (Cu) was detected above MDL in two (2) locations (S6 and S9), Molybdenum (Mo) in S9, Nickel (Ni) in six (6) locations (S1, S2, S3, S4, S7 and S8), Antimony (Sb) in three (3) locations (S1, S6 and S9), and Arsenic (As) in all locations except S2.

All metal exceedances are assessed to be of geologic source and no source of contamination from industrial facilities was possible considering the remoteness of the survey location.

7.5.2 Marine Ecology

The marine habitats identified across the study area were classified using the Environment Agency Abu Dhabi (EAD) Habitat Classification [8] and Marine Ecological Classification Standard (CMREC) Scheme. Based on the results of the marine ecology surveys, four (4) core habitats are present, and they are Unconsolidated Bottom: 14000, Dredged Seabed: 16100, Seagrass Bed: 12000, Macroalgae communities: 13010 and Hardbottom.

A macroalgae cover was documented colonizing the hardbottom habitat east of the channel. While west and north side of the channel was dominated by extensive seagrass bed. Also, the hardbottom habitat area was covered with wide bivalve beds. In the middle of the channel, a dredged area was made to facilitate navigation between the shallow shoals. The Dredged bed has remained void of extensive vegetation primarily due to the strong current that prevails on site. Coral presence on the hardbottom area was sparse but dead coral structure is still present.

Reef associated species were seen inhabiting the hardbottom habitat. During the fish study Tawny Nurse Sharks was present as other pelagic species such as King mackerel and Orange-spotted trevally. In total, the survey identified species that are considered commercially important. The composition of fish species at the survey is characteristics of a functional coral reef ecosystem.

7.5.3 Marine Mammals and Reptiles

Information about MMRO at MMBR is integrated in Route 1 (Mirfa) Landfall section.

7.6 Zakum Cluster Route 1A and 1B Re-routed – WKC

Zakum cluster route 1A and 1B Marine Environmental Baseline Study was conducted between 20th to 23rd of May 2022. The findings of the baseline survey are summarised below.

7.6.1 Seawater and Sediment Quality

Zakum Cluster Route 1A and 1B Re Routing Area

Temperature ranged from 27.30 °C at WSQ5 B to 28.90 °C at WSQ1 T, with an average of 27.83 °C. Redox Potential had positive values for all readings with an average of 67.40 mV, ranging from 25.80 mV to 110.70 mV. pH was similar for all locations with an average of 8.10 which is within the expected range.

Dissolved oxygen was high in all recordings ranging from 6.08 mg/L at WSQ9 M to 6.42 at WSQ8 B. Salinity levels were consistent across locations and depth with an average of 40.77 ppt.

Turbidity readings were very low ranging from <0.1 to 2.70 NTU and within the reference standard value, implying a good-water visibility. In deploying the Secchi Disc the highest water clarity was recorded at WSQ9 with 7.6 meters and the least clarity was at WSQ5 at 6.5 meters.

Among inorganic parameters, only Total Dissolved Solids (TDS) and Total Nitrogen (TN) had an active level. TDS was recorded in order of magnitude above the MDL ranging from 45,500 mg/L to 46,400 mg/L, as compared to the MDL of 5 mg/L. TN were below and above the MDL ranging from <0.5 mg/L to 5.3 mg/L.

Sulphate ranged from 3,060 mg/L to 3,120 mg/L whilst chloride ranged from 22,700 mg/L to 23,800 mg/L. Nitrate concentrations ranged from <0.04 mg/L to 18.6 mg/L and exceedances were recorded at eight (8) sampling locations such as: WSQ2 M; WSQ3 T& M; 5 T; WSQ WSQ4 T & B; WSQ6 B; WSQ7 T, WSQ8 T; and WSQ10 B.

BOD was below the MDL and its referenced standard whilst COD ranged from <5 mg/L to 30 mg/L, although there no existing standard for COD. TOC was similar across the project locations ranging from 1.4 mg/L to 2.0 mg/L.

Exceedances were recorded in three (3) of the metal parameters against ADQCC: Copper (Cu) exceeded in all sampling locations; Lead (Pb) exceeded in WSQ1, WSQ2 M & B, WSQ3, WSQ4, WSQ5 M, WSQ6 B, WSQ7, WSQ8 T, WSQ9 M & B, and WSQ10; and Zinc (Zn) in WSQ6 M and top layers in WSQ7, WSQ8 and WSQ10. Active metal levels above the MDL were recorded for Arsenic (As), Barium (Ba), Cadmium (Cd), Chromium (Cr), and Vanadium (V).

Petroleum hydrocarbons, BTEX, PAHs and Phenols were below the MDL for all sampling locations. Total coliform, a microbiological measure, was undetectable in all test locations, indicating little to no pollution from sewage sources.

For sediment quality, Oil and Grease was below the MDL across sampling locations. High levels of total nitrogen (TN) were detected in the sediments ranging from 530 mg/kg (WSQ3) to 968 mg/kg (WSQ5).

Active levels of silica concentration were detected in all locations with lowest value at WSQ3 with 2.53 % by wt. whilst highest value at WSQ1 with 4.81 % by wt. Orthophosphate, fluoride and sulphate were had an active level above the MDL. Orthophosphate ranged from 0.8 mg/kg (WSQ4) to 12.3 (WSQ1). Fluoride ranged from 1.4 mg/kg (WSQ1) to 3.3 mg/kg (WSQ5). Sulphate ranged from 0.78 %SO_4 (WSQ6) to 0.95 %SO_4 (WSQ5).

Two (2) out of eighteen (18) metals analysed were recorded in exceedance of the ADQCC standards. Chromium (Cr) exceeded at WSQ4 and WSQ5 whilst the remaining locations had an active level. Whereas Nickel (Ni) exceeded at WSQ4, WSQ5 and WSQ1, with the remaining locations at an active level. Aluminum (Al), Arsenic (As), Barium (Ba), Iron (Fe), Lead (Pb), Manganese (Mn), Phosphorus (P), Vanadium (V) and Zinc (Zn) had active levels in all locations above MDL , Mercury (Hg) and Copper (Cu) were above the MDL but below the referenced standard except at WSQ1 and WSQ6 for Hg and WSQ3 for Cu. Antimony (Sb), Cadmium (Cd), Molybdenum (Mo), Selenium (Se) and Silver (Ag) were below their respective MDLs.

There were no hydrocarbons, PAHs, or PCBs found in any of the samples.

Overall, the results demonstrate that the values of seawater and sediment are within predicted ranges and are typical of the region. Water and sediment test results reveal a high quality of seawater and sediment in the area.

Zakum Cluster Route 1A and 1B Re Routing Area

Temperature for the area ranged from 27.30 at WSQ 13 T & M to 28.90 °C at WSQ12 T, with an average of 27.75 °C. Redox Potential had positive values for all readings ranging from 10.60 mV (WSQ15 B) to 114.50 mV (WSQ17 M), with an average of 69.54 mV. pH levels had an average of 8.11. Dissolved Oxygen (DO) is within the referenced standard with an average of 6.29 mg/L. Salinity profiles ranged between 40.20 ppt to 41.10 ppt with an average of 40.56 ppt. The level of averages for conductivity is 85.31 µS/cm and TDS with 55.45 g/L.

Turbidity values were very minimal ranging from <0.1 NTU to 2.70 NTU, compared to the referenced standard of 10 NTU. Water clarity was highest at 7.8 meters and the lowest clarity measurements was at WSQ17 at 6.7 meters.

TDS and TN were detected above the MDL. TDS values above the MDL, ranging from 45,00 mg/L to 46,100 mg/L. Active levels above the MDL of total nitrogen were recorded only in six (6) locations at WSQ11 T, WSQ13 T, WSQ14T, WSQ15, WSQ16 T & B, and WSQ18 B.

Sulphate and chloride concentrations exceeded the MDL ranging from 3,040 mg/L to 3,110 mg/L and 22,700 mg/L to 23,400 mg/L, respectively. Exceedances in Nitrate were detected at four (4) locations: WSQ13 T; WSQ14 T, WSQ15 T &B, and WSQ16 T.

BOD was below the MDL whilst COD ranged from <5 mg/L to 8 mg/L. COD Exceedance was recorded in one location (WSQ17 M) with 2.9 mg/L, against the standard of 2.5 mg/L. TOC values were above MDL but below the referenced standard.

Exceedances were recorded in four (4) of the metal parameters. Copper (Cu) exceeded ADQCC at WSQ11, WSQ12 T &M, WSQ13 M, WSQ14 T & M, and WSQ15. Lead (Pb) exceeded ADQCC at most of the locations, at WSQ11, WSQ12 T &M, WSQ13 M, WSQ14, WSQ15, WSQ16 T & B, WSQ17, WSQ18 M & B, WSQ19 T & M, and WSQ20 M. Cadmium (Cd) exceeded ADQCC only at WSQ16 T & B. On the other hand, Zinc (Zn) exceeded AD QCCstandard at WSQ11 B and WSQ16 T. Active metal levels above the MDL were recorded for Arsenic (As), Barium (Ba), Vanadium (V), and Chromium (Cr).

BTEX, hydrocarbons, PAHs and Phenols were below the MDL for all sampling points throughout the survey. The microbial parameter, total coliform was undetected across all sampling locations.

In sediments, Oil and grease was detected in active level above the MDL at WSQ11, WSQ12, and WSQ15. High levels of total nitrogen (TN) were detected in the sediments ranging from 843 mg/kg WSQ12) to 1,240 mg/kg (WSQ15). Active level of silica was detected in all locations, ranging to lowest value of 2.13 % by wt. (WSQ12) to the highest value of 4.92 % by wt. (WSQ14). Total Cyanide was below the MDL for all locations.

The three anions tested, orthophosphate, fluoride and sulphate were above the MDL: Orthophosphate ranged from 0.6 mg/kg (WSQ12) to 6.4 mg/kg (WSQ17); No fluoride was detected in WSQ17 whilst other locations ranged from 1.1 mg/kg (WSQ12) to 3.6 mg/kg (WSQ15); and sulphate ranged from 0.49 %SO4 (WSQ13) to 0.95 %SO4 (WSQ15).

Three (3) metals were in exceedances to their respective referenced standard. Chromium was in exceedance only at WSQ14 (13.1 mg/kg) against ADQCC's standard of 11 mg/kg whilst the remaining locations had an active level. Lead was in exceedance at three (3) locations (WSQ14, WSQ15, and WSQ17) with a value of 6.8 mg/kg, 8.9 mg/kg and 5.5 mg/kg, respectively against the standard of 5 mg/kg. Nickel (Ni) was in exceedance at WSQ14 (11.4 mg/kg) and WSQ15 (8.6 mg/kg) against 7 mg/kg standard value. The remaining of the locations had an active level. No exceedances were detected for Antimony (Sb), Cadmium (Cd), Molybdenum (Mo), Selenium (Se), and Silver (Ag). Whereas Arsenic (As), Barium (Ba), Iron (Fe), Manganese (Mn), Phosphorus (P), Vanadium (V) and Zinc (Zn) all had active levels above the MDL but below referenced standards. Active level Mercury was detected at WSQ11, WSQ13, WSQ14, and WSQ15 whilst Copper (Cu) at WSQ13, WSQ14, WSQ15, and WSQ20.

Hydrocarbons, PAHs, and PCBs were below the MDL for all sampling locations.

Overall, the results demonstrate that the seawater and sediment test results were within expected ranges and considered of high quality.

7.6.2 Marine Ecology

There are three core habitats (Hard bottom, Unconsolidated bottom, and Patch reef) found along the survey route and surrounding area. the hard bottom habitat is mainly found inside the Zakum oilfield, and the unconsolidated bottom (fine silt and mud) are outside of the oilfields. Inside Mubarraz oilfield in unconsolidated bottom but mainly made of coarse sand particles with shell and coral fragments. The Patch reef habitat is a forming reef of young coral colonies but in sparse and widely distributed on the hard bottom substrate inside Zakum oilfield. The species found were Porites, Favia and Platygyra and this indicate that the diversity is low and recruitment was from a narrow spawning periods. This assessment is from the age distribution of corals in the area which is estimated to be <5 years old. No old reef or structure was found and most of the young colonies are dead from potentially a bleaching event brought about by high temperatures during summer.

Fish species were identified were mainly reef associated demersal fish and presence of commercially important species were also noted. During the deployment of DDV fish species identified are reef associated Arabian Yellow Bar Angelfish, Gobies and Breams. Commercially important Orange Spotted Grouper was also observed.

7.6.3 Marine Mammals and Reptiles

No marine mammals or turtles were encountered during the survey.

7.7 Underwater Noise

Sound analysis was conducted or the full duration of each recording to describe the seascape at each location. The data shows that Mean and Max Sound Pressure Levels (SPL) root mean squared (RMS) in dB was highest at Location 1 and decreasing to be lowest at location 5. Mean RMS ranged from 141.2 dB at location 1 to 108.9 dB at location 5. The maximum and minimum RMS ranged from 88.5 at location 5 to 153.4 dB at location 1.

During each recorded a clip was selected to analyse the ambient noise. The clip was chosen during the recording when no anthropogenic noises were recorded. Ambient background noise was similar across the sampled locations being slightly higher at locations 3 and 4 with location 2 being the lowest. Mean RBS ranged from 99.6 dB at location 2 to 120.1 dB at location 4.

A number of sources of noises were identified during the study including anthropogenic pulses, boat noise and biological clicks. At location 1 during the survey a regular series of pulses was recorded and most likely from a seismic or geological survey being conducted in the area. The pulses occurred approximately every 13 seconds. The pulses were predominantly low frequency <4 kHz reaching a max RMS of 125.3 dB.

Boat traffic was recorded at each location and an example of a boat pass was used at location 4. A boat passing recorded a max RMS of 133.3 dB and a peak of 1545.3 dB. The spectrograms of boat noise showed that peak sound levels were generally between 0 – 16 kHz, which overlaps the bandwidth which are known with dolphin communication and indicates that increased boat traffic could have a masking effect on local dolphin populations.

The ambient background noise at each location was marked with invertebrate clicking and a sample from location 4 was included for analysis. The clicks recorded a maximum RMS of 132.8 dB with a mean RMS of 124.6 dB. The clicks showed a wide range in frequency from 0 to approximately 44 kHz.

During the Passive Acoustic Monitoring, vocalisations were identified at locations 2, 3 and 5. The vocalisations were short whistle and moan type. At location 2 a series of short concave whistles were recorded in the 5-6 kHz range. At location 3 a longer moan was recorded around 2 seconds in duration with an ascending contour from around 1.5 kHz to 4 kHz. A further series of moans was detected later in the recording at location 3 with a slightly descending shape but in a similar frequency range. A series of whistles/moans were detected at location 5 with the chorus lasting 10 seconds and was between 3-4 kHz.

No direct information for the hearing threshold of Indian Ocean Humpback dolphins was available, but information is available for the Indo-Pacific Humpback dolphin (*Sousa chinensis*) species which would be expected to be similar. Bottlenose dolphins produce whistles in the range of 0.8-24 kHz while Indo-Pacific Humpback Dolphin produce whistles in the range of 1.2-16 kHz. Dugong can produce short duration barks with a frequency of 0.5 to 22 kHz with a median frequency of 1.2kHz and short duration (126 ms) and long duration (1737 ms) calls with a frequency around 4 – 4.5 kHz.

The identification of the species making the vocalisations could not be determined and could be either dolphin or dugong as these species can produce a range of sounds within the frequencies recorded.

7.8 Assumptions and Deviation

There are survey methods and sampling location which deviated from the scope of work;

A) Route 2 Underwater Noise Sampling – the survey locations along the cable route 2 were visited and hydrophones were deployed but post survey data recovery showed short bursts of recordings were captured therefore data quality was not viable to make an assessment for underwater noise.

B) BRUV 2 at Route 2 – the BRUV set up when deployed fell to the sides and camera angle was not capturing the right video for fish assessment.

C) Infauna at MMBR – Samples were not collected based on assumption that that area surveyed was a fill in for Fugro gaps. The MMBR survey before did not include infauna assessment.

D) Infauna at Route 1 Mirfa Landfall – Sampling and assessment of infauna was increased from 5 to 7 samples in view of the proposed floatation channel and trenching.

E) Infauna at Route 2 Shuweihat Landfall – Sampling and assessment of infauna samples was increased from 5 to 8 in view of the proposed trenching at nearshore areas.

F) Turtle Vantage Points- Established three (3) vantage points for turtle observations and enumeration. This is ion the light of high incidental counts while conducting the survey. The vantage points will generate better data to confirm levels of Turtle presence in the survey sites with MMBR as the background.

No other variations were done on methods and surveys. All gathered data were processed and assessed, and results are presented in this report.

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Appendix A – Laboratory Results

Element Materials Technology ME Limited Abu Dhabi
Plot 25, Umm Al Naar (Sas Al Nakhl)
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Analytical Report

Job Ref. No. :	113245
Report No :	158422
Date Reported :	12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113245-1	113245-2	113245-3
Date Received	08/04/2022	08/04/2022	08/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R1-WSQ1 Middle	R1-WSQ2 Top	R1-WSQ2 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
Total Suspended Solids	mg/L	<5.0	<5.0	<5.0	5
Total Dissolved Solids	mg/L	51400	49600	50800	5
Dissolved & Emulsified Oil	mg/L	<10	<10	<10	10
Free Oil	% vol./vol.	<0.01	<0.01	<0.01	0.01
Ammonia	mg/L	<0.06	<0.06	<0.06	0.06
Nitrogen (Ammonia)	mg/L	<0.05	<0.05	<0.05	0.05
Ammonium	mg/L	<0.064	<0.064	<0.064	0.064
Sulphide	mg/L	<0.004	<0.004	<0.004	0.004
Total Nitrogen	mg/L	0.5	0.5	0.6	0.5
Total Cyanide	mg/L	0.020	0.002	<0.001	0.001
Anions					
Nitrate	mg/L	<0.04	<0.04	<0.04	0.04
Orthophosphate	mg/L	<0.06	<0.06	<0.06	0.06
Sulphate	mg/L	3190	3100	3140	5
Chloride	mg/L	26200	25500	26200	2
Chemical Analysis					
Chemical Oxygen Demand	mg/L	<5	<5	<5	5
Total Organic Carbon	mg/L	1.7	1.7	1.6	1.0
Biochemical Oxygen Demand	mg/L	<2	<2	<2	2
Metals					
Aluminium (Al)	mg/L	<0.005	<0.005	<0.005	0.005

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Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113245-1	113245-2	113245-3
Date Received	08/04/2022	08/04/2022	08/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R1-WSQ1 Middle	R1-WSQ2 Top	R1-WSQ2 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Metals - Continued					
Arsenic (As)	mg/L	0.0033	0.0034	0.0034	0.0005
Barium (Ba)	mg/L	0.0099	0.0090	0.0116	0.0005
Cadmium (Cd)	mg/L	0.0003	<0.0001	0.0001	0.0001
Copper (Cu)	mg/L	0.0037	0.0014	0.0024	0.0003
Iron (Fe)	mg/L	<0.02	<0.02	0.06	0.02
Lead (Pb)	mg/L	0.0022	0.0013	0.0036	0.0002
Mercury (Hg)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Phosphorus (P)	mg/L	<0.03	<0.03	<0.03	0.03
Silver (Ag)	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Vanadium (V)	mg/L	0.0042	0.0037	0.0032	0.0001
Zinc (Zn)	mg/L	0.003	0.008	0.003	0.002
Silicon as SiO_2	mg/L	<2.8	<2.8	<2.8	2.8
Chromium (Cr)	µg/L	0.9	<0.3	0.6	0.3
BTEX					
Benzene	µg/L	<7	<7	<7	7
Ethyl benzene	µg/L	<7	<7	<7	7
m&p-Xylene	µg/L	<14	<14	<14	14
o-Xylene	µg/L	<7	<7	<7	7
Toluene	µg/L	<7	<7	<7	7
Hydrocarbons					
EPH C10-C40	µg/L	<7	<7	<7	7
VPH C5-C10	µg/L	<7	<7	<7	7

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Analytical Report

Job Ref. No. : 113245
Report No : 158422
Date Reported : 12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113245-1	113245-2	113245-3
Date Received	08/04/2022	08/04/2022	08/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R1-WSQ1 Middle	R1-WSQ2 Top	R1-WSQ2 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PAH's					
Acenaphthene	µg/L	<0.01	<0.01	<0.01	0.01
Acenaphthylene	µg/L	<0.01	<0.01	<0.01	0.01
Anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(b)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(g,h,i)perylene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(k)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Chrysene	µg/L	<0.01	<0.01	<0.01	0.01
Dibenzo(a,h)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Fluorene	µg/L	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Naphthalene	µg/L	<0.02	<0.02	<0.02	0.02
Phenanthrene	µg/L	<0.01	<0.01	<0.01	0.01
Pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Phenols					
2,4,5-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4,6-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dimethylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Chlorophenol	µg/L	<1.0	<1.0	<1.0	1

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Analytical Report

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Date Reported :	12/05/2022

Client:	WKC Middle East Environment Consultancy
	P.O Box: 130627
	ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113245-1	113245-2	113245-3
Date Received	08/04/2022	08/04/2022	08/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R1-WSQ1 Middle	R1-WSQ2 Top	R1-WSQ2 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Phenols - Continued					
2-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
4-Chloro-3-methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
Pentachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,4,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,5,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,6-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
3-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
Phenol	µg/L	<0.5	<0.5	<0.5	0.5
Microbiology					
Total Coliform	CFU/100mL	Not Detected	Not Detected	Not Detected	10

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Analytical Report

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Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113245-4	113245-5	113245-6
Date Received	08/04/2022	08/04/2022	08/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R1-WSQ3 Top	R1-WSQ3 Middle	R1-WSQ3 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
Total Suspended Solids	mg/L	<5.0	<5.0	<5.0	5
Total Dissolved Solids	mg/L	50400	51200	51200	5
Dissolved & Emulsified Oil	mg/L	<10	<10	<10	10
Free Oil	% vol./vol.	<0.01	<0.01	<0.01	0.01
Ammonia	mg/L	<0.06	<0.06	<0.06	0.06
Nitrogen (Ammonia)	mg/L	<0.05	<0.05	<0.05	0.05
Ammonium	mg/L	<0.064	<0.064	<0.064	0.064
Sulphide	mg/L	<0.004	<0.004	<0.004	0.004
Total Nitrogen	mg/L	<0.5	0.5	<0.5	0.5
Total Cyanide	mg/L	<0.001	<0.001	<0.001	0.001
Anions					
Nitrate	mg/L	0.04	<0.04	<0.04	0.04
Orthophosphate	mg/L	<0.06	<0.06	<0.06	0.06
Sulphate	mg/L	3150	3160	3160	5
Chloride	mg/L	25900	25900	26200	2
Chemical Analysis					
Chemical Oxygen Demand	mg/L	<5	<5	<5	5
Total Organic Carbon	mg/L	1.5	1.6	1.6	1.0
Biochemical Oxygen Demand	mg/L	<2	<2	<2	2
Metals					
Aluminium (Al)	mg/L	<0.005	<0.005	<0.005	0.005
Arsenic (As)	mg/L	0.0039	0.0039	0.0032	0.0005

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Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113245-4	113245-5	113245-6
Date Received	08/04/2022	08/04/2022	08/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R1-WSQ3 Top	R1-WSQ3 Middle	R1-WSQ3 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Metals - Continued					
Barium (Ba)	mg/L	0.0091	0.0123	0.0095	0.0005
Cadmium (Cd)	mg/L	<0.0001	0.0001	<0.0001	0.0001
Copper (Cu)	mg/L	0.0040	0.0022	0.0012	0.0003
Iron (Fe)	mg/L	<0.02	<0.02	<0.02	0.02
Lead (Pb)	mg/L	0.0010	0.0045	0.0013	0.0002
Mercury (Hg)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Phosphorus (P)	mg/L	<0.03	<0.03	<0.03	0.03
Silver (Ag)	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Vanadium (V)	mg/L	0.0034	0.0033	0.0034	0.0001
Zinc (Zn)	mg/L	<0.002	<0.002	<0.002	0.002
Silicon as SiO_2	mg/L	<2.8	<2.8	<2.8	2.8
Chromium (Cr)	µg/L	0.4	0.8	0.5	0.3
BTEX					
Benzene	µg/L	<7	<7	<7	7
Ethyl benzene	µg/L	<7	<7	<7	7
m&p-Xylene	µg/L	<14	<14	<14	14
o-Xylene	µg/L	<7	<7	<7	7
Toluene	µg/L	<7	<7	<7	7
Hydrocarbons					
EPH C10-C40	µg/L	<7	<7	<7	7
VPH C5-C10	µg/L	<7	<7	<7	7

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Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113245-4	113245-5	113245-6
Date Received	08/04/2022	08/04/2022	08/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R1-WSQ3 Top	R1-WSQ3 Middle	R1-WSQ3 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PAH's					
Acenaphthene	µg/L	<0.01	<0.01	<0.01	0.01
Acenaphthylene	µg/L	<0.01	<0.01	<0.01	0.01
Anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(b)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(g,h,i)perylene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(k)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Chrysene	µg/L	<0.01	<0.01	<0.01	0.01
Dibenzo(a,h)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Fluorene	µg/L	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Naphthalene	µg/L	<0.02	<0.02	<0.02	0.02
Phenanthrene	µg/L	<0.01	<0.01	<0.01	0.01
Pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Phenols					
2,4,5-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4,6-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dimethylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Chlorophenol	µg/L	<1.0	<1.0	<1.0	1

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Analytical Report

Job Ref. No.	:	113245
Report No	:	158422
Date Reported	:	12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113245-4	113245-5	113245-6
Date Received	08/04/2022	08/04/2022	08/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R1-WSQ3 Top	R1-WSQ3 Middle	R1-WSQ3 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Phenols - Continued					
2-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
4-Chloro-3-methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
Pentachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,4,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,5,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,6-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
3-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
Phenol	µg/L	<0.5	<0.5	<0.5	0.5
Microbiology					
Total Coliform	CFU/100mL	Not Detected	Not Detected	Not Detected	10

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Analytical Report

Job Ref. No. : 113245
Report No : 158422
Date Reported : 12/05/2022

Client: WKC Middle East Environment Consultancy

P.O Box: 130627

ABU DHABI, United Arab Emirates

Attn: Adrian Evans
Project ID: Water-Lightning
Project Name: WKC Middle East Environment Consultancy
Project Location: N/A
Tel. No: 971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113245-7	113245-8	113245-9
Date Received	08/04/2022	08/04/2022	08/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R1-WSQ4 Control Top	R1-WSQ4 Control Middle	R1-WSQ4 Control Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
Total Suspended Solids	mg/L	<5.0	<5.0	<5.0	5
Total Dissolved Solids	mg/L	50900	50700	50900	5
Dissolved & Emulsified Oil	mg/L	<10	<10	<10	10
Free Oil	% vol./vol.	<0.01	<0.01	<0.01	0.01
Ammonia	mg/L	<0.06	<0.06	<0.06	0.06
Nitrogen (Ammonia)	mg/L	<0.05	<0.05	<0.05	0.05
Ammonium	mg/L	<0.064	<0.064	<0.064	0.064
Sulphide	mg/L	<0.004	<0.004	<0.004	0.004
Total Nitrogen	mg/L	1.4	0.5	<0.5	0.5
Total Cyanide	mg/L	<0.001	<0.001	<0.001	0.001
Anions					
Nitrate	mg/L	5.75	<0.04	<0.04	0.04
Orthophosphate	mg/L	<0.06	<0.06	<0.06	0.06
Sulphate	mg/L	3150	3170	3170	5
Chloride	mg/L	25900	25900	25900	2
Chemical Analysis					
Chemical Oxygen Demand	mg/L	<5	<5	<5	5
Total Organic Carbon	mg/L	18.0	1.6	1.5	1.0
Biochemical Oxygen Demand	mg/L	<2	<2	<2	2
Metals					
Aluminium (Al)	mg/L	<0.005	<0.005	<0.005	0.005

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Analytical Report

Job Ref. No. :	113245
Report No :	158422
Date Reported :	12/05/2022

Client:	WKC Middle East Environment Consultancy
	P.O Box: 130627
	ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113245-7	113245-8	113245-9
Date Received	08/04/2022	08/04/2022	08/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R1-WSQ4 Control Top	R1-WSQ4 Control Middle	R1-WSQ4 Control Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Metals - Continued					
Arsenic (As)	mg/L	0.0032	0.0037	0.0027	0.0005
Barium (Ba)	mg/L	0.0074	0.0079	0.0106	0.0005
Cadmium (Cd)	mg/L	0.0001	<0.0001	0.0004	0.0001
Copper (Cu)	mg/L	0.0017	0.0027	0.0004	0.0003
Iron (Fe)	mg/L	<0.02	<0.02	<0.02	0.02
Lead (Pb)	mg/L	0.0010	0.0014	0.0009	0.0002
Mercury (Hg)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Phosphorus (P)	mg/L	<0.03	<0.03	<0.03	0.03
Silver (Ag)	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Vanadium (V)	mg/L	0.0029	0.0033	0.0032	0.0001
Zinc (Zn)	mg/L	0.002	<0.002	<0.002	0.002
Silicon as SiO_2	mg/L	<2.8	<2.8	<2.8	2.8
Chromium (Cr)	µg/L	<0.3	0.5	0.8	0.3
BTEX					
Benzene	µg/L	<7	<7	<7	7
Ethyl benzene	µg/L	<7	<7	<7	7
m&p-Xylene	µg/L	<14	<14	<14	14
o-Xylene	µg/L	<7	<7	<7	7
Toluene	µg/L	<7	<7	<7	7
Hydrocarbons					
EPH C10-C40	µg/L	<7	<7	<7	7

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Analytical Report

Job Ref. No. :	113245
Report No :	158422
Date Reported :	12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113245-7	113245-8	113245-9
Date Received	08/04/2022	08/04/2022	08/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R1-WSQ4 Control Top	R1-WSQ4 Control Middle	R1-WSQ4 Control Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Hydrocarbons - Continued					
VPH C5-C10	µg/L	<7	<7	<7	7
PAH's					
Acenaphthene	µg/L	<0.01	<0.01	<0.01	0.01
Acenaphthylene	µg/L	<0.01	<0.01	<0.01	0.01
Anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(b)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(g,h,i)perylene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(k)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Chrysene	µg/L	<0.01	<0.01	<0.01	0.01
Dibenzo(a,h)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Fluorene	µg/L	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Naphthalene	µg/L	<0.02	<0.02	<0.02	0.02
Phenanthrene	µg/L	<0.01	<0.01	<0.01	0.01
Pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Phenols					
2,4,5-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4,6-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1

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Analytical Report

Job Ref. No. : 113245
Report No : 158422
Date Reported : 12/05/2022

Client:	WKC Middle East Environment Consultancy
	P.O Box: 130627
	ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113245-7	113245-8	113245-9
Date Received	08/04/2022	08/04/2022	08/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R1-WSQ4 Control Top	R1-WSQ4 Control Middle	R1-WSQ4 Control Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Phenols - Continued					
2,4-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dimethylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Chlorophenol	µg/L	<1.0	<1.0	<1.0	1
2-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
4-Chloro-3-methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
Pentachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,4,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,5,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,6-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
3-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
Phenol	µg/L	<0.5	<0.5	<0.5	0.5
Microbiology					
Total Coliform	CFU/100mL	Not Detected	Not Detected	Not Detected	10

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Analytical Report

Job Ref. No. :	113245
Report No :	158422
Date Reported :	12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113245-10	113245-11
Date Received	08/04/2022	08/04/2022
Sampled By	Client	Client
Sampling Date	Not Given	Not Given
Sampling Time	Not Given	Not Given
Sample Sub Matrix	Water	Water
Sampling Location	Not Given	Not Given
Client Sample ID	R1-WSQ5 Middle	R1-WSQ6 Middle
Sampling Method	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
Total Suspended Solids	mg/L	<5.0	<5.0		5
Total Dissolved Solids	mg/L	50700	50400		5
Dissolved & Emulsified Oil	mg/L	<10	<10		10
Free Oil	% vol./vol.	<0.01	<0.01		0.01
Ammonia	mg/L	<0.06	<0.06		0.06
Nitrogen (Ammonia)	mg/L	<0.05	<0.05		0.05
Ammonium	mg/L	<0.064	<0.064		0.064
Sulphide	mg/L	<0.004	<0.004		0.004
Total Nitrogen	mg/L	<0.5	0.5		0.5
Total Cyanide	mg/L	<0.001	<0.001		0.001
Anions					
Nitrate	mg/L	<0.04	<0.04		0.04
Orthophosphate	mg/L	<0.06	<0.06		0.06
Sulphate	mg/L	3150	3170		5
Chloride	mg/L	25900	25900		2
Chemical Analysis					
Chemical Oxygen Demand	mg/L	<5	<5		5
Total Organic Carbon	mg/L	1.7	1.6		1.0
Biochemical Oxygen Demand	mg/L	<2	<2		2
Metals					
Aluminium (Al)	mg/L	<0.005	<0.005		0.005
Arsenic (As)	mg/L	0.0029	0.0032		0.0005

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Analytical Report

Job Ref. No. : 113245
Report No : 158422
Date Reported : 12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113245-10	113245-11
Date Received	08/04/2022	08/04/2022
Sampled By	Client	Client
Sampling Date	Not Given	Not Given
Sampling Time	Not Given	Not Given
Sample Sub Matrix	Water	Water
Sampling Location	Not Given	Not Given
Client Sample ID	R1-WSQ5 Middle	R1-WSQ6 Middle
Sampling Method	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Metals - Continued					
Barium (Ba)	mg/L	0.0109	0.0134		0.0005
Cadmium (Cd)	mg/L	0.0003	0.0012		0.0001
Copper (Cu)	mg/L	0.0073	0.0022		0.0003
Iron (Fe)	mg/L	<0.02	<0.02		0.02
Lead (Pb)	mg/L	0.0003	0.0019		0.0002
Mercury (Hg)	mg/L	<0.0001	<0.0001		0.0001
Phosphorus (P)	mg/L	<0.03	<0.03		0.03
Silver (Ag)	mg/L	<0.0005	<0.0005		0.0005
Vanadium (V)	mg/L	0.0031	0.0037		0.0001
Zinc (Zn)	mg/L	<0.002	0.002		0.002
Silicon as SiO_2	mg/L	<2.8	<2.8		2.8
Chromium (Cr)	µg/L	0.4	0.5		0.3
BTEX					
Benzene	µg/L	<7	<7		7
Ethyl benzene	µg/L	<7	<7		7
m&p-Xylene	µg/L	<14	<14		14
o-Xylene	µg/L	<7	<7		7
Toluene	µg/L	<7	<7		7
Hydrocarbons					
EPH C10-C40	µg/L	<7	<7		7
VPH C5-C10	µg/L	<7	<7		7

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Analytical Report

Job Ref. No.	:	113245
Report No	:	158422
Date Reported :		12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113245-10	113245-11
Date Received	08/04/2022	08/04/2022
Sampled By	Client	Client
Sampling Date	Not Given	Not Given
Sampling Time	Not Given	Not Given
Sample Sub Matrix	Water	Water
Sampling Location	Not Given	Not Given
Client Sample ID	R1-WSQ5 Middle	R1-WSQ6 Middle
Sampling Method	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PAH's					
Acenaphthene	µg/L	<0.01	<0.01		0.01
Acenaphthylene	µg/L	<0.01	<0.01		0.01
Anthracene	µg/L	<0.01	<0.01		0.01
Benzo(a)anthracene	µg/L	<0.01	<0.01		0.01
Benzo(a)pyrene	µg/L	<0.01	<0.01		0.01
Benzo(b)fluoranthene	µg/L	<0.01	<0.01		0.01
Benzo(g,h,i)perylene	µg/L	<0.01	<0.01		0.01
Benzo(k)fluoranthene	µg/L	<0.01	<0.01		0.01
Chrysene	µg/L	<0.01	<0.01		0.01
Dibenzo(a,h)anthracene	µg/L	<0.01	<0.01		0.01
Fluoranthene	µg/L	<0.01	<0.01		0.01
Fluorene	µg/L	<0.01	<0.01		0.01
Indeno(1,2,3-c,d)pyrene	µg/L	<0.01	<0.01		0.01
Naphthalene	µg/L	<0.02	<0.02		0.02
Phenanthrene	µg/L	<0.01	<0.01		0.01
Pyrene	µg/L	<0.01	<0.01		0.01
Phenols					
2,4,5-Trichlorophenol	µg/L	<1.0	<1.0		1
2,4,6-Trichlorophenol	µg/L	<1.0	<1.0		1
2,4-Dichlorophenol	µg/L	<1.0	<1.0		1
2,4-Dimethylphenol	µg/L	<1.0	<1.0		1
2-Chlorophenol	µg/L	<1.0	<1.0		1

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Analytical Report

Job Ref. No.	:	113245
Report No	:	158422
Date Reported	:	12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113245-10	113245-11
Date Received	08/04/2022	08/04/2022
Sampled By	Client	Client
Sampling Date	Not Given	Not Given
Sampling Time	Not Given	Not Given
Sample Sub Matrix	Water	Water
Sampling Location	Not Given	Not Given
Client Sample ID	R1-WSQ5 Middle	R1-WSQ6 Middle
Sampling Method	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Phenols - Continued					
2-Methylphenol	µg/L	<1.0	<1.0		1
2-Nitrophenol	µg/L	<1.0	<1.0		1
4-Chloro-3-methylphenol	µg/L	<1.0	<1.0		1
4-Methylphenol	µg/L	<1.0	<1.0		1
4-Nitrophenol	µg/L	<1.0	<1.0		1
Pentachlorophenol	µg/L	<1.0	<1.0		1
2,3,4,6-Tetrachlorophenol	µg/L	<1.0	<1.0		1
2,3,5,6-Tetrachlorophenol	µg/L	<1.0	<1.0		1
2,6-Dichlorophenol	µg/L	<1.0	<1.0		1
3-Methylphenol	µg/L	<1.0	<1.0		1
Phenol	µg/L	<0.5	<0.5		0.5
Microbiology					
Total Coliform	CFU/100mL	Not Detected	Not Detected		10

Method of Analysis

Method Name	Reference
Biochemical Oxygen Demand [APHA 5210 B]Water-DXB	APHA [5210 B]
BTEX (including VPH) by GC-FID-HS [EPA 8015B] Water-DXB	EPA [8015B]
Chemical Oxygen Demand [APHA 5220 B]Water-DXB	APHA [5220 B]
Chloride [APHA 4500 Cl- B]-DXB	APHA [4500 Cl- B]
Cyanide [Modified USEPA method OIA-1667 - Subcontract]-DXB	USEPA [Method OIA-1667]
EPH C10-C40 (Low LOD) by GC-FID [EPA 8015B] Water-DXB	EPA [8015B]
Metals ICP-MS (APHA 3125) SW-DXB	APHA [3125]

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Analytical Report

Job Ref. No.	:	113245
Report No	:	158422
Date Reported :		12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Method of Analysis

Method Name	Reference
Nitrate [HACH 8039]-DXB	HACH [8039]
Nitrogen (Ammonia) [HACH 8155]-DXB	HACH [8155]
Nitrogen (Total) [ASTM D5176]-DXB	ASTM [D5176-08]
	ASTM [D5176-08]
Oil & Grease [APHA 5520 B]Water-DXB	APHA [5520 B]
Orthophosphate [HACH 8048]-DXB	HACH [8048]
PAH in Water [EPA 8270D, July 2014]-DXB	EPA [8270D, July 2014]
	EPA [8270D, July 2014]
Phenols water [EPA 528]-DXB	EPA [528]
Solids (Total Dissolved) [APHA 2540 C]Water-DXB	APHA [2540 C]
Solids (Total Suspended) [APHA 2540 D]Water-DXB	APHA [2540 D]
Sulphate [APHA 4500 SO42- C]-DXB	APHA [4500 SO42- C]
Sulphide [HACH 8131]-DXB	HACH [8131]
Total Coliform (APHA 9222 B)Water-DXB	APHA [9222 B]
Total Organic Carbon (TOC) [APHA 5310 B]-DXB	APHA [5310 B]
	APHA [5310 B]

* Reference Method Modified

Comments:

- Tested By : AAP, GAN, HRA, JCH, NHA, SGE, SMO
- Date Tested: 09/04/2022 to 27/04/2022
- Please note that all tests shown not containing the `AUH` extension are subcontracted to Element group of laboratories.
- Please note that if the sample has to be diluted due to the matrix, the reported Limit of Detection (LOD) value will increase from the method LOD.
- Any APHA methods stated herein are documented in-house procedures, referenced to 23rd edition.

- This test report supersedes previous report dated 28 Apr 2022. Report revised to amend the Sample Descriptions as per client's request. Previous report 156859.
- Please note that in a revised report the reported limit of detection will not be the same as the method limit of detection if the latter has been modified since the analysis was completed.

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Analytical Report

Job Ref. No. : 113379
Report No : 158423
Date Reported : 12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113379-1	113379-2	113379-3
Date Received	11/04/2022	11/04/2022	11/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R1-WSQ7 Middle	R1-WSQ8 Middle	R1-WSQ9 Middle
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
Total Suspended Solids	mg/L	<5.0	<5.0	<5.0	5
Total Dissolved Solids	mg/L	50900	51000	52000	5
Dissolved & Emulsified Oil	mg/L	<10	<10	<10	10
Free Oil	% vol./vol.	<0.01	<0.01	<0.01	0.01
Ammonia	mg/L	<0.06	<0.06	<0.06	0.06
Nitrogen (Ammonia)	mg/L	<0.05	<0.05	<0.05	0.05
Ammonium	mg/L	<0.064	<0.064	<0.064	0.064
Sulphide	mg/L	<0.004	<0.004	<0.004	0.004
Total Nitrogen	mg/L	0.5	0.5	0.5	0.5
Total Cyanide	mg/L	0.001	<0.001	<0.001	0.001
Anions					
Nitrate	mg/L	0.09	0.09	0.84	0.04
Orthophosphate	mg/L	<0.06	<0.06	<0.06	0.06
Sulphate	mg/L	3170	3160	3160	5
Chloride	mg/L	25900	25900	26200	2
Chemical Analysis					
Chemical Oxygen Demand	mg/L	<5	<5	<5	5
Total Organic Carbon	mg/L	1.5	1.6	1.6	1.0
Biochemical Oxygen Demand	mg/L	<2	<2	<2	2
Metals					
Aluminium (Al)	mg/L	<0.005	<0.005	<0.005	0.005

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Analytical Report

Job Ref. No. :	113379
Report No :	158423
Date Reported :	12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113379-1	113379-2	113379-3
Date Received	11/04/2022	11/04/2022	11/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R1-WSQ7 Middle	R1-WSQ8 Middle	R1-WSQ9 Middle
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Metals - Continued					
Arsenic (As)	mg/L	0.0045	0.0039	0.0040	0.0005
Barium (Ba)	mg/L	0.0099	0.0101	0.0149	0.0005
Cadmium (Cd)	mg/L	0.0013	0.0002	0.0001	0.0001
Copper (Cu)	mg/L	<0.0003	<0.0003	<0.0003	0.0003
Iron (Fe)	mg/L	<0.02	<0.02	<0.02	0.02
Lead (Pb)	mg/L	0.0016	0.0027	0.0033	0.0002
Phosphorus (P)	mg/L	<0.03	<0.03	<0.03	0.03
Silver (Ag)	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Vanadium (V)	mg/L	0.0037	0.0036	0.0041	0.0001
Zinc (Zn)	mg/L	<0.002	<0.002	<0.002	0.002
Mercury (Hg)	µg/L	<0.10	<0.10	<0.10	0.10
Silicon as SiO2	mg/L	<2.8	<2.8	<2.8	2.8
Chromium (Cr)	µg/L	0.4	1.3	0.7	0.3
BTEX					
Benzene	µg/L	<7	<7	<7	7
Ethyl benzene	µg/L	<7	<7	<7	7
m&p-Xylene	µg/L	<14	<14	<14	14
o-Xylene	µg/L	<7	<7	<7	7
Toluene	µg/L	<7	<7	<7	7
Hydrocarbons					
EPH C10-C40	µg/L	<7	<7	<7	7
VPH C5-C10	µg/L	<7	<7	<7	7

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Analytical Report

Job Ref. No.	:	113379
Report No	:	158423
Date Reported :		12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113379-1	113379-2	113379-3
Date Received	11/04/2022	11/04/2022	11/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R1-WSQ7 Middle	R1-WSQ8 Middle	R1-WSQ9 Middle
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PAH's					
Acenaphthene	µg/L	<0.01	<0.01	<0.01	0.01
Acenaphthylene	µg/L	<0.01	<0.01	<0.01	0.01
Anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(b)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(g,h,i)perylene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(k)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Chrysene	µg/L	<0.01	<0.01	<0.01	0.01
Dibenzo(a,h)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Fluorene	µg/L	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Naphthalene	µg/L	<0.02	<0.02	<0.02	0.02
Phenanthrene	µg/L	<0.01	<0.01	<0.01	0.01
Pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Phenols					
2,4,5-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4,6-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dimethylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Chlorophenol	µg/L	<1.0	<1.0	<1.0	1

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Analytical Report

Job Ref. No. :	113379
Report No :	158423
Date Reported :	12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113379-1	113379-2	113379-3
Date Received	11/04/2022	11/04/2022	11/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R1-WSQ7 Middle	R1-WSQ8 Middle	R1-WSQ9 Middle
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Phenols - Continued					
2-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
4-Chloro-3-methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
Pentachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,4,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,5,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,6-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
3-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
Phenol	µg/L	<0.5	<0.5	<0.5	0.5
Microbiology					
Total Coliform	CFU/100mL	Not Detected	Not Detected	Not Detected	10

Method of Analysis

Method Name	Reference
Biochemical Oxygen Demand [APHA 5210 B]Water-DXB	APHA [5210 B]
BTEX (including VPH) by GC-FID-HS [EPA 8015B] Water-DXB	EPA [8015B]
Chemical Oxygen Demand [APHA 5220 B]Water-DXB	APHA [5220 B]
Chloride [APHA 4500 Cl- B]-DXB	APHA [4500 Cl- B]
Cyanide [Modified USEPA method OIA-1667 - Subcontract]-DXB	USEPA [Method OIA-1667]
EPH C10-C40 (Low LOD) by GC-FID [EPA 8015B] Water-DXB	EPA [8015B]
Mercury by PSA [EPA 245.7] SW-DXB	EPA [245.7]

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Analytical Report

Job Ref. No. : 113379
Report No : 158423
Date Reported : 12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Method of Analysis

Method Name	Reference
Metals ICP-MS (APHA 3125) SW-DXB	APHA [3125]
	APHA [3125]
Nitrate [HACH 8039]-DXB	HACH [8039]
Nitrogen (Ammonia) [HACH 8155]-DXB	HACH [8155]
Nitrogen (Total) [ASTM D5176]-DXB	ASTM [D5176-08]
Oil & Grease [APHA 5520 B]Water-DXB	APHA [5520 B]
Orthophosphate [HACH 8048]-DXB	HACH [8048]
PAH in Water [EPA 8270D, July 2014]-DXB	EPA [8270D, July 2014]
Phenols water [EPA 528]-DXB	EPA [528]
Solids (Total Dissolved) [APHA 2540 C]Water-DXB	APHA [2540 C]
Solids (Total Suspended) [APHA 2540 D]Water-DXB	APHA [2540 D]
Sulphate [APHA 4500 SO42- C]-DXB	APHA [4500 SO42- C]
Sulphide [HACH 8131]-DXB	HACH [8131]
Total Coliform (APHA 9222 B)Water-DXB	APHA [9222 B]
Total Organic Carbon (TOC) [APHA 5310 B]-DXB	APHA [5310 B]

* Reference Method Modified

Comments:

· Tested By : AAP, GAN, HRA, JCH, NHA, SGE, SMO
· Date Tested: 13/04/2022 to 30/04/2022

· Please note that all tests shown not containing the `AUH` extension are subcontracted to Element group of laboratories.

. Please note that if the sample has to be diluted due to the matrix, the reported Limit of Detection (LOD) value will increase from the method LOD.

. Any APHA methods stated herein are documented in-house procedures, referenced to 23rd edition.

- This test report supersedes previous report dated 04 May 2022. Report revised to amend the Sample Descriptions as per client's request. Previous report 157012.
- Please note that in a revised report the reported limit of detection will not be the same as the method limit of detection if the latter has been modified since the analysis was completed.

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Analytical Report

Job Ref. No. : 113091
Report No : 158424
Date Reported : 12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113091-1	113091-2	113091-3
Date Received	04/04/2022	04/04/2022	04/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R2-WSQ1 Top	R2-WSQ1 Middle	R2-WSQ1 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
Total Suspended Solids	mg/L	<5.0	<5.0	<5.0	5
Total Dissolved Solids	mg/L	49600	49800	49600	5
Dissolved & Emulsified Oil	mg/L	<10	<10	<10	10
Free Oil	% vol./vol.	<0.01	<0.01	<0.01	0.01
Ammonia	mg/L	<0.06	<0.06	<0.06	0.06
Nitrogen (Ammonia)	mg/L	<0.05	<0.05	<0.05	0.05
Ammonium	mg/L	<0.064	<0.064	<0.064	0.064
Sulphide	mg/L	<0.004	<0.004	<0.004	0.004
Total Nitrogen	mg/L	<0.5	<0.5	0.5	0.5
Total Cyanide	mg/L	<0.001	<0.001	<0.001	0.001
Anions					
Nitrate	mg/L	<0.04	0.09	0.04	0.04
Orthophosphate	mg/L	<0.06	<0.06	<0.06	0.06
Sulphate	mg/L	3120	3100	3110	5
Chloride	mg/L	25500	25200	25500	2
Chemical Analysis					
Chemical Oxygen Demand	mg/L	<5	<5	<5	5
Total Organic Carbon	mg/L	1.7	1.6	1.7	1.0
Biochemical Oxygen Demand	mg/L	<2	<2	<2	2
Metals					
Aluminium (Al)	mg/L	<0.005	<0.005	<0.005	0.005

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Analytical Report

Job Ref. No.	:	113091
Report No	:	158424
Date Reported	:	12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113091-1	113091-2	113091-3
Date Received	04/04/2022	04/04/2022	04/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R2-WSQ1 Top	R2-WSQ1 Middle	R2-WSQ1 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Metals - Continued					
Arsenic (As)	mg/L	0.0022	0.0026	0.0028	0.0005
Barium (Ba)	mg/L	0.0094	0.0093	0.0103	0.0005
Cadmium (Cd)	mg/L	<0.0001	0.0001	0.0001	0.0001
Copper (Cu)	mg/L	0.0037	0.0085	0.0069	0.0003
Iron (Fe)	mg/L	<0.02	<0.02	<0.02	0.02
Lead (Pb)	mg/L	0.0029	0.0017	0.0058	0.0002
Phosphorus (P)	mg/L	<0.03	<0.03	<0.03	0.03
Silver (Ag)	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Vanadium (V)	mg/L	0.0034	0.0036	0.0038	0.0001
Zinc (Zn)	mg/L	0.011	0.012	0.008	0.002
Mercury (Hg)	µg/L	<0.10	<0.10	<0.10	0.10
Silicon as SiO_2	mg/L	<2.8	<2.8	<2.8	2.8
Chromium (Cr)	µg/L	0.9	0.5	1.6	0.3
BTEX					
Benzene	µg/L	<7	<7	<7	7
Ethyl benzene	µg/L	<7	<7	<7	7
m&p-Xylene	µg/L	<14	<14	<14	14
o-Xylene	µg/L	<7	<7	<7	7
Toluene	µg/L	<7	<7	<7	7
Hydrocarbons					
EPH C10-C40	µg/L	<7	<7	<7	7
VPH C5-C10	µg/L	<7	<7	<7	7

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Analytical Report

Job Ref. No.	:	113091
Report No	:	158424
Date Reported :		12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113091-1	113091-2	113091-3
Date Received	04/04/2022	04/04/2022	04/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R2-WSQ1 Top	R2-WSQ1 Middle	R2-WSQ1 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PAH's					
Acenaphthene	µg/L	<0.01	<0.01	<0.01	0.01
Acenaphthylene	µg/L	0.01	0.01	0.01	0.01
Anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(b)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(g,h,i)perylene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(k)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Chrysene	µg/L	<0.01	<0.01	<0.01	0.01
Dibenzo(a,h)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Fluorene	µg/L	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Naphthalene	µg/L	<0.02	<0.02	<0.02	0.02
Phenanthrene	µg/L	<0.01	<0.01	<0.01	0.01
Pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Phenols					
2,4,5-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4,6-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dimethylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Chlorophenol	µg/L	<1.0	<1.0	<1.0	1

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Analytical Report

Job Ref. No.	:	113091
Report No	:	158424
Date Reported :		12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113091-1	113091-2	113091-3
Date Received	04/04/2022	04/04/2022	04/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R2-WSQ1 Top	R2-WSQ1 Middle	R2-WSQ1 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Phenols - Continued					
2-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
4-Chloro-3-methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
Pentachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,4,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,5,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,6-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
3-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
Phenol	µg/L	<0.5	<0.5	<0.5	0.5
Microbiology					
Total Coliform	CFU/100mL	Not Detected	Not Detected	Not Detected	10

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Analytical Report

Job Ref. No. : 113091
Report No : 158424
Date Reported : 12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113091-4	113091-5	113091-6
Date Received	04/04/2022	04/04/2022	04/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R2-WSQ2 Top	R2-WSQ2 Middle	R2-WSQ2 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
Total Suspended Solids	mg/L	<5.0	<5.0	<5.0	5
Total Dissolved Solids	mg/L	49600	49900	49700	5
Dissolved & Emulsified Oil	mg/L	<10	<10	<10	10
Free Oil	% vol./vol.	<0.01	<0.01	<0.01	0.01
Ammonia	mg/L	<0.06	<0.06	<0.06	0.06
Nitrogen (Ammonia)	mg/L	<0.05	<0.05	<0.05	0.05
Ammonium	mg/L	<0.064	<0.064	<0.064	0.064
Sulphide	mg/L	<0.004	<0.004	<0.004	0.004
Total Nitrogen	mg/L	<0.5	<0.5	<0.5	0.5
Total Cyanide	mg/L	0.008	<0.001	<0.001	0.001
Anions					
Nitrate	mg/L	<0.04	<0.04	0.22	0.04
Orthophosphate	mg/L	<0.06	<0.06	<0.06	0.06
Sulphate	mg/L	3100	3110	3110	5
Chloride	mg/L	25200	25500	25500	2
Chemical Analysis					
Chemical Oxygen Demand	mg/L	<5	<5	<5	5
Total Organic Carbon	mg/L	1.7	1.7	1.6	1.0
Biochemical Oxygen Demand	mg/L	<2	<2	<2	2
Metals					
Aluminium (Al)	mg/L	<0.005	<0.005	<0.005	0.005
Arsenic (As)	mg/L	0.0025	0.0030	0.0020	0.0005

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Job Ref. No. : 113091
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Date Reported : 12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113091-4	113091-5	113091-6
Date Received	04/04/2022	04/04/2022	04/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R2-WSQ2 Top	R2-WSQ2 Middle	R2-WSQ2 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Metals - Continued					
Barium (Ba)	mg/L	0.0216	0.0124	0.0124	0.0005
Cadmium (Cd)	mg/L	<0.0001	0.0001	0.0001	0.0001
Copper (Cu)	mg/L	0.0043	0.0032	0.0062	0.0003
Iron (Fe)	mg/L	<0.02	<0.02	<0.02	0.02
Lead (Pb)	mg/L	0.0010	0.0056	0.0038	0.0002
Phosphorus (P)	mg/L	<0.03	<0.03	<0.03	0.03
Silver (Ag)	mg/L	0.0076	<0.0005	<0.0005	0.0005
Vanadium (V)	mg/L	0.0033	0.0032	0.0041	0.0001
Zinc (Zn)	mg/L	0.008	0.003	0.004	0.002
Mercury (Hg)	µg/L	<0.10	<0.10	<0.10	0.10
Silicon as SiO2	mg/L	<2.8	<2.8	<2.8	2.8
Chromium (Cr)	µg/L	0.5	0.6	0.9	0.3
BTEX					
Benzene	µg/L	<7	<7	<7	7
Ethyl benzene	µg/L	<7	<7	<7	7
m&p-Xylene	µg/L	<14	<14	<14	14
o-Xylene	µg/L	<7	<7	<7	7
Toluene	µg/L	<7	<7	<7	7
Hydrocarbons					
EPH C10-C40	µg/L	<7	<7	<7	7
VPH C5-C10	µg/L	<7	<7	<7	7

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Analytical Report

Job Ref. No. :	113091
Report No :	158424
Date Reported :	12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113091-4	113091-5	113091-6
Date Received	04/04/2022	04/04/2022	04/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R2-WSQ2 Top	R2-WSQ2 Middle	R2-WSQ2 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PAH's					
Acenaphthene	µg/L	<0.01	<0.01	<0.01	0.01
Acenaphthylene	µg/L	<0.01	<0.01	<0.01	0.01
Anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(b)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(g,h,i)perylene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(k)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Chrysene	µg/L	<0.01	<0.01	<0.01	0.01
Dibenzo(a,h)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Fluorene	µg/L	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Naphthalene	µg/L	<0.02	<0.02	<0.02	0.02
Phenanthrene	µg/L	<0.01	<0.01	<0.01	0.01
Pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Phenols					
2,4,5-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4,6-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dimethylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Chlorophenol	µg/L	<1.0	<1.0	<1.0	1

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Report No	:	158424
Date Reported :		12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113091-4	113091-5	113091-6
Date Received	04/04/2022	04/04/2022	04/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R2-WSQ2 Top	R2-WSQ2 Middle	R2-WSQ2 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Phenols - Continued					
2-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
4-Chloro-3-methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
Pentachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,4,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,5,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,6-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
3-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
Phenol	µg/L	<0.5	<0.5	<0.5	0.5
Microbiology					
Total Coliform	CFU/100mL	Not Detected	Not Detected	Not Detected	10

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Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113091-7	113091-8	113091-9
Date Received	04/04/2022	04/04/2022	04/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R2-WSQ3 Top	R2-WSQ3 Bottom	R2-WSQ4 Middle
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
Total Suspended Solids	mg/L	<5.0	<5.0	<5.0	5
Total Dissolved Solids	mg/L	49700	49700	49900	5
Dissolved & Emulsified Oil	mg/L	<10	<10	<10	10
Free Oil	% vol./vol.	<0.01	<0.01	<0.01	0.01
Ammonia	mg/L	<0.06	<0.06	<0.06	0.06
Nitrogen (Ammonia)	mg/L	<0.05	<0.05	<0.05	0.05
Ammonium	mg/L	<0.064	<0.064	<0.064	0.064
Sulphide	mg/L	<0.004	<0.004	<0.004	0.004
Total Nitrogen	mg/L	<0.5	0.5	<0.5	0.5
Total Cyanide	mg/L	<0.001	<0.001	<0.001	0.001
Anions					
Nitrate	mg/L	<0.04	0.04	<0.04	0.04
Orthophosphate	mg/L	<0.06	<0.06	<0.06	0.06
Sulphate	mg/L	3100	3100	3100	5
Chloride	mg/L	25200	25500	25500	2
Chemical Analysis					
Chemical Oxygen Demand	mg/L	<5	<5	<5	5
Total Organic Carbon	mg/L	1.6	1.6	1.6	1.0
Biochemical Oxygen Demand	mg/L	<2	<2	<2	2
Metals					
Aluminium (Al)	mg/L	<0.005	<0.005	<0.005	0.005
Arsenic (As)	mg/L	0.0036	0.0027	0.0033	0.0005

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Analytical Report

Job Ref. No. :	113091
Report No :	158424
Date Reported :	12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113091-7	113091-8	113091-9
Date Received	04/04/2022	04/04/2022	04/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R2-WSQ3 Top	R2-WSQ3 Bottom	R2-WSQ4 Middle
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Metals - Continued					
Barium (Ba)	mg/L	0.0225	0.0116	0.0133	0.0005
Cadmium (Cd)	mg/L	0.0002	0.0002	<0.0001	0.0001
Copper (Cu)	mg/L	0.0200	0.0062	0.0025	0.0003
Iron (Fe)	mg/L	<0.02	<0.02	<0.02	0.02
Lead (Pb)	mg/L	0.0061	0.0017	0.0010	0.0002
Phosphorus (P)	mg/L	<0.03	<0.03	<0.03	0.03
Silver (Ag)	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Vanadium (V)	mg/L	0.0043	0.0037	0.0040	0.0001
Zinc (Zn)	mg/L	0.003	<0.002	0.007	0.002
Mercury (Hg)	µg/L	<0.10	<0.10	<0.10	0.10
Silicon as SiO2	mg/L	<2.8	<2.8	<2.8	2.8
Chromium (Cr)	µg/L	1.7	1.1	0.4	0.3
BTEX					
Benzene	µg/L	<7	<7	<7	7
Ethyl benzene	µg/L	<7	<7	<7	7
m&p-Xylene	µg/L	<14	<14	<14	14
o-Xylene	µg/L	<7	<7	<7	7
Toluene	µg/L	<7	<7	<7	7
Hydrocarbons					
EPH C10-C40	µg/L	<7	<7	<7	7
VPH C5-C10	µg/L	<7	<7	<7	7

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Report No	:	158424
Date Reported :		12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113091-7	113091-8	113091-9
Date Received	04/04/2022	04/04/2022	04/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R2-WSQ3 Top	R2-WSQ3 Bottom	R2-WSQ4 Middle
Sampling Method	Not Given	Not Given	Not Given

Analyte	**Units**	**Results**	**Results**	**Results**	**Method Limit of Detection**
PAH's					
Acenaphthene	µg/L	<0.01	<0.01	<0.01	0.01
Acenaphthylene	µg/L	<0.01	<0.01	<0.01	0.01
Anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(b)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(g,h,i)perylene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(k)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Chrysene	µg/L	<0.01	<0.01	<0.01	0.01
Dibenzo(a,h)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Fluorene	µg/L	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Naphthalene	µg/L	<0.02	<0.02	<0.02	0.02
Phenanthrene	µg/L	<0.01	<0.01	<0.01	0.01
Pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Phenols					
2,4,5-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4,6-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dimethylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Chlorophenol	µg/L	<1.0	<1.0	<1.0	1

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Date Reported	:	12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113091-7	113091-8	113091-9
Date Received	04/04/2022	04/04/2022	04/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R2-WSQ3 Top	R2-WSQ3 Bottom	R2-WSQ4 Middle
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Phenols - Continued					
2-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
4-Chloro-3-methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
Pentachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,4,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,5,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,6-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
3-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
Phenol	µg/L	<0.5	<0.5	<0.5	0.5
Microbiology					
Total Coliform	CFU/100mL	Not Detected	Not Detected	Not Detected	10

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Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113091-10	113091-11	113091-12
Date Received	04/04/2022	04/04/2022	04/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R2-WSQ5 Top	R2-WSQ5 Middle	R2-WSQ5 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
Total Suspended Solids	mg/L	<5.0	<5.0	<5.0	5
Total Dissolved Solids	mg/L	49600	49600	49700	5
Dissolved & Emulsified Oil	mg/L	<10	<10	<10	10
Free Oil	% vol./vol.	<0.01	<0.01	<0.01	0.01
Ammonia	mg/L	<0.06	<0.06	<0.06	0.06
Nitrogen (Ammonia)	mg/L	<0.05	<0.05	<0.05	0.05
Ammonium	mg/L	<0.064	<0.064	<0.064	0.064
Sulphide	mg/L	<0.004	<0.004	<0.004	0.004
Total Nitrogen	mg/L	<0.5	2.5	<0.5	0.5
Total Cyanide	mg/L	<0.001	<0.001	<0.001	0.001
Anions					
Nitrate	mg/L	<0.04	10.6	<0.04	0.04
Orthophosphate	mg/L	<0.06	<0.06	<0.06	0.06
Sulphate	mg/L	3120	3110	3090	5
Chloride	mg/L	25500	25500	25500	2
Chemical Analysis					
Chemical Oxygen Demand	mg/L	<5	<5	<5	5
Total Organic Carbon	mg/L	1.6	1.6	1.6	1.0
Biochemical Oxygen Demand	mg/L	<2	<2	<2	2
Metals					
Aluminium (Al)	mg/L	<0.005	<0.005	<0.005	0.005
Arsenic (As)	mg/L	0.0028	0.0029	0.0020	0.0005

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Analytical Report

Job Ref. No. :	113091
Report No :	158424
Date Reported :	12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113091-10	113091-11	113091-12
Date Received	04/04/2022	04/04/2022	04/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R2-WSQ5 Top	R2-WSQ5 Middle	R2-WSQ5 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Metals - Continued					
Barium (Ba)	mg/L	0.0235	0.0116	0.0192	0.0005
Cadmium (Cd)	mg/L	<0.0001	<0.0001	0.0001	0.0001
Copper (Cu)	mg/L	0.0062	0.0058	0.0023	0.0003
Iron (Fe)	mg/L	<0.02	<0.02	<0.02	0.02
Lead (Pb)	mg/L	0.0044	0.0037	0.0029	0.0002
Phosphorus (P)	mg/L	<0.03	<0.03	<0.03	0.03
Silver (Ag)	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Vanadium (V)	mg/L	0.0040	0.0041	0.0037	0.0001
Zinc (Zn)	mg/L	<0.002	<0.002	0.004	0.002
Mercury (Hg)	µg/L	<0.10	<0.10	<0.10	0.10
Silicon as SiO2	mg/L	<2.8	<2.8	<2.8	2.8
Chromium (Cr)	µg/L	1.3	1.0	1.4	0.3
BTEX					
Benzene	µg/L	<7	<7	<7	7
Ethyl benzene	µg/L	<7	<7	<7	7
m&p-Xylene	µg/L	<14	<14	<14	14
o-Xylene	µg/L	<7	<7	<7	7
Toluene	µg/L	<7	<7	<7	7
Hydrocarbons					
EPH C10-C40	µg/L	<7	<7	<7	7
VPH C5-C10	µg/L	<7	<7	<7	7

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Job Ref. No.	:	113091
Report No	:	158424
Date Reported :		12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113091-10	113091-11	113091-12
Date Received	04/04/2022	04/04/2022	04/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R2-WSQ5 Top	R2-WSQ5 Middle	R2-WSQ5 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PAH's					
Acenaphthene	µg/L	<0.01	<0.01	<0.01	0.01
Acenaphthylene	µg/L	<0.01	<0.01	<0.01	0.01
Anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(b)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(g,h,i)perylene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(k)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Chrysene	µg/L	<0.01	<0.01	<0.01	0.01
Dibenzo(a,h)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Fluorene	µg/L	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Naphthalene	µg/L	<0.02	<0.02	<0.02	0.02
Phenanthrene	µg/L	<0.01	<0.01	<0.01	0.01
Pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Phenols					
2,4,5-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4,6-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dimethylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Chlorophenol	µg/L	<1.0	<1.0	<1.0	1

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Report No	:	158424
Date Reported :		12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113091-10	113091-11	113091-12
Date Received	04/04/2022	04/04/2022	04/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R2-WSQ5 Top	R2-WSQ5 Middle	R2-WSQ5 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Phenols - Continued					
2-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
4-Chloro-3-methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
Pentachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,4,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,5,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,6-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
3-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
Phenol	µg/L	<0.5	<0.5	<0.5	0.5
Microbiology					
Total Coliform	CFU/100mL	Not Detected	Not Detected	Not Detected	10

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Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113091-13	113091-14	113091-15
Date Received	04/04/2022	04/04/2022	04/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R2-WSQ6 Top	R2-WSQ6 Bottom	R2-WSQ7 Top
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
Total Suspended Solids	mg/L	<5.0	<5.0	<5.0	5
Total Dissolved Solids	mg/L	49600	49700	49800	5
Dissolved & Emulsified Oil	mg/L	<10	<10	<10	10
Free Oil	% vol./vol.	<0.01	<0.01	<0.01	0.01
Ammonia	mg/L	<0.06	<0.06	<0.06	0.06
Nitrogen (Ammonia)	mg/L	<0.05	<0.05	<0.05	0.05
Ammonium	mg/L	<0.064	<0.064	<0.064	0.064
Sulphide	mg/L	<0.004	<0.004	<0.004	0.004
Total Nitrogen	mg/L	<0.5	<0.5	1.6	0.5
Total Cyanide	mg/L	<0.001	<0.001	<0.001	0.001
Anions					
Nitrate	mg/L	<0.04	<0.04	7.08	0.04
Orthophosphate	mg/L	<0.06	<0.06	<0.06	0.06
Sulphate	mg/L	3100	3100	3120	5
Chloride	mg/L	25500	25200	25500	2
Chemical Analysis					
Chemical Oxygen Demand	mg/L	<5	<5	<5	5
Total Organic Carbon	mg/L	1.5	1.7	1.6	1.0
Biochemical Oxygen Demand	mg/L	<2	<2	<2	2
Metals					
Aluminium (Al)	mg/L	<0.005	<0.005	<0.005	0.005
Arsenic (As)	mg/L	0.0027	0.0021	0.0029	0.0005

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Analytical Report

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Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113091-13	113091-14	113091-15
Date Received	04/04/2022	04/04/2022	04/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R2-WSQ6 Top	R2-WSQ6 Bottom	R2-WSQ7 Top
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Metals - Continued					
Barium (Ba)	mg/L	0.0147	0.0117	0.0118	0.0005
Cadmium (Cd)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Copper (Cu)	mg/L	0.0037	0.0041	0.0019	0.0003
Iron (Fe)	mg/L	<0.02	<0.02	<0.02	0.02
Lead (Pb)	mg/L	0.0011	0.0015	0.0017	0.0002
Phosphorus (P)	mg/L	<0.03	<0.03	<0.03	0.03
Silver (Ag)	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Vanadium (V)	mg/L	0.0040	0.0045	0.0038	0.0001
Zinc (Zn)	mg/L	0.002	<0.002	<0.002	0.002
Mercury (Hg)	µg/L	<0.10	<0.10	<0.10	0.10
Silicon as SiO2	mg/L	<2.8	<2.8	<2.8	2.8
Chromium (Cr)	µg/L	0.8	0.5	0.6	0.3
BTEX					
Benzene	µg/L	<7	<7	<7	7
Ethyl benzene	µg/L	<7	<7	<7	7
m&p-Xylene	µg/L	<14	<14	<14	14
o-Xylene	µg/L	<7	<7	<7	7
Toluene	µg/L	<7	<7	<7	7
Hydrocarbons					
EPH C10-C40	µg/L	<7	<7	9	7
VPH C5-C10	µg/L	<7	<7	<7	7

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Analytical Report

Job Ref. No. : 113091
Report No : 158424
Date Reported : 12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113091-13	113091-14	113091-15
Date Received	04/04/2022	04/04/2022	04/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R2-WSQ6 Top	R2-WSQ6 Bottom	R2-WSQ7 Top
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PAH's					
Acenaphthene	µg/L	<0.01	<0.01	<0.01	0.01
Acenaphthylene	µg/L	<0.01	<0.01	<0.01	0.01
Anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(b)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(g,h,i)perylene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(k)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Chrysene	µg/L	<0.01	<0.01	<0.01	0.01
Dibenzo(a,h)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Fluorene	µg/L	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Naphthalene	µg/L	<0.02	<0.02	<0.02	0.02
Phenanthrene	µg/L	<0.01	<0.01	<0.01	0.01
Pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Phenols					
2,4,5-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4,6-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dimethylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Chlorophenol	µg/L	<1.0	<1.0	<1.0	1

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Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113091-13	113091-14	113091-15
Date Received	04/04/2022	04/04/2022	04/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R2-WSQ6 Top	R2-WSQ6 Bottom	R2-WSQ7 Top
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Phenols - Continued					
2-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
4-Chloro-3-methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
Pentachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,4,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,5,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,6-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
3-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
Phenol	µg/L	<0.5	<0.5	<0.5	0.5
Microbiology					
Total Coliform	CFU/100mL	Not Detected	Not Detected	Not Detected	10

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Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113091-16
Date Received	04/04/2022
Sampled By	Client
Sampling Date	Not Given
Sampling Time	Not Given
Sample Sub Matrix	Water
Sampling Location	Not Given
Client Sample ID	R2-WSQ7 Bottom
Sampling Method	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
Total Suspended Solids	mg/L	<5.0			5
Total Dissolved Solids	mg/L	50000			5
Dissolved & Emulsified Oil	mg/L	<10			10
Free Oil	% vol./vol.	<0.01			0.01
Ammonia	mg/L	<0.06			0.06
Nitrogen (Ammonia)	mg/L	<0.05			0.05
Ammonium	mg/L	<0.064			0.064
Sulphide	mg/L	<0.004			0.004
Total Nitrogen	mg/L	<0.5			0.5
Total Cyanide	mg/L	<0.001			0.001
Anions					
Nitrate	mg/L	<0.04			0.04
Orthophosphate	mg/L	<0.06			0.06
Sulphate	mg/L	3120			5
Chloride	mg/L	25500			2
Chemical Analysis					
Chemical Oxygen Demand	mg/L	<5			5
Total Organic Carbon	mg/L	1.6			1.0
Biochemical Oxygen Demand	mg/L	<2			2
Metals					
Aluminium (Al)	mg/L	<0.005			0.005
Arsenic (As)	mg/L	0.0018			0.0005

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Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113091-16
Date Received	04/04/2022
Sampled By	Client
Sampling Date	Not Given
Sampling Time	Not Given
Sample Sub Matrix	Water
Sampling Location	Not Given
Client Sample ID	R2-WSQ7 Bottom
Sampling Method	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Metals - Continued					
Barium (Ba)	mg/L	0.0123			0.0005
Cadmium (Cd)	mg/L	<0.0001			0.0001
Copper (Cu)	mg/L	0.0049			0.0003
Iron (Fe)	mg/L	<0.02			0.02
Lead (Pb)	mg/L	0.0030			0.0002
Phosphorus (P)	mg/L	<0.03			0.03
Silver (Ag)	mg/L	<0.0005			0.0005
Vanadium (V)	mg/L	0.0037			0.0001
Zinc (Zn)	mg/L	<0.002			0.002
Mercury (Hg)	µg/L	<0.10			0.10
Silicon as SiO2	mg/L	<2.8			2.8
Chromium (Cr)	µg/L	1.1			0.3
BTEX					
Benzene	µg/L	<7			7
Ethyl benzene	µg/L	<7			7
m&p-Xylene	µg/L	<14			14
o-Xylene	µg/L	<7			7
Toluene	µg/L	<7			7
Hydrocarbons					
EPH C10-C40	µg/L	<7			7
VPH C5-C10	µg/L	<7			7

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Analytical Report

Job Ref. No.	:	113091
Report No	:	158424
Date Reported :		12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113091-16
Date Received	04/04/2022
Sampled By	Client
Sampling Date	Not Given
Sampling Time	Not Given
Sample Sub Matrix	Water
Sampling Location	Not Given
Client Sample ID	R2-WSQ7 Bottom
Sampling Method	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PAH's					
Acenaphthene	µg/L	<0.01			0.01
Acenaphthylene	µg/L	<0.01			0.01
Anthracene	µg/L	<0.01			0.01
Benzo(a)anthracene	µg/L	<0.01			0.01
Benzo(a)pyrene	µg/L	<0.01			0.01
Benzo(b)fluoranthene	µg/L	<0.01			0.01
Benzo(g,h,i)perylene	µg/L	<0.01			0.01
Benzo(k)fluoranthene	µg/L	<0.01			0.01
Chrysene	µg/L	<0.01			0.01
Dibenzo(a,h)anthracene	µg/L	<0.01			0.01
Fluoranthene	µg/L	<0.01			0.01
Fluorene	µg/L	<0.01			0.01
Indeno(1,2,3-c,d)pyrene	µg/L	<0.01			0.01
Naphthalene	µg/L	<0.02			0.02
Phenanthrene	µg/L	<0.01			0.01
Pyrene	µg/L	<0.01			0.01
Phenols					
2,4,5-Trichlorophenol	µg/L	<1.0			1
2,4,6-Trichlorophenol	µg/L	<1.0			1
2,4-Dichlorophenol	µg/L	<1.0			1
2,4-Dimethylphenol	µg/L	<1.0			1
2-Chlorophenol	µg/L	<1.0			1

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Analytical Report

Job Ref. No. :	113091
Report No :	158424
Date Reported :	12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113091-16
Date Received	04/04/2022
Sampled By	Client
Sampling Date	Not Given
Sampling Time	Not Given
Sample Sub Matrix	Water
Sampling Location	Not Given
Client Sample ID	R2-WSQ7 Bottom
Sampling Method	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Phenols - Continued					
2-Methylphenol	µg/L	<1.0			1
2-Nitrophenol	µg/L	<1.0			1
4-Chloro-3-methylphenol	µg/L	<1.0			1
4-Methylphenol	µg/L	<1.0			1
4-Nitrophenol	µg/L	<1.0			1
Pentachlorophenol	µg/L	<1.0			1
2,3,4,6-Tetrachlorophenol	µg/L	<1.0			1
2,3,5,6-Tetrachlorophenol	µg/L	<1.0			1
2,6-Dichlorophenol	µg/L	<1.0			1
3-Methylphenol	µg/L	<1.0			1
Phenol	µg/L	<0.5			0.5
Microbiology					
Total Coliform	CFU/100mL	Not Detected			10

Method of Analysis

Method Name	Reference
Biochemical Oxygen Demand [APHA 5210 B]Water-DXB	APHA [5210 B]
BTEX (including VPH) by GC-FID-HS [EPA 8015B] Water-DXB	EPA [8015B]
Chemical Oxygen Demand [APHA 5220 B]Water-DXB	APHA [5220 B]
Chloride [APHA 4500 Cl- B]-DXB	APHA [4500 Cl- B]
Cyanide [Modified USEPA method OIA-1667 - Subcontract]-DXB	USEPA [Method OIA-1667]
EPH C10-C40 (Low LOD) by GC-FID [EPA 8015B] Water-DXB	EPA [8015B]
Mercury by PSA [EPA 245.7] SW-DXB	EPA [245.7]

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Analytical Report

Job Ref. No.	:	113091
Report No	:	158424
Date Reported :		12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Method of Analysis

Method Name	Reference
Metals ICP-MS (APHA 3125) SW-DXB	APHA [3125]
Nitrate [HACH 8039]-DXB	HACH [8039]
Nitrogen (Ammonia) [HACH 8155]-DXB	HACH [8155]
Nitrogen (Total) [ASTM D5176]-DXB	ASTM [D5176-08]
Oil & Grease [APHA 5520 B]Water-DXB	APHA [5520 B]
Orthophosphate [HACH 8048]-DXB	HACH [8048]
PAH in Water [EPA 8270D, July 2014]-DXB	EPA [8270D, July 2014]
Phenols water [EPA 528]-DXB	EPA [528]
Solids (Total Dissolved) [APHA 2540 C]Water-DXB	APHA [2540 C]
Solids (Total Suspended) [APHA 2540 D]Water-DXB	APHA [2540 D]
Sulphate [APHA 4500 SO42- C]-DXB	APHA [4500 SO42- C]
Sulphide [HACH 8131]-DXB	HACH [8131]
Total Coliform (APHA 9222 B)Water-DXB	APHA [9222 B]
Total Organic Carbon (TOC) [APHA 5310 B]-DXB	APHA [5310 B]
	APHA [5310 B]

* Reference Method Modified

Comments:

- Tested By : AAP, GAN, HRA, JCH, NHA, SGE, SMO
- Date Tested: 06/04/2022 to 26/04/2022
- Please note that all tests shown not containing the `AUH` extension are subcontracted to Element group of laboratories.
- Please note that if the sample has to be diluted due to the matrix, the reported Limit of Detection (LOD) value will increase from the method LOD.
- Any APHA methods stated herein are documented in-house procedures, referenced to 23rd edition.

- This test report supersedes previous report dated 05 May 2022. Report revised to amend the Sample Descriptions as per client's request. Previous report 156654.
- Please note that in a revised report the reported limit of detection will not be the same as the method limit of detection if the latter has been modified since the analysis was completed.

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Analytical Report

Job Ref. No.	:	114841
Report No	:	159009
Date Reported :		03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-1	114841-2	114841-3
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ1 Top	WSQ1 Middle	WSQ1 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
Total Suspended Solids	mg/L	<5.0	<5.0	<5.0	5
Total Dissolved Solids	mg/L	45500	45700	45800	5
Dissolved & Emulsified Oil	mg/L	<10	<10	<10	10
Free Oil	% vol./vol.	<0.01	<0.01	<0.01	0.01
Ammonia	mg/L	<0.06	<0.06	<0.06	0.06
Nitrogen (Ammonia)	mg/L	<0.05	<0.05	<0.05	0.05
Ammonium	mg/L	<0.064	<0.064	<0.064	0.064
Sulphide	mg/L	<0.004	<0.004	<0.004	0.004
Total Nitrogen	mg/L	<0.5	<0.5	<0.5	0.5
Total Cyanide	mg/L	<0.01	<0.01	<0.01	0.01
Anions					
Nitrate	mg/L	0.04	0.04	0.04	0.04
Orthophosphate	mg/L	<0.06	<0.06	<0.06	0.06
Sulphate	mg/L	3080	3090	3070	5
Chloride	mg/L	23000	23400	23400	2
Chemical Analysis					
Chemical Oxygen Demand	mg/L	8	<5	<5	5
Total Organic Carbon	mg/L	1.5	1.6	1.5	1.0
Biochemical Oxygen Demand	mg/L	<2	<2	<2	2
Metals					
Aluminium (Al)	mg/L	<0.005	<0.005	<0.005	0.005

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Analytical Report

Job Ref. No. : 114841
Report No : 159009
Date Reported : 03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-1	114841-2	114841-3
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ1 Top	WSQ1 Middle	WSQ1 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Metals - Continued					
Arsenic (As)	mg/L	0.0028	0.0016	0.0018	0.0005
Barium (Ba)	mg/L	0.0070	0.0027	0.0038	0.0005
Cadmium (Cd)	mg/L	0.0003	0.0001	0.0001	0.0001
Copper (Cu)	mg/L	0.0047	0.0030	0.0038	0.0003
Iron (Fe)	mg/L	<0.02	<0.02	<0.02	0.02
Lead (Pb)	mg/L	0.0029	0.0024	0.0024	0.0002
Mercury (Hg)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Phosphorus (P)	mg/L	<0.03	<0.03	<0.03	0.03
Silver (Ag)	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Vanadium (V)	mg/L	0.0033	0.0032	0.0036	0.0001
Zinc (Zn)	mg/L	<0.002	<0.002	<0.002	0.002
Silicon as SiO2	mg/L	<2.8	<2.8	<2.8	2.8
Chromium (Cr)	µg/L	0.9	0.6	0.6	0.3
BTEX					
Benzene	µg/L	<7	<7	<7	7
Ethyl benzene	µg/L	<7	<7	<7	7
m&p-Xylene	µg/L	<14	<14	<14	14
o-Xylene	µg/L	<7	<7	<7	7
Toluene	µg/L	<7	<7	<7	7
Hydrocarbons					
EPH C10-C40	µg/L	<7	<7	<7	7
VPH C5-C10	µg/L	<7	<7	<7	7

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Analytical Report

Job Ref. No. : 114841
Report No : 159009
Date Reported : 03/06/2022

Client: WKC Middle East Environment Consultancy

P.O Box: 130627

ABU DHABI, United Arab Emirates

Attn: Adrian Evans
Project ID: Water-Lightning
Project Name: WKC Middle East Environment Consultancy
Project Location: N/A
Tel. No: 971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-1	114841-2	114841-3
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ1 Top	WSQ1 Middle	WSQ1 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PAH's					
Acenaphthene	µg/L	<0.01	<0.01	<0.01	0.01
Acenaphthylene	µg/L	<0.01	<0.01	<0.01	0.01
Anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(b)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(g,h,i)perylene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(k)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Chrysene	µg/L	<0.01	<0.01	<0.01	0.01
Dibenzo(a,h)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Fluorene	µg/L	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Naphthalene	µg/L	<0.02	<0.02	<0.02	0.02
Phenanthrene	µg/L	<0.01	<0.01	<0.01	0.01
Pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Phenols					
2,4,5-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4,6-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dimethylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Chlorophenol	µg/L	<1.0	<1.0	<1.0	1

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Analytical Report

Job Ref. No. : 114841
Report No : 159009
Date Reported : 03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-1	114841-2	114841-3
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ1 Top	WSQ1 Middle	WSQ1 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Phenols - Continued					
2-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
4-Chloro-3-methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
Pentachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,4,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,5,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,6-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
3-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
Phenol	µg/L	<0.5	<0.5	<0.5	0.5
Microbiology					
Total Coliform	CFU/100mL	Not Detected	Not Detected	Not Detected	10

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Analytical Report

Job Ref. No. :	114841
Report No :	159009
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy
	P.O Box: 130627
	ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-4	114841-5	114841-6
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ2 Top	WSQ2 Middle	WSQ2 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
Total Suspended Solids	mg/L	<5.0	<5.0	<5.0	5
Total Dissolved Solids	mg/L	45400	45800	46000	5
Dissolved & Emulsified Oil	mg/L	<10	<10	<10	10
Free Oil	% vol./vol.	<0.01	<0.01	<0.01	0.01
Ammonia	mg/L	<0.06	<0.06	<0.06	0.06
Nitrogen (Ammonia)	mg/L	<0.05	<0.05	<0.05	0.05
Ammonium	mg/L	<0.064	<0.064	<0.064	0.064
Sulphide	mg/L	<0.004	<0.004	<0.004	0.004
Total Nitrogen	mg/L	<0.5	5.3	<0.5	0.5
Total Cyanide	mg/L	<0.01	<0.01	<0.01	0.01
Anions					
Nitrate	mg/L	<0.04	18.6	0.04	0.04
Orthophosphate	mg/L	<0.06	<0.06	<0.06	0.06
Sulphate	mg/L	3060	3080	3090	5
Chloride	mg/L	22700	23400	23400	2
Chemical Analysis					
Chemical Oxygen Demand	mg/L	<5	30	6	5
Total Organic Carbon	mg/L	1.5	1.6	1.5	1.0
Biochemical Oxygen Demand	mg/L	<2	<2	<2	2
Metals					
Aluminium (Al)	mg/L	<0.005	<0.005	<0.005	0.005
Arsenic (As)	mg/L	0.0031	0.0024	0.0026	0.0005

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Analytical Report

Job Ref. No. : 114841
Report No : 159009
Date Reported : 03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-4	114841-5	114841-6
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ2 Top	WSQ2 Middle	WSQ2 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Metals - Continued					
Barium (Ba)	mg/L	0.0077	0.0088	0.0099	0.0005
Cadmium (Cd)	mg/L	<0.0001	0.0002	0.0002	0.0001
Copper (Cu)	mg/L	0.0043	0.0091	0.0529	0.0003
Iron (Fe)	mg/L	<0.02	<0.02	<0.02	0.02
Lead (Pb)	mg/L	0.0020	0.0040	0.0079	0.0002
Mercury (Hg)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Phosphorus (P)	mg/L	<0.03	<0.03	<0.03	0.03
Silver (Ag)	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Vanadium (V)	mg/L	0.0028	0.0036	0.0038	0.0001
Zinc (Zn)	mg/L	<0.002	<0.002	<0.002	0.002
Silicon as SiO2	mg/L	<2.8	<2.8	<2.8	2.8
Chromium (Cr)	µg/L	0.5	1.1	1.9	0.3
BTEX					
Benzene	µg/L	<7	<7	<7	7
Ethyl benzene	µg/L	<7	<7	<7	7
m&p-Xylene	µg/L	<14	<14	<14	14
o-Xylene	µg/L	<7	<7	<7	7
Toluene	µg/L	<7	<7	<7	7
Hydrocarbons					
EPH C10-C40	µg/L	<7	<7	<7	7
VPH C5-C10	µg/L	<7	<7	<7	7

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Analytical Report

Job Ref. No.	:	114841
Report No	:	159009
Date Reported :		03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-4	114841-5	114841-6
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ2 Top	WSQ2 Middle	WSQ2 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PAH's					
Acenaphthene	µg/L	<0.01	<0.01	<0.01	0.01
Acenaphthylene	µg/L	<0.01	<0.01	<0.01	0.01
Anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(b)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(g,h,i)perylene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(k)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Chrysene	µg/L	<0.01	<0.01	<0.01	0.01
Dibenzo(a,h)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Fluorene	µg/L	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Naphthalene	µg/L	<0.02	<0.02	<0.02	0.02
Phenanthrene	µg/L	<0.01	<0.01	<0.01	0.01
Pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Phenols					
2,4,5-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4,6-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dimethylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Chlorophenol	µg/L	<1.0	<1.0	<1.0	1

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Analytical Report

Job Ref. No.	:	114841
Report No	:	159009
Date Reported :		03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-4	114841-5	114841-6
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ2 Top	WSQ2 Middle	WSQ2 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Phenols - Continued					
2-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
4-Chloro-3-methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
Pentachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,4,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,5,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,6-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
3-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
Phenol	µg/L	<0.5	<0.5	<0.5	0.5
Microbiology					
Total Coliform	CFU/100mL	Not Detected	Not Detected	Not Detected	10

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Analytical Report

Job Ref. No. :	114841
Report No :	159009
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-7	114841-8	114841-9
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ3 Top	WSQ3 Middle	WSQ3 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
Total Suspended Solids	mg/L	<5.0	<5.0	<5.0	5
Total Dissolved Solids	mg/L	45900	46400	46300	5
Dissolved & Emulsified Oil	mg/L	<10	<10	<10	10
Free Oil	% vol./vol.	<0.01	<0.01	<0.01	0.01
Ammonia	mg/L	<0.06	<0.06	<0.06	0.06
Nitrogen (Ammonia)	mg/L	<0.05	<0.05	<0.05	0.05
Ammonium	mg/L	<0.064	<0.064	<0.064	0.064
Sulphide	mg/L	<0.004	<0.004	<0.004	0.004
Total Nitrogen	mg/L	2.8	1.3	<0.5	0.5
Total Cyanide	mg/L	<0.01	<0.01	<0.01	0.01
Anions					
Nitrate	mg/L	6.64	1.73	0.04	0.04
Orthophosphate	mg/L	<0.06	<0.06	<0.06	0.06
Sulphate	mg/L	3080	3110	3120	5
Chloride	mg/L	23400	23800	23800	2
Chemical Analysis					
Chemical Oxygen Demand	mg/L	22	18	8	5
Total Organic Carbon	mg/L	1.7	1.6	1.6	1.0
Biochemical Oxygen Demand	mg/L	<2	<2	<2	2
Metals					
Aluminium (Al)	mg/L	<0.005	<0.005	<0.005	0.005
Arsenic (As)	mg/L	0.0024	0.0019	0.0028	0.0005

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Analytical Report

Job Ref. No. : 114841
Report No : 159009
Date Reported : 03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-7	114841-8	114841-9
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ3 Top	WSQ3 Middle	WSQ3 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Metals - Continued					
Barium (Ba)	mg/L	0.0073	0.0065	0.0091	0.0005
Cadmium (Cd)	mg/L	0.0001	0.0001	0.0001	0.0001
Copper (Cu)	mg/L	0.0117	0.0047	0.0048	0.0003
Iron (Fe)	mg/L	<0.02	<0.02	<0.02	0.02
Lead (Pb)	mg/L	0.0029	0.0029	0.0038	0.0002
Mercury (Hg)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Phosphorus (P)	mg/L	<0.03	<0.03	<0.03	0.03
Silver (Ag)	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Vanadium (V)	mg/L	0.0037	0.0032	0.0037	0.0001
Zinc (Zn)	mg/L	0.006	<0.002	<0.002	0.002
Silicon as SiO2	mg/L	<2.8	<2.8	<2.8	2.8
Chromium (Cr)	µg/L	1.8	0.5	1.5	0.3
BTEX					
Benzene	µg/L	<7	<7	<7	7
Ethyl benzene	µg/L	<7	<7	<7	7
m&p-Xylene	µg/L	<14	<14	<14	14
o-Xylene	µg/L	<7	<7	<7	7
Toluene	µg/L	<7	<7	<7	7
Hydrocarbons					
EPH C10-C40	µg/L	<7	<7	<7	7
VPH C5-C10	µg/L	<7	<7	<7	7

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Analytical Report

Job Ref. No. : 114841
Report No : 159009
Date Reported : 03/06/2022

Client: WKC Middle East Environment Consultancy

P.O Box: 130627

ABU DHABI, United Arab Emirates

Attn: Adrian Evans
Project ID: Water-Lightning
Project Name: WKC Middle East Environment Consultancy
Project Location: N/A
Tel. No: 971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-7	114841-8	114841-9
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ3 Top	WSQ3 Middle	WSQ3 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PAH's					
Acenaphthene	µg/L	<0.01	<0.01	<0.01	0.01
Acenaphthylene	µg/L	<0.01	<0.01	<0.01	0.01
Anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(b)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(g,h,i)perylene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(k)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Chrysene	µg/L	<0.01	<0.01	<0.01	0.01
Dibenzo(a,h)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Fluorene	µg/L	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Naphthalene	µg/L	<0.02	<0.02	<0.02	0.02
Phenanthrene	µg/L	<0.01	<0.01	<0.01	0.01
Pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Phenols					
2,4,5-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4,6-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dimethylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Chlorophenol	µg/L	<1.0	<1.0	<1.0	1

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Analytical Report

Job Ref. No. :	114841
Report No :	159009
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-7	114841-8	114841-9
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ3 Top	WSQ3 Middle	WSQ3 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Phenols - Continued					
2-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
4-Chloro-3-methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
Pentachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,4,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,5,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,6-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
3-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
Phenol	µg/L	<0.5	<0.5	<0.5	0.5
Microbiology					
Total Coliform	CFU/100mL	Not Detected	Not Detected	Not Detected	10

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Analytical Report

Job Ref. No. : 114841
Report No : 159009
Date Reported : 03/06/2022

Client:	WKC Middle East Environment Consultancy
	P.O Box: 130627
	ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-10	114841-11	114841-12
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ4 Top	WSQ4 Middle	WSQ4 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
Total Suspended Solids	mg/L	<5.0	<5.0	<5.0	5
Total Dissolved Solids	mg/L	45800	46100	46400	5
Dissolved & Emulsified Oil	mg/L	<10	<10	<10	10
Free Oil	% vol./vol.	<0.01	<0.01	<0.01	0.01
Ammonia	mg/L	<0.06	<0.06	<0.06	0.06
Nitrogen (Ammonia)	mg/L	<0.05	<0.05	<0.05	0.05
Ammonium	mg/L	<0.064	<0.064	<0.064	0.064
Sulphide	mg/L	<0.004	<0.004	<0.004	0.004
Total Nitrogen	mg/L	0.6	<0.5	0.6	0.5
Total Cyanide	mg/L	<0.01	<0.01	<0.01	0.01
Anions					
Nitrate	mg/L	0.13	<0.04	0.49	0.04
Orthophosphate	mg/L	<0.06	<0.06	<0.06	0.06
Sulphate	mg/L	3090	3080	3120	5
Chloride	mg/L	23400	23800	23800	2
Chemical Analysis					
Chemical Oxygen Demand	mg/L	10	<5	10	5
Total Organic Carbon	mg/L	1.7	1.4	1.6	1.0
Biochemical Oxygen Demand	mg/L	<2	<2	<2	2
Metals					
Aluminium (Al)	mg/L	<0.005	<0.005	<0.005	0.005
Arsenic (As)	mg/L	0.0021	0.0016	0.0028	0.0005

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Analytical Report

Job Ref. No. : 114841
Report No : 159009
Date Reported : 03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-10	114841-11	114841-12
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ4 Top	WSQ4 Middle	WSQ4 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Metals - Continued					
Barium (Ba)	mg/L	0.0082	0.0120	0.0082	0.0005
Cadmium (Cd)	mg/L	0.0002	0.0012	0.0002	0.0001
Copper (Cu)	mg/L	0.0088	0.0048	0.0039	0.0003
Iron (Fe)	mg/L	<0.02	<0.02	<0.02	0.02
Lead (Pb)	mg/L	0.0023	0.0059	0.0033	0.0002
Mercury (Hg)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Phosphorus (P)	mg/L	<0.03	<0.03	<0.03	0.03
Silver (Ag)	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Vanadium (V)	mg/L	0.0036	0.0039	0.0037	0.0001
Zinc (Zn)	mg/L	0.006	<0.002	<0.002	0.002
Silicon as SiO2	mg/L	<2.8	<2.8	<2.8	2.8
Chromium (Cr)	µg/L	1.2	3.0	1.1	0.3
BTEX					
Benzene	µg/L	<7	<7	<7	7
Ethyl benzene	µg/L	<7	<7	<7	7
m&p-Xylene	µg/L	<14	<14	<14	14
o-Xylene	µg/L	<7	<7	<7	7
Toluene	µg/L	<7	<7	<7	7
Hydrocarbons					
EPH C10-C40	µg/L	<7	<7	<7	7
VPH C5-C10	µg/L	<7	<7	<7	7

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Analytical Report

Job Ref. No. : 114841
Report No : 159009
Date Reported : 03/06/2022

Client: WKC Middle East Environment Consultancy

P.O Box: 130627

ABU DHABI, United Arab Emirates

Attn: Adrian Evans
Project ID: Water-Lightning
Project Name: WKC Middle East Environment Consultancy
Project Location: N/A
Tel. No: 971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-10	114841-11	114841-12
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ4 Top	WSQ4 Middle	WSQ4 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PAH's					
Acenaphthene	µg/L	<0.01	<0.01	<0.01	0.01
Acenaphthylene	µg/L	<0.01	<0.01	<0.01	0.01
Anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(b)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(g,h,i)perylene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(k)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Chrysene	µg/L	<0.01	<0.01	<0.01	0.01
Dibenzo(a,h)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Fluorene	µg/L	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Naphthalene	µg/L	<0.02	<0.02	<0.02	0.02
Phenanthrene	µg/L	<0.01	<0.01	<0.01	0.01
Pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Phenols					
2,4,5-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4,6-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dimethylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Chlorophenol	µg/L	<1.0	<1.0	<1.0	1

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Analytical Report

Job Ref. No.	:	114841
Report No	:	159009
Date Reported	:	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-10	114841-11	114841-12
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ4 Top	WSQ4 Middle	WSQ4 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Phenols - Continued					
2-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
4-Chloro-3-methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
Pentachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,4,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,5,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,6-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
3-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
Phenol	µg/L	<0.5	<0.5	<0.5	0.5
Microbiology					
Total Coliform	CFU/100mL	Not Detected	Not Detected	Not Detected	10

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Analytical Report

Job Ref. No.	:	114841
Report No	:	159009
Date Reported	:	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-13	114841-14	114841-15
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ5 Top	WSQ5 Middle	WSQ5 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
Total Suspended Solids	mg/L	<5.0	<5.0	<5.0	5
Total Dissolved Solids	mg/L	45800	46300	46300	5
Dissolved & Emulsified Oil	mg/L	<10	<10	<10	10
Free Oil	% vol./vol.	<0.01	<0.01	<0.01	0.01
Ammonia	mg/L	<0.06	<0.06	<0.06	0.06
Nitrogen (Ammonia)	mg/L	<0.05	<0.05	<0.05	0.05
Ammonium	mg/L	<0.064	<0.064	<0.064	0.064
Sulphide	mg/L	<0.004	<0.004	<0.004	0.004
Total Nitrogen	mg/L	0.5	<0.5	<0.5	0.5
Total Cyanide	mg/L	<0.01	<0.01	<0.01	0.01
Anions					
Nitrate	mg/L	0.13	0.04	0.04	0.04
Orthophosphate	mg/L	<0.06	<0.06	<0.06	0.06
Sulphate	mg/L	3070	3110	3090	5
Chloride	mg/L	23400	23800	23800	2
Chemical Analysis					
Chemical Oxygen Demand	mg/L	8	<5	6	5
Total Organic Carbon	mg/L	1.6	1.6	1.7	1.0
Biochemical Oxygen Demand	mg/L	<2	<2	<2	2
Metals					
Aluminium (Al)	mg/L	<0.005	<0.005	<0.005	0.005
Arsenic (As)	mg/L	0.0024	0.0026	0.0033	0.0005

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Analytical Report

Job Ref. No. : 114841
Report No : 159009
Date Reported : 03/06/2022

Client:	WKC Middle East Environment Consultancy
	P.O Box: 130627
	ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-13	114841-14	114841-15
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ5 Top	WSQ5 Middle	WSQ5 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Metals - Continued					
Barium (Ba)	mg/L	0.0059	0.0088	0.0078	0.0005
Cadmium (Cd)	mg/L	0.0001	0.0001	0.0002	0.0001
Copper (Cu)	mg/L	0.0048	0.0055	0.0050	0.0003
Iron (Fe)	mg/L	<0.02	<0.02	<0.02	0.02
Lead (Pb)	mg/L	0.0014	0.0040	0.0014	0.0002
Mercury (Hg)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Phosphorus (P)	mg/L	<0.03	<0.03	<0.03	0.03
Silver (Ag)	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Vanadium (V)	mg/L	0.0036	0.0038	0.0037	0.0001
Zinc (Zn)	mg/L	<0.002	<0.002	<0.002	0.002
Silicon as SiO2	mg/L	<2.8	<2.8	<2.8	2.8
Chromium (Cr)	µg/L	0.8	1.7	1.0	0.3
BTEX					
Benzene	µg/L	<7	<7	<7	7
Ethyl benzene	µg/L	<7	<7	<7	7
m&p-Xylene	µg/L	<14	<14	<14	14
o-Xylene	µg/L	<7	<7	<7	7
Toluene	µg/L	<7	<7	<7	7
Hydrocarbons					
EPH C10-C40	µg/L	<7	<7	<7	7
VPH C5-C10	µg/L	<7	<7	<7	7

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Analytical Report

Job Ref. No. : 114841
Report No : 159009
Date Reported : 03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-13	114841-14	114841-15
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ5 Top	WSQ5 Middle	WSQ5 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PAH's					
Acenaphthene	µg/L	<0.01	<0.01	<0.01	0.01
Acenaphthylene	µg/L	<0.01	<0.01	<0.01	0.01
Anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(b)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(g,h,i)perylene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(k)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Chrysene	µg/L	<0.01	<0.01	<0.01	0.01
Dibenzo(a,h)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Fluorene	µg/L	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Naphthalene	µg/L	<0.02	<0.02	<0.02	0.02
Phenanthrene	µg/L	<0.01	<0.01	<0.01	0.01
Pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Phenols					
2,4,5-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4,6-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dimethylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Chlorophenol	µg/L	<1.0	<1.0	<1.0	1

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Analytical Report

Job Ref. No. :	114841
Report No :	159009
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-13	114841-14	114841-15
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ5 Top	WSQ5 Middle	WSQ5 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Phenols - Continued					
2-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
4-Chloro-3-methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
Pentachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,4,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,5,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,6-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
3-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
Phenol	µg/L	<0.5	<0.5	<0.5	0.5
Microbiology					
Total Coliform	CFU/100mL	Not Detected	Not Detected	Not Detected	10

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Analytical Report

Job Ref. No. :	114841
Report No :	159009
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-16	114841-17	114841-18
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ6 Top	WSQ6 Middle	WSQ6 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
Total Suspended Solids	mg/L	<5.0	<5.0	<5.0	5
Total Dissolved Solids	mg/L	45800	45600	45900	5
Dissolved & Emulsified Oil	mg/L	<10	<10	<10	10
Free Oil	% vol./vol.	<0.01	<0.01	<0.01	0.01
Ammonia	mg/L	<0.06	<0.06	<0.06	0.06
Nitrogen (Ammonia)	mg/L	<0.05	<0.05	<0.05	0.05
Ammonium	mg/L	<0.064	<0.064	<0.064	0.064
Sulphide	mg/L	<0.004	<0.004	<0.004	0.004
Total Nitrogen	mg/L	<0.5	<0.5	<0.5	0.5
Total Cyanide	mg/L	<0.01	<0.01	<0.01	0.01
Anions					
Nitrate	mg/L	0.04	<0.04	0.13	0.04
Orthophosphate	mg/L	<0.06	<0.06	<0.06	0.06
Sulphate	mg/L	3080	3090	3090	5
Chloride	mg/L	23400	23400	23400	2
Chemical Analysis					
Chemical Oxygen Demand	mg/L	<5	<5	<5	5
Total Organic Carbon	mg/L	1.6	1.6	1.5	1.0
Biochemical Oxygen Demand	mg/L	<2	<2	<2	2
Metals					
Aluminium (Al)	mg/L	<0.005	<0.005	<0.005	0.005
Arsenic (As)	mg/L	0.0028	0.0027	0.0023	0.0005

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Analytical Report

Job Ref. No. :	114841
Report No :	159009
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-16	114841-17	114841-18
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ6 Top	WSQ6 Middle	WSQ6 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	**Units**	**Results**	**Results**	**Results**	**Method Limit of Detection**
Metals - Continued					
Barium (Ba)	mg/L	0.0078	0.0073	0.0073	0.0005
Cadmium (Cd)	mg/L	0.0001	0.0001	0.0002	0.0001
Copper (Cu)	mg/L	0.0080	0.0053	0.0037	0.0003
Iron (Fe)	mg/L	<0.02	<0.02	<0.02	0.02
Lead (Pb)	mg/L	0.0017	0.0015	0.0022	0.0002
Mercury (Hg)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Phosphorus (P)	mg/L	<0.03	<0.03	<0.03	0.03
Silver (Ag)	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Vanadium (V)	mg/L	0.0038	0.0037	0.0041	0.0001
Zinc (Zn)	mg/L	0.003	0.010	<0.002	0.002
Silicon as SiO2	mg/L	<2.8	<2.8	<2.8	2.8
Chromium (Cr)	µg/L	1.3	0.8	1.1	0.3
BTEX					
Benzene	µg/L	<7	<7	<7	7
Ethyl benzene	µg/L	<7	<7	<7	7
m&p-Xylene	µg/L	<14	<14	<14	14
o-Xylene	µg/L	<7	<7	<7	7
Toluene	µg/L	<7	<7	<7	7
Hydrocarbons					
EPH C10-C40	µg/L	<7	<7	<7	7
VPH C5-C10	µg/L	<7	<7	<7	7

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Analytical Report

Job Ref. No. : 114841
Report No : 159009
Date Reported : 03/06/2022

Client: WKC Middle East Environment Consultancy

P.O Box: 130627

ABU DHABI, United Arab Emirates

Attn: Adrian Evans
Project ID: Water-Lightning
Project Name: WKC Middle East Environment Consultancy
Project Location: N/A
Tel. No: 971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-16	114841-17	114841-18
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ6 Top	WSQ6 Middle	WSQ6 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PAH's					
Acenaphthene	µg/L	<0.01	<0.01	<0.01	0.01
Acenaphthylene	µg/L	<0.01	<0.01	<0.01	0.01
Anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(b)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(g,h,i)perylene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(k)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Chrysene	µg/L	<0.01	<0.01	<0.01	0.01
Dibenzo(a,h)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Fluorene	µg/L	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Naphthalene	µg/L	<0.02	<0.02	<0.02	0.02
Phenanthrene	µg/L	<0.01	<0.01	<0.01	0.01
Pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Phenols					
2,4,5-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4,6-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dimethylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Chlorophenol	µg/L	<1.0	<1.0	<1.0	1

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Analytical Report

Job Ref. No. : 114841
Report No : 159009
Date Reported : 03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-16	114841-17	114841-18
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ6 Top	WSQ6 Middle	WSQ6 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Phenols - Continued					
2-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
4-Chloro-3-methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
Pentachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,4,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,5,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,6-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
3-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
Phenol	µg/L	<0.5	<0.5	<0.5	0.5
Microbiology					
Total Coliform	CFU/100mL	Not Detected	Not Detected	Not Detected	10

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Analytical Report

Job Ref. No.	:	114841
Report No	:	159009
Date Reported	:	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-19	114841-20	114841-21
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ7 Top	WSQ7 Middle	WSQ7 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
Total Suspended Solids	mg/L	<5.0	<5.0	<5.0	5
Total Dissolved Solids	mg/L	45900	46000	46000	5
Dissolved & Emulsified Oil	mg/L	<10	<10	<10	10
Free Oil	% vol./vol.	<0.01	<0.01	<0.01	0.01
Ammonia	mg/L	<0.06	<0.06	<0.06	0.06
Nitrogen (Ammonia)	mg/L	<0.05	<0.05	<0.05	0.05
Ammonium	mg/L	<0.064	<0.064	<0.064	0.064
Sulphide	mg/L	<0.004	<0.004	<0.004	0.004
Total Nitrogen	mg/L	0.7	0.5	<0.5	0.5
Total Cyanide	mg/L	<0.01	<0.01	<0.01	0.01
Anions					
Nitrate	mg/L	0.13	0.04	<0.04	0.04
Orthophosphate	mg/L	<0.06	<0.06	<0.06	0.06
Sulphate	mg/L	3070	3060	3070	5
Chloride	mg/L	23400	23400	23400	2
Chemical Analysis					
Chemical Oxygen Demand	mg/L	12	8	10	5
Total Organic Carbon	mg/L	2.0	1.6	1.5	1.0
Biochemical Oxygen Demand	mg/L	<2	<2	<2	2
Metals					
Aluminium (Al)	mg/L	<0.005	<0.005	<0.005	0.005
Arsenic (As)	mg/L	0.0032	0.0025	0.0023	0.0005

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Analytical Report

Job Ref. No. :	114841
Report No :	159009
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy
	P.O Box: 130627
	ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-19	114841-20	114841-21
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ7 Top	WSQ7 Middle	WSQ7 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Metals - Continued					
Barium (Ba)	mg/L	0.0108	0.0091	0.0101	0.0005
Cadmium (Cd)	mg/L	0.0005	0.0003	<0.0001	0.0001
Copper (Cu)	mg/L	0.0101	0.0066	0.0047	0.0003
Iron (Fe)	mg/L	<0.02	<0.02	<0.02	0.02
Lead (Pb)	mg/L	0.0048	0.0028	0.0022	0.0002
Mercury (Hg)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Phosphorus (P)	mg/L	<0.03	<0.03	<0.03	0.03
Silver (Ag)	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Vanadium (V)	mg/L	0.0041	0.0039	0.0034	0.0001
Zinc (Zn)	mg/L	0.017	0.002	<0.002	0.002
Silicon as SiO2	mg/L	<2.8	<2.8	<2.8	2.8
Chromium (Cr)	µg/L	1.0	1.1	1.1	0.3
BTEX					
Benzene	µg/L	<7	<7	<7	7
Ethyl benzene	µg/L	<7	<7	<7	7
m&p-Xylene	µg/L	<14	<14	<14	14
o-Xylene	µg/L	<7	<7	<7	7
Toluene	µg/L	<7	<7	<7	7
Hydrocarbons					
EPH C10-C40	µg/L	<7	<7	<7	7
VPH C5-C10	µg/L	<7	<7	<7	7

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Analytical Report

Job Ref. No.	:	114841
Report No	:	159009
Date Reported :		03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-19	114841-20	114841-21
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ7 Top	WSQ7 Middle	WSQ7 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PAH's					
Acenaphthene	µg/L	<0.01	<0.01	<0.01	0.01
Acenaphthylene	µg/L	<0.01	<0.01	<0.01	0.01
Anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(b)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(g,h,i)perylene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(k)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Chrysene	µg/L	<0.01	<0.01	<0.01	0.01
Dibenzo(a,h)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Fluorene	µg/L	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Naphthalene	µg/L	<0.02	<0.02	<0.02	0.02
Phenanthrene	µg/L	<0.01	<0.01	<0.01	0.01
Pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Phenols					
2,4,5-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4,6-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dimethylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Chlorophenol	µg/L	<1.0	<1.0	<1.0	1

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Analytical Report

Job Ref. No.	:	114841
Report No	:	159009
Date Reported :		03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-19	114841-20	114841-21
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ7 Top	WSQ7 Middle	WSQ7 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Phenols - Continued					
2-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
4-Chloro-3-methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
Pentachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,4,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,5,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,6-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
3-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
Phenol	µg/L	<0.5	<0.5	<0.5	0.5
Microbiology					
Total Coliform	CFU/100mL	Not Detected	Not Detected	Not Detected	10

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Analytical Report

Job Ref. No. :	114841
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Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-22	114841-23	114841-24
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ8 Top	WSQ8 Middle	WSQ8 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
Total Suspended Solids	mg/L	<5.0	<5.0	<5.0	5
Total Dissolved Solids	mg/L	45800	45700	45700	5
Dissolved & Emulsified Oil	mg/L	<10	<10	<10	10
Free Oil	% vol./vol.	<0.01	<0.01	<0.01	0.01
Ammonia	mg/L	<0.06	<0.06	<0.06	0.06
Nitrogen (Ammonia)	mg/L	<0.05	<0.05	<0.05	0.05
Ammonium	mg/L	<0.064	<0.064	<0.064	0.064
Sulphide	mg/L	<0.004	<0.004	<0.004	0.004
Total Nitrogen	mg/L	1.0	<0.5	<0.5	0.5
Total Cyanide	mg/L	<0.01	<0.01	<0.01	0.01
Anions					
Nitrate	mg/L	0.13	0.04	0.04	0.04
Orthophosphate	mg/L	<0.06	<0.06	<0.06	0.06
Sulphate	mg/L	3070	3090	3090	5
Chloride	mg/L	23400	23000	23000	2
Chemical Analysis					
Chemical Oxygen Demand	mg/L	<5	<5	<5	5
Total Organic Carbon	mg/L	1.8	1.5	1.6	1.0
Biochemical Oxygen Demand	mg/L	<2	<2	<2	2
Metals					
Aluminium (Al)	mg/L	<0.005	<0.005	<0.005	0.005
Arsenic (As)	mg/L	0.0025	0.0032	0.0032	0.0005

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Analytical Report

Job Ref. No.	:	114841
Report No	:	159009
Date Reported	:	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-22	114841-23	114841-24
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ8 Top	WSQ8 Middle	WSQ8 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Metals - Continued					
Barium (Ba)	mg/L	0.0107	0.0082	0.0081	0.0005
Cadmium (Cd)	mg/L	0.0002	0.0001	0.0001	0.0001
Copper (Cu)	mg/L	0.0271	0.0110	0.0139	0.0003
Iron (Fe)	mg/L	<0.02	<0.02	<0.02	0.02
Lead (Pb)	mg/L	0.0032	0.0017	0.0018	0.0002
Mercury (Hg)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Phosphorus (P)	mg/L	<0.03	<0.03	<0.03	0.03
Silver (Ag)	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Vanadium (V)	mg/L	0.0040	0.0036	0.0033	0.0001
Zinc (Zn)	mg/L	0.047	0.008	0.009	0.002
Silicon as SiO_2	mg/L	<2.8	<2.8	<2.8	2.8
Chromium (Cr)	µg/L	1.2	0.6	1.1	0.3
BTEX					
Benzene	µg/L	<7	<7	<7	7
Ethyl benzene	µg/L	<7	<7	<7	7
m&p-Xylene	µg/L	<14	<14	<14	14
o-Xylene	µg/L	<7	<7	<7	7
Toluene	µg/L	<7	<7	<7	7
Hydrocarbons					
EPH C10-C40	µg/L	<7	<7	<7	7
VPH C5-C10	µg/L	<7	<7	<7	7

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Analytical Report

Job Ref. No. :	114841
Report No :	159009
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-22	114841-23	114841-24
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ8 Top	WSQ8 Middle	WSQ8 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	**Units**	**Results**	**Results**	**Results**	**Method Limit of Detection**
PAH's					
Acenaphthene	µg/L	<0.01	<0.01	<0.01	0.01
Acenaphthylene	µg/L	<0.01	<0.01	<0.01	0.01
Anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(b)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(g,h,i)perylene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(k)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Chrysene	µg/L	<0.01	<0.01	<0.01	0.01
Dibenzo(a,h)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Fluorene	µg/L	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Naphthalene	µg/L	<0.02	<0.02	<0.02	0.02
Phenanthrene	µg/L	<0.01	<0.01	<0.01	0.01
Pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Phenols					
2,4,5-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4,6-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dimethylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Chlorophenol	µg/L	<1.0	<1.0	<1.0	1

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Analytical Report

Job Ref. No. :	114841
Report No :	159009
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-22	114841-23	114841-24
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ8 Top	WSQ8 Middle	WSQ8 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Phenols - Continued					
2-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
4-Chloro-3-methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
Pentachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,4,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,5,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,6-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
3-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
Phenol	µg/L	<0.5	<0.5	<0.5	0.5
Microbiology					
Total Coliform	CFU/100mL	Not Detected	Not Detected	Not Detected	10

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Analytical Report

Job Ref. No. : 114841
Report No : 159009
Date Reported : 03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-25	114841-26	114841-27
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ9 Top	WSQ9 Middle	WSQ9 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
Total Suspended Solids	mg/L	<5.0	<5.0	<5.0	5
Total Dissolved Solids	mg/L	46000	45900	45900	5
Dissolved & Emulsified Oil	mg/L	<10	<10	<10	10
Free Oil	% vol./vol.	<0.01	<0.01	<0.01	0.01
Ammonia	mg/L	<0.06	<0.06	<0.06	0.06
Nitrogen (Ammonia)	mg/L	<0.05	<0.05	<0.05	0.05
Ammonium	mg/L	<0.064	<0.064	<0.064	0.064
Sulphide	mg/L	<0.004	<0.004	<0.004	0.004
Total Nitrogen	mg/L	<0.5	<0.5	<0.5	0.5
Total Cyanide	mg/L	<0.01	<0.01	<0.01	0.01
Anions					
Nitrate	mg/L	<0.04	0.04	<0.04	0.04
Orthophosphate	mg/L	<0.06	<0.06	<0.06	0.06
Sulphate	mg/L	3100	3110	3090	5
Chloride	mg/L	23400	23400	23400	2
Chemical Analysis					
Chemical Oxygen Demand	mg/L	<5	<5	<5	5
Total Organic Carbon	mg/L	1.6	1.5	1.4	1.0
Biochemical Oxygen Demand	mg/L	<2	<2	<2	2
Metals					
Aluminium (Al)	mg/L	<0.005	<0.005	<0.005	0.005
Arsenic (As)	mg/L	0.0021	0.0037	0.0039	0.0005

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Analytical Report

Job Ref. No. : 114841
Report No : 159009
Date Reported : 03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-25	114841-26	114841-27
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ9 Top	WSQ9 Middle	WSQ9 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Metals - Continued					
Barium (Ba)	mg/L	0.0081	0.0108	0.0141	0.0005
Cadmium (Cd)	mg/L	0.0001	0.0001	0.0001	0.0001
Copper (Cu)	mg/L	0.0081	0.0123	0.0067	0.0003
Iron (Fe)	mg/L	<0.02	<0.02	<0.02	0.02
Lead (Pb)	mg/L	0.0017	0.0029	0.0050	0.0002
Mercury (Hg)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Phosphorus (P)	mg/L	<0.03	<0.03	<0.03	0.03
Silver (Ag)	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Vanadium (V)	mg/L	0.0037	0.0041	0.0043	0.0001
Zinc (Zn)	mg/L	0.008	0.008	<0.002	0.002
Silicon as SiO2	mg/L	<2.8	<2.8	<2.8	2.8
Chromium (Cr)	µg/L	0.8	4.0	2.2	0.3
BTEX					
Benzene	µg/L	<7	<7	<7	7
Ethyl benzene	µg/L	<7	<7	<7	7
m&p-Xylene	µg/L	<14	<14	<14	14
o-Xylene	µg/L	<7	<7	<7	7
Toluene	µg/L	<7	<7	<7	7
Hydrocarbons					
EPH C10-C40	µg/L	<7	<7	<7	7
VPH C5-C10	µg/L	<7	<7	<7	7

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Analytical Report

Job Ref. No.	:	114841
Report No	:	159009
Date Reported :		03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-25	114841-26	114841-27
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ9 Top	WSQ9 Middle	WSQ9 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PAH's					
Acenaphthene	µg/L	<0.01	<0.01	<0.01	0.01
Acenaphthylene	µg/L	<0.01	<0.01	<0.01	0.01
Anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(b)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(g,h,i)perylene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(k)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Chrysene	µg/L	<0.01	<0.01	<0.01	0.01
Dibenzo(a,h)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Fluorene	µg/L	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Naphthalene	µg/L	<0.02	<0.02	<0.02	0.02
Phenanthrene	µg/L	<0.01	<0.01	<0.01	0.01
Pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Phenols					
2,4,5-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4,6-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dimethylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Chlorophenol	µg/L	<1.0	<1.0	<1.0	1

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Analytical Report

Job Ref. No.	:	114841
Report No	:	159009
Date Reported	:	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-25	114841-26	114841-27
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ9 Top	WSQ9 Middle	WSQ9 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Phenols - Continued					
2-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
4-Chloro-3-methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
Pentachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,4,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,5,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,6-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
3-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
Phenol	µg/L	<0.5	<0.5	<0.5	0.5
Microbiology					
Total Coliform	CFU/100mL	Not Detected	Not Detected	Not Detected	10

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Analytical Report

Job Ref. No. :	114841
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Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-28	114841-29	114841-30
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ10 Top	WSQ10 Middle	WSQ10 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
Total Suspended Solids	mg/L	<5.0	<5.0	<5.0	5
Total Dissolved Solids	mg/L	46100	45900	45800	5
Dissolved & Emulsified Oil	mg/L	<10	<10	<10	10
Free Oil	% vol./vol.	<0.01	<0.01	<0.01	0.01
Ammonia	mg/L	<0.06	<0.06	<0.06	0.06
Nitrogen (Ammonia)	mg/L	<0.05	<0.05	<0.05	0.05
Ammonium	mg/L	<0.064	<0.064	<0.064	0.064
Sulphide	mg/L	<0.004	<0.004	<0.004	0.004
Total Nitrogen	mg/L	<0.5	<0.5	3.6	0.5
Total Cyanide	mg/L	<0.01	<0.01	<0.01	0.01
Anions					
Nitrate	mg/L	0.04	0.04	6.20	0.04
Orthophosphate	mg/L	<0.06	<0.06	<0.06	0.06
Sulphate	mg/L	3080	3090	3090	5
Chloride	mg/L	23800	23400	23400	2
Chemical Analysis					
Chemical Oxygen Demand	mg/L	<5	<5	22	5
Total Organic Carbon	mg/L	1.6	1.7	1.5	1.0
Biochemical Oxygen Demand	mg/L	<2	<2	<2	2
Metals					
Aluminium (Al)	mg/L	<0.005	<0.005	<0.005	0.005
Arsenic (As)	mg/L	0.0025	0.0032	0.0032	0.0005

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Analytical Report

Job Ref. No. :	114841
Report No :	159009
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-28	114841-29	114841-30
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ10 Top	WSQ10 Middle	WSQ10 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Metals - Continued					
Barium (Ba)	mg/L	0.0155	0.0140	0.0136	0.0005
Cadmium (Cd)	mg/L	0.0002	0.0002	<0.0001	0.0001
Copper (Cu)	mg/L	0.0096	0.0066	0.0074	0.0003
Iron (Fe)	mg/L	<0.02	<0.02	<0.02	0.02
Lead (Pb)	mg/L	0.0058	0.0028	0.0028	0.0002
Mercury (Hg)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Phosphorus (P)	mg/L	<0.03	<0.03	<0.03	0.03
Silver (Ag)	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Vanadium (V)	mg/L	0.0046	0.0039	0.0041	0.0001
Zinc (Zn)	mg/L	0.013	0.008	<0.002	0.002
Silicon as SiO_2	mg/L	<2.8	<2.8	<2.8	2.8
Chromium (Cr)	µg/L	2.1	1.4	1.5	0.3
BTEX					
Benzene	µg/L	<7	<7	<7	7
Ethyl benzene	µg/L	<7	<7	<7	7
m&p-Xylene	µg/L	<14	<14	<14	14
o-Xylene	µg/L	<7	<7	<7	7
Toluene	µg/L	<7	<7	<7	7
Hydrocarbons					
EPH C10-C40	µg/L	<7	<7	<7	7
VPH C5-C10	µg/L	<7	<7	<7	7

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Analytical Report

Job Ref. No. : 114841
Report No : 159009
Date Reported : 03/06/2022

Client: WKC Middle East Environment Consultancy

P.O Box: 130627

ABU DHABI, United Arab Emirates

Attn: Adrian Evans
Project ID: Water-Lightning
Project Name: WKC Middle East Environment Consultancy
Project Location: N/A
Tel. No: 971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-28	114841-29	114841-30
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ10 Top	WSQ10 Middle	WSQ10 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PAH's					
Acenaphthene	µg/L	<0.01	<0.01	<0.01	0.01
Acenaphthylene	µg/L	<0.01	<0.01	<0.01	0.01
Anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(b)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(g,h,i)perylene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(k)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Chrysene	µg/L	<0.01	<0.01	<0.01	0.01
Dibenzo(a,h)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Fluorene	µg/L	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Naphthalene	µg/L	<0.02	<0.02	<0.02	0.02
Phenanthrene	µg/L	<0.01	<0.01	<0.01	0.01
Pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Phenols					
2,4,5-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4,6-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dimethylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Chlorophenol	µg/L	<1.0	<1.0	<1.0	1

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Analytical Report

Job Ref. No. : 114841
Report No : 159009
Date Reported : 03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-28	114841-29	114841-30
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ10 Top	WSQ10 Middle	WSQ10 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Phenols - Continued					
2-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
4-Chloro-3-methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
Pentachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,4,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,5,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,6-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
3-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
Phenol	µg/L	<0.5	<0.5	<0.5	0.5
Microbiology					
Total Coliform	CFU/100mL	Not Detected	Not Detected	Not Detected	10

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Analytical Report

Job Ref. No. :	114841
Report No :	159009
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-31	114841-32	114841-33
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ11 Top	WSQ11 Middle	WSQ11 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
Total Suspended Solids	mg/L	<5.0	<5.0	<5.0	5
Total Dissolved Solids	mg/L	45600	45800	46000	5
Dissolved & Emulsified Oil	mg/L	<10	<10	<10	10
Free Oil	% vol./vol.	<0.01	<0.01	<0.01	0.01
Ammonia	mg/L	<0.06	<0.06	<0.06	0.06
Nitrogen (Ammonia)	mg/L	<0.05	<0.05	<0.05	0.05
Ammonium	mg/L	<0.064	<0.064	<0.064	0.064
Sulphide	mg/L	<0.004	<0.004	<0.004	0.004
Total Nitrogen	mg/L	0.5	<0.5	<0.5	0.5
Total Cyanide	mg/L	<0.01	<0.01	<0.01	0.01
Anions					
Nitrate	mg/L	0.04	<0.04	0.04	0.04
Orthophosphate	mg/L	<0.06	<0.06	<0.06	0.06
Sulphate	mg/L	3090	3070	3080	5
Chloride	mg/L	22700	23000	23400	2
Chemical Analysis					
Chemical Oxygen Demand	mg/L	8	<5	6	5
Total Organic Carbon	mg/L	1.5	1.5	1.5	1.0
Biochemical Oxygen Demand	mg/L	<2	<2	<2	2
Metals					
Aluminium (Al)	mg/L	<0.005	<0.005	<0.005	0.005
Arsenic (As)	mg/L	0.0025	0.0020	0.0025	0.0005

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Analytical Report

Job Ref. No. : 114841
Report No : 159009
Date Reported : 03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-31	114841-32	114841-33
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ11 Top	WSQ11 Middle	WSQ11 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Metals - Continued					
Barium (Ba)	mg/L	0.0107	0.0113	0.0070	0.0005
Cadmium (Cd)	mg/L	0.0003	0.0002	0.0002	0.0001
Copper (Cu)	mg/L	0.0125	0.0106	0.0317	0.0003
Iron (Fe)	mg/L	<0.02	<0.02	<0.02	0.02
Lead (Pb)	mg/L	0.0059	0.0049	0.0023	0.0002
Mercury (Hg)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Phosphorus (P)	mg/L	<0.03	<0.03	<0.03	0.03
Silver (Ag)	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Vanadium (V)	mg/L	0.0041	0.0024	0.0023	0.0001
Zinc (Zn)	mg/L	0.003	0.009	0.010	0.002
Silicon as SiO2	mg/L	<2.8	<2.8	<2.8	2.8
Chromium (Cr)	µg/L	2.2	1.6	1.0	0.3
BTEX					
Benzene	µg/L	<7	<7	<7	7
Ethyl benzene	µg/L	<7	<7	<7	7
m&p-Xylene	µg/L	<14	<14	<14	14
o-Xylene	µg/L	<7	<7	<7	7
Toluene	µg/L	<7	<7	<7	7
Hydrocarbons					
EPH C10-C40	µg/L	<7	<7	<7	7
VPH C5-C10	µg/L	<7	<7	<7	7

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Analytical Report

Job Ref. No. :	114841
Report No :	159009
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-31	114841-32	114841-33
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ11 Top	WSQ11 Middle	WSQ11 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PAH's					
Acenaphthene	µg/L	<0.01	<0.01	<0.01	0.01
Acenaphthylene	µg/L	<0.01	<0.01	<0.01	0.01
Anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(b)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(g,h,i)perylene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(k)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Chrysene	µg/L	<0.01	<0.01	<0.01	0.01
Dibenzo(a,h)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Fluorene	µg/L	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Naphthalene	µg/L	<0.02	<0.02	<0.02	0.02
Phenanthrene	µg/L	<0.01	<0.01	<0.01	0.01
Pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Phenols					
2,4,5-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4,6-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dimethylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Chlorophenol	µg/L	<1.0	<1.0	<1.0	1

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Analytical Report

Job Ref. No. :	114841
Report No :	159009
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-31	114841-32	114841-33
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ11 Top	WSQ11 Middle	WSQ11 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Phenols - Continued					
2-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
4-Chloro-3-methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
Pentachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,4,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,5,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,6-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
3-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
Phenol	µg/L	<0.5	<0.5	<0.5	0.5
Microbiology					
Total Coliform	CFU/100mL	Not Detected	Not Detected	Not Detected	10

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Analytical Report

Job Ref. No. : 114841
Report No : 159009
Date Reported : 03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-34	114841-35	114841-36
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ12 Top	WSQ12 Middle	WSQ12 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
Total Suspended Solids	mg/L	<5.0	<5.0	<5.0	5
Total Dissolved Solids	mg/L	45400	45600	45800	5
Dissolved & Emulsified Oil	mg/L	<10	<10	<10	10
Free Oil	% vol./vol.	<0.01	<0.01	<0.01	0.01
Ammonia	mg/L	<0.06	<0.06	<0.06	0.06
Nitrogen (Ammonia)	mg/L	<0.05	<0.05	<0.05	0.05
Ammonium	mg/L	<0.064	<0.064	<0.064	0.064
Sulphide	mg/L	<0.004	<0.004	<0.004	0.004
Total Nitrogen	mg/L	<0.5	<0.5	<0.5	0.5
Total Cyanide	mg/L	<0.01	<0.01	<0.01	0.01
Anions					
Nitrate	mg/L	<0.04	0.04	<0.04	0.04
Orthophosphate	mg/L	<0.06	<0.06	<0.06	0.06
Sulphate	mg/L	3080	3110	3090	5
Chloride	mg/L	22700	23400	23400	2
Chemical Analysis					
Chemical Oxygen Demand	mg/L	<5	6	<5	5
Total Organic Carbon	mg/L	1.5	1.6	1.4	1.0
Biochemical Oxygen Demand	mg/L	<2	<2	<2	2
Metals					
Aluminium (Al)	mg/L	<0.005	<0.005	<0.005	0.005
Arsenic (As)	mg/L	0.0021	0.0021	0.0018	0.0005

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Analytical Report

Job Ref. No. :	114841
Report No :	159009
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-34	114841-35	114841-36
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ12 Top	WSQ12 Middle	WSQ12 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	**Units**	**Results**	**Results**	**Results**	**Method Limit of Detection**
Metals - Continued					
Barium (Ba)	mg/L	0.0100	0.0074	0.0060	0.0005
Cadmium (Cd)	mg/L	0.0001	0.0006	0.0001	0.0001
Copper (Cu)	mg/L	0.0078	0.0045	0.0024	0.0003
Iron (Fe)	mg/L	<0.02	<0.02	<0.02	0.02
Lead (Pb)	mg/L	0.0044	0.0141	0.0015	0.0002
Mercury (Hg)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Phosphorus (P)	mg/L	<0.03	<0.03	<0.03	0.03
Silver (Ag)	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Vanadium (V)	mg/L	0.0030	0.0027	0.0017	0.0001
Zinc (Zn)	mg/L	<0.002	<0.002	<0.002	0.002
Silicon as SiO_2	mg/L	<2.8	<2.8	<2.8	2.8
Chromium (Cr)	µg/L	1.1	0.5	<0.3	0.3
BTEX					
Benzene	µg/L	<7	<7	<7	7
Ethyl benzene	µg/L	<7	<7	<7	7
m&p-Xylene	µg/L	<14	<14	<14	14
o-Xylene	µg/L	<7	<7	<7	7
Toluene	µg/L	<7	<7	<7	7
Hydrocarbons					
EPH C10-C40	µg/L	<7	<7	<7	7
VPH C5-C10	µg/L	<7	<7	<7	7

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Analytical Report

Job Ref. No.	:	114841
Report No	:	159009
Date Reported :		03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-34	114841-35	114841-36
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ12 Top	WSQ12 Middle	WSQ12 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PAH's					
Acenaphthene	µg/L	<0.01	<0.01	<0.01	0.01
Acenaphthylene	µg/L	<0.01	<0.01	<0.01	0.01
Anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(b)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(g,h,i)perylene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(k)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Chrysene	µg/L	<0.01	<0.01	<0.01	0.01
Dibenzo(a,h)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Fluorene	µg/L	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Naphthalene	µg/L	<0.02	<0.02	<0.02	0.02
Phenanthrene	µg/L	<0.01	<0.01	<0.01	0.01
Pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Phenols					
2,4,5-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4,6-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dimethylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Chlorophenol	µg/L	<1.0	<1.0	<1.0	1

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Analytical Report

Job Ref. No. :	114841
Report No :	159009
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-34	114841-35	114841-36
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ12 Top	WSQ12 Middle	WSQ12 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Phenols - Continued					
2-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
4-Chloro-3-methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
Pentachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,4,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,5,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,6-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
3-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
Phenol	µg/L	<0.5	<0.5	<0.5	0.5
Microbiology					
Total Coliform	CFU/100mL	Not Detected	Not Detected	Not Detected	10

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Analytical Report

Job Ref. No.	:	114841
Report No	:	159009
Date Reported	:	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-37	114841-38	114841-39
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ13 Top	WSQ13 Middle	WSQ13 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
Total Suspended Solids	mg/L	<5.0	<5.0	<5.0	5
Total Dissolved Solids	mg/L	45700	45800	45700	5
Dissolved & Emulsified Oil	mg/L	<10	<10	<10	10
Free Oil	% vol./vol.	<0.01	<0.01	<0.01	0.01
Ammonia	mg/L	<0.06	<0.06	<0.06	0.06
Nitrogen (Ammonia)	mg/L	<0.05	<0.05	<0.05	0.05
Ammonium	mg/L	<0.064	<0.064	<0.064	0.064
Sulphide	mg/L	<0.004	<0.004	<0.004	0.004
Total Nitrogen	mg/L	0.6	<0.5	<0.5	0.5
Total Cyanide	mg/L	<0.01	<0.01	<0.01	0.01
Anions					
Nitrate	mg/L	0.13	0.04	<0.04	0.04
Orthophosphate	mg/L	<0.06	<0.06	<0.06	0.06
Sulphate	mg/L	3090	3080	3090	5
Chloride	mg/L	23000	23400	23400	2
Chemical Analysis					
Chemical Oxygen Demand	mg/L	8	<5	<5	5
Total Organic Carbon	mg/L	1.8	1.7	1.5	1.0
Biochemical Oxygen Demand	mg/L	<2	<2	<2	2
Metals					
Aluminium (Al)	mg/L	<0.005	<0.005	<0.005	0.005
Arsenic (As)	mg/L	0.0021	0.0029	0.0022	0.0005

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Analytical Report

Job Ref. No. : 114841
Report No : 159009
Date Reported : 03/06/2022

Client: WKC Middle East Environment Consultancy

P.O Box: 130627

ABU DHABI, United Arab Emirates

Attn: Adrian Evans
Project ID: Water-Lightning
Project Name: WKC Middle East Environment Consultancy
Project Location: N/A
Tel. No: 971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-37	114841-38	114841-39
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ13 Top	WSQ13 Middle	WSQ13 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Metals - Continued					
Barium (Ba)	mg/L	0.0062	0.0099	0.0044	0.0005
Cadmium (Cd)	mg/L	0.0001	0.0002	<0.0001	0.0001
Copper (Cu)	mg/L	0.0067	0.0044	0.0028	0.0003
Iron (Fe)	mg/L	<0.02	<0.02	<0.02	0.02
Lead (Pb)	mg/L	0.0021	0.0048	0.0007	0.0002
Mercury (Hg)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Phosphorus (P)	mg/L	<0.03	<0.03	<0.03	0.03
Silver (Ag)	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Vanadium (V)	mg/L	0.0019	0.0032	0.0021	0.0001
Zinc (Zn)	mg/L	0.008	<0.002	<0.002	0.002
Silicon as SiO2	mg/L	<2.8	<2.8	<2.8	2.8
Chromium (Cr)	µg/L	0.5	1.3	<0.3	0.3
BTEX					
Benzene	µg/L	<7	<7	<7	7
Ethyl benzene	µg/L	<7	<7	<7	7
m&p-Xylene	µg/L	<14	<14	<14	14
o-Xylene	µg/L	<7	<7	<7	7
Toluene	µg/L	<7	<7	<7	7
Hydrocarbons					
EPH C10-C40	µg/L	<7	<7	<7	7
VPH C5-C10	µg/L	<7	<7	<7	7

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Project Name: WKC Middle East Environment Consultancy
Project Location: N/A
Tel. No: 971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-37	114841-38	114841-39
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ13 Top	WSQ13 Middle	WSQ13 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PAH's					
Acenaphthene	µg/L	<0.01	<0.01	<0.01	0.01
Acenaphthylene	µg/L	<0.01	<0.01	<0.01	0.01
Anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(b)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(g,h,i)perylene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(k)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Chrysene	µg/L	<0.01	<0.01	<0.01	0.01
Dibenzo(a,h)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Fluorene	µg/L	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Naphthalene	µg/L	<0.02	<0.02	<0.02	0.02
Phenanthrene	µg/L	<0.01	<0.01	<0.01	0.01
Pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Phenols					
2,4,5-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4,6-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dimethylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Chlorophenol	µg/L	<1.0	<1.0	<1.0	1

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Analytical Report

Job Ref. No. :	114841
Report No :	159009
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-37	114841-38	114841-39
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ13 Top	WSQ13 Middle	WSQ13 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Phenols - Continued					
2-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
4-Chloro-3-methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
Pentachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,4,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,5,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,6-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
3-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
Phenol	µg/L	<0.5	<0.5	<0.5	0.5
Microbiology					
Total Coliform	CFU/100mL	Not Detected	Not Detected	Not Detected	10

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Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-40	114841-41	114841-42
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ14 Top	WSQ14 Middle	WSQ14 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
Total Suspended Solids	mg/L	<5.0	<5.0	<5.0	5
Total Dissolved Solids	mg/L	45600	45600	46100	5
Dissolved & Emulsified Oil	mg/L	<10	<10	<10	10
Free Oil	% vol./vol.	<0.01	<0.01	<0.01	0.01
Ammonia	mg/L	<0.06	<0.06	<0.06	0.06
Nitrogen (Ammonia)	mg/L	<0.05	<0.05	<0.05	0.05
Ammonium	mg/L	<0.064	<0.064	<0.064	0.064
Sulphide	mg/L	<0.004	<0.004	<0.004	0.004
Total Nitrogen	mg/L	0.5	<0.5	<0.5	0.5
Total Cyanide	mg/L	<0.01	<0.01	<0.01	0.01
Anions					
Nitrate	mg/L	0.13	<0.04	0.04	0.04
Orthophosphate	mg/L	<0.06	<0.06	<0.06	0.06
Sulphate	mg/L	3110	3070	3090	5
Chloride	mg/L	23000	23400	23400	2
Chemical Analysis					
Chemical Oxygen Demand	mg/L	6	<5	<5	5
Total Organic Carbon	mg/L	1.8	1.4	1.7	1.0
Biochemical Oxygen Demand	mg/L	<2	<2	<2	2
Metals					
Aluminium (Al)	mg/L	<0.005	<0.005	<0.005	0.005
Arsenic (As)	mg/L	0.0028	0.0027	0.0018	0.0005

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Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-40	114841-41	114841-42
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ14 Top	WSQ14 Middle	WSQ14 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	**Units**	**Results**	**Results**	**Results**	**Method Limit of Detection**
Metals - Continued					
Barium (Ba)	mg/L	0.0073	0.0073	0.0058	0.0005
Cadmium (Cd)	mg/L	0.0002	0.0001	0.0004	0.0001
Copper (Cu)	mg/L	0.0124	0.0033	0.0026	0.0003
Iron (Fe)	mg/L	<0.02	<0.02	<0.02	0.02
Lead (Pb)	mg/L	0.0026	0.0025	0.0029	0.0002
Mercury (Hg)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Phosphorus (P)	mg/L	<0.03	<0.03	<0.03	0.03
Silver (Ag)	mg/L	<0.0005	<0.0005	0.0006	0.0005
Vanadium (V)	mg/L	0.0024	0.0030	0.0024	0.0001
Zinc (Zn)	mg/L	<0.002	<0.002	<0.002	0.002
Silicon as SiO2	mg/L	37.9	<2.8	<2.8	2.8
Chromium (Cr)	µg/L	0.5	0.9	<0.3	0.3
BTEX					
Benzene	µg/L	<7	<7	<7	7
Ethyl benzene	µg/L	<7	<7	<7	7
m&p-Xylene	µg/L	<14	<14	<14	14
o-Xylene	µg/L	<7	<7	<7	7
Toluene	µg/L	<7	<7	<7	7
Hydrocarbons					
EPH C10-C40	µg/L	<7	<7	41	7
VPH C5-C10	µg/L	<7	<7	<7	7

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Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-40	114841-41	114841-42
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ14 Top	WSQ14 Middle	WSQ14 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PAH's					
Acenaphthene	µg/L	<0.01	<0.01	<0.01	0.01
Acenaphthylene	µg/L	<0.01	<0.01	<0.01	0.01
Anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(b)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(g,h,i)perylene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(k)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Chrysene	µg/L	<0.01	<0.01	<0.01	0.01
Dibenzo(a,h)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Fluorene	µg/L	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Naphthalene	µg/L	<0.02	<0.02	<0.02	0.02
Phenanthrene	µg/L	<0.01	<0.01	<0.01	0.01
Pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Phenols					
2,4,5-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4,6-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dimethylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Chlorophenol	µg/L	<1.0	<1.0	<1.0	1

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Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-40	114841-41	114841-42
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ14 Top	WSQ14 Middle	WSQ14 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Phenols - Continued					
2-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
4-Chloro-3-methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
Pentachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,4,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,5,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,6-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
3-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
Phenol	µg/L	<0.5	<0.5	<0.5	0.5
Microbiology					
Total Coliform	CFU/100mL	Not Detected	Not Detected	Not Detected	10

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Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-43	114841-44	114841-45
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ15 Top	WSQ15 Middle	WSQ15 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
Total Suspended Solids	mg/L	<5.0	<5.0	<5.0	5
Total Dissolved Solids	mg/L	45000	45500	45500	5
Dissolved & Emulsified Oil	mg/L	<10	<10	<10	10
Free Oil	% vol./vol.	<0.01	<0.01	<0.01	0.01
Ammonia	mg/L	<0.06	<0.06	<0.06	0.06
Nitrogen (Ammonia)	mg/L	<0.05	<0.05	<0.05	0.05
Ammonium	mg/L	<0.064	<0.064	<0.064	0.064
Sulphide	mg/L	<0.004	<0.004	<0.004	0.004
Total Nitrogen	mg/L	1.1	0.5	0.7	0.5
Total Cyanide	mg/L	<0.01	<0.01	<0.01	0.01
Anions					
Nitrate	mg/L	0.62	0.09	0.40	0.04
Orthophosphate	mg/L	<0.06	<0.06	<0.06	0.06
Sulphate	mg/L	3040	3090	3090	5
Chloride	mg/L	22700	23000	23000	2
Chemical Analysis					
Chemical Oxygen Demand	mg/L	6	<5	6	5
Total Organic Carbon	mg/L	2.0	1.5	1.6	1.0
Biochemical Oxygen Demand	mg/L	<2	<2	<2	2
Metals					
Aluminium (Al)	mg/L	<0.005	<0.005	<0.005	0.005
Arsenic (As)	mg/L	0.0021	0.0028	0.0018	0.0005

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ABU DHABI, United Arab Emirates

Attn: Adrian Evans
Project ID: Water-Lightning
Project Name: WKC Middle East Environment Consultancy
Project Location: N/A
Tel. No: 971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID		114841-43	114841-44	114841-45	
Date Received		23/05/2022	23/05/2022	23/05/2022	
Sampled By		Client	Client	Client	
Sampling Date		Not Given	Not Given	Not Given	
Sampling Time		Not Given	Not Given	Not Given	
Sample Sub Matrix		Water	Water	Water	
Sampling Location		Not Given	Not Given	Not Given	
Client Sample ID		WSQ15 Top	WSQ15 Middle	WSQ15 Bottom	
Sampling Method		Not Given	Not Given	Not Given	
Analyte	**Units**	**Results**	**Results**	**Results**	**Method Limit of Detection**
Metals - Continued					
Barium (Ba)	mg/L	0.0078	0.0054	0.0097	0.0005
Cadmium (Cd)	mg/L	0.0006	0.0005	0.0001	0.0001
Copper (Cu)	mg/L	0.0030	0.0036	0.0041	0.0003
Iron (Fe)	mg/L	<0.02	<0.02	<0.02	0.02
Lead (Pb)	mg/L	0.0039	0.0047	0.0047	0.0002
Mercury (Hg)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Phosphorus (P)	mg/L	<0.03	<0.03	<0.03	0.03
Silver (Ag)	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Vanadium (V)	mg/L	0.0024	0.0025	0.0023	0.0001
Zinc (Zn)	mg/L	0.009	<0.002	<0.002	0.002
Silicon as SiO2	mg/L	<2.8	<2.8	<2.8	2.8
Chromium (Cr)	µg/L	<0.3	<0.3	1.0	0.3
BTEX					
Benzene	µg/L	<7	<7	<7	7
Ethyl benzene	µg/L	<7	<7	<7	7
m&p-Xylene	µg/L	<14	<14	<14	14
o-Xylene	µg/L	<7	<7	<7	7
Toluene	µg/L	<7	<7	<7	7
Hydrocarbons					
EPH C10-C40	µg/L	<7	<7	<7	7
VPH C5-C10	µg/L	<7	<7	<7	7

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Analytical Report

Job Ref. No. : 114841
Report No : 159009
Date Reported : 03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-43	114841-44	114841-45
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ15 Top	WSQ15 Middle	WSQ15 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PAH's					
Acenaphthene	µg/L	<0.01	<0.01	<0.01	0.01
Acenaphthylene	µg/L	<0.01	<0.01	<0.01	0.01
Anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(b)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(g,h,i)perylene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(k)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Chrysene	µg/L	<0.01	<0.01	<0.01	0.01
Dibenzo(a,h)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Fluorene	µg/L	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Naphthalene	µg/L	<0.02	<0.02	<0.02	0.02
Phenanthrene	µg/L	<0.01	<0.01	<0.01	0.01
Pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Phenols					
2,4,5-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4,6-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dimethylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Chlorophenol	µg/L	<1.0	<1.0	<1.0	1

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Analytical Report

Job Ref. No. :	114841
Report No :	159009
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-43	114841-44	114841-45
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ15 Top	WSQ15 Middle	WSQ15 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Phenols - Continued					
2-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
4-Chloro-3-methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
Pentachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,4,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,5,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,6-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
3-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
Phenol	µg/L	<0.5	<0.5	<0.5	0.5
Microbiology					
Total Coliform	CFU/100mL	Not Detected	Not Detected	Not Detected	10

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Analytical Report

Job Ref. No. :	114841
Report No :	159009
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-46	114841-47	114841-48
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ16 Top	WSQ16 Middle	WSQ16 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
Total Suspended Solids	mg/L	<5.0	<5.0	<5.0	5
Total Dissolved Solids	mg/L	45600	45700	45700	5
Dissolved & Emulsified Oil	mg/L	<10	<10	<10	10
Free Oil	% vol./vol.	<0.01	<0.01	<0.01	0.01
Ammonia	mg/L	<0.06	<0.06	<0.06	0.06
Nitrogen (Ammonia)	mg/L	<0.05	<0.05	<0.05	0.05
Ammonium	mg/L	<0.064	<0.064	<0.064	0.064
Sulphide	mg/L	<0.004	<0.004	<0.004	0.004
Total Nitrogen	mg/L	0.5	<0.5	0.5	0.5
Total Cyanide	mg/L	<0.01	<0.01	<0.01	0.01
Anions					
Nitrate	mg/L	0.18	0.04	0.04	0.04
Orthophosphate	mg/L	<0.06	<0.06	<0.06	0.06
Sulphate	mg/L	3080	3080	3090	5
Chloride	mg/L	23000	23000	23000	2
Chemical Analysis					
Chemical Oxygen Demand	mg/L	<5	<5	6	5
Total Organic Carbon	mg/L	1.7	1.6	1.6	1.0
Biochemical Oxygen Demand	mg/L	<2	<2	<2	2
Metals					
Aluminium (Al)	mg/L	<0.005	<0.005	<0.005	0.005
Arsenic (As)	mg/L	0.0017	0.0028	0.0027	0.0005

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Analytical Report

Job Ref. No. :	114841
Report No :	159009
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-46	114841-47	114841-48
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ16 Top	WSQ16 Middle	WSQ16 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	**Units**	**Results**	**Results**	**Results**	**Method Limit of Detection**
Metals - Continued					
Barium (Ba)	mg/L	0.0057	0.0055	0.0079	0.0005
Cadmium (Cd)	mg/L	0.0018	<0.0001	0.0010	0.0001
Copper (Cu)	mg/L	0.0038	0.0063	0.0060	0.0003
Iron (Fe)	mg/L	<0.02	<0.02	<0.02	0.02
Lead (Pb)	mg/L	0.0222	0.0019	0.0142	0.0002
Mercury (Hg)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Phosphorus (P)	mg/L	<0.03	<0.03	<0.03	0.03
Silver (Ag)	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Vanadium (V)	mg/L	0.0023	0.0022	0.0023	0.0001
Zinc (Zn)	mg/L	0.021	0.006	<0.002	0.002
Silicon as SiO2	mg/L	<2.8	<2.8	<2.8	2.8
Chromium (Cr)	µg/L	1.4	<0.3	0.4	0.3
BTEX					
Benzene	µg/L	<7	<7	<7	7
Ethyl benzene	µg/L	<7	<7	<7	7
m&p-Xylene	µg/L	<14	<14	<14	14
o-Xylene	µg/L	<7	<7	<7	7
Toluene	µg/L	<7	<7	<7	7
Hydrocarbons					
EPH C10-C40	µg/L	<7	<7	<7	7
VPH C5-C10	µg/L	<7	<7	<7	7

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Analytical Report

Job Ref. No. :	114841
Report No :	159009
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-46	114841-47	114841-48
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ16 Top	WSQ16 Middle	WSQ16 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PAH's					
Acenaphthene	µg/L	<0.01	<0.01	<0.01	0.01
Acenaphthylene	µg/L	<0.01	<0.01	<0.01	0.01
Anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(b)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(g,h,i)perylene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(k)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Chrysene	µg/L	<0.01	<0.01	<0.01	0.01
Dibenzo(a,h)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Fluorene	µg/L	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Naphthalene	µg/L	<0.02	<0.02	<0.02	0.02
Phenanthrene	µg/L	<0.01	<0.01	<0.01	0.01
Pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Phenols					
2,4,5-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4,6-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dimethylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Chlorophenol	µg/L	<1.0	<1.0	<1.0	1

Analytical Report

Job Ref. No. : 114841
Report No : 159009
Date Reported : 03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-46	114841-47	114841-48
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ16 Top	WSQ16 Middle	WSQ16 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Phenols - Continued					
2-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
4-Chloro-3-methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
Pentachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,4,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,5,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,6-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
3-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
Phenol	µg/L	<0.5	<0.5	<0.5	0.5
Microbiology					
Total Coliform	CFU/100mL	Not Detected	Not Detected	Not Detected	10

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Analytical Report

Job Ref. No. :	114841
Report No :	159009
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-49	114841-50	114841-51
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ17 Top	WSQ17 Middle	WSQ17 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
Total Suspended Solids	mg/L	<5.0	<5.0	<5.0	5
Total Dissolved Solids	mg/L	45700	45600	45300	5
Dissolved & Emulsified Oil	mg/L	<10	<10	<10	10
Free Oil	% vol./vol.	<0.01	<0.01	<0.01	0.01
Ammonia	mg/L	<0.06	<0.06	<0.06	0.06
Nitrogen (Ammonia)	mg/L	<0.05	<0.05	<0.05	0.05
Ammonium	mg/L	<0.064	<0.064	<0.064	0.064
Sulphide	mg/L	<0.004	<0.004	<0.004	0.004
Total Nitrogen	mg/L	<0.5	<0.5	<0.5	0.5
Total Cyanide	mg/L	<0.01	<0.01	<0.01	0.01
Anions					
Nitrate	mg/L	0.04	0.04	<0.04	0.04
Orthophosphate	mg/L	<0.06	<0.06	<0.06	0.06
Sulphate	mg/L	3100	3100	3090	5
Chloride	mg/L	23000	23000	23000	2
Chemical Analysis					
Chemical Oxygen Demand	mg/L	<5	<5	<5	5
Total Organic Carbon	mg/L	1.4	2.9	1.4	1.0
Biochemical Oxygen Demand	mg/L	<2	<2	<2	2
Metals					
Aluminium (Al)	mg/L	<0.005	<0.005	<0.005	0.005
Arsenic (As)	mg/L	0.0018	0.0030	0.0034	0.0005

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Analytical Report

Job Ref. No. : 114841
Report No : 159009
Date Reported : 03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-49	114841-50	114841-51
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ17 Top	WSQ17 Middle	WSQ17 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Metals - Continued					
Barium (Ba)	mg/L	0.0076	0.0056	0.0072	0.0005
Cadmium (Cd)	mg/L	<0.0001	0.0001	0.0002	0.0001
Copper (Cu)	mg/L	0.0049	0.0046	0.0041	0.0003
Iron (Fe)	mg/L	<0.02	<0.02	<0.02	0.02
Lead (Pb)	mg/L	0.0022	0.0038	0.0033	0.0002
Mercury (Hg)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Phosphorus (P)	mg/L	<0.03	<0.03	<0.03	0.03
Silver (Ag)	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Vanadium (V)	mg/L	0.0026	0.0022	0.0022	0.0001
Zinc (Zn)	mg/L	0.004	<0.002	<0.002	0.002
Silicon as SiO2	mg/L	<2.8	<2.8	<2.8	2.8
Chromium (Cr)	µg/L	0.7	<0.3	<0.3	0.3
BTEX					
Benzene	µg/L	<7	<7	<7	7
Ethyl benzene	µg/L	<7	<7	<7	7
m&p-Xylene	µg/L	<14	<14	<14	14
o-Xylene	µg/L	<7	<7	<7	7
Toluene	µg/L	<7	<7	<7	7
Hydrocarbons					
EPH C10-C40	µg/L	<7	<7	<7	7
VPH C5-C10	µg/L	<7	<7	<7	7

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Analytical Report

Job Ref. No. :	114841
Report No :	159009
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-49	114841-50	114841-51
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ17 Top	WSQ17 Middle	WSQ17 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PAH's					
Acenaphthene	µg/L	<0.01	<0.01	<0.01	0.01
Acenaphthylene	µg/L	<0.01	<0.01	<0.01	0.01
Anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(b)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(g,h,i)perylene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(k)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Chrysene	µg/L	<0.01	<0.01	<0.01	0.01
Dibenzo(a,h)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Fluorene	µg/L	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Naphthalene	µg/L	<0.02	<0.02	<0.02	0.02
Phenanthrene	µg/L	<0.01	<0.01	<0.01	0.01
Pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Phenols					
2,4,5-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4,6-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dimethylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Chlorophenol	µg/L	<1.0	<1.0	<1.0	1

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Analytical Report

Job Ref. No. : 114841
Report No : 159009
Date Reported : 03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-49	114841-50	114841-51
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ17 Top	WSQ17 Middle	WSQ17 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Phenols - Continued					
2-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
4-Chloro-3-methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
Pentachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,4,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,5,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,6-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
3-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
Phenol	µg/L	<0.5	<0.5	<0.5	0.5
Microbiology					
Total Coliform	CFU/100mL	Not Detected	Not Detected	Not Detected	10

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Analytical Report

Job Ref. No.	:	114841
Report No	:	159009
Date Reported :		03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-52	114841-53	114841-54
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ18 Top	WSQ18 Middle	WSQ18 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
Total Suspended Solids	mg/L	<5.0	<5.0	<5.0	5
Total Dissolved Solids	mg/L	45800	45500	45900	5
Dissolved & Emulsified Oil	mg/L	<10	<10	<10	10
Free Oil	% vol./vol.	<0.01	<0.01	<0.01	0.01
Ammonia	mg/L	<0.06	<0.06	<0.06	0.06
Nitrogen (Ammonia)	mg/L	<0.05	<0.05	<0.05	0.05
Ammonium	mg/L	<0.064	<0.064	<0.064	0.064
Sulphide	mg/L	<0.004	<0.004	<0.004	0.004
Total Nitrogen	mg/L	<0.5	<0.5	0.5	0.5
Total Cyanide	mg/L	<0.01	<0.01	<0.01	0.01
Anions					
Nitrate	mg/L	<0.04	0.04	0.04	0.04
Orthophosphate	mg/L	<0.06	<0.06	<0.06	0.06
Sulphate	mg/L	3090	3070	3100	5
Chloride	mg/L	23000	23000	23000	2
Chemical Analysis					
Chemical Oxygen Demand	mg/L	<5	<5	6	5
Total Organic Carbon	mg/L	1.5	1.7	1.6	1.0
Biochemical Oxygen Demand	mg/L	<2	<2	<2	2
Metals					
Aluminium (Al)	mg/L	<0.005	<0.005	<0.005	0.005
Arsenic (As)	mg/L	0.0031	0.0019	0.0027	0.0005

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Analytical Report

Job Ref. No. : 114841
Report No : 159009
Date Reported : 03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-52	114841-53	114841-54
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ18 Top	WSQ18 Middle	WSQ18 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Metals - Continued					
Barium (Ba)	mg/L	0.0072	0.0095	0.0191	0.0005
Cadmium (Cd)	mg/L	0.0002	0.0002	0.0001	0.0001
Copper (Cu)	mg/L	0.0115	0.0141	0.0120	0.0003
Iron (Fe)	mg/L	<0.02	<0.02	<0.02	0.02
Lead (Pb)	mg/L	0.0021	0.0045	0.0045	0.0002
Mercury (Hg)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Phosphorus (P)	mg/L	<0.03	<0.03	<0.03	0.03
Silver (Ag)	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Vanadium (V)	mg/L	0.0025	0.0022	0.0028	0.0001
Zinc (Zn)	mg/L	0.002	<0.002	<0.002	0.002
Silicon as SiO2	mg/L	<2.8	<2.8	<2.8	2.8
Chromium (Cr)	µg/L	0.8	0.3	1.7	0.3
BTEX					
Benzene	µg/L	<7	<7	<7	7
Ethyl benzene	µg/L	<7	<7	<7	7
m&p-Xylene	µg/L	<14	<14	<14	14
o-Xylene	µg/L	<7	<7	<7	7
Toluene	µg/L	<7	<7	<7	7
Hydrocarbons					
EPH C10-C40	µg/L	<7	<7	<7	7
VPH C5-C10	µg/L	<7	<7	<7	7

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Analytical Report

Job Ref. No. : 114841
Report No : 159009
Date Reported : 03/06/2022

Client: WKC Middle East Environment Consultancy

P.O Box: 130627

ABU DHABI, United Arab Emirates

Attn: Adrian Evans
Project ID: Water-Lightning
Project Name: WKC Middle East Environment Consultancy
Project Location: N/A
Tel. No: 971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-52	114841-53	114841-54
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ18 Top	WSQ18 Middle	WSQ18 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PAH's					
Acenaphthene	µg/L	<0.01	<0.01	<0.01	0.01
Acenaphthylene	µg/L	<0.01	<0.01	<0.01	0.01
Anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(b)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(g,h,i)perylene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(k)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Chrysene	µg/L	<0.01	<0.01	<0.01	0.01
Dibenzo(a,h)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Fluorene	µg/L	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Naphthalene	µg/L	<0.02	<0.02	<0.02	0.02
Phenanthrene	µg/L	<0.01	<0.01	<0.01	0.01
Pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Phenols					
2,4,5-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4,6-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dimethylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Chlorophenol	µg/L	<1.0	<1.0	<1.0	1

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Analytical Report

Job Ref. No.	:	114841
Report No	:	159009
Date Reported :		03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-52	114841-53	114841-54
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ18 Top	WSQ18 Middle	WSQ18 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Phenols - Continued					
2-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
4-Chloro-3-methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
Pentachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,4,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,5,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,6-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
3-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
Phenol	µg/L	<0.5	<0.5	<0.5	0.5
Microbiology					
Total Coliform	CFU/100mL	Not Detected	Not Detected	Not Detected	10

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Analytical Report

Job Ref. No. : 114841
Report No : 159009
Date Reported : 03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-55	114841-56	114841-57
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ19 Top	WSQ19 Middle	WSQ19 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	**Units**	**Results**	**Results**	**Results**	**Method Limit of Detection**
Inorganic Parameters					
Total Suspended Solids	mg/L	<5.0	<5.0	<5.0	5
Total Dissolved Solids	mg/L	45800	45900	45800	5
Dissolved & Emulsified Oil	mg/L	<10	<10	<10	10
Free Oil	% vol./vol.	<0.01	<0.01	<0.01	0.01
Ammonia	mg/L	<0.06	<0.06	<0.06	0.06
Nitrogen (Ammonia)	mg/L	<0.05	<0.05	<0.05	0.05
Ammonium	mg/L	<0.064	<0.064	<0.064	0.064
Sulphide	mg/L	<0.004	<0.004	<0.004	0.004
Total Nitrogen	mg/L	<0.5	<0.5	<0.5	0.5
Total Cyanide	mg/L	<0.01	<0.01	<0.01	0.01
Anions					
Nitrate	mg/L	<0.04	<0.04	<0.04	0.04
Orthophosphate	mg/L	<0.06	<0.06	<0.06	0.06
Sulphate	mg/L	3110	3080	3090	5
Chloride	mg/L	23400	23400	23400	2
Chemical Analysis					
Chemical Oxygen Demand	mg/L	<5	<5	<5	5
Total Organic Carbon	mg/L	1.5	1.4	1.5	1.0
Biochemical Oxygen Demand	mg/L	<2	<2	<2	2
Metals					
Aluminium (Al)	mg/L	<0.005	<0.005	<0.005	0.005
Arsenic (As)	mg/L	0.0020	0.0033	0.0032	0.0005

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Analytical Report

Job Ref. No. :	114841
Report No :	159009
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-55	114841-56	114841-57
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ19 Top	WSQ19 Middle	WSQ19 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Metals - Continued					
Barium (Ba)	mg/L	0.0074	0.0067	0.0055	0.0005
Cadmium (Cd)	mg/L	0.0001	<0.0001	0.0003	0.0001
Copper (Cu)	mg/L	0.0041	0.0096	0.0036	0.0003
Iron (Fe)	mg/L	<0.02	<0.02	<0.02	0.02
Lead (Pb)	mg/L	0.0027	0.0057	0.0019	0.0002
Mercury (Hg)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Phosphorus (P)	mg/L	<0.03	<0.03	<0.03	0.03
Silver (Ag)	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Vanadium (V)	mg/L	0.0026	0.0026	0.0023	0.0001
Zinc (Zn)	mg/L	<0.002	0.005	<0.002	0.002
Silicon as SiO2	mg/L	<2.8	<2.8	<2.8	2.8
Chromium (Cr)	µg/L	0.5	0.7	<0.3	0.3
BTEX					
Benzene	µg/L	<7	<7	<7	7
Ethyl benzene	µg/L	<7	<7	<7	7
m&p-Xylene	µg/L	<14	<14	<14	14
o-Xylene	µg/L	<7	<7	<7	7
Toluene	µg/L	<7	<7	<7	7
Hydrocarbons					
EPH C10-C40	µg/L	<7	<7	<7	7
VPH C5-C10	µg/L	<7	<7	<7	7

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Analytical Report

Job Ref. No.	:	114841
Report No	:	159009
Date Reported	:	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-55	114841-56	114841-57
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ19 Top	WSQ19 Middle	WSQ19 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PAH's					
Acenaphthene	µg/L	<0.01	<0.01	<0.01	0.01
Acenaphthylene	µg/L	<0.01	<0.01	<0.01	0.01
Anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(b)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(g,h,i)perylene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(k)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Chrysene	µg/L	<0.01	<0.01	<0.01	0.01
Dibenzo(a,h)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Fluorene	µg/L	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Naphthalene	µg/L	<0.02	<0.02	<0.02	0.02
Phenanthrene	µg/L	<0.01	<0.01	<0.01	0.01
Pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Phenols					
2,4,5-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4,6-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dimethylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Chlorophenol	µg/L	<1.0	<1.0	<1.0	1

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Analytical Report

Job Ref. No. : 114841
Report No : 159009
Date Reported : 03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-55	114841-56	114841-57
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ19 Top	WSQ19 Middle	WSQ19 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Phenols - Continued					
2-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
4-Chloro-3-methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
Pentachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,4,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,5,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,6-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
3-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
Phenol	µg/L	<0.5	<0.5	<0.5	0.5
Microbiology					
Total Coliform	CFU/100mL	Not Detected	Not Detected	Not Detected	10

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Analytical Report

Job Ref. No. :	114841
Report No :	159009
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy
	P.O Box: 130627
	ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-58	114841-59	114841-60
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ20 Top	WSQ20 Middle	WSQ20 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
Total Suspended Solids	mg/L	<5.0	<5.0	<5.0	5
Total Dissolved Solids	mg/L	46000	45800	45800	5
Dissolved & Emulsified Oil	mg/L	<10	<10	<10	10
Free Oil	% vol./vol.	<0.01	<0.01	<0.01	0.01
Ammonia	mg/L	<0.06	<0.06	<0.06	0.06
Nitrogen (Ammonia)	mg/L	<0.05	<0.05	<0.05	0.05
Ammonium	mg/L	<0.064	<0.064	<0.064	0.064
Sulphide	mg/L	<0.004	<0.004	<0.004	0.004
Total Nitrogen	mg/L	<0.5	<0.5	<0.5	0.5
Total Cyanide	mg/L	<0.01	<0.01	<0.01	0.01
Anions					
Nitrate	mg/L	0.04	<0.04	<0.04	0.04
Orthophosphate	mg/L	<0.06	<0.06	<0.06	0.06
Sulphate	mg/L	3050	3090	3090	5
Chloride	mg/L	23400	23400	23000	2
Chemical Analysis					
Chemical Oxygen Demand	mg/L	<5	<5	<5	5
Total Organic Carbon	mg/L	1.4	1.6	1.6	1.0
Biochemical Oxygen Demand	mg/L	<2	<2	<2	2
Metals					
Aluminium (Al)	mg/L	<0.005	<0.005	<0.005	0.005
Arsenic (As)	mg/L	0.0026	0.0021	0.0031	0.0005

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Analytical Report

Job Ref. No. : 114841
Report No : 159009
Date Reported : 03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-58	114841-59	114841-60
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ20 Top	WSQ20 Middle	WSQ20 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	**Units**	**Results**	**Results**	**Results**	**Method Limit of Detection**
Metals - Continued					
Barium (Ba)	mg/L	0.0073	0.0071	0.0024	0.0005
Cadmium (Cd)	mg/L	<0.0001	0.0002	0.0001	0.0001
Copper (Cu)	mg/L	0.0028	0.0040	0.0047	0.0003
Iron (Fe)	mg/L	<0.02	<0.02	<0.02	0.02
Lead (Pb)	mg/L	0.0016	0.0112	0.0008	0.0002
Mercury (Hg)	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Phosphorus (P)	mg/L	<0.03	<0.03	<0.03	0.03
Silver (Ag)	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Vanadium (V)	mg/L	0.0024	0.0022	0.0021	0.0001
Zinc (Zn)	mg/L	0.007	0.005	0.008	0.002
Silicon as SiO2	mg/L	<2.8	<2.8	<2.8	2.8
Chromium (Cr)	µg/L	<0.3	<0.3	<0.3	0.3
BTEX					
Benzene	µg/L	<7	<7	<7	7
Ethyl benzene	µg/L	<7	<7	<7	7
m&p-Xylene	µg/L	<14	<14	<14	14
o-Xylene	µg/L	<7	<7	<7	7
Toluene	µg/L	<7	<7	<7	7
Hydrocarbons					
EPH C10-C40	µg/L	<7	<7	<7	7
VPH C5-C10	µg/L	<7	<7	<7	7

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Analytical Report

Job Ref. No.	:	114841
Report No	:	159009
Date Reported	:	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-58	114841-59	114841-60
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ20 Top	WSQ20 Middle	WSQ20 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PAH's					
Acenaphthene	µg/L	<0.01	<0.01	<0.01	0.01
Acenaphthylene	µg/L	<0.01	<0.01	<0.01	0.01
Anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(a)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(b)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(g,h,i)perylene	µg/L	<0.01	<0.01	<0.01	0.01
Benzo(k)fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Chrysene	µg/L	<0.01	<0.01	<0.01	0.01
Dibenzo(a,h)anthracene	µg/L	<0.01	<0.01	<0.01	0.01
Fluoranthene	µg/L	<0.01	<0.01	<0.01	0.01
Fluorene	µg/L	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Naphthalene	µg/L	<0.02	<0.02	<0.02	0.02
Phenanthrene	µg/L	<0.01	<0.01	<0.01	0.01
Pyrene	µg/L	<0.01	<0.01	<0.01	0.01
Phenols					
2,4,5-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4,6-Trichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,4-Dimethylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Chlorophenol	µg/L	<1.0	<1.0	<1.0	1

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Analytical Report

Job Ref. No. :	114841
Report No :	159009
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114841-58	114841-59	114841-60
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Water	Water	Water
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ20 Top	WSQ20 Middle	WSQ20 Bottom
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Phenols - Continued					
2-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
2-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
4-Chloro-3-methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
4-Nitrophenol	µg/L	<1.0	<1.0	<1.0	1
Pentachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,4,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,3,5,6-Tetrachlorophenol	µg/L	<1.0	<1.0	<1.0	1
2,6-Dichlorophenol	µg/L	<1.0	<1.0	<1.0	1
3-Methylphenol	µg/L	<1.0	<1.0	<1.0	1
Phenol	µg/L	<0.5	<0.5	<0.5	0.5
Microbiology					
Total Coliform	CFU/100mL	Not Detected	Not Detected	Not Detected	10

Method of Analysis

Method Name	Reference
Biochemical Oxygen Demand [APHA 5210 B]Water-DXB	APHA [5210 B]
	APHA [5210 B]
	APHA [5210 B]
BTEX (including VPH) by GC-FID-HS [EPA 8015B] Water-DXB	EPA [8015B]
Chemical Oxygen Demand [APHA 5220 B]Water-DXB	APHA [5220 B]
	APHA [5220 B]
	APHA [5220 B]

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Analytical Report

Job Ref. No.	:	114841
Report No	:	159009
Date Reported :		03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Method of Analysis

Method Name	Reference
Chloride [APHA 4500 Cl- B]-DXB	APHA [4500 Cl- B]
	APHA [4500 Cl- B]
	APHA [4500 Cl- B]
Cyanide [Modified USEPA method OIA-1667 - Subcontract]-DXB	USEPA [Method OIA-1667]
	USEPA [Method OIA-1667]
	USEPA [Method OIA-1667]
EPH C10-C40 (Low LOD) by GC-FID [EPA 8015B] Water-DXB	EPA [8015B]
	EPA [8015B]
Metals ICP-MS (APHA 3125) SW-DXB	APHA [3125]
	APHA [3125]
Nitrate [HACH 8039]-DXB	HACH [8039]
	HACH [8039]
Nitrogen (Ammonia) [HACH 8155]-DXB	HACH [8155]
	HACH [8155]
Nitrogen (Total) [ASTM D5176]-DXB	ASTM [D5176-08]
Oil & Grease [APHA 5520 B]Water-DXB	APHA [5520 B]
	APHA [5520 B]
	APHA [5520 B]
Orthophosphate [HACH 8048]-DXB	HACH [8048]
	HACH [8048]
PAH in Water [EPA 8270D, July 2014]-DXB	EPA [8270D, July 2014]
	EPA [8270D, July 2014]
Phenols water [EPA 528]-DXB	EPA [528]
	EPA [528]
	EPA [528]
	EPA [528]
Solids (Total Dissolved) [APHA 2540 C]Water-DXB	APHA [2540 C]
	APHA [2540 C]
	APHA [2540 C]
	APHA [2540 C]
Solids (Total Suspended) [APHA 2540 D]Water-DXB	APHA [2540 D]
	APHA [2540 D]
	APHA [2540 D]
	APHA [2540 D]
Sulphate [APHA 4500 SO42- C]-DXB	APHA [4500 SO42- C]
	APHA [4500 SO42- C]
Sulphide [HACH 8131]-DXB	HACH [8131]
Total Coliform (APHA 9222 B)Water-DXB	APHA [9222 B]

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Analytical Report

Job Ref. No.	:	114841
Report No	:	159009
Date Reported :		03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Water-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Method of Analysis

Method Name	Reference
	APHA [9222 B]
	APHA [9222 B]
Total Organic Carbon (TOC) [APHA 5310 B]-DXB	APHA [5310 B]

Comments:

· Tested By : AAB, AAP, GAN, JCH, NAH, NHA, SGE, SMO
· Date Tested: 24/05/2022 to 03/06/2022

. Please note that all tests shown not containing the `AUH` extension are subcontracted to Element group of laboratories.

. Please note that if the sample has to be diluted due to the matrix, the reported Limit of Detection (LOD) value will increase from the method LOD.

. Any APHA methods stated herein are documented in-house procedures, referenced to 23rd edition.

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Analytical Report

Job Ref. No. : 113259
Report No : 158633
Date Reported : 17/05/2022

Client: WKC Middle East Environment Consultancy

P.O Box: 130627

ABU DHABI, United Arab Emirates

Attn: Adrian Evans
Project ID: Sediment-Lightning
Project Name: WKC Middle East Environment Consultancy
Project Location: N/A
Tel. No: 971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113259-1	113259-2	113259-3
Date Received	08/04/2022	08/04/2022	08/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment	Sediment
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	Fugro Gap S1	Fugro Gap S2	Fugro Gap S3
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
pH	pH units	9.0	8.8	9.2	0.1
Oil and Grease	%	<0.01	<0.01	<0.01	0.01
Total Nitrogen	mg/kg	540	564	340	5
Silica-SiO2	% by wt	7.69	8.07	3.64	0.01
Total Cyanide	mg/kg	<0.5	<0.5	<0.5	0.5
Anions					
Orthophosphate	mg/kg	<0.3	<0.3	0.3	0.3
Fluoride	mg/kg	1.8	1.8	1.4	0.5
Sulphate (Acid Soluble)	%SO4	0.53	0.59	0.55	0.01
Chemical Analysis					
Total Organic Carbon	%	0.6	0.8	0.3	0.1
Metals					
Cadmium (Cd)	mg/kg	<0.5	<0.5	<0.5	0.5
Aluminium (Al)	mg/kg	1140	1340	750	130
Arsenic (As)	mg/kg	6.9	7.1	2.2	1.0
Barium (Ba)	mg/kg	16.0	16.3	11.0	3.0
Chromium (Cr)	mg/kg	6.2	6.5	4.3	1.0
Copper (Cu)	mg/kg	<3.0	<3.0	<3.0	3.0
Iron (Fe)	mg/kg	1240	1440	704	70
Lead (Pb)	mg/kg	1.2	1.4	1.1	1.0
Manganese (Mn)	mg/kg	41.9	45.8	29.8	3.0

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Analytical Report

Job Ref. No.	:	113259
Report No	:	158633
Date Reported :		17/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113259-1	113259-2	113259-3
Date Received	08/04/2022	08/04/2022	08/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment	Sediment
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	Fugro Gap S1	Fugro Gap S2	Fugro Gap S3
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Metals - Continued					
Molybdenum (Mo)	mg/kg	<3.0	<3.0	<3.0	3.0
Nickel (Ni)	mg/kg	4.5	5.4	2.6	1.0
Phosphorus (P)	mg/kg	263	261	253	50
Selenium (Se)	mg/kg	<3.0	<3.0	<3.0	3.0
Silver (Ag)	mg/kg	<10	<10	<10	10
Vanadium (V)	mg/kg	6.9	7.5	6.1	1.0
Zinc (Zn)	mg/kg	4.0	4.5	<3.0	3.0
Antimony (Sb)	mg/kg	1.1	<1.0	<1.0	1.0
Mercury (Hg)	mg/kg	0.015	0.015	0.011	0.010
Hydrocarbons					
VPH C5-C10	mg/kg	<0.05	<0.05	<0.05	0.05
EPH C10-C40	mg/kg	<50	<50	<50	50
PAH's					
Acenaphthene	mg/kg	<0.01	<0.01	<0.01	0.01
Acenaphthylene	mg/kg	<0.01	<0.01	<0.01	0.01
Anthracene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(a)pyrene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(b)fluoranthene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(g,h,i)perylene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(k)fluoranthene	mg/kg	<0.01	<0.01	<0.01	0.01
Chrysene	mg/kg	<0.01	<0.01	<0.01	0.01

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Analytical Report

Job Ref. No. :	113259
Report No :	158633
Date Reported :	17/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113259-1	113259-2	113259-3
Date Received	08/04/2022	08/04/2022	08/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment	Sediment
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	Fugro Gap S1	Fugro Gap S2	Fugro Gap S3
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PAH's - Continued					
Dibenzo(a,h)anthracene	mg/kg	<0.01	<0.01	<0.01	0.01
Fluoranthene	mg/kg	<0.01	<0.01	<0.01	0.01
Fluorene	mg/kg	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.01	<0.01	<0.01	0.01
Naphthalene	mg/kg	<0.01	<0.01	<0.01	0.01
Phenanthrene	mg/kg	<0.01	<0.01	<0.01	0.01
Pyrene	mg/kg	<0.01	<0.01	<0.01	0.01
PCB's					
2,2`,3,3`,4,4` - Hexachlorobiphenyl (PCB 128)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,3`,4,4`,5 - Heptachlorobiphenyl (PCB 170)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,3`,4,4`,5,5`,6,6` - Decachlorobiphenyl	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,3`,4,4`,5,5`,6-Nonachlorobiphenyl (PCB 206)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,3`,4,4`,5,6 - Octachlorobiphenyl (PCB 195)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,4`,5,5',6 - Heptachlorobiphenyl (PCB 187)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,4,4`,5` - Hexachlorobiphenyl (PCB 138)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,4,4`,5,5` - Heptachlorobiphenyl (PCB 180)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,5` - Tetrachlorobiphenyl (PCB 44)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,4,4`,5,5` - Hexachlorobiphenyl (PCB 153)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,4,5,5` - Pentachlorobiphenyl (PCB 101)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,5,5` - Tetrachlorobiphenyl (PCB 52)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,5 - Trichlorobiphenyl (PCB 18)	mg/kg	<0.01	<0.01	<0.01	0.01
3,3`,4,4` - Tetrachlorobiphenyl (PCB 77)	mg/kg	<0.01	<0.01	<0.01	0.01

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Analytical Report

Job Ref. No. : 113259
Report No : 158633
Date Reported : 17/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113259-1	113259-2	113259-3
Date Received	08/04/2022	08/04/2022	08/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment	Sediment
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	Fugro Gap S1	Fugro Gap S2	Fugro Gap S3
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PCB's - Continued					
3,3`,4,4`,5 - Pentachlorobiphenyl (PCB 126)	mg/kg	<0.01	<0.01	<0.01	0.01
2,3`,4,4` - Tetrachlorobiphenyl (PCB 66)	mg/kg	<0.01	<0.01	<0.01	0.01
2,3`,4,4`,5 - Pentachlorobiphenyl (PCB 118)	mg/kg	<0.01	<0.01	<0.01	0.01
2,3,3`,4,4` - Pentachlorobiphenyl (PCB 105)	mg/kg	<0.01	<0.01	<0.01	0.01
2,4` - Dichlorobiphenyl (PCB 8)	mg/kg	<0.01	<0.01	<0.01	0.01
2,4,4` - Trichlorobiphenyl (PCB 28)	mg/kg	<0.01	<0.01	<0.01	0.01

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Analytical Report

Job Ref. No. :	113259
Report No :	158633
Date Reported :	17/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113259-4	113259-5	113259-6
Date Received	08/04/2022	08/04/2022	08/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment	Sediment
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	Fugro Gap S4	Fugro Gap S6	Fugro Gap S7
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
pH	pH units	9.0	8.8	9.0	0.1
Oil and Grease	%	<0.01	<0.01	<0.01	0.01
Total Nitrogen	mg/kg	533	500	430	5
Silica-SiO2	% by wt	3.57	14.9	1.54	0.01
Total Cyanide	mg/kg	<0.5	<0.5	<0.5	0.5
Anions					
Orthophosphate	mg/kg	<0.3	<0.3	<0.3	0.3
Fluoride	mg/kg	2.3	2.0	1.6	0.5
Sulphate (Acid Soluble)	%SO4	0.69	0.54	0.84	0.01
Chemical Analysis					
Total Organic Carbon	%	0.6	0.9	0.5	0.1
Metals					
Cadmium (Cd)	mg/kg	<0.5	<0.5	<0.5	0.5
Aluminium (Al)	mg/kg	493	1850	232	130
Arsenic (As)	mg/kg	4.6	5.6	3.9	1.0
Barium (Ba)	mg/kg	10.0	14.5	9.2	3.0
Chromium (Cr)	mg/kg	2.4	8.0	1.4	1.0
Copper (Cu)	mg/kg	<3.0	3.2	<3.0	3.0
Iron (Fe)	mg/kg	491	1850	286	70
Lead (Pb)	mg/kg	1.4	1.7	1.2	1.0
Manganese (Mn)	mg/kg	23.2	59.9	19.0	3.0
Molybdenum (Mo)	mg/kg	<3.0	<3.0	<3.0	3.0

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Analytical Report

Job Ref. No. :	113259
Report No :	158633
Date Reported :	17/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113259-4	113259-5	113259-6
Date Received	08/04/2022	08/04/2022	08/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment	Sediment
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	Fugro Gap S4	Fugro Gap S6	Fugro Gap S7
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Metals - Continued					
Nickel (Ni)	mg/kg	2.1	7.1	1.3	1.0
Phosphorus (P)	mg/kg	258	272	279	50
Selenium (Se)	mg/kg	<3.0	<3.0	<3.0	3.0
Silver (Ag)	mg/kg	<10	<10	<10	10
Vanadium (V)	mg/kg	3.6	9.3	2.1	1.0
Zinc (Zn)	mg/kg	<3.0	5.3	<3.0	3.0
Antimony (Sb)	mg/kg	<1.0	1.4	<1.0	1.0
Mercury (Hg)	mg/kg	0.012	0.015	0.012	0.010
Hydrocarbons					
VPH C5-C10	mg/kg	<0.05	<0.05	<0.05	0.05
EPH C10-C40	mg/kg	<50	<50	<50	50
PAH's					
Acenaphthene	mg/kg	<0.01	<0.01	<0.01	0.01
Acenaphthylene	mg/kg	<0.01	<0.01	<0.01	0.01
Anthracene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(a)pyrene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(b)fluoranthene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(g,h,i)perylene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(k)fluoranthene	mg/kg	<0.01	<0.01	<0.01	0.01
Chrysene	mg/kg	<0.01	<0.01	<0.01	0.01
Dibenzo(a,h)anthracene	mg/kg	<0.01	<0.01	<0.01	0.01

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Analytical Report

Job Ref. No.	:	113259
Report No	:	158633
Date Reported	:	17/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113259-4	113259-5	113259-6
Date Received	08/04/2022	08/04/2022	08/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment	Sediment
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	Fugro Gap S4	Fugro Gap S6	Fugro Gap S7
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PAH's - Continued					
Fluoranthene	mg/kg	<0.01	<0.01	<0.01	0.01
Fluorene	mg/kg	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.01	<0.01	<0.01	0.01
Naphthalene	mg/kg	<0.01	<0.01	<0.01	0.01
Phenanthrene	mg/kg	<0.01	<0.01	<0.01	0.01
Pyrene	mg/kg	<0.01	<0.01	<0.01	0.01
PCB's					
2,2`,3,3`,4,4` - Hexachlorobiphenyl (PCB 128)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,3`,4,4`,5 - Heptachlorobiphenyl (PCB 170)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,3`,4,4`,5,5`,6,6` - Decachlorobiphenyl	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,3`,4,4`,5,5`,6-Nonachlorobiphenyl (PCB 206)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,3`,4,4`,5,6 - Octachlorobiphenyl (PCB 195)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,4`,5,5',6 - Heptachlorobiphenyl (PCB 187)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,4,4`,5` - Hexachlorobiphenyl (PCB 138)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,4,4`,5,5` - Heptachlorobiphenyl (PCB 180)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,5` - Tetrachlorobiphenyl (PCB 44)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,4,4`,5,5` - Hexachlorobiphenyl (PCB 153)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,4,5,5` - Pentachlorobiphenyl (PCB 101)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,5,5` - Tetrachlorobiphenyl (PCB 52)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,5 - Trichlorobiphenyl (PCB 18)	mg/kg	<0.01	<0.01	<0.01	0.01
3,3`,4,4` - Tetrachlorobiphenyl (PCB 77)	mg/kg	<0.01	<0.01	<0.01	0.01
3,3`,4,4`,5 - Pentachlorobiphenyl (PCB 126)	mg/kg	<0.01	<0.01	<0.01	0.01

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Analytical Report

Job Ref. No. :	113259
Report No :	158633
Date Reported :	17/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113259-4	113259-5	113259-6
Date Received	08/04/2022	08/04/2022	08/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment	Sediment
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	Fugro Gap S4	Fugro Gap S6	Fugro Gap S7
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PCB's - Continued					
2,3`,4,4` - Tetrachlorobiphenyl (PCB 66)	mg/kg	<0.01	<0.01	<0.01	0.01
2,3`,4,4`,5 - Pentachlorobiphenyl (PCB 118)	mg/kg	<0.01	<0.01	<0.01	0.01
2,3,3`,4,4` - Pentachlorobiphenyl (PCB 105)	mg/kg	<0.01	<0.01	<0.01	0.01
2,4` - Dichlorobiphenyl (PCB 8)	mg/kg	<0.01	<0.01	<0.01	0.01
2,4,4` - Trichlorobiphenyl (PCB 28)	mg/kg	<0.01	<0.01	<0.01	0.01

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Analytical Report

Job Ref. No. :	113259
Report No :	158633
Date Reported :	17/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113259-7	113259-8
Date Received	08/04/2022	08/04/2022
Sampled By	Client	Client
Sampling Date	Not Given	Not Given
Sampling Time	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment
Sampling Location	Not Given	Not Given
Client Sample ID	Fugro Gap S8	Fugro Gap S9
Sampling Method	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
pH	pH units	9.1	8.9		0.1
Oil and Grease	%	<0.01	<0.01		0.01
Total Nitrogen	mg/kg	314	925		5
Silica-SiO2	% by wt	2.45	7.12		0.01
Total Cyanide	mg/kg	<0.5	<0.5		0.5
Anions					
Orthophosphate	mg/kg	<0.3	<0.3		0.3
Fluoride	mg/kg	1.3	2.3		0.5
Sulphate (Acid Soluble)	%SO4	0.51	0.74		0.01
Chemical Analysis					
Total Organic Carbon	%	0.3	1.2		0.1
Metals					
Cadmium (Cd)	mg/kg	<0.5	<0.5		0.5
Aluminium (Al)	mg/kg	816	2020		130
Arsenic (As)	mg/kg	4.9	6.3		1.0
Barium (Ba)	mg/kg	12.0	13.4		3.0
Chromium (Cr)	mg/kg	4.4	8.3		1.0
Copper (Cu)	mg/kg	<3.0	4.1		3.0
Iron (Fe)	mg/kg	892	2010		70
Lead (Pb)	mg/kg	1.4	1.4		1.0
Manganese (Mn)	mg/kg	37.7	51.1		3.0
Molybdenum (Mo)	mg/kg	<3.0	3.6		3.0

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Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113259-7	113259-8
Date Received	08/04/2022	08/04/2022
Sampled By	Client	Client
Sampling Date	Not Given	Not Given
Sampling Time	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment
Sampling Location	Not Given	Not Given
Client Sample ID	Fugro Gap S8	Fugro Gap S9
Sampling Method	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Metals - Continued					
Nickel (Ni)	mg/kg	3.0	8.2		1.0
Phosphorus (P)	mg/kg	251	224		50
Selenium (Se)	mg/kg	<3.0	<3.0		3.0
Silver (Ag)	mg/kg	<10	<10		10
Vanadium (V)	mg/kg	5.8	9.0		1.0
Zinc (Zn)	mg/kg	<3.0	6.0		3.0
Antimony (Sb)	mg/kg	<1.0	1.0		1.0
Mercury (Hg)	mg/kg	0.012	0.021		0.010
Hydrocarbons					
VPH C5-C10	mg/kg	<0.05	<0.05		0.05
EPH C10-C40	mg/kg	<50	<50		50
PAH's					
Acenaphthene	mg/kg	<0.01	<0.01		0.01
Acenaphthylene	mg/kg	<0.01	<0.01		0.01
Anthracene	mg/kg	<0.01	<0.01		0.01
Benzo(a)anthracene	mg/kg	<0.01	<0.01		0.01
Benzo(a)pyrene	mg/kg	<0.01	<0.01		0.01
Benzo(b)fluoranthene	mg/kg	<0.01	<0.01		0.01
Benzo(g,h,i)perylene	mg/kg	<0.01	<0.01		0.01
Benzo(k)fluoranthene	mg/kg	<0.01	<0.01		0.01
Chrysene	mg/kg	<0.01	<0.01		0.01
Dibenzo(a,h)anthracene	mg/kg	<0.01	<0.01		0.01

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Analytical Report

Job Ref. No. :	113259
Report No :	158633
Date Reported :	17/05/2022

Client:	WKC Middle East Environment Consultancy
	P.O Box: 130627
	ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113259-7	113259-8
Date Received	08/04/2022	08/04/2022
Sampled By	Client	Client
Sampling Date	Not Given	Not Given
Sampling Time	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment
Sampling Location	Not Given	Not Given
Client Sample ID	Fugro Gap S8	Fugro Gap S9
Sampling Method	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PAH's - Continued					
Fluoranthene	mg/kg	<0.01	<0.01		0.01
Fluorene	mg/kg	<0.01	<0.01		0.01
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.01	<0.01		0.01
Naphthalene	mg/kg	<0.01	<0.01		0.01
Phenanthrene	mg/kg	<0.01	<0.01		0.01
Pyrene	mg/kg	<0.01	<0.01		0.01
PCB's					
2,2`,3,3`,4,4` - Hexachlorobiphenyl (PCB 128)	mg/kg	<0.01	<0.01		0.01
2,2`,3,3`,4,4`,5 - Heptachlorobiphenyl (PCB 170)	mg/kg	<0.01	<0.01		0.01
2,2`,3,3`,4,4`,5,5`,6,6` - Decachlorobiphenyl	mg/kg	<0.01	<0.01		0.01
2,2`,3,3`,4,4`,5,5`,6-Nonachlorobiphenyl (PCB 206)	mg/kg	<0.01	<0.01		0.01
2,2`,3,3`,4,4`,5,6 - Octachlorobiphenyl (PCB 195)	mg/kg	<0.01	<0.01		0.01
2,2`,3,4`,5,5',6 - Heptachlorobiphenyl (PCB 187)	mg/kg	<0.01	<0.01		0.01
2,2`,3,4,4`,5` - Hexachlorobiphenyl (PCB 138)	mg/kg	<0.01	<0.01		0.01
2,2`,3,4,4`,5,5` - Heptachlorobiphenyl (PCB 180)	mg/kg	<0.01	<0.01		0.01
2,2`,3,5` - Tetrachlorobiphenyl (PCB 44)	mg/kg	<0.01	<0.01		0.01
2,2`,4,4`,5,5` - Hexachlorobiphenyl (PCB 153)	mg/kg	<0.01	<0.01		0.01
2,2`,4,5,5` - Pentachlorobiphenyl (PCB 101)	mg/kg	<0.01	<0.01		0.01
2,2`,5,5` - Tetrachlorobiphenyl (PCB 52)	mg/kg	<0.01	<0.01		0.01
2,2`,5 - Trichlorobiphenyl (PCB 18)	mg/kg	<0.01	<0.01		0.01
3,3`,4,4` - Tetrachlorobiphenyl (PCB 77)	mg/kg	<0.01	<0.01		0.01
3,3`,4,4`,5 - Pentachlorobiphenyl (PCB 126)	mg/kg	<0.01	<0.01		0.01

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Analytical Report

Job Ref. No.	:	113259
Report No	:	158633
Date Reported	:	17/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113259-7	113259-8
Date Received	08/04/2022	08/04/2022
Sampled By	Client	Client
Sampling Date	Not Given	Not Given
Sampling Time	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment
Sampling Location	Not Given	Not Given
Client Sample ID	Fugro Gap S8	Fugro Gap S9
Sampling Method	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PCB's - Continued					
2,3`,4,4` - Tetrachlorobiphenyl (PCB 66)	mg/kg	<0.01	<0.01		0.01
2,3`,4,4`,5 - Pentachlorobiphenyl (PCB 118)	mg/kg	<0.01	<0.01		0.01
2,3,3`,4,4` - Pentachlorobiphenyl (PCB 105)	mg/kg	<0.01	<0.01		0.01
2,4` - Dichlorobiphenyl (PCB 8)	mg/kg	<0.01	<0.01		0.01
2,4,4` - Trichlorobiphenyl (PCB 28)	mg/kg	<0.01	<0.01		0.01

Method of Analysis

Method Name	Reference
Cyanide [Modified USEPA method OIA-1667 - Subcontract]-DXB	USEPA [Method OIA-1667]
EPH C10-C40 by GC-FID [EPA 8015B] SSS-DXB	EPA [8015B]
Fluoride [HACH 8029]-DXB	HACH [8029]
Mercury by PSA [EPA 245.7] SSS-DXB	EPA [245.7]
Metals ICP OES [APHA 3120 B] SSS-DXB	APHA [3120 B]
Nitrogen (Total) [APHA 4500 Norg B] Solids-DXB	APHA [4500 Norg B]
Oil & Grease [APHA 5520 E]-DXB	APHA [5520 E]
Orthophosphate [HACH 8048]-DXB	HACH [8048]
PAH in Soils [EPA 8270 D]-DXB	EPA [8270 D]
PCB [EPA 8270D] Solids-DXB	EPA [8270 D]
pH [BS 1377-3: 2018] Soil-DXB	BS [1377-3: 2018]
Silica-SiO2 [ASTM C146]-DXB	ASTM [C146]
Sulphate (Acid Soluble)[BS 1377-3: 2018] Soil-DXB	BS [1377-3: 2018]
Total Organic Carbon [MOOPAM IV.4]-DXB	MOOPAM [IV.4]
VPH C5-C10 by GC-FID [EPA 8015B]-SSS-DXB	EPA [8015B]

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Analytical Report

Job Ref. No. :	113259
Report No :	158633
Date Reported :	17/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Comments:

- Tested By : AAP, EMA, GAN, HRA, JCH, JRE, NHA
- Date Tested: 15/04/2022 to 28/04/2022
- Please note that all tests shown not containing the `AUH` extension are subcontracted to Element group of laboratories.
- Please note that if the sample has to be diluted due to the matrix, the reported Limit of Detection (LOD) value will increase from the method LOD.
- Any APHA methods stated herein are documented in-house procedures, referenced to 23rd edition.

- This test report supersedes previous report dated 12 May 2022. Report revised to amend the Sample Descriptions as per client's request. Previous report 158427.
- Please note that in a revised report the reported limit of detection will not be the same as the method limit of detection if the latter has been modified since the analysis was completed.

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Analytical Report

Job Ref. No. : 113258
Report No : 158425
Date Reported : 12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113258-1	113258-2	113258-3
Date Received	08/04/2022	08/04/2022	08/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment	Sediment
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R1-WSQ1	R1-WSQ2	R1-WSQ3
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
pH	pH units	8.7	8.7	9.0	0.1
Oil and Grease	%	<0.01	<0.01	<0.01	0.01
Total Nitrogen	mg/kg	880	922	194	5
Silica-SiO2	% by wt	6.95	11.1	18.1	0.01
Total Cyanide	mg/kg	<0.5	<0.5	<0.5	0.5
Anions					
Orthophosphate	mg/kg	<0.3	0.5	<0.3	0.3
Fluoride	mg/kg	1.8	2.3	2.2	0.5
Sulphate (Acid Soluble)	%SO4	0.69	0.94	0.40	0.01
Chemical Analysis					
Total Organic Carbon	%	1.4	2.1	0.4	0.1
Metals					
Cadmium (Cd)	mg/kg	<0.5	<0.5	<0.5	0.5
Aluminium (Al)	mg/kg	3040	5170	5720	130
Arsenic (As)	mg/kg	6.7	8.3	5.5	1.0
Barium (Ba)	mg/kg	16.1	24.2	11.8	3.0
Chromium (Cr)	mg/kg	11.7	20.1	24.1	1.0
Copper (Cu)	mg/kg	4.8	8.3	4.6	3.0
Iron (Fe)	mg/kg	2960	4980	5520	70
Lead (Pb)	mg/kg	2.1	2.5	2.0	1.0
Manganese (Mn)	mg/kg	72.9	112	154	3.0

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Analytical Report

Job Ref. No. :	113258
Report No :	158425
Date Reported :	12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113258-1	113258-2	113258-3
Date Received	08/04/2022	08/04/2022	08/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment	Sediment
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R1-WSQ1	R1-WSQ2	R1-WSQ3
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Metals - Continued					
Molybdenum (Mo)	mg/kg	<3.0	3.1	<3.0	3.0
Nickel (Ni)	mg/kg	11.2	18.4	16.9	1.0
Phosphorus (P)	mg/kg	236	267	223	50
Selenium (Se)	mg/kg	<3.0	<3.0	<3.0	3.0
Silver (Ag)	mg/kg	<10	<10	<10	10
Vanadium (V)	mg/kg	13.8	20.3	21.6	1.0
Zinc (Zn)	mg/kg	8.2	13.8	12.2	3.0
Antimony (Sb)	mg/kg	1.1	1.5	<1.0	1.0
Mercury (Hg)	mg/kg	0.021	0.018	0.013	0.010
Hydrocarbons					
VPH C5-C10	mg/kg	<0.05	<0.05	<0.05	0.05
EPH C10-C40	mg/kg	<50	<50	<50	50
PAH's					
Acenaphthene	mg/kg	<0.01	<0.01	<0.01	0.01
Acenaphthylene	mg/kg	<0.01	<0.01	<0.01	0.01
Anthracene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(a)pyrene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(b)fluoranthene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(g,h,i)perylene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(k)fluoranthene	mg/kg	<0.01	<0.01	<0.01	0.01
Chrysene	mg/kg	<0.01	<0.01	<0.01	0.01

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Analytical Report

Job Ref. No.	:	113258
Report No	:	158425
Date Reported :		12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113258-1	113258-2	113258-3
Date Received	08/04/2022	08/04/2022	08/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment	Sediment
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R1-WSQ1	R1-WSQ2	R1-WSQ3
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PAH's - Continued					
Dibenzo(a,h)anthracene	mg/kg	<0.01	<0.01	<0.01	0.01
Fluoranthene	mg/kg	<0.01	<0.01	<0.01	0.01
Fluorene	mg/kg	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.01	<0.01	<0.01	0.01
Naphthalene	mg/kg	<0.01	<0.01	<0.01	0.01
Phenanthrene	mg/kg	<0.01	<0.01	<0.01	0.01
Pyrene	mg/kg	<0.01	<0.01	<0.01	0.01
PCB's					
2,2`,3,3`,4,4` - Hexachlorobiphenyl (PCB 128)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,3`,4,4`,5 - Heptachlorobiphenyl (PCB 170)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,3`,4,4`,5,5`,6,6` - Decachlorobiphenyl	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,3`,4,4`,5,5`,6-Nonachlorobiphenyl (PCB 206)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,3`,4,4`,5,6 - Octachlorobiphenyl (PCB 195)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,4`,5,5',6 - Heptachlorobiphenyl (PCB 187)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,4,4`,5` - Hexachlorobiphenyl (PCB 138)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,4,4`,5,5` - Heptachlorobiphenyl (PCB 180)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,5` - Tetrachlorobiphenyl (PCB 44)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,4,4`,5,5` - Hexachlorobiphenyl (PCB 153)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,4,5,5` - Pentachlorobiphenyl (PCB 101)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,5,5` - Tetrachlorobiphenyl (PCB 52)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,5 - Trichlorobiphenyl (PCB 18)	mg/kg	<0.01	<0.01	<0.01	0.01
3,3`,4,4` - Tetrachlorobiphenyl (PCB 77)	mg/kg	<0.01	<0.01	<0.01	0.01

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Analytical Report

Job Ref. No. :	113258
Report No :	158425
Date Reported :	12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113258-1	113258-2	113258-3
Date Received	08/04/2022	08/04/2022	08/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment	Sediment
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R1-WSQ1	R1-WSQ2	R1-WSQ3
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PCB's - Continued					
3,3`,4,4`,5 - Pentachlorobiphenyl (PCB 126)	mg/kg	<0.01	<0.01	<0.01	0.01
2,3`,4,4` - Tetrachlorobiphenyl (PCB 66)	mg/kg	<0.01	<0.01	<0.01	0.01
2,3`,4,4`,5 - Pentachlorobiphenyl (PCB 118)	mg/kg	<0.01	<0.01	<0.01	0.01
2,3,3`,4,4` - Pentachlorobiphenyl (PCB 105)	mg/kg	<0.01	<0.01	<0.01	0.01
2,4` - Dichlorobiphenyl (PCB 8)	mg/kg	<0.01	<0.01	<0.01	0.01
2,4,4` - Trichlorobiphenyl (PCB 28)	mg/kg	<0.01	<0.01	<0.01	0.01

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Analytical Report

Job Ref. No. : 113258
Report No : 158425
Date Reported : 12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113258-4	113258-5	113258-6
Date Received	08/04/2022	08/04/2022	08/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment	Sediment
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R1-WSQ4 Control	R1-WSQ5	R1-WSQ6
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
pH	pH units	8.9	9.2	9.2	0.1
Oil and Grease	%	<0.01	<0.01	<0.01	0.01
Total Nitrogen	mg/kg	869	419	373	5
Silica-SiO2	% by wt	13.1	28.2	13.6	0.01
Total Cyanide	mg/kg	<0.5	<0.5	<0.5	0.5
Anions					
Orthophosphate	mg/kg	<0.3	<0.3	<0.3	0.3
Fluoride	mg/kg	2.5	1.4	1.1	0.5
Sulphate (Acid Soluble)	%SO4	0.64	0.48	0.48	0.01
Chemical Analysis					
Total Organic Carbon	%	1.4	0.3	0.3	0.1
Metals					
Cadmium (Cd)	mg/kg	<0.5	<0.5	<0.5	0.5
Aluminium (Al)	mg/kg	4080	1650	1200	130
Arsenic (As)	mg/kg	6.6	4.0	4.2	1.0
Barium (Ba)	mg/kg	17.2	11.9	11.6	3.0
Chromium (Cr)	mg/kg	15.8	7.6	6.2	1.0
Copper (Cu)	mg/kg	5.7	<3.0	<3.0	3.0
Iron (Fe)	mg/kg	3870	1600	1170	70
Lead (Pb)	mg/kg	1.7	1.3	1.3	1.0
Manganese (Mn)	mg/kg	110	55.3	43.7	3.0
Molybdenum (Mo)	mg/kg	<3.0	<3.0	<3.0	3.0

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Analytical Report

Job Ref. No. : 113258
Report No : 158425
Date Reported : 12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113258-4	113258-5	113258-6
Date Received	08/04/2022	08/04/2022	08/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment	Sediment
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R1-WSQ4 Control	R1-WSQ5	R1-WSQ6
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Metals - Continued					
Nickel (Ni)	mg/kg	15.2	4.9	3.6	1.0
Phosphorus (P)	mg/kg	268	110	112	50
Selenium (Se)	mg/kg	<3.0	<3.0	<3.0	3.0
Silver (Ag)	mg/kg	<10	<10	<10	10
Vanadium (V)	mg/kg	15.7	8.1	7.4	1.0
Zinc (Zn)	mg/kg	10.7	3.6	<3.0	3.0
Antimony (Sb)	mg/kg	<1.0	1.1	1.7	1.0
Mercury (Hg)	mg/kg	0.018	0.011	0.011	0.010
Hydrocarbons					
VPH C5-C10	mg/kg	<0.05	<0.05	<0.05	0.05
EPH C10-C40	mg/kg	<50	<50	<50	50
PAH's					
Acenaphthene	mg/kg	<0.01	<0.01	<0.01	0.01
Acenaphthylene	mg/kg	<0.01	<0.01	<0.01	0.01
Anthracene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(a)pyrene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(b)fluoranthene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(g,h,i)perylene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(k)fluoranthene	mg/kg	<0.01	<0.01	<0.01	0.01
Chrysene	mg/kg	<0.01	<0.01	<0.01	0.01
Dibenzo(a,h)anthracene	mg/kg	<0.01	<0.01	<0.01	0.01

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Analytical Report

Job Ref. No. :	113258
Report No :	158425
Date Reported :	12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113258-4	113258-5	113258-6
Date Received	08/04/2022	08/04/2022	08/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment	Sediment
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R1-WSQ4 Control	R1-WSQ5	R1-WSQ6
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PAH's - Continued					
Fluoranthene	mg/kg	<0.01	<0.01	<0.01	0.01
Fluorene	mg/kg	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.01	<0.01	<0.01	0.01
Naphthalene	mg/kg	<0.01	<0.01	<0.01	0.01
Phenanthrene	mg/kg	<0.01	<0.01	<0.01	0.01
Pyrene	mg/kg	<0.01	<0.01	<0.01	0.01
PCB's					
2,2`,3,3`,4,4` - Hexachlorobiphenyl (PCB 128)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,3`,4,4`,5 - Heptachlorobiphenyl (PCB 170)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,3`,4,4`,5,5`,6,6` - Decachlorobiphenyl	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,3`,4,4`,5,5`,6-Nonachlorobiphenyl (PCB 206)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,3`,4,4`,5,6 - Octachlorobiphenyl (PCB 195)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,4`,5,5',6 - Heptachlorobiphenyl (PCB 187)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,4,4`,5` - Hexachlorobiphenyl (PCB 138)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,4,4`,5,5` - Heptachlorobiphenyl (PCB 180)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,5` - Tetrachlorobiphenyl (PCB 44)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,4,4`,5,5` - Hexachlorobiphenyl (PCB 153)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,4,5,5` - Pentachlorobiphenyl (PCB 101)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,5,5` - Tetrachlorobiphenyl (PCB 52)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,5 - Trichlorobiphenyl (PCB 18)	mg/kg	<0.01	<0.01	<0.01	0.01
3,3`,4,4` - Tetrachlorobiphenyl (PCB 77)	mg/kg	<0.01	<0.01	<0.01	0.01
3,3`,4,4`,5 - Pentachlorobiphenyl (PCB 126)	mg/kg	<0.01	<0.01	<0.01	0.01

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Analytical Report

Job Ref. No. : 113258
Report No : 158425
Date Reported : 12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113258-4	113258-5	113258-6
Date Received	08/04/2022	08/04/2022	08/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment	Sediment
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R1-WSQ4 Control	R1-WSQ5	R1-WSQ6
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PCB's - Continued					
2,3`,4,4` - Tetrachlorobiphenyl (PCB 66)	mg/kg	<0.01	<0.01	<0.01	0.01
2,3`,4,4`,5 - Pentachlorobiphenyl (PCB 118)	mg/kg	<0.01	<0.01	<0.01	0.01
2,3,3`,4,4` - Pentachlorobiphenyl (PCB 105)	mg/kg	<0.01	<0.01	<0.01	0.01
2,4` - Dichlorobiphenyl (PCB 8)	mg/kg	<0.01	<0.01	<0.01	0.01
2,4,4` - Trichlorobiphenyl (PCB 28)	mg/kg	<0.01	<0.01	<0.01	0.01

Method of Analysis

Method Name	Reference
Cyanide [Modified USEPA method OIA-1667 - Subcontract]-DXB	USEPA [Method OIA-1667]
EPH C10-C40 by GC-FID [EPA 8015B] SSS-DXB	EPA [8015B]
Fluoride [HACH 8029]-DXB	HACH [8029]
Mercury by PSA [EPA 245.7] SSS-DXB	EPA [245.7]
Metals ICP OES [APHA 3120 B] SSS-DXB	APHA [3120 B]
Nitrogen (Total) [APHA 4500 Norg B] Solids-DXB	APHA [4500 Norg B]
Oil & Grease [APHA 5520 E]-DXB	APHA [5520 E]
Orthophosphate [HACH 8048]-DXB	HACH [8048]
PAH in Soils [EPA 8270 D]-DXB	EPA [8270 D]
PCB [EPA 8270D] Solids-DXB	EPA [8270 D]
pH [BS 1377-3: 2018] Soil-DXB	BS [1377-3: 2018]
Silica-SiO2 [ASTM C146]-DXB	ASTM [C146]
Sulphate (Acid Soluble)[BS 1377-3: 2018] Soil-DXB	BS [1377-3: 2018]
Total Organic Carbon [MOOPAM IV.4]-DXB	MOOPAM [IV.4]
VPH C5-C10 by GC-FID [EPA 8015B]-SSS-DXB	EPA [8015B]

* Reference Method Modified

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Analytical Report

Job Ref. No. :	113258
Report No :	158425
Date Reported :	12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Comments:

· Tested By : AAP, EMA, GAN, HRA, JCH, JRE, NHA
· Date Tested: 15/04/2022 to 28/04/2022

. Please note that all tests shown not containing the `AUH` extension are subcontracted to Element group of laboratories.

. Please note that if the sample has to be diluted due to the matrix, the reported Limit of Detection (LOD) value will increase from the method LOD.

. Any APHA methods stated herein are documented in-house procedures, referenced to 23rd edition.

. This test report supersedes previous report dated 28 Apr 2022. Report revised to amend the Sample Descriptions as per client's request. Previous report 156872.
. Please note that in a revised report the reported limit of detection will not be the same as the method limit of detection if the latter has been modified since the analysis was completed.

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Analytical Report

Job Ref. No. : 113087
Report No : 158426
Date Reported : 12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113087-1	113087-2	113087-3
Date Received	04/04/2022	04/04/2022	04/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment	Sediment
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R2-WSQ1	R2-WSQ2	R2-WSQ3 Control
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
pH	pH units	9.7	9.2	9.9	0.1
Oil and Grease	%	<0.01	<0.01	<0.01	0.01
Total Nitrogen	mg/kg	400	298	319	5
Silica-SiO2	% by wt	0.63	1.51	1.48	0.01
Total Cyanide	mg/kg	<0.5	<0.5	<0.5	0.5
Anions					
Orthophosphate	mg/kg	<0.3	<0.3	<0.3	0.3
Fluoride	mg/kg	1.1	1.8	1.2	0.5
Sulphate (Acid Soluble)	%SO4	0.35	0.51	0.46	0.01
Chemical Analysis					
Total Organic Carbon	%	0.2	0.3	0.2	0.1
Metals					
Cadmium (Cd)	mg/kg	<0.5	<0.5	<0.5	0.5
Aluminium (Al)	mg/kg	587	922	514	130
Arsenic (As)	mg/kg	3.7	3.9	2.0	1.0
Barium (Ba)	mg/kg	9.1	9.7	9.2	3.0
Chromium (Cr)	mg/kg	3.3	4.5	2.9	1.0
Copper (Cu)	mg/kg	<3.0	<3.0	<3.0	3.0
Iron (Fe)	mg/kg	637	882	516	70
Lead (Pb)	mg/kg	1.5	1.4	<1.0	1.0
Manganese (Mn)	mg/kg	17.0	26.7	13.8	3.0

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Analytical Report

Job Ref. No.	:	113087
Report No	:	158426
Date Reported	:	12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113087-1	113087-2	113087-3
Date Received	04/04/2022	04/04/2022	04/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment	Sediment
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R2-WSQ1	R2-WSQ2	R2-WSQ3 Control
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Metals - Continued					
Molybdenum (Mo)	mg/kg	<3.0	<3.0	<3.0	3.0
Nickel (Ni)	mg/kg	1.9	2.9	1.6	1.0
Phosphorus (P)	mg/kg	205	223	136	50
Selenium (Se)	mg/kg	<3.0	<3.0	<3.0	3.0
Silver (Ag)	mg/kg	<10	<10	<10	10
Vanadium (V)	mg/kg	4.0	4.6	4.1	1.0
Zinc (Zn)	mg/kg	<3.0	<3.0	<3.0	3.0
Antimony (Sb)	mg/kg	1.7	<1.0	1.2	1.0
Mercury (Hg)	mg/kg	0.098	0.017	0.013	0.010
Hydrocarbons					
VPH C5-C10	mg/kg	<0.05	<0.05	<0.05	0.05
EPH C10-C40	mg/kg	<50	<50	<50	50
PAH's					
Acenaphthene	mg/kg	<0.01	<0.01	<0.01	0.01
Acenaphthylene	mg/kg	<0.01	<0.01	<0.01	0.01
Anthracene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(a)pyrene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(b)fluoranthene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(g,h,i)perylene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(k)fluoranthene	mg/kg	<0.01	<0.01	<0.01	0.01
Chrysene	mg/kg	<0.01	<0.01	<0.01	0.01

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Analytical Report

Job Ref. No. :	113087
Report No :	158426
Date Reported :	12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113087-1	113087-2	113087-3
Date Received	04/04/2022	04/04/2022	04/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment	Sediment
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R2-WSQ1	R2-WSQ2	R2-WSQ3 Control
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PAH's - Continued					
Dibenzo(a,h)anthracene	mg/kg	<0.01	<0.01	<0.01	0.01
Fluoranthene	mg/kg	<0.01	<0.01	<0.01	0.01
Fluorene	mg/kg	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.01	<0.01	<0.01	0.01
Naphthalene	mg/kg	<0.01	<0.01	<0.01	0.01
Phenanthrene	mg/kg	<0.01	<0.01	<0.01	0.01
Pyrene	mg/kg	<0.01	<0.01	<0.01	0.01
PCB's					
2,2`,3,3`,4,4` - Hexachlorobiphenyl (PCB 128)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,3`,4,4`,5 - Heptachlorobiphenyl (PCB 170)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,3`,4,4`,5,5`,6,6` - Decachlorobiphenyl	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,3`,4,4`,5,5`,6-Nonachlorobiphenyl (PCB 206)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,3`,4,4`,5,6 - Octachlorobiphenyl (PCB 195)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,4`,5,5',6 - Heptachlorobiphenyl (PCB 187)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,4,4`,5` - Hexachlorobiphenyl (PCB 138)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,4,4`,5,5` - Heptachlorobiphenyl (PCB 180)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,5` - Tetrachlorobiphenyl (PCB 44)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,4,4`,5,5` - Hexachlorobiphenyl (PCB 153)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,4,5,5` - Pentachlorobiphenyl (PCB 101)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,5,5` - Tetrachlorobiphenyl (PCB 52)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,5 - Trichlorobiphenyl (PCB 18)	mg/kg	<0.01	<0.01	<0.01	0.01
3,3`,4,4` - Tetrachlorobiphenyl (PCB 77)	mg/kg	<0.01	<0.01	<0.01	0.01

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Analytical Report

Job Ref. No.	:	113087
Report No	:	158426
Date Reported :		12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113087-1	113087-2	113087-3
Date Received	04/04/2022	04/04/2022	04/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment	Sediment
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R2-WSQ1	R2-WSQ2	R2-WSQ3 Control
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PCB's - Continued					
3,3`,4,4`,5 - Pentachlorobiphenyl (PCB 126)	mg/kg	<0.01	<0.01	<0.01	0.01
2,3`,4,4` - Tetrachlorobiphenyl (PCB 66)	mg/kg	<0.01	<0.01	<0.01	0.01
2,3`,4,4`,5 - Pentachlorobiphenyl (PCB 118)	mg/kg	<0.01	<0.01	<0.01	0.01
2,3,3`,4,4` - Pentachlorobiphenyl (PCB 105)	mg/kg	<0.01	<0.01	<0.01	0.01
2,4` - Dichlorobiphenyl (PCB 8)	mg/kg	<0.01	<0.01	<0.01	0.01
2,4,4` - Trichlorobiphenyl (PCB 28)	mg/kg	<0.01	<0.01	<0.01	0.01

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Analytical Report

Job Ref. No. :	113087
Report No :	158426
Date Reported :	12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113087-4	113087-5	113087-6
Date Received	04/04/2022	04/04/2022	04/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment	Sediment
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R2-WSQ4	R2-WSQ5	R2-WSQ6
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
pH	pH units	9.8	8.7	9.2	0.1
Oil and Grease	%	<0.01	<0.01	<0.01	0.01
Total Nitrogen	mg/kg	328	422	316	5
Silica-SiO2	% by wt	0.70	9.02	20.3	0.01
Total Cyanide	mg/kg	<0.5	<0.5	<0.5	0.5
Anions					
Orthophosphate	mg/kg	<0.3	<0.3	<0.3	0.3
Fluoride	mg/kg	1.7	2.2	1.5	0.5
Sulphate (Acid Soluble)	%SO4	0.58	0.45	0.42	0.01
Chemical Analysis					
Total Organic Carbon	%	0.3	0.4	0.3	0.1
Metals					
Cadmium (Cd)	mg/kg	<0.5	<0.5	<0.5	0.5
Aluminium (Al)	mg/kg	388	1520	975	130
Arsenic (As)	mg/kg	4.3	4.6	2.4	1.0
Barium (Ba)	mg/kg	9.9	11.7	8.1	3.0
Chromium (Cr)	mg/kg	2.4	7.0	4.7	1.0
Copper (Cu)	mg/kg	<3.0	<3.0	<3.0	3.0
Iron (Fe)	mg/kg	353	1520	936	70
Lead (Pb)	mg/kg	1.1	<1.0	<1.0	1.0
Manganese (Mn)	mg/kg	17.2	51.1	31.2	3.0
Molybdenum (Mo)	mg/kg	<3.0	<3.0	<3.0	3.0

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Analytical Report

Job Ref. No. : 113087
Report No : 158426
Date Reported : 12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113087-4	113087-5	113087-6
Date Received	04/04/2022	04/04/2022	04/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment	Sediment
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R2-WSQ4	R2-WSQ5	R2-WSQ6
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Metals - Continued					
Nickel (Ni)	mg/kg	1.2	4.9	2.5	1.0
Phosphorus (P)	mg/kg	176	201	156	50
Selenium (Se)	mg/kg	<3.0	<3.0	<3.0	3.0
Silver (Ag)	mg/kg	<10	<10	<10	10
Vanadium (V)	mg/kg	3.4	6.8	5.3	1.0
Zinc (Zn)	mg/kg	<3.0	3.5	<3.0	3.0
Antimony (Sb)	mg/kg	<1.0	<1.0	<1.0	1.0
Mercury (Hg)	mg/kg	<0.010	0.013	<0.010	0.010
Hydrocarbons					
VPH C5-C10	mg/kg	<0.05	<0.05	<0.05	0.05
EPH C10-C40	mg/kg	<50	<50	<50	50
PAH's					
Acenaphthene	mg/kg	<0.01	<0.01	<0.01	0.01
Acenaphthylene	mg/kg	<0.01	<0.01	<0.01	0.01
Anthracene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(a)pyrene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(b)fluoranthene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(g,h,i)perylene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(k)fluoranthene	mg/kg	<0.01	<0.01	<0.01	0.01
Chrysene	mg/kg	<0.01	<0.01	<0.01	0.01
Dibenzo(a,h)anthracene	mg/kg	<0.01	<0.01	<0.01	0.01

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Analytical Report

Job Ref. No. : 113087
Report No : 158426
Date Reported : 12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113087-4	113087-5	113087-6
Date Received	04/04/2022	04/04/2022	04/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment	Sediment
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R2-WSQ4	R2-WSQ5	R2-WSQ6
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PAH's - Continued					
Fluoranthene	mg/kg	<0.01	<0.01	<0.01	0.01
Fluorene	mg/kg	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.01	<0.01	<0.01	0.01
Naphthalene	mg/kg	<0.01	<0.01	<0.01	0.01
Phenanthrene	mg/kg	<0.01	<0.01	<0.01	0.01
Pyrene	mg/kg	<0.01	<0.01	<0.01	0.01
PCB's					
2,2`,3,3`,4,4` - Hexachlorobiphenyl (PCB 128)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,3`,4,4`,5 - Heptachlorobiphenyl (PCB 170)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,3`,4,4`,5,5`,6,6` - Decachlorobiphenyl	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,3`,4,4`,5,5`,6-Nonachlorobiphenyl (PCB 206)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,3`,4,4`,5,6 - Octachlorobiphenyl (PCB 195)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,4`,5,5',6 - Heptachlorobiphenyl (PCB 187)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,4,4`,5` - Hexachlorobiphenyl (PCB 138)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,4,4`,5,5` - Heptachlorobiphenyl (PCB 180)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,5` - Tetrachlorobiphenyl (PCB 44)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,4,4`,5,5` - Hexachlorobiphenyl (PCB 153)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,4,5,5` - Pentachlorobiphenyl (PCB 101)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,5,5` - Tetrachlorobiphenyl (PCB 52)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,5 - Trichlorobiphenyl (PCB 18)	mg/kg	<0.01	<0.01	<0.01	0.01
3,3`,4,4` - Tetrachlorobiphenyl (PCB 77)	mg/kg	<0.01	<0.01	<0.01	0.01
3,3`,4,4`,5 - Pentachlorobiphenyl (PCB 126)	mg/kg	<0.01	<0.01	<0.01	0.01

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Analytical Report

Job Ref. No. :	113087
Report No :	158426
Date Reported :	12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113087-4	113087-5	113087-6
Date Received	04/04/2022	04/04/2022	04/04/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment	Sediment
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	R2-WSQ4	R2-WSQ5	R2-WSQ6
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PCB's - Continued					
2,3`,4,4` - Tetrachlorobiphenyl (PCB 66)	mg/kg	<0.01	<0.01	<0.01	0.01
2,3`,4,4`,5 - Pentachlorobiphenyl (PCB 118)	mg/kg	<0.01	<0.01	<0.01	0.01
2,3,3`,4,4` - Pentachlorobiphenyl (PCB 105)	mg/kg	<0.01	<0.01	<0.01	0.01
2,4` - Dichlorobiphenyl (PCB 8)	mg/kg	<0.01	<0.01	<0.01	0.01
2,4,4` - Trichlorobiphenyl (PCB 28)	mg/kg	<0.01	<0.01	<0.01	0.01

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Analytical Report

Job Ref. No. : 113087
Report No : 158426
Date Reported : 12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113087-7
Date Received	04/04/2022
Sampled By	Client
Sampling Date	Not Given
Sampling Time	Not Given
Sample Sub Matrix	Sediment
Sampling Location	Not Given
Client Sample ID	R2-WSQ7
Sampling Method	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
pH	pH units	9.5			0.1
Oil and Grease	%	<0.01			0.01
Total Nitrogen	mg/kg	420			5
Silica-SiO2	% by wt	0.69			0.01
Total Cyanide	mg/kg	<0.5			0.5
Anions					
Orthophosphate	mg/kg	<0.3			0.3
Fluoride	mg/kg	1.4			0.5
Sulphate (Acid Soluble)	%SO4	0.61			0.01
Chemical Analysis					
Total Organic Carbon	%	0.2			0.1
Metals					
Cadmium (Cd)	mg/kg	<0.5			0.5
Aluminium (Al)	mg/kg	432			130
Arsenic (As)	mg/kg	4.3			1.0
Barium (Ba)	mg/kg	9.5			3.0
Chromium (Cr)	mg/kg	2.1			1.0
Copper (Cu)	mg/kg	<3.0			3.0
Iron (Fe)	mg/kg	444			70
Lead (Pb)	mg/kg	<1.0			1.0
Manganese (Mn)	mg/kg	17.1			3.0
Molybdenum (Mo)	mg/kg	<3.0			3.0

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Analytical Report

Job Ref. No. :	113087
Report No :	158426
Date Reported :	12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113087-7
Date Received	04/04/2022
Sampled By	Client
Sampling Date	Not Given
Sampling Time	Not Given
Sample Sub Matrix	Sediment
Sampling Location	Not Given
Client Sample ID	R2-WSQ7
Sampling Method	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Metals - Continued					
Nickel (Ni)	mg/kg	1.4			1.0
Phosphorus (P)	mg/kg	185			50
Selenium (Se)	mg/kg	<3.0			3.0
Silver (Ag)	mg/kg	<10			10
Vanadium (V)	mg/kg	3.3			1.0
Zinc (Zn)	mg/kg	<3.0			3.0
Antimony (Sb)	mg/kg	<1.0			1.0
Mercury (Hg)	mg/kg	<0.010			0.010
Hydrocarbons					
VPH C5-C10	mg/kg	<0.05			0.05
EPH C10-C40	mg/kg	<50			50
PAH's					
Acenaphthene	mg/kg	<0.01			0.01
Acenaphthylene	mg/kg	<0.01			0.01
Anthracene	mg/kg	<0.01			0.01
Benzo(a)anthracene	mg/kg	<0.01			0.01
Benzo(a)pyrene	mg/kg	<0.01			0.01
Benzo(b)fluoranthene	mg/kg	<0.01			0.01
Benzo(g,h,i)perylene	mg/kg	<0.01			0.01
Benzo(k)fluoranthene	mg/kg	<0.01			0.01
Chrysene	mg/kg	<0.01			0.01
Dibenzo(a,h)anthracene	mg/kg	<0.01			0.01

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Analytical Report

Job Ref. No. : 113087
Report No : 158426
Date Reported : 12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113087-7
Date Received	04/04/2022
Sampled By	Client
Sampling Date	Not Given
Sampling Time	Not Given
Sample Sub Matrix	Sediment
Sampling Location	Not Given
Client Sample ID	R2-WSQ7
Sampling Method	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PAH's - Continued					
Fluoranthene	mg/kg	<0.01			0.01
Fluorene	mg/kg	<0.01			0.01
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.01			0.01
Naphthalene	mg/kg	<0.01			0.01
Phenanthrene	mg/kg	<0.01			0.01
Pyrene	mg/kg	<0.01			0.01
PCB's					
2,2`,3,3`,4,4` - Hexachlorobiphenyl (PCB 128)	mg/kg	<0.01			0.01
2,2`,3,3`,4,4`,5 - Heptachlorobiphenyl (PCB 170)	mg/kg	<0.01			0.01
2,2`,3,3`,4,4`,5,5`,6,6` - Decachlorobiphenyl	mg/kg	<0.01			0.01
2,2`,3,3`,4,4`,5,5`,6-Nonachlorobiphenyl (PCB 206)	mg/kg	<0.01			0.01
2,2`,3,3`,4,4`,5,6 - Octachlorobiphenyl (PCB 195)	mg/kg	<0.01			0.01
2,2`,3,4`,5,5',6 - Heptachlorobiphenyl (PCB 187)	mg/kg	<0.01			0.01
2,2`,3,4,4`,5` - Hexachlorobiphenyl (PCB 138)	mg/kg	<0.01			0.01
2,2`,3,4,4`,5,5` - Heptachlorobiphenyl (PCB 180)	mg/kg	<0.01			0.01
2,2`,3,5` - Tetrachlorobiphenyl (PCB 44)	mg/kg	<0.01			0.01
2,2`,4,4`,5,5` - Hexachlorobiphenyl (PCB 153)	mg/kg	<0.01			0.01
2,2`,4,5,5` - Pentachlorobiphenyl (PCB 101)	mg/kg	<0.01			0.01
2,2`,5,5` - Tetrachlorobiphenyl (PCB 52)	mg/kg	<0.01			0.01
2,2`,5 - Trichlorobiphenyl (PCB 18)	mg/kg	<0.01			0.01
3,3`,4,4` - Tetrachlorobiphenyl (PCB 77)	mg/kg	<0.01			0.01
3,3`,4,4`,5 - Pentachlorobiphenyl (PCB 126)	mg/kg	<0.01			0.01

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Analytical Report

Job Ref. No.	:	113087
Report No	:	158426
Date Reported :		12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	113087-7
Date Received	04/04/2022
Sampled By	Client
Sampling Date	Not Given
Sampling Time	Not Given
Sample Sub Matrix	Sediment
Sampling Location	Not Given
Client Sample ID	R2-WSQ7
Sampling Method	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PCB's - Continued					
2,3`,4,4` - Tetrachlorobiphenyl (PCB 66)	mg/kg	<0.01			0.01
2,3`,4,4`,5 - Pentachlorobiphenyl (PCB 118)	mg/kg	<0.01			0.01
2,3,3`,4,4` - Pentachlorobiphenyl (PCB 105)	mg/kg	<0.01			0.01
2,4` - Dichlorobiphenyl (PCB 8)	mg/kg	<0.01			0.01
2,4,4` - Trichlorobiphenyl (PCB 28)	mg/kg	<0.01			0.01

Method of Analysis

Method Name	Reference
Cyanide [Modified USEPA method OIA-1667 - Subcontract]-DXB	USEPA [Method OIA-1667]
EPH C10-C40 by GC-FID [EPA 8015B] SSS-DXB	EPA [8015B]
Fluoride [HACH 8029]-DXB	HACH [8029]
Mercury by PSA [EPA 245.7] SSS-DXB	EPA [245.7]
Metals ICP OES [APHA 3120 B] SSS-DXB	APHA [3120 B]
Nitrogen (Total) [APHA 4500 Norg B] Solids-DXB	APHA [4500 Norg B]
Oil & Grease [APHA 5520 E]-DXB	APHA [5520 E]
Orthophosphate [HACH 8048]-DXB	HACH [8048]
PAH in Soils [EPA 8270 D]-DXB	EPA [8270 D]
PCB [EPA 8270D] Solids-DXB	EPA [8270 D]
pH [BS 1377-3: 2018] Soil-DXB	BS [1377-3: 2018]
Silica-SiO2 [ASTM C146]-DXB	ASTM [C146]
Sulphate (Acid Soluble)[BS 1377-3: 2018] Soil-DXB	BS [1377-3: 2018]
Total Organic Carbon [MOOPAM IV.4]-DXB	MOOPAM [IV.4]
VPH C5-C10 by GC-FID [EPA 8015B]-SSS-DXB	EPA [8015B]

* Reference Method Modified

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Analytical Report

Job Ref. No. :	113087
Report No :	158426
Date Reported :	12/05/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Comments:

- Tested By : AAP, EMA, GAN, HRA, JCH, JRE, NHA
- Date Tested: 07/04/2022 to 26/04/2022

- Please note that all tests shown not containing the `AUH` extension are subcontracted to Element group of laboratories.
- Please note that if the sample has to be diluted due to the matrix, the reported Limit of Detection (LOD) value will increase from the method LOD.
- Any APHA methods stated herein are documented in-house procedures, referenced to 23rd edition.

- This test report supersedes previous report dated 26 Apr 2022. Report revised to amend the Sample Descriptions as per client's request. Previous report 156649.
- Please note that in a revised report the reported limit of detection will not be the same as the method limit of detection if the latter has been modified since the analysis was completed.

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Analytical Report

Job Ref. No. : 114850
Report No : 159019
Date Reported : 03/06/2022

Client: WKC Middle East Environment Consultancy

P.O Box: 130627

ABU DHABI, United Arab Emirates

Attn: Adrian Evans
Project ID: Sediment-Lightning
Project Name: WKC Middle East Environment Consultancy
Project Location: N/A
Tel. No: 971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114850-1	114850-2	114850-3
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment	Sediment
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ-1-SED	WSQ-3-SED	WSQ-4-SED
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
pH	pH units	8.2	8.6	8.7	0.1
Oil and Grease	%	<0.01	<0.01	<0.01	0.01
Total Nitrogen	mg/kg	751	530	908	5
Silica-SiO2	% by wt	4.81	2.53	4.31	0.01
Total Cyanide	mg/kg	<0.5	<0.5	<0.5	0.5
Anions					
Orthophosphate	mg/kg	12.3	2.0	0.8	0.3
Fluoride	mg/kg	1.4	2.5	2.8	0.5
Sulphate (Acid Soluble)	%SO4	0.90	0.84	0.93	0.01
Chemical Analysis					
Total Organic Carbon	%	1.4	0.6	1.1	0.1
Metals					
Cadmium (Cd)	mg/kg	<0.2	<0.2	<0.2	0.5
Aluminium (Al)	mg/kg	2090	1200	2820	130
Arsenic (As)	mg/kg	3.9	3.5	3.0	1.0
Barium (Ba)	mg/kg	140	51.8	229	3.0
Chromium (Cr)	mg/kg	9.4	6.6	11.9	1.0
Copper (Cu)	mg/kg	4.8	<3.0	5.7	3.0
Iron (Fe)	mg/kg	2180	1700	2700	70
Lead (Pb)	mg/kg	3.5	2.9	3.9	1.0
Manganese (Mn)	mg/kg	38.4	26.8	46.6	3.0

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Analytical Report

Job Ref. No. : 114850
Report No : 159019
Date Reported : 03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114850-1	114850-2	114850-3
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment	Sediment
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ-1-SED	WSQ-3-SED	WSQ-4-SED
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Metals - Continued					
Molybdenum (Mo)	mg/kg	<3.0	<3.0	<3.0	3.0
Nickel (Ni)	mg/kg	8.0	4.3	11.1	1.0
Phosphorus (P)	mg/kg	601	593	572	50
Selenium (Se)	mg/kg	<3.0	<3.0	<3.0	3.0
Silver (Ag)	mg/kg	<10	<10	<10	10
Vanadium (V)	mg/kg	8.0	5.7	9.8	1.0
Zinc (Zn)	mg/kg	9.7	6.0	10.9	3.0
Antimony (Sb)	mg/kg	<1.0	<1.0	<1.0	1.0
Mercury (Hg)	mg/kg	<0.010	0.017	0.016	0.010
Hydrocarbons					
VPH C5-C10	mg/kg	<0.05	<0.05	<0.05	0.05
EPH C10-C40	mg/kg	<50	<50	<50	50
PAH's					
Acenaphthene	mg/kg	<0.01	<0.01	<0.01	0.01
Acenaphthylene	mg/kg	<0.01	<0.01	<0.01	0.01
Anthracene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(a)pyrene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(b)fluoranthene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(g,h,i)perylene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(k)fluoranthene	mg/kg	<0.01	<0.01	<0.01	0.01
Chrysene	mg/kg	<0.01	<0.01	<0.01	0.01

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Analytical Report

Job Ref. No. :	114850
Report No :	159019
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114850-1	114850-2	114850-3
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment	Sediment
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ-1-SED	WSQ-3-SED	WSQ-4-SED
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PAH's - Continued					
Dibenzo(a,h)anthracene	mg/kg	<0.01	<0.01	<0.01	0.01
Fluoranthene	mg/kg	<0.01	<0.01	<0.01	0.01
Fluorene	mg/kg	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.01	<0.01	<0.01	0.01
Naphthalene	mg/kg	<0.01	<0.01	<0.01	0.01
Phenanthrene	mg/kg	<0.01	<0.01	<0.01	0.01
Pyrene	mg/kg	<0.01	<0.01	<0.01	0.01
PCB's					
2,2\`,3,3\`,4,4\` - Hexachlorobiphenyl (PCB 128)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2\`,3,3\`,4,4\`,5 - Heptachlorobiphenyl (PCB 170)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2\`,3,3\`,4,4\`,5,5\`,6,6\` - Decachlorobiphenyl	mg/kg	<0.01	<0.01	<0.01	0.01
2,2\`,3,3\`,4,4\`,5,5\`,6-Nonachlorobiphenyl (PCB 206)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2\`,3,3\`,4,4\`,5,6 - Octachlorobiphenyl (PCB 195)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2\`,3,4\`,5,5',6 - Heptachlorobiphenyl (PCB 187)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2\`,3,4,4\`,5\` - Hexachlorobiphenyl (PCB 138)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2\`,3,4,4\`,5,5\` - Heptachlorobiphenyl (PCB 180)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2\`,3,5\` - Tetrachlorobiphenyl (PCB 44)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2\`,4,4\`,5,5\` - Hexachlorobiphenyl (PCB 153)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2\`,4,5,5\` - Pentachlorobiphenyl (PCB 101)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2\`,5,5\` - Tetrachlorobiphenyl (PCB 52)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2\`,5 - Trichlorobiphenyl (PCB 18)	mg/kg	<0.01	<0.01	<0.01	0.01
3,3\`,4,4\` - Tetrachlorobiphenyl (PCB 77)	mg/kg	<0.01	<0.01	<0.01	0.01

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Analytical Report

Job Ref. No. :	114850
Report No :	159019
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114850-1	114850-2	114850-3
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment	Sediment
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ-1-SED	WSQ-3-SED	WSQ-4-SED
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PCB's - Continued					
3,3`,4,4`,5 - Pentachlorobiphenyl (PCB 126)	mg/kg	<0.01	<0.01	<0.01	0.01
2,3`,4,4` - Tetrachlorobiphenyl (PCB 66)	mg/kg	<0.01	<0.01	<0.01	0.01
2,3`,4,4`,5 - Pentachlorobiphenyl (PCB 118)	mg/kg	<0.01	<0.01	<0.01	0.01
2,3,3`,4,4` - Pentachlorobiphenyl (PCB 105)	mg/kg	<0.01	<0.01	<0.01	0.01
2,4` - Dichlorobiphenyl (PCB 8)	mg/kg	<0.01	<0.01	<0.01	0.01
2,4,4` - Trichlorobiphenyl (PCB 28)	mg/kg	<0.01	<0.01	<0.01	0.01

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Analytical Report

Job Ref. No.	:	114850
Report No	:	159019
Date Reported :		03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114850-4	114850-5	114850-6
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment	Sediment
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ-5-SED	WSQ-6-SED	WSQ-11-SED
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
pH	pH units	8.6	8.5	8.2	0.1
Oil and Grease	%	<0.01	<0.01	0.02	0.01
Total Nitrogen	mg/kg	968	942	996	5
Silica-SiO2	% by wt	4.04	2.56	2.64	0.01
Total Cyanide	mg/kg	<0.5	<0.5	<0.5	0.5
Anions					
Orthophosphate	mg/kg	1.1	2.1	2.5	0.3
Fluoride	mg/kg	3.3	2.2	1.8	0.5
Sulphate (Acid Soluble)	%SO4	0.95	0.78	0.76	0.01
Chemical Analysis					
Total Organic Carbon	%	1.1	0.6	0.7	0.1
Metals					
Cadmium (Cd)	mg/kg	<0.2	<0.2	<0.2	0.5
Aluminium (Al)	mg/kg	2560	1050	1230	130
Arsenic (As)	mg/kg	3.3	4.2	6.0	1.0
Barium (Ba)	mg/kg	426	417	69.4	3.0
Chromium (Cr)	mg/kg	11.3	5.6	7.0	1.0
Copper (Cu)	mg/kg	5.7	3.2	<3.0	3.0
Iron (Fe)	mg/kg	2450	1100	1480	70
Lead (Pb)	mg/kg	4.5	3.8	2.1	1.0
Manganese (Mn)	mg/kg	41.1	19.7	28.2	3.0
Molybdenum (Mo)	mg/kg	<3.0	<3.0	<3.0	3.0

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Analytical Report

Job Ref. No.	:	114850
Report No	:	159019
Date Reported :		03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114850-4	114850-5	114850-6
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment	Sediment
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ-5-SED	WSQ-6-SED	WSQ-11-SED
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Metals - Continued					
Nickel (Ni)	mg/kg	10.2	4.0	4.7	1.0
Phosphorus (P)	mg/kg	534	408	509	50
Selenium (Se)	mg/kg	<3.0	<3.0	<3.0	3.0
Silver (Ag)	mg/kg	<10	<10	<10	10
Vanadium (V)	mg/kg	9.3	4.8	5.6	1.0
Zinc (Zn)	mg/kg	10.7	5.8	4.6	3.0
Antimony (Sb)	mg/kg	<1.0	<1.0	<1.0	1.0
Mercury (Hg)	mg/kg	0.015	<0.010	0.012	0.010
Hydrocarbons					
VPH C5-C10	mg/kg	<0.05	<0.05	<0.05	0.05
EPH C10-C40	mg/kg	<50	<50	<50	50
PAH's					
Acenaphthene	mg/kg	<0.01	<0.01	<0.01	0.01
Acenaphthylene	mg/kg	<0.01	<0.01	<0.01	0.01
Anthracene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(a)pyrene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(b)fluoranthene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(g,h,i)perylene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(k)fluoranthene	mg/kg	<0.01	<0.01	<0.01	0.01
Chrysene	mg/kg	<0.01	<0.01	<0.01	0.01
Dibenzo(a,h)anthracene	mg/kg	<0.01	<0.01	<0.01	0.01

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Analytical Report

Job Ref. No. :	114850
Report No :	159019
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114850-4	114850-5	114850-6
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment	Sediment
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ-5-SED	WSQ-6-SED	WSQ-11-SED
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PAH's - Continued					
Fluoranthene	mg/kg	<0.01	<0.01	<0.01	0.01
Fluorene	mg/kg	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.01	<0.01	<0.01	0.01
Naphthalene	mg/kg	<0.01	<0.01	<0.01	0.01
Phenanthrene	mg/kg	<0.01	<0.01	<0.01	0.01
Pyrene	mg/kg	<0.01	<0.01	<0.01	0.01
PCB's					
2,2`,3,3`,4,4` - Hexachlorobiphenyl (PCB 128)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,3`,4,4`,5 - Heptachlorobiphenyl (PCB 170)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,3`,4,4`,5,5`,6,6` - Decachlorobiphenyl	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,3`,4,4`,5,5`,6-Nonachlorobiphenyl (PCB 206)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,3`,4,4`,5,6 - Octachlorobiphenyl (PCB 195)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,4`,5,5',6 - Heptachlorobiphenyl (PCB 187)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,4,4`,5` - Hexachlorobiphenyl (PCB 138)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,4,4`,5,5` - Heptachlorobiphenyl (PCB 180)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,5` - Tetrachlorobiphenyl (PCB 44)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,4,4`,5,5` - Hexachlorobiphenyl (PCB 153)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,4,5,5` - Pentachlorobiphenyl (PCB 101)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,5,5` - Tetrachlorobiphenyl (PCB 52)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,5 - Trichlorobiphenyl (PCB 18)	mg/kg	<0.01	<0.01	<0.01	0.01
3,3`,4,4` - Tetrachlorobiphenyl (PCB 77)	mg/kg	<0.01	<0.01	<0.01	0.01
3,3`,4,4`,5 - Pentachlorobiphenyl (PCB 126)	mg/kg	<0.01	<0.01	<0.01	0.01

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Analytical Report

Job Ref. No.	:	114850
Report No	:	159019
Date Reported :		03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114850-4	114850-5	114850-6
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment	Sediment
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ-5-SED	WSQ-6-SED	WSQ-11-SED
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PCB's - Continued					
2,3`,4,4` - Tetrachlorobiphenyl (PCB 66)	mg/kg	<0.01	<0.01	<0.01	0.01
2,3`,4,4`,5 - Pentachlorobiphenyl (PCB 118)	mg/kg	<0.01	<0.01	<0.01	0.01
2,3,3`,4,4` - Pentachlorobiphenyl (PCB 105)	mg/kg	<0.01	<0.01	<0.01	0.01
2,4` - Dichlorobiphenyl (PCB 8)	mg/kg	<0.01	<0.01	<0.01	0.01
2,4,4` - Trichlorobiphenyl (PCB 28)	mg/kg	<0.01	<0.01	<0.01	0.01

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Analytical Report

Job Ref. No.	:	114850
Report No	:	159019
Date Reported :		03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114850-7	114850-8	114850-9
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment	Sediment
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ-12-SED	WSQ-13-SED	WSQ-14-SED
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
pH	pH units	8.4	8.6	8.6	0.1
Oil and Grease	%	0.01	<0.01	<0.01	0.01
Total Nitrogen	mg/kg	843	847	1100	5
Silica-SiO2	% by wt	2.13	2.85	4.92	0.01
Total Cyanide	mg/kg	<0.5	<0.5	<0.5	0.5
Anions					
Orthophosphate	mg/kg	0.6	2.5	1.2	0.3
Fluoride	mg/kg	1.1	1.4	2.8	0.5
Sulphate (Acid Soluble)	%SO4	0.80	0.49	0.94	0.01
Chemical Analysis					
Total Organic Carbon	%	0.8	0.6	1.4	0.1
Metals					
Cadmium (Cd)	mg/kg	<0.2	<0.2	<0.2	0.5
Aluminium (Al)	mg/kg	1110	1420	2980	130
Arsenic (As)	mg/kg	3.7	4.6	4.8	1.0
Barium (Ba)	mg/kg	84.6	205	580	3.0
Chromium (Cr)	mg/kg	6.1	9.0	13.1	1.0
Copper (Cu)	mg/kg	<3.0	3.4	5.7	3.0
Iron (Fe)	mg/kg	1190	1760	2830	70
Lead (Pb)	mg/kg	2.7	3.9	6.8	1.0
Manganese (Mn)	mg/kg	25.5	29.6	47.7	3.0
Molybdenum (Mo)	mg/kg	<3.0	<3.0	<3.0	3.0

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Analytical Report

Job Ref. No. :	114850
Report No :	159019
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114850-7	114850-8	114850-9
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment	Sediment
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ-12-SED	WSQ-13-SED	WSQ-14-SED
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Metals - Continued					
Nickel (Ni)	mg/kg	4.2	5.2	11.4	1.0
Phosphorus (P)	mg/kg	479	555	590	50
Selenium (Se)	mg/kg	<3.0	<3.0	<3.0	3.0
Silver (Ag)	mg/kg	<10	<10	<10	10
Vanadium (V)	mg/kg	5.0	7.3	10.3	1.0
Zinc (Zn)	mg/kg	4.7	6.7	12.6	3.0
Antimony (Sb)	mg/kg	<1.0	<1.0	<1.0	1.0
Mercury (Hg)	mg/kg	<0.010	0.012	0.018	0.010
Hydrocarbons					
VPH C5-C10	mg/kg	<0.05	<0.05	<0.05	0.05
EPH C10-C40	mg/kg	<50	<50	<50	50
PAH's					
Acenaphthene	mg/kg	<0.01	<0.01	<0.01	0.01
Acenaphthylene	mg/kg	<0.01	<0.01	<0.01	0.01
Anthracene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(a)pyrene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(b)fluoranthene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(g,h,i)perylene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(k)fluoranthene	mg/kg	<0.01	<0.01	<0.01	0.01
Chrysene	mg/kg	<0.01	<0.01	<0.01	0.01
Dibenzo(a,h)anthracene	mg/kg	<0.01	<0.01	<0.01	0.01

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Analytical Report

Job Ref. No. : 114850
Report No : 159019
Date Reported : 03/06/2022

Client: WKC Middle East Environment Consultancy

P.O Box: 130627

ABU DHABI, United Arab Emirates

Attn: Adrian Evans
Project ID: Sediment-Lightning
Project Name: WKC Middle East Environment Consultancy
Project Location: N/A
Tel. No: 971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114850-7	114850-8	114850-9
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment	Sediment
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ-12-SED	WSQ-13-SED	WSQ-14-SED
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PAH's - Continued					
Fluoranthene	mg/kg	<0.01	<0.01	<0.01	0.01
Fluorene	mg/kg	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.01	<0.01	<0.01	0.01
Naphthalene	mg/kg	<0.01	<0.01	<0.01	0.01
Phenanthrene	mg/kg	<0.01	<0.01	<0.01	0.01
Pyrene	mg/kg	<0.01	<0.01	<0.01	0.01
PCB's					
2,2`,3,3`,4,4` - Hexachlorobiphenyl (PCB 128)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,3`,4,4`,5 - Heptachlorobiphenyl (PCB 170)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,3`,4,4`,5,5`,6,6` - Decachlorobiphenyl	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,3`,4,4`,5,5`,6-Nonachlorobiphenyl (PCB 206)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,3`,4,4`,5,6 - Octachlorobiphenyl (PCB 195)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,4`,5,5',6 - Heptachlorobiphenyl (PCB 187)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,4,4`,5` - Hexachlorobiphenyl (PCB 138)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,4,4`,5,5` - Heptachlorobiphenyl (PCB 180)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,5` - Tetrachlorobiphenyl (PCB 44)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,4,4`,5,5` - Hexachlorobiphenyl (PCB 153)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,4,5,5` - Pentachlorobiphenyl (PCB 101)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,5,5` - Tetrachlorobiphenyl (PCB 52)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,5 - Trichlorobiphenyl (PCB 18)	mg/kg	<0.01	<0.01	<0.01	0.01
3,3`,4,4` - Tetrachlorobiphenyl (PCB 77)	mg/kg	<0.01	<0.01	<0.01	0.01
3,3`,4,4`,5 - Pentachlorobiphenyl (PCB 126)	mg/kg	<0.01	<0.01	<0.01	0.01

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Analytical Report

Job Ref. No. :	114850
Report No :	159019
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114850-7	114850-8	114850-9
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment	Sediment
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ-12-SED	WSQ-13-SED	WSQ-14-SED
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PCB's - Continued					
2,3`,4,4` - Tetrachlorobiphenyl (PCB 66)	mg/kg	<0.01	<0.01	<0.01	0.01
2,3`,4,4`,5 - Pentachlorobiphenyl (PCB 118)	mg/kg	<0.01	<0.01	<0.01	0.01
2,3,3`,4,4` - Pentachlorobiphenyl (PCB 105)	mg/kg	<0.01	<0.01	<0.01	0.01
2,4` - Dichlorobiphenyl (PCB 8)	mg/kg	<0.01	<0.01	<0.01	0.01
2,4,4` - Trichlorobiphenyl (PCB 28)	mg/kg	<0.01	<0.01	<0.01	0.01

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Analytical Report

Job Ref. No.	:	114850
Report No	:	159019
Date Reported :		03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114850-10	114850-11
Date Received	23/05/2022	23/05/2022
Sampled By	Client	Client
Sampling Date	Not Given	Not Given
Sampling Time	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment
Sampling Location	Not Given	Not Given
Client Sample ID	WSQ-15-SED	WSQ-17-SED
Sampling Method	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Inorganic Parameters					
pH	pH units	8.4	7.8		0.1
Oil and Grease	%	0.01	<0.01		0.01
Total Nitrogen	mg/kg	1240	988		5
Silica-SiO2	% by wt	3.46	2.19		0.01
Total Cyanide	mg/kg	<0.5	<0.5		0.5
Anions					
Orthophosphate	mg/kg	2.3	6.4		0.3
Fluoride	mg/kg	3.6	<0.5		0.5
Sulphate (Acid Soluble)	%SO4	0.95	0.74		0.01
Chemical Analysis					
Total Organic Carbon	%	1.1	0.9		0.1

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Analytical Report

Job Ref. No.	:	114850
Report No	:	159019
Date Reported	:	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114850-10	114850-11	114850-12
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment	Sediment
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ-15-SED	WSQ-17-SED	WSQ-20-SED
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
Metals					
Cadmium (Cd)	mg/kg	<0.2	<0.2	<0.2	0.5
Aluminium (Al)	mg/kg	2160	371	369	130
Arsenic (As)	mg/kg	3.8	2.8	2.4	1.0
Barium (Ba)	mg/kg	768	162	58.6	3.0
Chromium (Cr)	mg/kg	10.3	2.9	2.5	1.0
Copper (Cu)	mg/kg	5.3	<3.0	13.6	3.0
Iron (Fe)	mg/kg	2200	445	380	70
Lead (Pb)	mg/kg	8.9	5.5	3.5	1.0
Manganese (Mn)	mg/kg	35.9	15.9	12.9	3.0
Molybdenum (Mo)	mg/kg	<3.0	<3.0	<3.0	3.0
Nickel (Ni)	mg/kg	8.6	1.8	1.6	1.0
Phosphorus (P)	mg/kg	529	385	348	50
Selenium (Se)	mg/kg	<3.0	<3.0	<3.0	3.0
Silver (Ag)	mg/kg	<10	<10	<10	10
Vanadium (V)	mg/kg	8.6	3.5	2.9	1.0
Zinc (Zn)	mg/kg	11.9	7.8	5.2	3.0
Antimony (Sb)	mg/kg	<1.0	<1.0	<1.0	1.0
Mercury (Hg)	mg/kg	0.019	<0.010	<0.010	0.010
Hydrocarbons					
VPH C5-C10	mg/kg	<0.05	<0.05		0.05
EPH C10-C40	mg/kg	<50	<50	<50	50

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Analytical Report

Job Ref. No. :	114850
Report No :	159019
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114850-10	114850-11	114850-12
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment	Sediment
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ-15-SED	WSQ-17-SED	WSQ-20-SED
Sampling Method	Not Given	Not Given	Not Given

Analyte	**Units**	**Results**	**Results**	**Results**	**Method Limit of Detection**
PAH's					
Acenaphthene	mg/kg	<0.01	<0.01	<0.01	0.01
Acenaphthylene	mg/kg	<0.01	<0.01	<0.01	0.01
Anthracene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(a)anthracene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(a)pyrene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(b)fluoranthene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(g,h,i)perylene	mg/kg	<0.01	<0.01	<0.01	0.01
Benzo(k)fluoranthene	mg/kg	<0.01	<0.01	<0.01	0.01
Chrysene	mg/kg	<0.01	<0.01	<0.01	0.01
Dibenzo(a,h)anthracene	mg/kg	<0.01	<0.01	<0.01	0.01
Fluoranthene	mg/kg	<0.01	<0.01	<0.01	0.01
Fluorene	mg/kg	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.01	<0.01	<0.01	0.01
Naphthalene	mg/kg	<0.01	<0.01	<0.01	0.01
Phenanthrene	mg/kg	<0.01	<0.01	<0.01	0.01
Pyrene	mg/kg	<0.01	<0.01	<0.01	0.01
PCB's					
2,2`,3,3`,4,4` - Hexachlorobiphenyl (PCB 128)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,3`,4,4`,5 - Heptachlorobiphenyl (PCB 170)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,3`,4,4`,5,5`,6,6` - Decachlorobiphenyl	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,3`,4,4`,5,5`,6-Nonachlorobiphenyl (PCB 206)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,3`,4,4`,5,6 - Octachlorobiphenyl (PCB 195)	mg/kg	<0.01	<0.01	<0.01	0.01

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Analytical Report

Job Ref. No. :	114850
Report No :	159019
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample ID	114850-10	114850-11	114850-12
Date Received	23/05/2022	23/05/2022	23/05/2022
Sampled By	Client	Client	Client
Sampling Date	Not Given	Not Given	Not Given
Sampling Time	Not Given	Not Given	Not Given
Sample Sub Matrix	Sediment	Sediment	Sediment
Sampling Location	Not Given	Not Given	Not Given
Client Sample ID	WSQ-15-SED	WSQ-17-SED	WSQ-20-SED
Sampling Method	Not Given	Not Given	Not Given

Analyte	Units	Results	Results	Results	Method Limit of Detection
PCB's - Continued					
2,2`,3,4`,5,5',6 - Heptachlorobiphenyl (PCB 187)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,4,4`,5` - Hexachlorobiphenyl (PCB 138)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,4,4`,5,5` - Heptachlorobiphenyl (PCB 180)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,3,5` - Tetrachlorobiphenyl (PCB 44)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,4,4`,5,5` - Hexachlorobiphenyl (PCB 153)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,4,5,5` - Pentachlorobiphenyl (PCB 101)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,5,5` - Tetrachlorobiphenyl (PCB 52)	mg/kg	<0.01	<0.01	<0.01	0.01
2,2`,5 - Trichlorobiphenyl (PCB 18)	mg/kg	<0.01	<0.01	<0.01	0.01
3,3`,4,4` - Tetrachlorobiphenyl (PCB 77)	mg/kg	<0.01	<0.01	<0.01	0.01
3,3`,4,4`,5 - Pentachlorobiphenyl (PCB 126)	mg/kg	<0.01	<0.01	<0.01	0.01
2,3`,4,4` - Tetrachlorobiphenyl (PCB 66)	mg/kg	<0.01	<0.01	<0.01	0.01
2,3`,4,4`,5 - Pentachlorobiphenyl (PCB 118)	mg/kg	<0.01	<0.01	<0.01	0.01
2,3,3`,4,4` - Pentachlorobiphenyl (PCB 105)	mg/kg	<0.01	<0.01	<0.01	0.01
2,4` - Dichlorobiphenyl (PCB 8)	mg/kg	<0.01	<0.01	<0.01	0.01
2,4,4` - Trichlorobiphenyl (PCB 28)	mg/kg	<0.01	<0.01	<0.01	0.01

Method of Analysis

Method Name	Reference
Cyanide [Modified USEPA method OIA-1667 - Subcontract]-DXB	USEPA [Method OIA-1667]
EPH C10-C40 by GC-FID [EPA 8015B] SSS-DXB	EPA [8015B]
Fluoride [HACH 8029]-DXB	HACH [8029]
Mercury by PSA [EPA 245.7] SSS-DXB	EPA [245.7]

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Analytical Report

Job Ref. No.	:	114850
Report No	:	159019
Date Reported :		03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Method of Analysis

Method Name	Reference
	EPA [245.7]
Metals ICP OES [APHA 3120 B] SSS-DXB	APHA [3120 B]
	APHA [3120 B]
Nitrogen (Total) [APHA 4500 Norg B] Solids-DXB	APHA [4500 Norg B]
Oil & Grease [APHA 5520 E]-DXB	APHA [5520 E]
Orthophosphate [HACH 8048]-DXB	HACH [8048]
PAH in Soils [EPA 8270 D]-DXB	EPA [8270 D]
PCB [EPA 8270D] Solids-DXB	EPA [8270 D]
pH [BS 1377-3: 2018] Soil-DXB	BS [1377-3: 2018]
Silica-SiO2 [ASTM C146]-DXB	ASTM [C146]
Sulphate (Acid Soluble)[BS 1377-3: 2018] Soil-DXB	BS [1377-3: 2018]
Total Organic Carbon [MOOPAM IV.4]-DXB	MOOPAM [IV.4]
VPH C5-C10 by GC-FID [EPA 8015B]-SSS-DXB	EPA [8015B]

Comments:

· Tested By : AAP, EMA, GAN, JCH, JRE, NHA, SMO
· Date Tested: 25/05/2022 to 03/06/2022

· Please note that all tests shown not containing the `AUH` extension are subcontracted to Element group of laboratories.

. Please note that if the sample has to be diluted due to the matrix, the reported Limit of Detection (LOD) value will increase from the method LOD.

. Any APHA methods stated herein are documented in-house procedures, referenced to 23rd edition.

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Analytical Report

Job Ref. No.	:	114850
Report No	:	159019
Date Reported :		03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample Details

Job Ref. No.:	114850	**Sample ID:**	114850-4
Sample Sub Matrix:	Sediment	**Date Received:**	23/05/2022
Sampling Location:	Not Given	**Sampling Date:**	Not Given
Sampled By :	Client	**Sampling Time :**	Not Given
Sample Description:	WSQ-5-SED	**Sampling Method:**	Not Given

Test Results

Test Name	Units	Result	Method Limit of Detection
Inorganic Parameters			
pH	pH units	8.6	0.1
Oil and Grease	%	<0.01	0.01
Total Nitrogen	mg/kg	968	5
Silica-SiO2	% by wt	4.04	0.01
Total Cyanide	mg/kg	<0.5	0.5
Anions			
Orthophosphate	mg/kg	1.1	0.3
Fluoride	mg/kg	3.3	0.5
Sulphate (Acid Soluble)	%SO4	0.95	0.01
Chemical Analysis			
Total Organic Carbon	%	1.1	0.1
Metals			
Cadmium (Cd)	mg/kg	<0.2	0.5
Aluminium (Al)	mg/kg	2560	130
Arsenic (As)	mg/kg	3.3	1.0
Barium (Ba)	mg/kg	426	3.0
Chromium (Cr)	mg/kg	11.3	1.0
Copper (Cu)	mg/kg	5.7	3.0
Iron (Fe)	mg/kg	2450	70
Lead (Pb)	mg/kg	4.5	1.0
Manganese (Mn)	mg/kg	41.1	3.0
Molybdenum (Mo)	mg/kg	<3.0	3.0
Nickel (Ni)	mg/kg	10.2	1.0
Phosphorus (P)	mg/kg	534	50
Selenium (Se)	mg/kg	<3.0	3.0
Silver (Ag)	mg/kg	<10	10
Vanadium (V)	mg/kg	9.3	1.0
Zinc (Zn)	mg/kg	10.7	3.0
Antimony (Sb)	mg/kg	<1.0	1.0
Mercury (Hg)	mg/kg	0.015	0.010
Hydrocarbons			
VPH C5-C10	mg/kg	<0.05	0.05
EPH C10-C40	mg/kg	<50	50
PAH's			
Acenaphthene	mg/kg	<0.01	0.01

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Analytical Report

Job Ref. No. :	114850
Report No :	159019
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample Details

Job Ref. No.:	114850	**Sample ID:**	114850-4
Sample Sub Matrix:	Sediment	**Date Received:**	23/05/2022
Sampling Location:	Not Given	**Sampling Date:**	Not Given
Sampled By :	Client	**Sampling Time :**	Not Given
Sample Description:	WSQ-5-SED	**Sampling Method:**	Not Given

Test Results

Test Name	Units	Result	Method Limit of Detection
PAH's - Continued			
Acenaphthylene	mg/kg	<0.01	0.01
Anthracene	mg/kg	<0.01	0.01
Benzo(a)anthracene	mg/kg	<0.01	0.01
Benzo(a)pyrene	mg/kg	<0.01	0.01
Benzo(b)fluoranthene	mg/kg	<0.01	0.01
Benzo(g,h,i)perylene	mg/kg	<0.01	0.01
Benzo(k)fluoranthene	mg/kg	<0.01	0.01
Chrysene	mg/kg	<0.01	0.01
Dibenzo(a,h)anthracene	mg/kg	<0.01	0.01
Fluoranthene	mg/kg	<0.01	0.01
Fluorene	mg/kg	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.01	0.01
Naphthalene	mg/kg	<0.01	0.01
Phenanthrene	mg/kg	<0.01	0.01
Pyrene	mg/kg	<0.01	0.01
PCB's			
2,2\`,3,3\`,4,4\` - Hexachlorobiphenyl (PCB 128)	mg/kg	<0.01	0.01
2,2\`,3,3\`,4,4\`,5 - Heptachlorobiphenyl (PCB 170)	mg/kg	<0.01	0.01
2,2\`,3,3\`,4,4\`,5,5\`,6,6\` - Decachlorobiphenyl	mg/kg	<0.01	0.01
2,2\`,3,3\`,4,4\`,5,5\`,6-Nonachlorobiphenyl (PCB 206)	mg/kg	<0.01	0.01
2,2\`,3,3\`,4,4\`,5,6 - Octachlorobiphenyl (PCB 195)	mg/kg	<0.01	0.01
2,2\`,3,4\`,5,5',6 - Heptachlorobiphenyl (PCB 187)	mg/kg	<0.01	0.01
2,2\`,3,4,4\`,5\` - Hexachlorobiphenyl (PCB 138)	mg/kg	<0.01	0.01
2,2\`,3,4,4\`,5,5\` - Heptachlorobiphenyl (PCB 180)	mg/kg	<0.01	0.01
2,2\`,3,5\` - Tetrachlorobiphenyl (PCB 44)	mg/kg	<0.01	0.01
2,2\`,4,4\`,5,5\` - Hexachlorobiphenyl (PCB 153)	mg/kg	<0.01	0.01
2,2\`,4,5,5\` - Pentachlorobiphenyl (PCB 101)	mg/kg	<0.01	0.01
2,2\`,5,5\` - Tetrachlorobiphenyl (PCB 52)	mg/kg	<0.01	0.01
2,2\`,5 - Trichlorobiphenyl (PCB 18)	mg/kg	<0.01	0.01
3,3\`,4,4\` - Tetrachlorobiphenyl (PCB 77)	mg/kg	<0.01	0.01
3,3\`,4,4\`,5 - Pentachlorobiphenyl (PCB 126)	mg/kg	<0.01	0.01
2,3\`,4,4\` - Tetrachlorobiphenyl (PCB 66)	mg/kg	<0.01	0.01
2,3\`,4,4\`,5 - Pentachlorobiphenyl (PCB 118)	mg/kg	<0.01	0.01
2,3,3\`,4,4\` - Pentachlorobiphenyl (PCB 105)	mg/kg	<0.01	0.01
2,4\` - Dichlorobiphenyl (PCB 8)	mg/kg	<0.01	0.01

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Analytical Report

Job Ref. No. :	114850
Report No :	159019
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample Details

Job Ref. No.:	114850	**Sample ID:**	114850-4
Sample Sub Matrix:	Sediment	**Date Received:**	23/05/2022
Sampling Location:	Not Given	**Sampling Date:**	Not Given
Sampled By :	Client	**Sampling Time :**	Not Given
Sample Description:	WSQ-5-SED	**Sampling Method:**	Not Given

Test Results

Test Name	Units	Result	Method Limit of Detection
PCB's - Continued			
2,4,4` - Trichlorobiphenyl (PCB 28)	mg/kg	<0.01	0.01

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Analytical Report

Job Ref. No.	:	114850
Report No	:	159019
Date Reported :		03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample Details

Job Ref. No.:	114850	**Sample ID:**	114850-5
Sample Sub Matrix:	Sediment	**Date Received:**	23/05/2022
Sampling Location:	Not Given	**Sampling Date:**	Not Given
Sampled By :	Client	**Sampling Time :**	Not Given
Sample Description:	WSQ-6-SED	**Sampling Method:**	Not Given

Test Results

Test Name	Units	Result	Method Limit of Detection
Inorganic Parameters			
pH	pH units	8.5	0.1
Oil and Grease	%	<0.01	0.01
Total Nitrogen	mg/kg	942	5
Silica-SiO2	% by wt	2.56	0.01
Total Cyanide	mg/kg	<0.5	0.5
Anions			
Orthophosphate	mg/kg	2.1	0.3
Fluoride	mg/kg	2.2	0.5
Sulphate (Acid Soluble)	%SO4	0.78	0.01
Chemical Analysis			
Total Organic Carbon	%	0.6	0.1
Metals			
Cadmium (Cd)	mg/kg	<0.2	0.5
Aluminium (Al)	mg/kg	1050	130
Arsenic (As)	mg/kg	4.2	1.0
Barium (Ba)	mg/kg	417	3.0
Chromium (Cr)	mg/kg	5.6	1.0
Copper (Cu)	mg/kg	3.2	3.0
Iron (Fe)	mg/kg	1100	70
Lead (Pb)	mg/kg	3.8	1.0
Manganese (Mn)	mg/kg	19.7	3.0
Molybdenum (Mo)	mg/kg	<3.0	3.0
Nickel (Ni)	mg/kg	4.0	1.0
Phosphorus (P)	mg/kg	408	50
Selenium (Se)	mg/kg	<3.0	3.0
Silver (Ag)	mg/kg	<10	10
Vanadium (V)	mg/kg	4.8	1.0
Zinc (Zn)	mg/kg	5.8	3.0
Antimony (Sb)	mg/kg	<1.0	1.0
Mercury (Hg)	mg/kg	<0.010	0.010
Hydrocarbons			
VPH C5-C10	mg/kg	<0.05	0.05
EPH C10-C40	mg/kg	<50	50
PAH's			
Acenaphthene	mg/kg	<0.01	0.01

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Analytical Report

Job Ref. No.	:	114850
Report No	:	159019
Date Reported :		03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample Details

Job Ref. No.:	114850	**Sample ID:**	114850-5
Sample Sub Matrix:	Sediment	**Date Received:**	23/05/2022
Sampling Location:	Not Given	**Sampling Date:**	Not Given
Sampled By :	Client	**Sampling Time :**	Not Given
Sample Description:	WSQ-6-SED	**Sampling Method:**	Not Given

Test Results

Test Name	Units	Result	Method Limit of Detection
PAH's - Continued			
Acenaphthylene	mg/kg	<0.01	0.01
Anthracene	mg/kg	<0.01	0.01
Benzo(a)anthracene	mg/kg	<0.01	0.01
Benzo(a)pyrene	mg/kg	<0.01	0.01
Benzo(b)fluoranthene	mg/kg	<0.01	0.01
Benzo(g,h,i)perylene	mg/kg	<0.01	0.01
Benzo(k)fluoranthene	mg/kg	<0.01	0.01
Chrysene	mg/kg	<0.01	0.01
Dibenzo(a,h)anthracene	mg/kg	<0.01	0.01
Fluoranthene	mg/kg	<0.01	0.01
Fluorene	mg/kg	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.01	0.01
Naphthalene	mg/kg	<0.01	0.01
Phenanthrene	mg/kg	<0.01	0.01
Pyrene	mg/kg	<0.01	0.01
PCB's			
2,2`,3,3`,4,4` - Hexachlorobiphenyl (PCB 128)	mg/kg	<0.01	0.01
2,2`,3,3`,4,4`,5 - Heptachlorobiphenyl (PCB 170)	mg/kg	<0.01	0.01
2,2`,3,3`,4,4`,5,5`,6,6` - Decachlorobiphenyl	mg/kg	<0.01	0.01
2,2`,3,3`,4,4`,5,5`,6-Nonachlorobiphenyl (PCB 206)	mg/kg	<0.01	0.01
2,2`,3,3`,4,4`,5,6 - Octachlorobiphenyl (PCB 195)	mg/kg	<0.01	0.01
2,2`,3,4`,5,5',6 - Heptachlorobiphenyl (PCB 187)	mg/kg	<0.01	0.01
2,2`,3,4,4`,5` - Hexachlorobiphenyl (PCB 138)	mg/kg	<0.01	0.01
2,2`,3,4,4`,5,5` - Heptachlorobiphenyl (PCB 180)	mg/kg	<0.01	0.01
2,2`,3,5` - Tetrachlorobiphenyl (PCB 44)	mg/kg	<0.01	0.01
2,2`,4,4`,5,5` - Hexachlorobiphenyl (PCB 153)	mg/kg	<0.01	0.01
2,2`,4,5,5` - Pentachlorobiphenyl (PCB 101)	mg/kg	<0.01	0.01
2,2`,5,5` - Tetrachlorobiphenyl (PCB 52)	mg/kg	<0.01	0.01
2,2`,5 - Trichlorobiphenyl (PCB 18)	mg/kg	<0.01	0.01
3,3`,4,4` - Tetrachlorobiphenyl (PCB 77)	mg/kg	<0.01	0.01
3,3`,4,4`,5 - Pentachlorobiphenyl (PCB 126)	mg/kg	<0.01	0.01
2,3`,4,4` - Tetrachlorobiphenyl (PCB 66)	mg/kg	<0.01	0.01
2,3`,4,4`,5 - Pentachlorobiphenyl (PCB 118)	mg/kg	<0.01	0.01
2,3,3`,4,4` - Pentachlorobiphenyl (PCB 105)	mg/kg	<0.01	0.01
2,4` - Dichlorobiphenyl (PCB 8)	mg/kg	<0.01	0.01

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Analytical Report

Job Ref. No. : 114850
Report No : 159019
Date Reported : 03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample Details

Job Ref. No.:	114850	**Sample ID:**	114850-5
Sample Sub Matrix:	Sediment	**Date Received:**	23/05/2022
Sampling Location:	Not Given	**Sampling Date:**	Not Given
Sampled By :	Client	**Sampling Time :**	Not Given
Sample Description:	WSQ-6-SED	**Sampling Method:**	Not Given

Test Results

Test Name	Units	Result	Method Limit of Detection
PCB's - Continued			
2,4,4` - Trichlorobiphenyl (PCB 28)	mg/kg	<0.01	0.01

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Analytical Report

Job Ref. No.	:	114850
Report No	:	159019
Date Reported :		03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample Details

Job Ref. No.:	114850	**Sample ID:**	114850-6
Sample Sub Matrix:	Sediment	**Date Received:**	23/05/2022
Sampling Location:	Not Given	**Sampling Date:**	Not Given
Sampled By :	Client	**Sampling Time :**	Not Given
Sample Description:	WSQ-11-SED	**Sampling Method:**	Not Given

Test Results

Test Name	Units	Result	Method Limit of Detection
Inorganic Parameters			
pH	pH units	8.2	0.1
Oil and Grease	%	0.02	0.01
Total Nitrogen	mg/kg	996	5
Silica-SiO2	% by wt	2.64	0.01
Total Cyanide	mg/kg	<0.5	0.5
Anions			
Orthophosphate	mg/kg	2.5	0.3
Fluoride	mg/kg	1.8	0.5
Sulphate (Acid Soluble)	%SO4	0.76	0.01
Chemical Analysis			
Total Organic Carbon	%	0.7	0.1
Metals			
Cadmium (Cd)	mg/kg	<0.2	0.5
Aluminium (Al)	mg/kg	1230	130
Arsenic (As)	mg/kg	6.0	1.0
Barium (Ba)	mg/kg	69.4	3.0
Chromium (Cr)	mg/kg	7.0	1.0
Copper (Cu)	mg/kg	<3.0	3.0
Iron (Fe)	mg/kg	1480	70
Lead (Pb)	mg/kg	2.1	1.0
Manganese (Mn)	mg/kg	28.2	3.0
Molybdenum (Mo)	mg/kg	<3.0	3.0
Nickel (Ni)	mg/kg	4.7	1.0
Phosphorus (P)	mg/kg	509	50
Selenium (Se)	mg/kg	<3.0	3.0
Silver (Ag)	mg/kg	<10	10
Vanadium (V)	mg/kg	5.6	1.0
Zinc (Zn)	mg/kg	4.6	3.0
Antimony (Sb)	mg/kg	<1.0	1.0
Mercury (Hg)	mg/kg	0.012	0.010
Hydrocarbons			
VPH C5-C10	mg/kg	<0.05	0.05
EPH C10-C40	mg/kg	<50	50
PAH's			
Acenaphthene	mg/kg	<0.01	0.01

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Analytical Report

Job Ref. No.	:	114850
Report No	:	159019
Date Reported :		03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample Details

Job Ref. No.:	114850	**Sample ID:**	114850-6
Sample Sub Matrix:	Sediment	**Date Received:**	23/05/2022
Sampling Location:	Not Given	**Sampling Date:**	Not Given
Sampled By :	Client	**Sampling Time :**	Not Given
Sample Description:	WSQ-11-SED	**Sampling Method:**	Not Given

Test Results

Test Name	Units	Result	Method Limit of Detection
PAH's - Continued			
Acenaphthylene	mg/kg	<0.01	0.01
Anthracene	mg/kg	<0.01	0.01
Benzo(a)anthracene	mg/kg	<0.01	0.01
Benzo(a)pyrene	mg/kg	<0.01	0.01
Benzo(b)fluoranthene	mg/kg	<0.01	0.01
Benzo(g,h,i)perylene	mg/kg	<0.01	0.01
Benzo(k)fluoranthene	mg/kg	<0.01	0.01
Chrysene	mg/kg	<0.01	0.01
Dibenzo(a,h)anthracene	mg/kg	<0.01	0.01
Fluoranthene	mg/kg	<0.01	0.01
Fluorene	mg/kg	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.01	0.01
Naphthalene	mg/kg	<0.01	0.01
Phenanthrene	mg/kg	<0.01	0.01
Pyrene	mg/kg	<0.01	0.01
PCB's			
2,2`,3,3`,4,4` - Hexachlorobiphenyl (PCB 128)	mg/kg	<0.01	0.01
2,2`,3,3`,4,4`,5 - Heptachlorobiphenyl (PCB 170)	mg/kg	<0.01	0.01
2,2`,3,3`,4,4`,5,5`,6,6` - Decachlorobiphenyl	mg/kg	<0.01	0.01
2,2`,3,3`,4,4`,5,5`,6-Nonachlorobiphenyl (PCB 206)	mg/kg	<0.01	0.01
2,2`,3,3`,4,4`,5,6 - Octachlorobiphenyl (PCB 195)	mg/kg	<0.01	0.01
2,2`,3,4`,5,5',6 - Heptachlorobiphenyl (PCB 187)	mg/kg	<0.01	0.01
2,2`,3,4,4`,5` - Hexachlorobiphenyl (PCB 138)	mg/kg	<0.01	0.01
2,2`,3,4,4`,5,5` - Heptachlorobiphenyl (PCB 180)	mg/kg	<0.01	0.01
2,2`,3,5` - Tetrachlorobiphenyl (PCB 44)	mg/kg	<0.01	0.01
2,2`,4,4`,5,5` - Hexachlorobiphenyl (PCB 153)	mg/kg	<0.01	0.01
2,2`,4,5,5` - Pentachlorobiphenyl (PCB 101)	mg/kg	<0.01	0.01
2,2`,5,5` - Tetrachlorobiphenyl (PCB 52)	mg/kg	<0.01	0.01
2,2`,5 - Trichlorobiphenyl (PCB 18)	mg/kg	<0.01	0.01
3,3`,4,4` - Tetrachlorobiphenyl (PCB 77)	mg/kg	<0.01	0.01
3,3`,4,4`,5 - Pentachlorobiphenyl (PCB 126)	mg/kg	<0.01	0.01
2,3`,4,4` - Tetrachlorobiphenyl (PCB 66)	mg/kg	<0.01	0.01
2,3`,4,4`,5 - Pentachlorobiphenyl (PCB 118)	mg/kg	<0.01	0.01
2,3,3`,4,4` - Pentachlorobiphenyl (PCB 105)	mg/kg	<0.01	0.01
2,4` - Dichlorobiphenyl (PCB 8)	mg/kg	<0.01	0.01

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Analytical Report

Job Ref. No.	:	114850
Report No	:	159019
Date Reported :		03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample Details

Job Ref. No.:	114850	**Sample ID:**	114850-6
Sample Sub Matrix:	Sediment	**Date Received:**	23/05/2022
Sampling Location:	Not Given	**Sampling Date:**	Not Given
Sampled By :	Client	**Sampling Time :**	Not Given
Sample Description:	WSQ-11-SED	**Sampling Method:**	Not Given

Test Results

Test Name	Units	Result	Method Limit of Detection
PCB's - Continued			
2,4,4` - Trichlorobiphenyl (PCB 28)	mg/kg	<0.01	0.01

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Analytical Report

Job Ref. No.	:	114850
Report No	:	159019
Date Reported	:	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample Details

Job Ref. No.:	114850	**Sample ID:**	114850-7
Sample Sub Matrix:	Sediment	**Date Received:**	23/05/2022
Sampling Location:	Not Given	**Sampling Date:**	Not Given
Sampled By :	Client	**Sampling Time :**	Not Given
Sample Description:	WSQ-12-SED	**Sampling Method:**	Not Given

Test Results

Test Name	Units	Result	Method Limit of Detection
Inorganic Parameters			
pH	pH units	8.4	0.1
Oil and Grease	%	0.01	0.01
Total Nitrogen	mg/kg	843	5
Silica-SiO2	% by wt	2.13	0.01
Total Cyanide	mg/kg	<0.5	0.5
Anions			
Orthophosphate	mg/kg	0.6	0.3
Fluoride	mg/kg	1.1	0.5
Sulphate (Acid Soluble)	%SO4	0.80	0.01
Chemical Analysis			
Total Organic Carbon	%	0.8	0.1
Metals			
Cadmium (Cd)	mg/kg	<0.2	0.5
Aluminium (Al)	mg/kg	1110	130
Arsenic (As)	mg/kg	3.7	1.0
Barium (Ba)	mg/kg	84.6	3.0
Chromium (Cr)	mg/kg	6.1	1.0
Copper (Cu)	mg/kg	<3.0	3.0
Iron (Fe)	mg/kg	1190	70
Lead (Pb)	mg/kg	2.7	1.0
Manganese (Mn)	mg/kg	25.5	3.0
Molybdenum (Mo)	mg/kg	<3.0	3.0
Nickel (Ni)	mg/kg	4.2	1.0
Phosphorus (P)	mg/kg	479	50
Selenium (Se)	mg/kg	<3.0	3.0
Silver (Ag)	mg/kg	<10	10
Vanadium (V)	mg/kg	5.0	1.0
Zinc (Zn)	mg/kg	4.7	3.0
Antimony (Sb)	mg/kg	<1.0	1.0
Mercury (Hg)	mg/kg	<0.010	0.010
Hydrocarbons			
VPH C5-C10	mg/kg	<0.05	0.05
EPH C10-C40	mg/kg	<50	50
PAH's			
Acenaphthene	mg/kg	<0.01	0.01

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Analytical Report

Job Ref. No. :	114850
Report No :	159019
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample Details

Job Ref. No.:	114850	**Sample ID:**	114850-7
Sample Sub Matrix:	Sediment	**Date Received:**	23/05/2022
Sampling Location:	Not Given	**Sampling Date:**	Not Given
Sampled By :	Client	**Sampling Time :**	Not Given
Sample Description:	WSQ-12-SED	**Sampling Method:**	Not Given

Test Results

Test Name	Units	Result	Method Limit of Detection
PAH's - Continued			
Acenaphthylene	mg/kg	<0.01	0.01
Anthracene	mg/kg	<0.01	0.01
Benzo(a)anthracene	mg/kg	<0.01	0.01
Benzo(a)pyrene	mg/kg	<0.01	0.01
Benzo(b)fluoranthene	mg/kg	<0.01	0.01
Benzo(g,h,i)perylene	mg/kg	<0.01	0.01
Benzo(k)fluoranthene	mg/kg	<0.01	0.01
Chrysene	mg/kg	<0.01	0.01
Dibenzo(a,h)anthracene	mg/kg	<0.01	0.01
Fluoranthene	mg/kg	<0.01	0.01
Fluorene	mg/kg	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.01	0.01
Naphthalene	mg/kg	<0.01	0.01
Phenanthrene	mg/kg	<0.01	0.01
Pyrene	mg/kg	<0.01	0.01
PCB's			
2,2`,3,3`,4,4` - Hexachlorobiphenyl (PCB 128)	mg/kg	<0.01	0.01
2,2`,3,3`,4,4`,5 - Heptachlorobiphenyl (PCB 170)	mg/kg	<0.01	0.01
2,2`,3,3`,4,4`,5,5`,6,6` - Decachlorobiphenyl	mg/kg	<0.01	0.01
2,2`,3,3`,4,4`,5,5`,6-Nonachlorobiphenyl (PCB 206)	mg/kg	<0.01	0.01
2,2`,3,3`,4,4`,5,6 - Octachlorobiphenyl (PCB 195)	mg/kg	<0.01	0.01
2,2`,3,4`,5,5',6 - Heptachlorobiphenyl (PCB 187)	mg/kg	<0.01	0.01
2,2`,3,4,4`,5` - Hexachlorobiphenyl (PCB 138)	mg/kg	<0.01	0.01
2,2`,3,4,4`,5,5` - Heptachlorobiphenyl (PCB 180)	mg/kg	<0.01	0.01
2,2`,3,5` - Tetrachlorobiphenyl (PCB 44)	mg/kg	<0.01	0.01
2,2`,4,4`,5,5` - Hexachlorobiphenyl (PCB 153)	mg/kg	<0.01	0.01
2,2`,4,5,5` - Pentachlorobiphenyl (PCB 101)	mg/kg	<0.01	0.01
2,2`,5,5` - Tetrachlorobiphenyl (PCB 52)	mg/kg	<0.01	0.01
2,2`,5 - Trichlorobiphenyl (PCB 18)	mg/kg	<0.01	0.01
3,3`,4,4` - Tetrachlorobiphenyl (PCB 77)	mg/kg	<0.01	0.01
3,3`,4,4`,5 - Pentachlorobiphenyl (PCB 126)	mg/kg	<0.01	0.01
2,3`,4,4` - Tetrachlorobiphenyl (PCB 66)	mg/kg	<0.01	0.01
2,3`,4,4`,5 - Pentachlorobiphenyl (PCB 118)	mg/kg	<0.01	0.01
2,3,3`,4,4` - Pentachlorobiphenyl (PCB 105)	mg/kg	<0.01	0.01
2,4` - Dichlorobiphenyl (PCB 8)	mg/kg	<0.01	0.01

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Analytical Report

Job Ref. No. :	114850
Report No :	159019
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample Details

Job Ref. No.:	114850	**Sample ID:**	114850-7
Sample Sub Matrix:	Sediment	**Date Received:**	23/05/2022
Sampling Location:	Not Given	**Sampling Date:**	Not Given
Sampled By :	Client	**Sampling Time :**	Not Given
Sample Description:	WSQ-12-SED	**Sampling Method:**	Not Given

Test Results

Test Name	Units	Result	Method Limit of Detection
PCB's - Continued			
2,4,4` - Trichlorobiphenyl (PCB 28)	mg/kg	<0.01	0.01

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Analytical Report

Job Ref. No.	:	114850
Report No	:	159019
Date Reported	:	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample Details

Job Ref. No.:	114850	**Sample ID:**	114850-8
Sample Sub Matrix:	Sediment	**Date Received:**	23/05/2022
Sampling Location:	Not Given	**Sampling Date:**	Not Given
Sampled By :	Client	**Sampling Time :**	Not Given
Sample Description:	WSQ-13-SED	**Sampling Method:**	Not Given

Test Results

Test Name	Units	Result	Method Limit of Detection
Inorganic Parameters			
pH	pH units	8.6	0.1
Oil and Grease	%	<0.01	0.01
Total Nitrogen	mg/kg	847	5
Silica-SiO2	% by wt	2.85	0.01
Total Cyanide	mg/kg	<0.5	0.5
Anions			
Orthophosphate	mg/kg	2.5	0.3
Fluoride	mg/kg	1.4	0.5
Sulphate (Acid Soluble)	%SO4	0.49	0.01
Chemical Analysis			
Total Organic Carbon	%	0.6	0.1
Metals			
Cadmium (Cd)	mg/kg	<0.2	0.5
Aluminium (Al)	mg/kg	1420	130
Arsenic (As)	mg/kg	4.6	1.0
Barium (Ba)	mg/kg	205	3.0
Chromium (Cr)	mg/kg	9.0	1.0
Copper (Cu)	mg/kg	3.4	3.0
Iron (Fe)	mg/kg	1760	70
Lead (Pb)	mg/kg	3.9	1.0
Manganese (Mn)	mg/kg	29.6	3.0
Molybdenum (Mo)	mg/kg	<3.0	3.0
Nickel (Ni)	mg/kg	5.2	1.0
Phosphorus (P)	mg/kg	555	50
Selenium (Se)	mg/kg	<3.0	3.0
Silver (Ag)	mg/kg	<10	10
Vanadium (V)	mg/kg	7.3	1.0
Zinc (Zn)	mg/kg	6.7	3.0
Antimony (Sb)	mg/kg	<1.0	1.0
Mercury (Hg)	mg/kg	0.012	0.010
Hydrocarbons			
VPH C5-C10	mg/kg	<0.05	0.05
EPH C10-C40	mg/kg	<50	50
PAH's			
Acenaphthene	mg/kg	<0.01	0.01

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Analytical Report

Job Ref. No. :	114850
Report No :	159019
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample Details

Job Ref. No.:	114850	**Sample ID:**	114850-8
Sample Sub Matrix:	Sediment	**Date Received:**	23/05/2022
Sampling Location:	Not Given	**Sampling Date:**	Not Given
Sampled By :	Client	**Sampling Time :**	Not Given
Sample Description:	WSQ-13-SED	**Sampling Method:**	Not Given

Test Results

Test Name	Units	Result	Method Limit of Detection
PAH's - Continued			
Acenaphthylene	mg/kg	<0.01	0.01
Anthracene	mg/kg	<0.01	0.01
Benzo(a)anthracene	mg/kg	<0.01	0.01
Benzo(a)pyrene	mg/kg	<0.01	0.01
Benzo(b)fluoranthene	mg/kg	<0.01	0.01
Benzo(g,h,i)perylene	mg/kg	<0.01	0.01
Benzo(k)fluoranthene	mg/kg	<0.01	0.01
Chrysene	mg/kg	<0.01	0.01
Dibenzo(a,h)anthracene	mg/kg	<0.01	0.01
Fluoranthene	mg/kg	<0.01	0.01
Fluorene	mg/kg	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.01	0.01
Naphthalene	mg/kg	<0.01	0.01
Phenanthrene	mg/kg	<0.01	0.01
Pyrene	mg/kg	<0.01	0.01
PCB's			
2,2`,3,3`,4,4` - Hexachlorobiphenyl (PCB 128)	mg/kg	<0.01	0.01
2,2`,3,3`,4,4`,5 - Heptachlorobiphenyl (PCB 170)	mg/kg	<0.01	0.01
2,2`,3,3`,4,4`,5,5`,6,6` - Decachlorobiphenyl	mg/kg	<0.01	0.01
2,2`,3,3`,4,4`,5,5`,6-Nonachlorobiphenyl (PCB 206)	mg/kg	<0.01	0.01
2,2`,3,3`,4,4`,5,6 - Octachlorobiphenyl (PCB 195)	mg/kg	<0.01	0.01
2,2`,3,4`,5,5',6 - Heptachlorobiphenyl (PCB 187)	mg/kg	<0.01	0.01
2,2`,3,4,4`,5` - Hexachlorobiphenyl (PCB 138)	mg/kg	<0.01	0.01
2,2`,3,4,4`,5,5` - Heptachlorobiphenyl (PCB 180)	mg/kg	<0.01	0.01
2,2`,3,5` - Tetrachlorobiphenyl (PCB 44)	mg/kg	<0.01	0.01
2,2`,4,4`,5,5` - Hexachlorobiphenyl (PCB 153)	mg/kg	<0.01	0.01
2,2`,4,5,5` - Pentachlorobiphenyl (PCB 101)	mg/kg	<0.01	0.01
2,2`,5,5` - Tetrachlorobiphenyl (PCB 52)	mg/kg	<0.01	0.01
2,2`,5 - Trichlorobiphenyl (PCB 18)	mg/kg	<0.01	0.01
3,3`,4,4` - Tetrachlorobiphenyl (PCB 77)	mg/kg	<0.01	0.01
3,3`,4,4`,5 - Pentachlorobiphenyl (PCB 126)	mg/kg	<0.01	0.01
2,3`,4,4` - Tetrachlorobiphenyl (PCB 66)	mg/kg	<0.01	0.01
2,3`,4,4`,5 - Pentachlorobiphenyl (PCB 118)	mg/kg	<0.01	0.01
2,3,3`,4,4` - Pentachlorobiphenyl (PCB 105)	mg/kg	<0.01	0.01
2,4` - Dichlorobiphenyl (PCB 8)	mg/kg	<0.01	0.01

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Analytical Report

Job Ref. No. :	114850
Report No :	159019
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample Details

Job Ref. No.:	114850	**Sample ID:**	114850-8
Sample Sub Matrix:	Sediment	**Date Received:**	23/05/2022
Sampling Location:	Not Given	**Sampling Date:**	Not Given
Sampled By :	Client	**Sampling Time :**	Not Given
Sample Description:	WSQ-13-SED	**Sampling Method:**	Not Given

Test Results

Test Name	Units	Result	Method Limit of Detection
PCB's - Continued			
2,4,4` - Trichlorobiphenyl (PCB 28)	mg/kg	<0.01	0.01

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Analytical Report

Job Ref. No.	:	114850
Report No	:	159019
Date Reported :		03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample Details

Job Ref. No.:	114850	**Sample ID:**	114850-9
Sample Sub Matrix:	Sediment	**Date Received:**	23/05/2022
Sampling Location:	Not Given	**Sampling Date:**	Not Given
Sampled By :	Client	**Sampling Time :**	Not Given
Sample Description:	WSQ-14-SED	**Sampling Method:**	Not Given

Test Results

Test Name	Units	Result	Method Limit of Detection
Inorganic Parameters			
pH	pH units	8.6	0.1
Oil and Grease	%	<0.01	0.01
Total Nitrogen	mg/kg	1100	5
Silica-SiO2	% by wt	4.92	0.01
Total Cyanide	mg/kg	<0.5	0.5
Anions			
Orthophosphate	mg/kg	1.2	0.3
Fluoride	mg/kg	2.8	0.5
Sulphate (Acid Soluble)	%SO4	0.94	0.01
Chemical Analysis			
Total Organic Carbon	%	1.4	0.1
Metals			
Cadmium (Cd)	mg/kg	<0.2	0.5
Aluminium (Al)	mg/kg	2980	130
Arsenic (As)	mg/kg	4.8	1.0
Barium (Ba)	mg/kg	580	3.0
Chromium (Cr)	mg/kg	13.1	1.0
Copper (Cu)	mg/kg	5.7	3.0
Iron (Fe)	mg/kg	2830	70
Lead (Pb)	mg/kg	6.8	1.0
Manganese (Mn)	mg/kg	47.7	3.0
Molybdenum (Mo)	mg/kg	<3.0	3.0
Nickel (Ni)	mg/kg	11.4	1.0
Phosphorus (P)	mg/kg	590	50
Selenium (Se)	mg/kg	<3.0	3.0
Silver (Ag)	mg/kg	<10	10
Vanadium (V)	mg/kg	10.3	1.0
Zinc (Zn)	mg/kg	12.6	3.0
Antimony (Sb)	mg/kg	<1.0	1.0
Mercury (Hg)	mg/kg	0.018	0.010
Hydrocarbons			
VPH C5-C10	mg/kg	<0.05	0.05
EPH C10-C40	mg/kg	<50	50
PAH's			
Acenaphthene	mg/kg	<0.01	0.01

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Analytical Report

Job Ref. No. :	114850
Report No :	159019
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample Details

Job Ref. No.:	114850	**Sample ID:**	114850-9
Sample Sub Matrix:	Sediment	**Date Received:**	23/05/2022
Sampling Location:	Not Given	**Sampling Date:**	Not Given
Sampled By :	Client	**Sampling Time :**	Not Given
Sample Description:	WSQ-14-SED	**Sampling Method:**	Not Given

Test Results

Test Name	Units	Result	Method Limit of Detection
PAH's - Continued			
Acenaphthylene	mg/kg	<0.01	0.01
Anthracene	mg/kg	<0.01	0.01
Benzo(a)anthracene	mg/kg	<0.01	0.01
Benzo(a)pyrene	mg/kg	<0.01	0.01
Benzo(b)fluoranthene	mg/kg	<0.01	0.01
Benzo(g,h,i)perylene	mg/kg	<0.01	0.01
Benzo(k)fluoranthene	mg/kg	<0.01	0.01
Chrysene	mg/kg	<0.01	0.01
Dibenzo(a,h)anthracene	mg/kg	<0.01	0.01
Fluoranthene	mg/kg	<0.01	0.01
Fluorene	mg/kg	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.01	0.01
Naphthalene	mg/kg	<0.01	0.01
Phenanthrene	mg/kg	<0.01	0.01
Pyrene	mg/kg	<0.01	0.01
PCB's			
2,2\`,3,3\`,4,4\` - Hexachlorobiphenyl (PCB 128)	mg/kg	<0.01	0.01
2,2\`,3,3\`,4,4\`,5 - Heptachlorobiphenyl (PCB 170)	mg/kg	<0.01	0.01
2,2\`,3,3\`,4,4\`,5,5\`,6,6\` - Decachlorobiphenyl	mg/kg	<0.01	0.01
2,2\`,3,3\`,4,4\`,5,5\`,6-Nonachlorobiphenyl (PCB 206)	mg/kg	<0.01	0.01
2,2\`,3,3\`,4,4\`,5,6 - Octachlorobiphenyl (PCB 195)	mg/kg	<0.01	0.01
2,2\`,3,4\`,5,5',6 - Heptachlorobiphenyl (PCB 187)	mg/kg	<0.01	0.01
2,2\`,3,4,4\`,5\` - Hexachlorobiphenyl (PCB 138)	mg/kg	<0.01	0.01
2,2\`,3,4,4\`,5,5\` - Heptachlorobiphenyl (PCB 180)	mg/kg	<0.01	0.01
2,2\`,3,5\` - Tetrachlorobiphenyl (PCB 44)	mg/kg	<0.01	0.01
2,2\`,4,4\`,5,5\` - Hexachlorobiphenyl (PCB 153)	mg/kg	<0.01	0.01
2,2\`,4,5,5\` - Pentachlorobiphenyl (PCB 101)	mg/kg	<0.01	0.01
2,2\`,5,5\` - Tetrachlorobiphenyl (PCB 52)	mg/kg	<0.01	0.01
2,2\`,5 - Trichlorobiphenyl (PCB 18)	mg/kg	<0.01	0.01
3,3\`,4,4\` - Tetrachlorobiphenyl (PCB 77)	mg/kg	<0.01	0.01
3,3\`,4,4\`,5 - Pentachlorobiphenyl (PCB 126)	mg/kg	<0.01	0.01
2,3\`,4,4\` - Tetrachlorobiphenyl (PCB 66)	mg/kg	<0.01	0.01
2,3\`,4,4\`,5 - Pentachlorobiphenyl (PCB 118)	mg/kg	<0.01	0.01
2,3,3\`,4,4\` - Pentachlorobiphenyl (PCB 105)	mg/kg	<0.01	0.01
2,4\` - Dichlorobiphenyl (PCB 8)	mg/kg	<0.01	0.01

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Analytical Report

Job Ref. No. :	114850
Report No :	159019
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample Details

Job Ref. No.:	114850	**Sample ID:**	114850-9
Sample Sub Matrix:	Sediment	**Date Received:**	23/05/2022
Sampling Location:	Not Given	**Sampling Date:**	Not Given
Sampled By :	Client	**Sampling Time :**	Not Given
Sample Description:	WSQ-14-SED	**Sampling Method:**	Not Given

Test Results

Test Name	Units	Result	Method Limit of Detection
PCB's - Continued			
2,4,4` - Trichlorobiphenyl (PCB 28)	mg/kg	<0.01	0.01

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Analytical Report

Job Ref. No.	:	114850
Report No	:	159019
Date Reported :		03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample Details

Job Ref. No.:	114850	**Sample ID:**	114850-10
Sample Sub Matrix:	Sediment	**Date Received:**	23/05/2022
Sampling Location:	Not Given	**Sampling Date:**	Not Given
Sampled By :	Client	**Sampling Time :**	Not Given
Sample Description:	WSQ-15-SED	**Sampling Method:**	Not Given

Test Results

Test Name	Units	Result	Method Limit of Detection
Inorganic Parameters			
pH	pH units	8.4	0.1
Oil and Grease	%	0.01	0.01
Total Nitrogen	mg/kg	1240	5
Silica-SiO2	% by wt	3.46	0.01
Total Cyanide	mg/kg	<0.5	0.5
Anions			
Orthophosphate	mg/kg	2.3	0.3
Fluoride	mg/kg	3.6	0.5
Sulphate (Acid Soluble)	%SO4	0.95	0.01
Chemical Analysis			
Total Organic Carbon	%	1.1	0.1
Metals			
Cadmium (Cd)	mg/kg	<0.2	0.5
Aluminium (Al)	mg/kg	2160	130
Arsenic (As)	mg/kg	3.8	1.0
Barium (Ba)	mg/kg	768	3.0
Chromium (Cr)	mg/kg	10.3	1.0
Copper (Cu)	mg/kg	5.3	3.0
Iron (Fe)	mg/kg	2200	70
Lead (Pb)	mg/kg	8.9	1.0
Manganese (Mn)	mg/kg	35.9	3.0
Molybdenum (Mo)	mg/kg	<3.0	3.0
Nickel (Ni)	mg/kg	8.6	1.0
Phosphorus (P)	mg/kg	529	50
Selenium (Se)	mg/kg	<3.0	3.0
Silver (Ag)	mg/kg	<10	10
Vanadium (V)	mg/kg	8.6	1.0
Zinc (Zn)	mg/kg	11.9	3.0
Antimony (Sb)	mg/kg	<1.0	1.0
Mercury (Hg)	mg/kg	0.019	0.010
Hydrocarbons			
VPH C5-C10	mg/kg	<0.05	0.05
EPH C10-C40	mg/kg	<50	50
PAH's			
Acenaphthene	mg/kg	<0.01	0.01

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Analytical Report

Job Ref. No. : 114850
Report No : 159019
Date Reported : 03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample Details

Job Ref. No.:	114850	**Sample ID:**	114850-10
Sample Sub Matrix:	Sediment	**Date Received:**	23/05/2022
Sampling Location:	Not Given	**Sampling Date:**	Not Given
Sampled By :	Client	**Sampling Time :**	Not Given
Sample Description:	WSQ-15-SED	**Sampling Method:**	Not Given

Test Results

Test Name	Units	Result	Method Limit of Detection
PAH's - Continued			
Acenaphthylene	mg/kg	<0.01	0.01
Anthracene	mg/kg	<0.01	0.01
Benzo(a)anthracene	mg/kg	<0.01	0.01
Benzo(a)pyrene	mg/kg	<0.01	0.01
Benzo(b)fluoranthene	mg/kg	<0.01	0.01
Benzo(g,h,i)perylene	mg/kg	<0.01	0.01
Benzo(k)fluoranthene	mg/kg	<0.01	0.01
Chrysene	mg/kg	<0.01	0.01
Dibenzo(a,h)anthracene	mg/kg	<0.01	0.01
Fluoranthene	mg/kg	<0.01	0.01
Fluorene	mg/kg	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.01	0.01
Naphthalene	mg/kg	<0.01	0.01
Phenanthrene	mg/kg	<0.01	0.01
Pyrene	mg/kg	<0.01	0.01
PCB's			
2,2`,3,3`,4,4` - Hexachlorobiphenyl (PCB 128)	mg/kg	<0.01	0.01
2,2`,3,3`,4,4`,5 - Heptachlorobiphenyl (PCB 170)	mg/kg	<0.01	0.01
2,2`,3,3`,4,4`,5,5`,6,6` - Decachlorobiphenyl	mg/kg	<0.01	0.01
2,2`,3,3`,4,4`,5,5`,6-Nonachlorobiphenyl (PCB 206)	mg/kg	<0.01	0.01
2,2`,3,3`,4,4`,5,6 - Octachlorobiphenyl (PCB 195)	mg/kg	<0.01	0.01
2,2`,3,4`,5,5',6 - Heptachlorobiphenyl (PCB 187)	mg/kg	<0.01	0.01
2,2`,3,4,4`,5` - Hexachlorobiphenyl (PCB 138)	mg/kg	<0.01	0.01
2,2`,3,4,4`,5,5` - Heptachlorobiphenyl (PCB 180)	mg/kg	<0.01	0.01
2,2`,3,5` - Tetrachlorobiphenyl (PCB 44)	mg/kg	<0.01	0.01
2,2`,4,4`,5,5` - Hexachlorobiphenyl (PCB 153)	mg/kg	<0.01	0.01
2,2`,4,5,5` - Pentachlorobiphenyl (PCB 101)	mg/kg	<0.01	0.01
2,2`,5,5` - Tetrachlorobiphenyl (PCB 52)	mg/kg	<0.01	0.01
2,2`,5 - Trichlorobiphenyl (PCB 18)	mg/kg	<0.01	0.01
3,3`,4,4` - Tetrachlorobiphenyl (PCB 77)	mg/kg	<0.01	0.01
3,3`,4,4`,5 - Pentachlorobiphenyl (PCB 126)	mg/kg	<0.01	0.01
2,3`,4,4` - Tetrachlorobiphenyl (PCB 66)	mg/kg	<0.01	0.01
2,3`,4,4`,5 - Pentachlorobiphenyl (PCB 118)	mg/kg	<0.01	0.01
2,3,3`,4,4` - Pentachlorobiphenyl (PCB 105)	mg/kg	<0.01	0.01
2,4` - Dichlorobiphenyl (PCB 8)	mg/kg	<0.01	0.01

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Analytical Report

Job Ref. No. :	114850
Report No :	159019
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample Details

Job Ref. No.:	114850	**Sample ID:**	114850-10
Sample Sub Matrix:	Sediment	**Date Received:**	23/05/2022
Sampling Location:	Not Given	**Sampling Date:**	Not Given
Sampled By :	Client	**Sampling Time :**	Not Given
Sample Description:	WSQ-15-SED	**Sampling Method:**	Not Given

Test Results

Test Name	Units	Result	Method Limit of Detection
PCB's - Continued			
2,4,4` - Trichlorobiphenyl (PCB 28)	mg/kg	<0.01	0.01

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Analytical Report

Job Ref. No.	:	114850
Report No	:	159019
Date Reported :		03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample Details

Job Ref. No.:	114850	**Sample ID:**	114850-11
Sample Sub Matrix:	Sediment	**Date Received:**	23/05/2022
Sampling Location:	Not Given	**Sampling Date:**	Not Given
Sampled By :	Client	**Sampling Time :**	Not Given
Sample Description:	WSQ-17-SED	**Sampling Method:**	Not Given

Test Results

Test Name	Units	Result	Method Limit of Detection
Inorganic Parameters			
pH	pH units	7.8	0.1
Oil and Grease	%	<0.01	0.01
Total Nitrogen	mg/kg	988	5
Silica-SiO2	% by wt	2.19	0.01
Total Cyanide	mg/kg	<0.5	0.5
Anions			
Orthophosphate	mg/kg	6.4	0.3
Fluoride	mg/kg	<0.5	0.5
Sulphate (Acid Soluble)	%SO4	0.74	0.01
Chemical Analysis			
Total Organic Carbon	%	0.9	0.1
Metals			
Cadmium (Cd)	mg/kg	<0.2	0.5
Aluminium (Al)	mg/kg	371	130
Arsenic (As)	mg/kg	2.8	1.0
Barium (Ba)	mg/kg	162	3.0
Chromium (Cr)	mg/kg	2.9	1.0
Copper (Cu)	mg/kg	<3.0	3.0
Iron (Fe)	mg/kg	445	70
Lead (Pb)	mg/kg	5.5	1.0
Manganese (Mn)	mg/kg	15.9	3.0
Molybdenum (Mo)	mg/kg	<3.0	3.0
Nickel (Ni)	mg/kg	1.8	1.0
Phosphorus (P)	mg/kg	385	50
Selenium (Se)	mg/kg	<3.0	3.0
Silver (Ag)	mg/kg	<10	10
Vanadium (V)	mg/kg	3.5	1.0
Zinc (Zn)	mg/kg	7.8	3.0
Antimony (Sb)	mg/kg	<1.0	1.0
Mercury (Hg)	mg/kg	<0.010	0.010
Hydrocarbons			
VPH C5-C10	mg/kg	<0.05	0.05
EPH C10-C40	mg/kg	<50	50
PAH's			
Acenaphthene	mg/kg	<0.01	0.01

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Analytical Report

Job Ref. No. :	114850
Report No :	159019
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Sample Details

Job Ref. No.:	114850	**Sample ID:**	114850-11
Sample Sub Matrix:	Sediment	**Date Received:**	23/05/2022
Sampling Location:	Not Given	**Sampling Date:**	Not Given
Sampled By :	Client	**Sampling Time :**	Not Given
Sample Description:	WSQ-17-SED	**Sampling Method:**	Not Given

Test Results

Test Name	Units	Result	Method Limit of Detection
PAH's - Continued			
Acenaphthylene	mg/kg	<0.01	0.01
Anthracene	mg/kg	<0.01	0.01
Benzo(a)anthracene	mg/kg	<0.01	0.01
Benzo(a)pyrene	mg/kg	<0.01	0.01
Benzo(b)fluoranthene	mg/kg	<0.01	0.01
Benzo(g,h,i)perylene	mg/kg	<0.01	0.01
Benzo(k)fluoranthene	mg/kg	<0.01	0.01
Chrysene	mg/kg	<0.01	0.01
Dibenzo(a,h)anthracene	mg/kg	<0.01	0.01
Fluoranthene	mg/kg	<0.01	0.01
Fluorene	mg/kg	<0.01	0.01
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.01	0.01
Naphthalene	mg/kg	<0.01	0.01
Phenanthrene	mg/kg	<0.01	0.01
Pyrene	mg/kg	<0.01	0.01
PCB's			
2,2`,3,3`,4,4` - Hexachlorobiphenyl (PCB 128)	mg/kg	<0.01	0.01
2,2`,3,3`,4,4`,5 - Heptachlorobiphenyl (PCB 170)	mg/kg	<0.01	0.01
2,2`,3,3`,4,4`,5,5`,6,6` - Decachlorobiphenyl	mg/kg	<0.01	0.01
2,2`,3,3`,4,4`,5,5`,6-Nonachlorobiphenyl (PCB 206)	mg/kg	<0.01	0.01
2,2`,3,3`,4,4`,5,6 - Octachlorobiphenyl (PCB 195)	mg/kg	<0.01	0.01
2,2`,3,4`,5,5',6 - Heptachlorobiphenyl (PCB 187)	mg/kg	<0.01	0.01
2,2`,3,4,4`,5` - Hexachlorobiphenyl (PCB 138)	mg/kg	<0.01	0.01
2,2`,3,4,4`,5,5` - Heptachlorobiphenyl (PCB 180)	mg/kg	<0.01	0.01
2,2`,3,5` - Tetrachlorobiphenyl (PCB 44)	mg/kg	<0.01	0.01
2,2`,4,4`,5,5` - Hexachlorobiphenyl (PCB 153)	mg/kg	<0.01	0.01
2,2`,4,5,5` - Pentachlorobiphenyl (PCB 101)	mg/kg	<0.01	0.01
2,2`,5,5` - Tetrachlorobiphenyl (PCB 52)	mg/kg	<0.01	0.01
2,2`,5 - Trichlorobiphenyl (PCB 18)	mg/kg	<0.01	0.01
3,3`,4,4` - Tetrachlorobiphenyl (PCB 77)	mg/kg	<0.01	0.01
3,3`,4,4`,5 - Pentachlorobiphenyl (PCB 126)	mg/kg	<0.01	0.01
2,3`,4,4` - Tetrachlorobiphenyl (PCB 66)	mg/kg	<0.01	0.01
2,3`,4,4`,5 - Pentachlorobiphenyl (PCB 118)	mg/kg	<0.01	0.01
2,3,3`,4,4` - Pentachlorobiphenyl (PCB 105)	mg/kg	<0.01	0.01
2,4` - Dichlorobiphenyl (PCB 8)	mg/kg	<0.01	0.01

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Analytical Report

Job Ref. No. :	114850
Report No :	159019
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK
Asst. Laboratory Manager–Chemistry & Microbiology

Sample Details

Job Ref. No.:	114850	**Sample ID:**	114850-11
Sample Sub Matrix:	Sediment	**Date Received:**	23/05/2022
Sampling Location:	Not Given	**Sampling Date:**	Not Given
Sampled By :	Client	**Sampling Time :**	Not Given
Sample Description:	WSQ-17-SED	**Sampling Method:**	Not Given

Test Results

Test Name	Units	Result	Method Limit of Detection
PCB's - Continued			
2,4,4` - Trichlorobiphenyl (PCB 28)	mg/kg	<0.01	0.01

Method of Analysis

Method Name	Reference
Cyanide [Modified USEPA method OIA-1667 - Subcontract]-DXB	USEPA [Method OIA-1667]
EPH C10-C40 by GC-FID [EPA 8015B] SSS-DXB	EPA [8015B]
Fluoride [HACH 8029]-DXB	HACH [8029]
Mercury by PSA [EPA 245.7] SSS-DXB	EPA [245.7]
	EPA [245.7]
Metals ICP OES [APHA 3120 B] SSS-DXB	APHA [3120 B]
	APHA [3120 B]
Nitrogen (Total) [APHA 4500 Norg B] Solids-DXB	APHA [4500 Norg B]
Oil & Grease [APHA 5520 E]-DXB	APHA [5520 E]
Orthophosphate [HACH 8048]-DXB	HACH [8048]
PAH in Soils [EPA 8270 D]-DXB	EPA [8270 D]
PCB [EPA 8270D] Solids-DXB	EPA [8270 D]
pH [BS 1377-3: 2018] Soil-DXB	BS [1377-3: 2018]
Silica-SiO2 [ASTM C146]-DXB	ASTM [C146]
Sulphate (Acid Soluble)[BS 1377-3: 2018] Soil-DXB	BS [1377-3: 2018]
Total Organic Carbon [MOOPAM IV.4]-DXB	MOOPAM [IV.4]
VPH C5-C10 by GC-FID [EPA 8015B]-SSS-DXB	EPA [8015B]

Comments:

· Tested By : AAP, EMA, GAN, JCH, JRE, NHA, SMO
· Date Tested: 25/05/2022 to 03/06/2022

. Please note that all tests shown not containing the `AUH` extension are subcontracted to Element group of laboratories.

. Please note that if the sample has to be diluted due to the matrix, the reported Limit of Detection (LOD) value will increase from the method LOD.

. Any APHA methods stated herein are documented in-house procedures, referenced to 23rd edition.

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Analytical Report

Job Ref. No. :	114850
Report No :	159019
Date Reported :	03/06/2022

Client:	WKC Middle East Environment Consultancy P.O Box: 130627 ABU DHABI, United Arab Emirates
Attn:	Adrian Evans
Project ID:	Sediment-Lightning
Project Name:	WKC Middle East Environment Consultancy
Project Location:	N/A
Tel. No:	971 (0)2 644 5224

Approved by: Saji SK

Asst. Laboratory Manager–Chemistry & Microbiology

Appendix 3 – Material Safety Data Sheet (Not Applicable)

Appendix 4 – Terms of Reference

Anthesis

Appendix 4.1 – Anthesis Scoping Letter to EAD

Anthesis

Anthesis

Our Ref:210923/EAD/1176/1

27 September 2021

Mr. Ibrahim Jaber Al Ali
Unit Head - Environmental Assessment Environment Quality
Environment Agency Abu Dhabi
P.O. Box 45553
Al Mamoura Building
Abu Dhabi

Dear Mr. Jaber Al Ali

Project Lightning: Proposed Scope for Additional Baseline Data Collection

We would like to extend our thanks for your attendance and comments on the presentation provided by Anthesis regarding Project Lightning on 21st September 2021. Further to this meeting, and as discussed, we set out below our intentions will the submittal of the attached Scoping Document.

Anthesis have been appointed by EDF (as part of the EDF-KEPCO-KYUDEN Consortium) as Environmental Consultants responsible for undertaking the Environmental and Social Impact Assessment for the proposed Project Lightning.

The Project briefly involves the supply of power from the Abu Dhabi utility grid network from Abu Dhabi Transmission and Dispatch Company (TRANSCO) to the Abu Dhabi offshore oil and gas facilities (ADNOC) to Das Island and Lower Zakum clusters. The power supply will consist of two high voltage direct current (HVDC) sub-sea transmission links to supply power from the Al Mirfa power complex to Al Ghallan Island within the Lower Zakum Cluster (known as Route 1) and Shuweihat power complex to Das artificial island (known as Route 2).

Further to the environmental studies previously undertaken for Project Lightning, Anthesis have reviewed the Gap Analysis Report prepared by Mott MacDonald in April 2021 (AD41-90.0/27/26-G-25301, Rev. 02), and on the basis of the information identified within this report as being still outstanding, have prepared a technical scoping note to outline our proposed approach for undertaking the required baseline surveys.

Please therefore find attached the technical scoping note, for which we would be grateful of your review, comments and approval, to enable the ESIA process to progress.

Yours sincerely,

Simon Pickup
Managing Director

PO Box 392563, Dubai, United Arab Emirates
Tel: +971 04 2778007| Fax: +971 04 2778006 | website: www.anthesisgroup.com

PROJECT LIGHTNING SCOPING DOCUMENT

Proposed ESIA Baseline Methodology

27th September 2021

1. INTRODUCTION

Anthesis have been appointed as Environmental Consultant responsible for the preparation of an Environmental & Social Impact Assessment (ESIA) for Project Lightning by a Consortium comprising KEPCO, EDF and Kyushu. Anthesis will be working in conjunction with WKC, marine specialists responsible for marine water and ecology impact assessment and marine modelling associated with the Project.

A number of baseline studies have recently been commissioned by ADNOC and undertaken by Mott MacDonald, Fugro and Nautica in support of Project Lightning. Anthesis has undertaken a review of these documents, and specifically the Gap Analysis Report prepared by Mott MacDonald in April 2021 (AD41-90.0/27/26-G-25301, Rev. 02) which identifies the existing and relevant baseline information available and subsequently areas where data is lacking. It is understood that the Gap Analysis Report has been accepted and approved by EAD and is to be considered as the Terms of Reference (ToR) for Project Lightning (please refer to **Section 3** below for Anthesis' responses to EAD comments on the Gap Analysis Report).

Whilst the Gap Analysis Report defines where additional data need to be collected and which impact assessments will be required, this does not provide detail on the actual approaches which will be adopted as part of the ESIA. This scoping document has therefore been prepared to supplement the Gap Analysis Report with the intention of providing EAD with:

- A detailed methodology for baseline investigations as identified within the Gap Analysis Report; and
- A detailed methodology for impact assessments identified within the Gap Analysis Report.

It is intended that the EAD would provide feedback on the methodologies set out herein to ensure that all parties fully agree with the scope which will ultimately be implemented as part of the ESIA.

2. PROJECT OVERVIEW

The Project involves the supply of power from the Abu Dhabi utility grid network from Abu Dhabi Transmission and Dispatch Company (TRANSCO) to the Abu Dhabi National Oil Company (ADNOC) offshore oil and gas facilities at Das Island and the Lower Zakum Cluster. The power supply will consist of two high voltage direct current (HVDC) sub-sea transmission links to supply power from the Al Mirfa power complex to Al Ghallan Island within the Lower Zakum Cluster (known as Route 1) and Shuweihat power complex to Das artificial island (known as Route 2).

3. RESPONSE TO EAD COMMENTS ON MOTT MACDONALD GAP ANALYSIS REPORT

Further to EAD comments made in relation to the Gap Analysis Report prepared by Mott MacDonald in April 2021 (AD41-90.0/27/26-G-25301, Rev. 02), please see our responses below in Table 3-1. These comments and responses will be integrated within the ESIA.

Table 3-1 Response to EAD Comments on Mott MacDonald Gap Analysis

EAD Comment	Anthesis Response
The most sensitive path of the Zakum cable from Mirfa power plant passes through the MMBR. EIA must address (a) why a deviated route cannot be considered, (b) seasonality, duration etc. of the operational aspect of the Project for the MMBR patch of the route, (c) impact of the Project within and outside of the MMBR.	Noted and agreed. Consultations will be undertaken with ADNOC relating to initial route selection and this will be reviewed following the results of marine modelling and impact assessments and appropriate mitigation measures will be presented.
Please review and follow the EAD TGD for hydrodynamic modelling (EAD-EQ-PR-TG-13) and TGD for Dredging and Reclamation in Abu Dhabi Emirate (EAD-EQ-PR-TG-12). Both TGDs can be found on: https://eservices.ead.ae/en/web/guest/info-center	Noted. WKC are very familiar with undertaking hydrodynamic modelling and associated assessments within Abu Dhabi Emirate and will incorporate all requirements specified within these documents.
The bathymetry survey is required to calibrate and validate the HDM and the bathymetry should cover the edge of the maximum potential impacts (worst case scenario(s)) of sediments dispersion during dredging and reclamation.	Noted. This will be included within the bathymetry data collection process.
2 ADCPs must be installed in parallel for 15 days minimum for each route.	Please note that only one marine model will be developed covering both routes simultaneously. We therefore propose to install one ADCP for each route only (2 in total), for 15 days. It is proposed that it will not be necessary to install two per route since one overarching model will be developed to cover the entire Project area i.e. both cable routes, and as such it is considered that 2 ADCPs to cover the wider Project area will be sufficient.
Animation videos for the model must be provided	Noted. These will be provided.

EAD Comment	Anthesis Response
The mesh growth rate should not exceed 10% to make sure it works efficiently.	Agreed. However, please note that mesh growth rate restriction of 10% is not applicable for flexible mesh models. This will be explained within the report. However, please note the below: During initial hydrodynamic simulation testing, the mesh size is varied in order to ensure model stability and accuracy. Once the model is proved to be stable, the mesh size is reduced to conclude if accuracy is improved by reducing the mesh size. WKC generally follows DHI guidelines on limiting scaling between mesh transitions by a factor of 4 to 10. Reference: (https://manuals.mikepoweredbydhi.help/2017/General/Mesh_Generator_Step_by_Step.pdf). This factor has been recommended to ensure mathematical stability for MIKE software specifically. 'Mesh growth size' is approached differently in different software. These other software (e.g. Delft3D) will require a different approach to mesh generation to ensure stability considering the different mathematics within the software. The EAD guidance specifies 'a maximum growth rate of 10% in the mesh size', however, using MIKE stability can be achieved outside of these bounds. This rate appears to match the default used in Delft (https://content.oss.deltares.nl/delft3d/manuals/RGFGRID_User_Manual.pdf). Although, please note that WKC only uses DHI's MIKE modelling suite.
The sensitivity test for the mesh size must be provided.	Please see response above.

4. ESIA COMPLIANCE

The ESIA will be developed to obtain approvals from a number of Abu Dhabi Regulatory Authorities as follows:

- Environment Agency Abu Dhabi (EAD);
- ADNOC HSE Division; and
- Abu Dhabi Tourism and Culture Authority (ADTCA).

The ESIA will also be developed to demonstrate compliance with IFC Performance Standards and EHS Guidelines, Equator Principles and other recognised International Best Practice Guidelines, to meet with the requirements of:

- Japanese Bank for International Cooperation (JBIC); and
- Other Lenders as required.

5. SENSITIVE RECEPTORS

5.1.1. General Project Site Overview

Figure 5-1 below provides an overview of the extent of the entire Project area including both cable corridors (Route 1 and Route 2) and protected areas within the surrounding areas. Initially, it is proposed that the following study areas, or areas of potential impact, are considered:

- 30km within the marine environment – this area has been selected as there is the potential for widespread transport of sediments from marine construction activities and longer range marine noise impacts (illustrated in Figure 5-1); and
- 2km for onshore areas – this area has been selected as construction impacts such as noise, dust etc. would not be expected beyond this distance (illustrated in Figure 5-2 and Figure 5-3 for Mirfa and Shuweihat, respectively).

These study areas will be refined and amended as necessary based upon the initial results of impact assessments (for example sediment transport within the marine model).

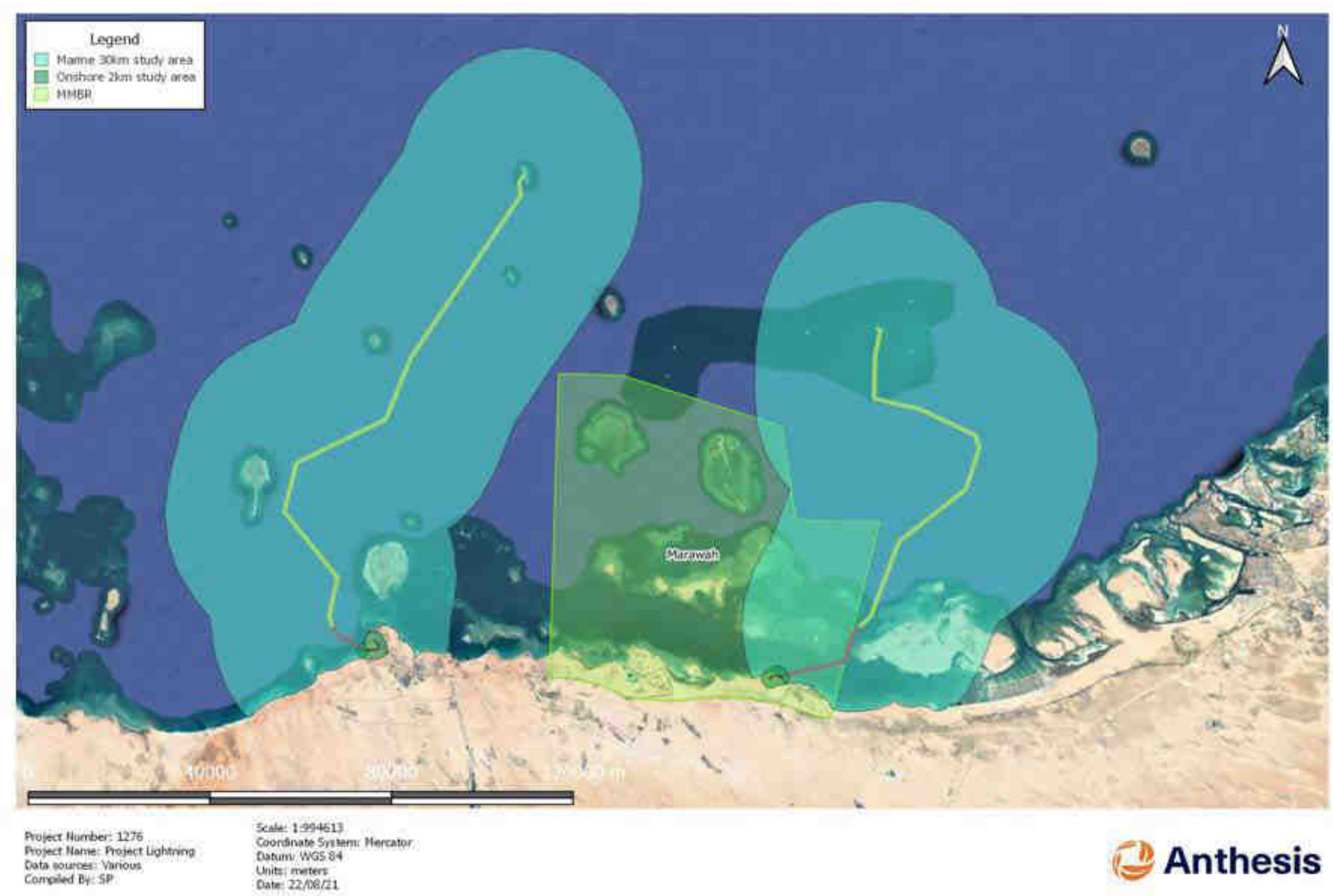


Figure 5-1: Project Study Area Overview and Marawah Marine Biosphere Reserve

Figure 5-2: Mirfa Onshore Study Area

27th September 2021

Figure 5-3: Shuweihat Onshore Study Area

5.1.2. Route 1 – Mirfa

The following key sensitive receptors will require consideration as part of the ESIA:

- Marine ecology, particularly:
  - Marawah Marine Biosphere Reserve (Route 1);
  - Potentially present nationally critical habitats, including:
    - Coral reef;
    - Seagrass;
    - Mudflats and sand/tidal flats;
    - Saltmarsh;
    - Mangrove habitats;
    - Sand sheets and dunes;
  - Potentially present nationally environmentally sensitive habitats, including:
    - Sheltered tidal flat with cyanobacterial mats;
    - Storm ridge beaches;
    - Coastal cliffs, headlands, rocky slopes and wadis in coastal situations;
    - Coastal sand sheets and low dunes;
    - Coastal sabkha, including sabkha matti; and
    - Beach rock and gravelly beaches.
- Species of conservation concern, including but not limited to:
  - Dugong (*Dugong dugon*);
  - Hawksbill turtle (*Eretmochelys imbricata*);
  - Green sea turtle (*Chelonia mydas*);
  - Olive ridley turtle (*Lepidochelys olivacea*);
  - Loggerhead turtle (*Caretta caretta*);
  - Indian ocean humpback dolphin (*Sousa plumea*);
  - Whale shark (*Rhincodon typus*);
  - Indo-pacific finless porpoise (*Neophocaena phocaenoides*);
  - Whitecheek shark (*Carcharhinus dussumieri*);
  - Smoothtooth blacktip shark (*Carcharhinus leiodon*);
  - Longhorned pygmy devil ray (*Mobula eregoodoo*);
  - Ocellate eagle ray (*Aetomylaeus milvus*);
  - Sharpnose guitarfish (*Glaucostegus granulatus*);
  - Halavi guitarfish (*Glaucostegus halavi*);
  - Daisy parrotfish (*Chlorurus sordidus*);
  - Green sawfish (*Pristis zijsron*);
  - Reticulate goby (*Gobiodon reticulatus*);
  - Thinstripe wrasee (*Halichoeres leptotaenia*); and
  - Other marine species.
- Numerous bird species including Socotra cormorant (*Phalacrocorax nigrogularis*), Sociable lapwing (*Vanellus gregarius)* and Great Knot (*Calidris tenuirostris*);
- Marine water quality;
- Cultural heritage sites;
- Coastal viewsheds valuable to recreational and touristic locations in the Western Region coastline;
- Local residents and fishermen of coastal towns and individual dwellings on coastal islands;

- Workers on oil and gas offshore islands/facilities; and
- Construction workers employed by the Project.

Additionally, as identified within Figure 5-4 below, a number of specific potential sensitive receptors are associated with Route 1 at the landfall area adjacent to Mirfa. These will require verification following site surveys, although initial identification suggests that these sensitive receptors include:

- Residential areas;
- Mangrove areas;
- Mirfa Hotel;
- Unidentified hotel;
- camping ground;
- Mirfa Park; and
- Mirfa Harbour.

Figure 5-4: Sensitive Receptors at Mirfa

5.1.3. Route 2 – Shuweihat

The landfall location of the cable route at Shuweihat appears to contain fewer potential sensitive receptors which are listed below and are illustrated in Figure 5-5, however this will require verification following completion of site surveys:

- Mangrove/creek areas within the cable route landfall area; and
- Worker's accommodation to the north of Shuweihat Power Complex.

Figure 5-5 Sensitive Receptors at Shuweihat

6. SUMMARY OF KEY POTENTIAL IMPACTS

Given the nature of the Project, the key potential impacts are predicted to occur during the construction phase, with either very limited negative or positive impacts predicted during the operational phase. The anticipated key impacts, as identified at this early stage, are presented below in Table 6-1.

Table 6-1: Potential Impacts

Receptor	Construction Impacts	Operational Impacts
Marawah Marine Biosphere Reserve	– Direct impacts upon Transition Zone through loss of habitats and disturbance to species – Indirect impacts resulting from sediment plumes and construction noise	– Likely to be very limited following reinstatement
Critical habitats, including reef, seagrass, mudflats and sand, tidal flats, saltmarsh and mangrove habitats	– Direct impacts through loss of habitats within footprint of cable route – Indirect impacts resulting from sediment plumes	– Likely to be very limited following reinstatement
Species of conservation concern, including: Dugong, Turtles and other marine species, Avifauna	– Direct impacts through loss of habitats and disturbance to species – Indirect impacts resulting from sediment plumes and construction noise	– Likely to be very limited following reinstatement
Marine water quality	– Impacts upon water quality from dredging – Mobilisation of contaminants within sediments, if present – Accidental spillages	– No impacts predicted
Cultural heritage sites	– Direct loss of known heritage sites, if present – Impacts to setting of known heritage sites, if present – Chance finds of unknown buried remains	– No impacts predicted
Coastal viewsheds	– Impacts upon landscape character and / or views of sensitive receptors	– Limited impacts are likely only

Receptor	Construction Impacts	Operational Impacts
Local residents and fishermen	– May be subject to community nuisance impacts and impacts upon livelihoods – Possible employment or economic opportunities	– No negative impacts predicted – Possible employment or economic opportunities
Workers on oil and gas	– May be subject to nuisance from construction activities	– No impacts predicted
Construction workers employed by the Project	– Health and Safety impacts – Employment and working conditions	– Health and Safety impacts – Employment and working conditions

7. SUMMARY OF PROPOSED APPROACH FOR ESIA METHODOLOGY

Table 7-1 below provides a summary of the existing baseline data available, the identified gaps in the baseline data and a summary of the required surveys to fill these data gaps for each technical aspect of the ESIA, in consideration of the information provided within the Gap Analysis Report. In addition, a brief summary of the proposed impact assessment methodology is provided for each technical aspect.

Appendix A provides further details relating to the proposed scope for technical aspects requiring extensive additional baseline surveys.

Table 7-1: Summary of Existing Baseline Data, Proposed Baseline Data Collection and Impact Assessment Methodology for the ESIA

Aspect	Existing Baseline Information	Summary of Baseline Data Gaps Identified	Proposed Additional Baseline Studies	Proposed Impact Assessment Methodology
Marine				
Marine Water	MEBS are available for significant sections of both route corridors, undertaken by Fugro in 2021. The data is recent and considered applicable for consideration within the ESIA.	MEBS data gaps identified within nearshore areas of both route corridors, in addition to shallow areas areas of MMBR (Route 1) and the new Zakum Cluster Re-route (Route 1).	Additional MEBS are proposed to be undertaken in those areas identified to have baseline data gaps and will briefly include: 1) Nearshore areas Route 1 and Route 2: - Water quality sampling; - Sediment sampling; - Benthic ecology surveys; - Fish survey; - Underwater noise; and - Infauna sampling. 2) Fugro sampling gaps: - Sediment quality sampling; - Benthic ecology surveys; - Fish survey; - Benthic infauna; - Underwater noise. 3) Zakum re-route corridor: - Water quality sampling; - Sediment sampling; and - Benthic ecology. Please refer to **Appendix A, Section 1** for full details of the proposed baseline survey methodologies for these areas.	**Construction** The key impacts are anticipated to occur during the construction phase. A quantitative assessment of impacts during construction will be undertaken using the MIKE software suite, specifically: • Hydrodynamic Modelling; and • Dredging Impact Assessment. This will be used to determine the extent and potential impact of the dredge plume within the water column. Appropriate mitigation measures will be provided on the basis of the modelling outcomes. **Operation** No significant impacts are anticipated during operation; nevertheless, the results of the hydrodynamic modelling will be used to determine any changes to the hydrodynamic regime (currents, erosion, deposition etc.) and therefore any requirements for mitigation.
Marine Ecology – benthic habitats	Benthic Habitats: – MEBS and geophysical reports available for significant sections of both route corridors. Marine mammals, reptiles and fish: – Some data provided in relation to Das Island but reports are outdated (Dome, 2012, Blue Sea, 2009)	Benthic Habitats: – MEBS data gaps within nearshore areas of both route corridors. Marine mammals, reptiles and fish: – No existing data for wider offshore areas.	Additional MEBS methodology will briefly include: 1) Nearshore areas Route 1 and Route 2: - Water quality sampling; - Sediment sampling; - Benthic ecology; - Fish survey; - Underwater noise; and - Infauna sampling. 2) Fugro sampling gaps: - Sediment quality; - Benthic ecology; - Fish survey; - Benthic infauna; - Underwater noise. 3) Zakum re-route corridor: - Water quality sampling; - Sediment sampling; and - Benthic ecology.	**Construction** The key impacts are anticipated to occur during the construction phase. The results of the marine ecology surveys will be used to determine the following: • The presence of protected marine species and habitats of conservation concern; • The potential extent of direct impacts upon sensitive benthic habitats such as corals and seagrasses; • The potential extent of dredge plume impacts in the wider area upon sensitive benthic habitats such as corals and seagrasses, based upon dredge plume modelling; • Risks for sensitive marine fauna such as dugong, turtles associated with increased noise levels and risk of collision with vessels; and • Appropriate mitigation and / or compensation measures.

Aspect	Existing Baseline Information	Summary of Baseline Data Gaps Identified	Proposed Additional Baseline Studies	Proposed Impact Assessment Methodology
			Please refer to **Appendix A, Section 1** for full details of the proposed baseline survey methodologies for these areas. No further baseline surveys are proposed for offshore areas outside of those mentioned above in relation to marine ecology, since it is considered that most key impacts will arise within the most sensitive areas (nearshore areas and MMBR) which will also likely experience greater impacts as a result of proposed dredging in these areas. Please refer to **Appendix A, Section 6** for proposed consultations relating to fisheries etc.	**Operation** No significant impacts are anticipated during operation; nevertheless, the results of the hydrodynamic modelling will be used to determine any changes to the hydrodynamic regime (currents, erosion, deposition etc.), which could impact upon the existing conditions and therefore alter the ecological composition of areas.
Intertidal				
Intertidal Ecology – mangroves and coastal sabkha	Limited intertidal, mangrove and coastal areas surveyed by Nautica in 2021 with baseline reports prepared for Mirfa, Shuweihat and Das Island.	Baseline ecological surveys undertaken by Nautica in relation to the nearshore coastal/intertidal areas within the vicinity of the landfall points at both Mirfa (Route 1), Shuweihat (Route 2) and Das Island provide a good overview of the general site ecology, however, the following gaps have been identified: • Methodology presented is not replicable for seasonal surveys; • Mangrove study not detailed enough to assess impacts on mangroves; • No bird vantage point counts; • Locations of transects not provided; and • Resolution of report not sufficient for an ESIA, but provides a good overview.	In order to provide a detailed intertidal ecological baseline, it is proposed that the following surveys are completed at Mirfa, Shuweihat and Das Island for both summer and winter seasons: • Habitat and vegetation surveys; • Mangrove surveys (including estimate of individuals); • Night-time fauna surveys – Sherman and camera traps; and • Vantage point bird surveys. Please refer to **Appendix A, Section 2** for full details of the proposed baseline survey methodologies for these areas. **No further terrestrial ecology surveys are considered to be necessary at Das Island, nor is it considered necessary to conduct surveys at Al Ghallan Island as this is also recently reclaimed.**	**Construction** The results of the seasonal terrestrial ecology surveys will be used to undertake an Ecological Impact Assessment which will be used to determine the following: • The presence of protected species of conservation concern and the potential extent of impact; • Identification of the potential impacts (local, national and regional) associated with the proposed construction works and operational activities; • Determination of the impact significance prior and following mitigation measures; and • The requirement for any mitigation or compensation measures to meet with EAD and the requirements of IFC / Equator Principles. **Operation** No significant impacts are anticipated during operation and therefore is proposed that a detailed assessment is scoped out of the ESIA.

Aspect	Existing Baseline Information	Summary of Baseline Data Gaps Identified	Proposed Additional Baseline Studies	Proposed Impact Assessment Methodology
Terrestrial				
Terrestrial Ecology – Onshore areas	Onshore terrestrial areas surveyed by Nautica in 2021 with baseline reports prepared for Mirfa, Shuweihat and Das Island. These baseline ecological surveys undertaken by Nautica provide a good overview of the general site ecology (refer to **Appendix A, Section 3**).	The only gaps relate to intertidal ecology (see point above).	It is considered that the onshore terrestrial surveys undertaken by Nautica are sufficient to enumerate the existing terrestrial ecological baseline conditions within Mirfa and Shuweihat and satisfy the requirements of EAD. No further surveying of the onshore terrestrial areas is considered necessary. Ecological baseline surveys undertaken at Das Island by Nautica on behalf of Mott MacDonald identify that whilst there are a few limited sensitivities within the island, the Project landfall tie in area is recently reclaimed land with few sensitive receptors. No further terrestrial ecology surveys are considered to be necessary at Das Island, nor is it considered necessary to conduct surveys at Al Ghallan Island as this is also recently reclaimed. **No further terrestrial ecology surveys are therefore required.**	The results of the Nautica onshore terrestrial ecology surveys will be used to undertake an Ecological Impact Assessment which will be used to determine the following: • The presence of protected species of conservation concern and the potential extent of impact; • Identification of the potential impacts (local, national and regional) associated with the proposed construction works and operational activities; • Determination of the impact significance prior and following mitigation measures; and • The requirement for any mitigation or compensation measures to meet with EAD and the requirements of IFC / Equator Principles. **Operation** No significant impacts are anticipated during operation and therefore is proposed that a detailed assessment is scoped out of the ESIA.
Other Environmental Aspects				
Air Quality	An air quality monitoring station (AQMS) is understood to be located at Das Island and hourly data is available. Existing data held by SCAD, ADNOC Offshore (Das) and Abu Dhabi Open Data. Confirmation required on the applicability of any publicly available information in relation to the Project site.	No primary air quality data available for onshore areas at Mirfa and Shuweihat.	**No air quality monitoring is considered to be necessary as construction impacts are likely to be limited to dust emissions and there will be no operational emissions.** Air quality impacts associated with construction can be managed through construction monitoring (for dust) as part of the CEMP to ensure compliance.	**Construction** Key impacts relating to air quality will occur during the construction phase of the Project, be temporary in nature and include the following: • Dust/particulates emissions from Project construction activities including soil movement and construction activities; and • Gaseous emissions from construction vehicles, plant and other equipment. A qualitative assessment of impacts during construction of the Project will be undertaken. Review of any publicly available and relevant data will be made. Appropriate mitigation measures will be provided. **Operation** No significant impacts are anticipated during operation and therefore a detailed assessment is proposed to be scoped out of the ESIA.
Noise	Site specific baseline noise monitoring undertaken at Mirfa, Shuweihat and Das Island by Nautica in 2021 (refer to **Appendix A, Section 4**).	The monitoring was undertaken at Mirfa, Shuweihat and Das Island. No baseline data available for Al Ghallan Island.	Sufficient noise data are available for Mirfa, Shuweihat and Das Island. No noise monitoring is considered necessary at Al Ghallan Island landfall area due to the temporary nature of construction on an industrial offshore island. **Further noise monitoring is therefore not required**.	**Construction** Key impacts associated with potential noise emissions are expected to be limited to construction activities, including: • Construction vehicles, plant and other equipment which could cause nuisance and impacts.

Aspect	Existing Baseline Information	Summary of Baseline Data Gaps Identified	Proposed Additional Baseline Studies	Proposed Impact Assessment Methodology
			Underwater noise impacts will be considered within the Marine Ecology assessment.	Impacts would be received by existing nearby sensitive receptors located nearby the Project site e.g. avifauna and residential areas. Construction phase noise impacts will be identified by undertaking noise calculations and recommendations for noise reduction measures will be provided. **Operation** No significant impacts are anticipated during operation and therefore it is proposed that a detailed assessment is scoped out of the ESIA.
Geology, Seismicity, Soil and Groundwater	information relating to Emirate level soils types etc available online. Site specific soil and groundwater sampling survey undertaken by Nautica for Mirfa and Shuweihat landfall areas and Das Island (2021) (refer to **Appendix A, Section 5**)	It is considered that the surveys undertaken by Nautica provide sufficient baseline data of the existing soil conditions within the Project site.	**Further soil and groundwater investigations are not required.**	**Construction** During construction works, existing contaminants could be mobilised (if present) and contamination events could occur as a result of spillages or accidents. The assessment will establish and consider the historical use and any existing potential contamination sources on site, risks of pollution events during construction and potential pathways and sensitive receptors. Mitigation measures to prevent, reduce or rectify any contamination events will be provided. **Operation** No significant impacts are anticipated during operation and therefore is proposed that a detailed assessment is scoped out of the ESIA.
Traffic	No existing available information.	No information relating to local road networks within onshore areas.	During site surveys, note will be taken of the local road network, road classifications, road conditions and any construction works or diversions already in place.	**Construction** An assessment of potential traffic impacts upon the local road network and local communities will be undertaken to determine the potential for community risks. Appropriate mitigation measures will be developed to ensure that such risks are minimised to acceptable levels. **Operation** No significant impacts are anticipated during operation and therefore it is proposed that a detailed assessment is scoped out of the ESIA.
Waste Management	No existing available information.	No existing available information relating to the Project site areas for both offshore and onshore footprints of the Project.	Desk based studies will be undertaken to inform the impact assessment, including review of available information relating to waste data publicly available at an Emirate level; and Site walkover surveys will be undertaken to identify any existing waste materials within or adjacent to Project site areas.	**Construction** During construction works, significant amounts non-hazardous wastes may be produced together with smaller amounts of hazardous solid wastes. If these wastes are not handled and stored appropriately, a

Aspect	Existing Baseline Information	Summary of Baseline Data Gaps Identified	Proposed Additional Baseline Studies	Proposed Impact Assessment Methodology
				number of impacts many occur e.g. contamination of soils and groundwater. An assessment of potential waste impacts during construction will include the following: • A desktop baseline study will be undertaken based on the current data and information on existing and proposed waste management facilities and quantities in Abu Dhabi; • An estimation of waste types and potential quantities associated with proposed construction activities; and • The development of appropriate and specific control measures, for the avoidance, re-use, recycling and disposal of various waste streams. **Operation** No significant impacts are anticipated during operation and therefore it is proposed that a detailed assessment is scoped out of the ESIA.
Socio-economic	Secondary data held by SCAD for general population and other socio economic statistics. No area specific information available.	Baseline information relating to local socioeconomic conditions and sensitive receptors e.g. local residents, commerce etc. within areas adjacent to the onshore Project site areas e.g. Mirfa and Shuweihat.	Desk based research will be undertaken to enumerate the existing socioeconomic characteristics of Abu Dhabi and the more local Project site areas, largely focusing on data held by SCAD, including consultation with relevant stakeholders. See **Appendix A, Section 6** for further details.	**Construction** An assessment of the construction related impacts upon the local community and wider socio-economic baseline within Abu Dhabi will be undertaken. This will include impacts in relation to: • Community health and safety; • Nuisance and loss of amenity; • The influx of a large population of expatriate workers; and • The creation of economic and employment opportunities. Mitigation measures will be provided to minimise the potential socioeconomic impacts. **Operation** No significant negative impacts are anticipated during operation; however, the assessment will consider positive impacts associated with the Project including a reduction of emissions to air and contribution to the UAE and ADNOC's climate commitments.
Other Environmental Component (s) (Archaeology and Cultural Heritage)	Potential available information from Abu Dhabi Islands Archaeological Survey (ADIAS) as referenced within the Gap Analysis.	Project site specific data on any existing cultural or archaeological sites of importance within the Project area footprint both within onshore and offshore areas.	Consultations will be undertaken with ADTCA and it is possible that the Authority themselves would undertake a Preliminary Cultural Review (PCR). This is a ADTCA led process and may involve reviews of existing records supplemented by fieldwork by ADTCA experts. This will inform the subsequent assessment of impacts within the ESIA.	**Construction** Based upon the results of the PCR, potential impacts will be determined based upon the presence of known archaeological or cultural heritage sites, together with any requirement for avoidance or mitigation, as directed by ADTCA.

Aspect	Existing Baseline Information	Summary of Baseline Data Gaps Identified	Proposed Additional Baseline Studies	Proposed Impact Assessment Methodology
				Operation No significant impacts are anticipated during operation and therefore it is proposed that a detailed assessment is scoped out of the ESIA.

Appendix A – Detailed Baseline Survey Methodologies

Anthesis

1. MARINE ENVIRONMENTAL BASELINE SURVEYS (MEBS)

1.1. Landfall Area Surveys Route 1 and Route 2

Mott MacDonald have identified key gaps for marine data within the nearshore/landfall areas, which we consider to be highly sensitive to Project activities, due to the valuable habitats likely to be present and because the nearshore areas will be subject to dredging activities. Therefore, the following surveys are proposed, over a single season:

1. Water quality sampling (8 locations plus one control for each route).

- *In-situ* measurements will be taken of physical water quality parameters for the following:
  - Dissolved oxygen (mg/l);
  - pH;
  - Salinity;
  - Temperature (°C);
  - Total dissolved solids (TDS); and
  - Turbidity (NTU).
- *Ex-situ* water quality sampling will be undertaken for the following parameters:
  - Total hydrocarbon content (THC);
  - BTEX;
  - pH;
  - Metals (aluminium, arsenic, barium, cadmium, chromium, copper, iron, lead, vanadium, mercury and zinc);
  - Polycyclic aromatic hydrocarbons (PAH); and
  - Phenols.

2. Sediment quality sampling (8 locations plus one control for each route), using a Van Veen grab and best practice MOOPAM sediment sampling procedures, for the following parameters:

- TOC
- PAH
- PCB
- Metals (antimony, aluminium, arsenic, barium, cadmium, chromium, copper, iron, lead, molybdenum, manganese, mercury, nickel, silver, selenium and zinc)
- Phosphorous
- Total Nitrogen
- Total Cyanide
- Total Soluble Sulphate
- THC
- BTEX
- Oil and grease
- Silicon
- Total cyanide
- Fluoride
- Phosphate
- PSA

3. Benthic ecology: Utilising the methods listed below, benthic ecology will be characterized and identified including benthic habitat descriptions, current health status, distribution, and abundance of each habitat and community type:
   - Drop down video (DDV) towed transects (Route 1- from landside for 1.2km, Route 2 – from landside to 5km; these distances are considered to cover the shallow areas of the nearshore route corridors but will be amended as necessary once the survey team has deployed to site. It is proposed that 3 locations will be surveyed along each corridor);
   - DDV drift transects at 300m either side of the proposed cable corridor within shallow areas and after that, every 2.5km (Route 1- 7 locations; Route 2 – 6 locations);
   - Photo quadrats (Route 1- 8 locations; Route 2 – 7 locations): At each sampling location, 5 photo quadrats will be taken along the DDV transect routes and benthic species composition and percentage cover will be recorded. All observed species will be documented;
4. Fish surveys using Baited Remote Underwater Video (BRUV) (3 locations for each route, deployed at each location for a minimum of one hour). Each station will record fish species identification and abundance;
5. Incidental sightings of marine mammals, reptiles and pelagic birds will be recorded throughout the marine ecology baseline survey, recording GPS position and time of sighting, behavioural notes and photographs, if possible;
6. Underwater noise monitoring to determine underwater noise baseline conditions and undertake Passive Acoustic Monitoring for Marine Mammals. Underwater noise measurements will be collected at 10 locations in total throughout the entire cable routes (5 per route at representative locations, as shown in Figure 1-5), with a 60 minute recording being taken at each location during daylight hours (06.00 – 17.00) utilizing a TR-Porpoise acoustic recorder with calibrated Geospectrum M36-900 hydrophone;
7. Benthic Infauna Survey (5 locations on each route) will be undertaken concurrently with sediment sampling using a 0.025m2 Van Veen grab.

Proposed survey locations for the Mirfa (Route 1) nearshore area are provided below in Figure 1-1. Nearshore survey locations proposed for Shuweihat (Route 2) are provided in Figure 1-2.

Figure 1-1: Mirfa Nearshore Marine Survey Locations

Figure 1-2: Shuweihat Nearshore Marine Survey Locations

1.2. Fugro Sampling Gaps Survey Route 1

It is considered that the approach detailed in **Section 1.1** above will be sufficient to enumerate the baseline conditions within the nearshore areas for both Route 1 and Route 2. However, gaps in baseline data have been identified for Route 1 within the Marawah Marine Biosphere Reserve and therefore the following surveys are proposed below and survey locations provided in Figure 1-3:

- Sediment quality sampling for the same parameters listed above in **Section 1.1** (8 locations and 1 control);
- Benthic ecology – DDV drift sampling at 9 locations where gaps were identified within the Marawah Marine Biosphere Reserve. A DDV drift tow method will deploy DDV for 5 minutes or for 250 metres maximum approximately every 1 km;
- Seagrass Photo Quadrats – 9 sampling transects (5 quadrats per transect). Method as per Seagrass-Watch (McKenzie et al 2003)
- Fish survey (3 locations) utilizing the same methodology set out in **Section 1.1**;
- Benthic Infauna Survey up to (5 locations maximum) will be undertaken concurrently with sediment sampling using a 0.025m^2 Van Veen grab;
- Underwater noise monitoring to determine underwater noise baseline conditions and undertake Passive Acoustic Monitoring for Marine Mammals. Underwater noise measurements will be collected at 10 locations in total throughout the entire cable routes (5 per route at representative locations, as shown in Figure 1-5), with a 60-minute recording being taken at each location during daylight hours (06.00 – 17.00) utilizing a TR-Porpoise acoustic recorder with calibrated Geospectrum M36-900 hydrophone; and
- Any other incidental sightings of marine mammals, pelagic birds or reptiles will be recorded.

Figure 1-3: Route 1 MMBR Marine Survey Locations

1.3. Zakum Cluster Re-route to Al Ghallan Island

The following surveys are also proposed to enumerate the baseline conditions along the new Zakum route to Al Ghallan Island, with locations provided in Figure 1-4:

- Water quality samples (*in situ* and *ex situ*) will be taken in accordance with the methodology described in **Section 1.1** every 5km (10 locations for each line 1A and 1B);
- Sediment samples will be undertaken at the same locations as water sampling and will be undertaken in accordance with the methodology set out in **Section 1.1** at a maximum of 20 locations (10 locations for each line 1A and 1B);
- Benthic marine ecology will be assessed through the deployment of DDC/DDV surveys at a maximum of 20 locations (10 locations for each line 1A and 1B), in accordance with the methodology set out within **Section 1.1**. The drift tow method will be applied on areas at 5km intervals, with deployment of DDV for 5 minutes or for a maximum of 250 metres;
- Underwater noise monitoring to determine underwater noise baseline conditions and undertake Passive Acoustic Monitoring for Marine Mammals. Underwater noise measurements will be collected at 10 locations in total throughout the entire cable routes (5 per route at representative locations, as shown in Figure 1-5), with a 60-minute recording being taken at each location during daylight hours (06.00 – 17.00) utilizing a TR-Porpoise acoustic recorder with calibrated Geospectrum M36-900 hydrophone; and
- Any other incidental sightings of marine mammals, pelagic birds or reptiles will be recorded.

1.4. ADCP Deployment

Additionally, the deployment of two ADCPs per route (as per EAD request) for 15 days duration each is proposed. The proposed locations for ADCPs are shown in Figure 1-5.

Figure 1-4: Zakum Cluster Reroute to Al Ghallan Island Marine Survey Locations

Figure 1-5: ADCP and Underwater Noise Monitoring Locations

1.5. Hydrodynamic Modelling and Dredging Impact Assessment

The hydrodynamics of the marine environment will be modelled utilising the MIKE modelling suite (The MIKE3 Flow Model (FM) Hydrodynamic Module (HD)). The marine modelling is broken down into two components as follows:

- Hydrodynamic Modelling; and
- Dredging Impacts Assessment.

The initial hydrodynamic model is used to generate ocean tide and 2D/3D current data, a pre-requisite to the subsequent flushing and dredging assessment. The results of this hydrodynamic modelling will be utilised to 'drive' the assessments included within the marine water and ecology chapter.

Based on initial feedback from the EAD, one numerical model will be developed for each route.

1.5.1. Hydrodynamic Modelling

The MIKE2/3 software (developed by DHI) is a powerful and versatile tool in simulating physical, chemical or biological processes in coastal and marine areas. The MIKE3 Flow Model (FM) Hydrodynamic Module (HD) is a general numerical modelling system for the simulation of water level variations and associated flows. MIKE3 FM HD also simulates unsteady three-dimensional flows in fluids when presented with the bathymetry and other relevant ambient conditions (e.g. bed resistance, wind forcing, baroclinic forcing, hydrographic boundary conditions, and atmospheric influence (e.g. temperature, pressure, humidity etc.)).

The model is available to run in multiple simulation engines; however, this project will likely utilise MIKE in the 3D mode utilising a flexible bathymetric mesh (which allow maximum flexibility for adapting the grid resolution to the local physical conditions). Please also note that a high resolution 2D mesh may be simulated for assessment of larger areas of interest if required.

The hydrodynamics of the project area will be simulated utilising the MIKE3 FM HD module utilising global tidal predictions, meteorological data and the bathymetry of the project area. The hydrodynamic modelling will be utilised to drive subsequent dredging assessments.

Model verification will be undertaken using 2 ADCPs per route, as requested by the EAD.

1.5.2. Dredging Simulations (MIKE MT)

Concentrations of sediment within the water column and deposition rates of said sediment during the dredging and reclamation works will be simulated using MIKE MT. Based on the completed hydrodynamic modelling, MIKE MT will be used to simulate the release of sediment from dredgers and at dumping locations, to determine impacts to water quality, and whether any sensitive habitats will be smothered. A single scenario will be simulated, encapsulating the entire dredging programme.

2. INTERTIDAL ECOLOGY

Project site specific baseline ecological surveys undertaken by Nautica on behalf of Mott MacDonald in relation to the coastal/intertidal areas within the vicinity of the landfall points at both Mirfa (Route 1), Shuweihat (Route 2) and Das Island provide a good overview of the general site intertidal ecology, however, the following gaps have been identified:

- Methodology presented is not replicable for seasonal surveys;
- Mangrove study not detailed enough to assess impacts to mangroves;
- No bird vantage point counts;
- Locations of transects not provided; and

- Resolution of report not sufficient for an ESIA but provides a good general overview.

In order to provide a detailed intertidal ecological baseline, it is proposed that the following surveys are completed at Mirfa and Shuweihat for both summer and winter seasons:

- Habitat and vegetation surveys;
- Mangrove surveys (including estimates of individuals);
- Night-time fauna surveys using Sherman traps and camera traps; and
- Vantage point bird surveys.

These surveys will be undertaken during both summer and winter seasons to provide adequate seasonal data. The proposed survey locations are shown in Figure 2-1 for Mirfa and Figure 2-2 and Figure 2-3 for Shuweihat.

Ecological baseline surveys undertaken at Das Island by Nautica on behalf of Mott MacDonald identify that whilst there are a few limited sensitivities within the island, the Project landfall tie in area is recently reclaimed land with few sensitive receptors.

No further intertidal ecology surveys are considered to be necessary at Das Island, nor is it considered necessary to conduct surveys at Al Ghallan Island, which is also recently reclaimed.

Project Number: 1276
Project Name: Project Lightning
Data sources: Various
Compiled By: SP

Scale: 1:12404
Coordinate System: Mercator
Datum: WGS 84
Units: meters
Date: 22/08/21

Anthesis

Figure 2-1: Mirfa Terrestrial Ecology Survey Locations

Project Number: 1276
Project Name: Project Lightning
Data sources: Various
Compiled By: SP

Scale: 1:13955
Coordinate System: Mercator
Datum: WGS 84
Units: meters
Date: 22/08/21

Anthesis

Figure 2-2: Shuweihat Terrestrial Ecology Survey Locations

Figure 2-3: Shuweihat Terrestrial Ecology Survey Overview

3. TERRESTRIAL ECOLOGY

Project site specific baseline ecological surveys undertaken by Nautica on behalf of Mott MacDonald in relation to the onshore areas within both Mirfa (Route 1), Shuweihat (Route 2) and Das Island provide a good overview of the general site terrestrial ecology.

It is considered that the onshore terrestrial surveys undertaken by Nautica are sufficient to enumerate the existing terrestrial ecological baseline conditions within Mirfa and Shuweihat and satisfy the requirements of EAD. No further surveying of the onshore terrestrial areas is considered necessary.

Ecological baseline surveys undertaken at Das Island by Nautica on behalf of Mott MacDonald identify that whilst there are a few limited sensitivities within the island, the Project landfall tie in area is recently reclaimed land with few sensitive receptors.

No further terrestrial ecology surveys are considered to be necessary at Das Island, nor is it considered necessary to conduct surveys at Al Ghallan Island as this is also recently reclaimed

4. NOISE

Project site specific baseline noise surveys were undertaken by Nautica on behalf of Mott MacDonald in July 2021 and it is proposed that these are sufficient to inform the baseline for the ESIA. The monitoring included the following, at each Mirfa, Shuweihat and Das Island:

Three short term noise monitoring locations – 15 mins during both day-time and night-time, for weekends and weekdays. (Total of 4 monitoring periods per location equaling 1-hour total monitoring per location).

The following parameters were measured:

- L_{Aeq} ;
- L_{AMax} ;
- L_{A10} ;
- L_{A50} ; and
- L_{A90}.

Two minor exceedances (of less than 2db) of the UAE residential ambient noise limits were noted at 2 monitoring locations at Mirfa (which is assumed within the Nautica report as being 'residential with light traffic'), although the source of the exceedances was not able to be identified since the monitoring locations were isolated with no obvious noise sources. It is possible that off-road vehicle movements within the vicinity caused these exceedances.

However, the overall ambient noise baseline data is considered to be representative of the local area at Mirfa, which is subject to anthropogenic sources of noise relating to recreational activities only.

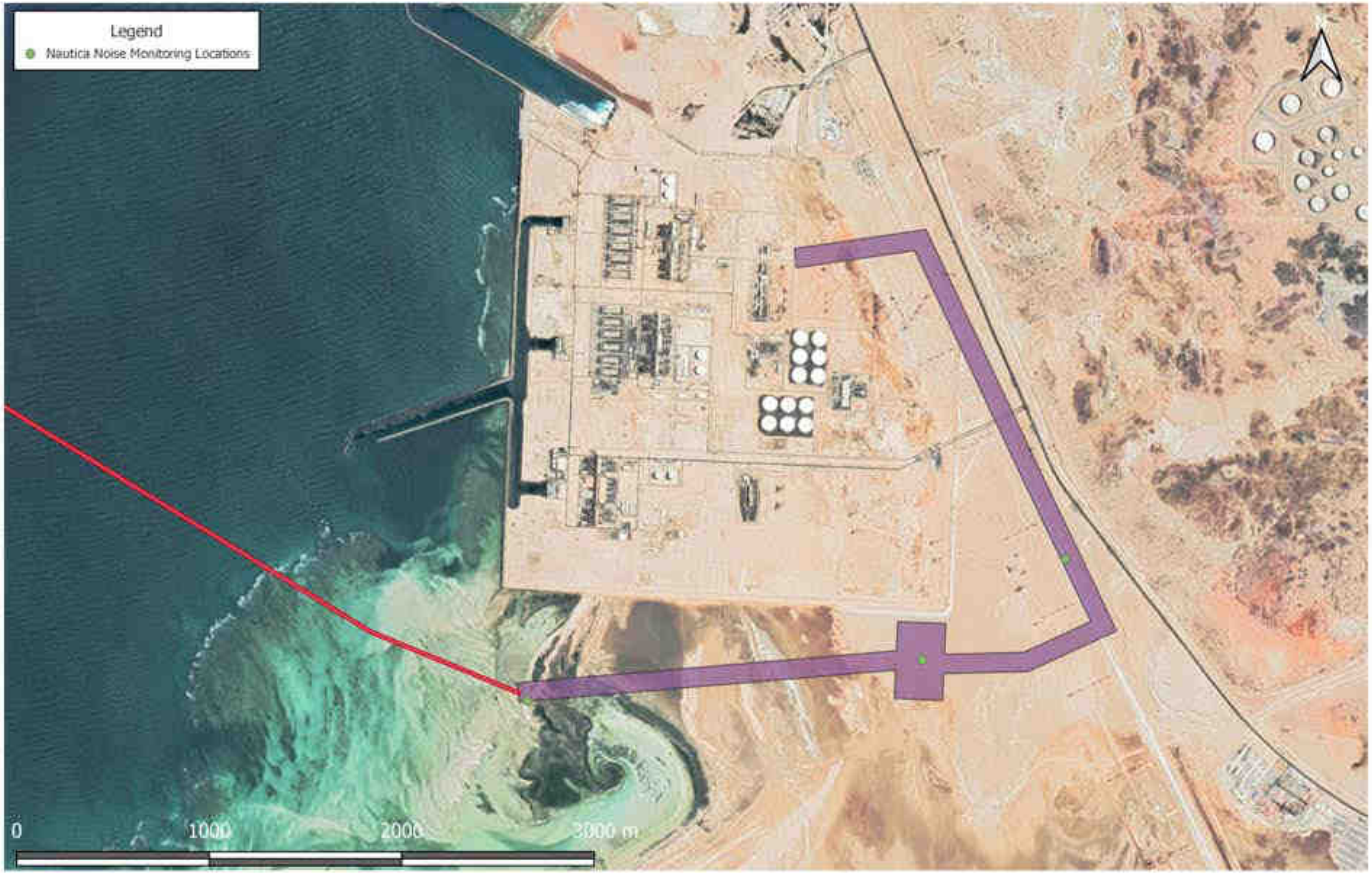
No exceedances were noted at Shuweihat or Das Island.

Anthesis propose that the noise monitoring undertaken at Mirfa and Shuweihat is sufficient in identifying the noise baseline and consider that impacts will be limited to construction. Therefore, no significant changes to the noise baseline within the landfall or offshore island tie in locations are expected during operation and noise sensitive receptors are therefore not likely to be significantly impacted. Noise monitoring at Al Ghallan Island landfall area is not considered necessary due to the temporary nature of construction on an industrial offshore island.

The locations of Nautica noise monitoring stations are provided in Figure 4-1 and Figure 4-2 below.

Underwater noise impacts will be considered within the Marine Ecology assessment.

Figure 4-1: Nautica noise surveys at Mirfa



Project Number: 1176
Project Name: Project Lightning
Data sources: Various
Compiled By: AB

Scale: 1:24393
Coordinate System: Mercator
Datum: WGS 84
Units: meters
Date: 21/09/21

Anthesis

Figure 4-2: Nautica noise surveys at Shuweihat

5. SOIL AND GROUNDWATER

Project site specific baseline soil and groundwater surveys were undertaken by Nautica on behalf of Mott MacDonald in July 2021 and it is proposed that these surveys are adequate for the purposes of informing the baseline for the ESIA at Mirfa, Shuweihat and Das Island:

- A Phase 1 walkover survey was undertaken to identify any potential sources of existing contamination. No potential sources or visible signs of potential contamination were identified at Mirfa, Shuweihat or Das Island; and
- 8 soil samples were collected within the Project corridor by hand auger to a maximum depth of 2 metres where possible (up to 0.5m at Das Island). Sampling locations are provided below within Figure 5-1 and Figure 5-2. Soil samples were analysed at an ENAS accredited laboratory;
- The sampling results were compared against Abu Dhabi Quality and Conformity Council (ADQCC) Environmental Specification for Soil Contamination Soil Limits for Industrial and Commercial Use (ADS 19/2017);
- No exceedances were identified within any samples collected at Mirfa, Shuweihat or Das Island;
- One groundwater sample was collected at Shuweihat, although the sample was taken outside of the Project study area and therefore is not considered applicable in terms of enumerating baseline conditions within the Project site.
- No groundwater sampling was undertaken at Mirfa, Das Island or Al Ghallan Island.

Figure 5-1: Nautica soil sampling at Mirfa

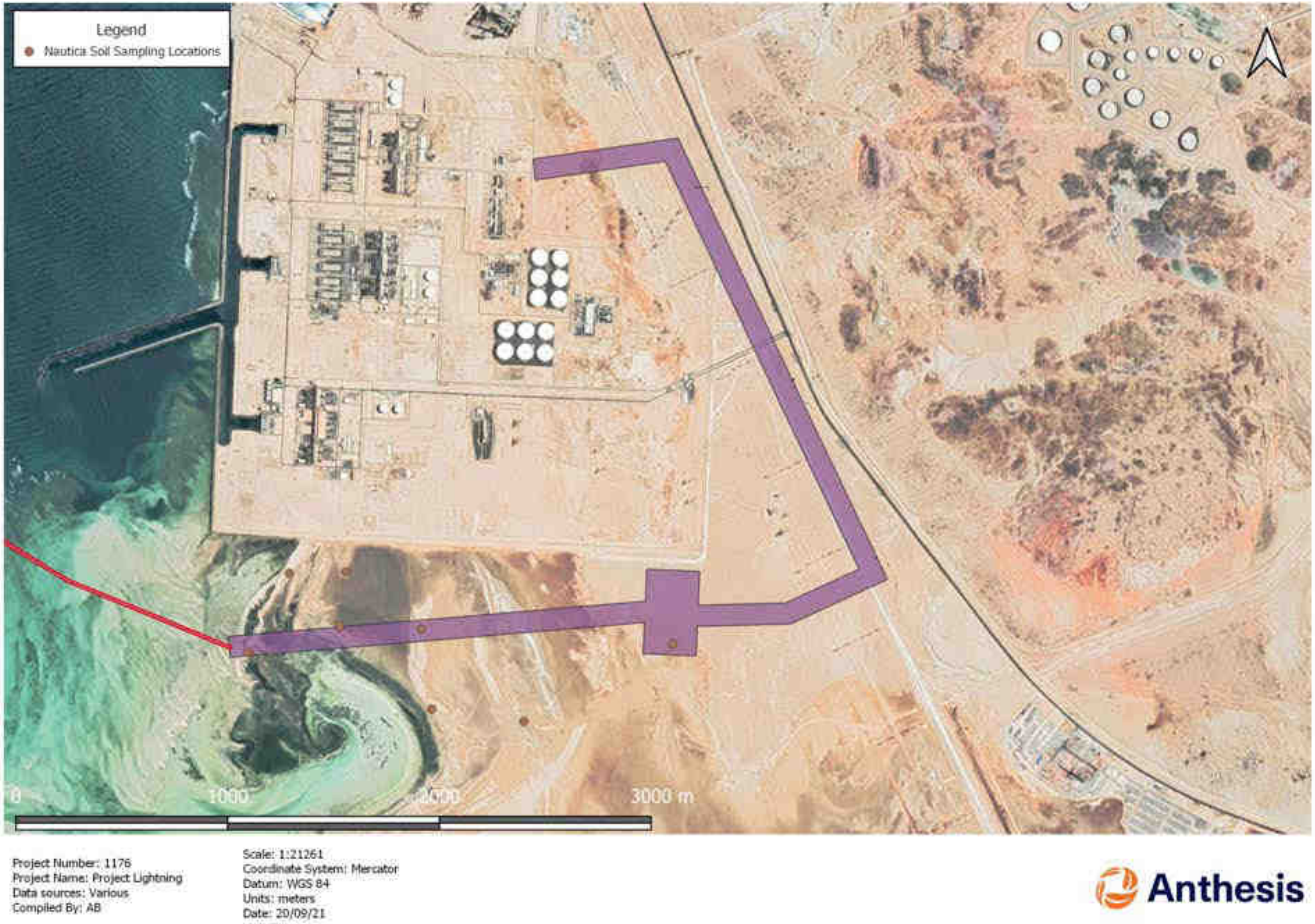


Figure 5-2: Nautica soil sampling at Shuweihat

6. 6SOCIAL CONSULTATIONS

Desk based research will be undertaken to enumerate the existing socioeconomic characteristics of Abu Dhabi and the more local Project site areas, largely focusing on data held by SCAD.

It is expected that Anthesis will have regular consultations with EAD, ADNOC, ADTCA and the Lenders. Consultations will also be undertaken with any Project Affected Persons (PAP), which will be defined during the initial stages of the ESIA. Potential additional consultees include:

- Local residents, and businesses, particularly within the Mirfa area;
- Department of Energy,
- EAD's Marawah Marine Biosphere Reserve Dept.;
- TRANSCO;
- MoCCaE Fisheries Department;
- Department of Urban Planning and Municipalities (DPM);
- TAQA/ADWEA and EWEC, particularly within Shuweihat
- Al Dhafra Region Municipality (Western Region);
- Abu Dhabi Municipality (ADM).
- Emirates Wildlife Group;
- Aquaculture and Marine Studies Center, Abu Al Abyad Island; and
- Abu Dhabi Global Environmental Data Initiative (AGEDI).

Appendix 4.2 – Mott MacDonald Gap Analysis Report

Anthesis

PROJECT LIGHTNING BASELINE GAP ANALYSIS

02	07.04.2021	Updated to address comments	CS	JR/RA	SM
01	18.03.2021	Issued for review	CS	JR/RA	SM
Rev. No.	Date	Description of Issue	Prepared	Reviewed	Approved

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EXECUTIVE SUMMARY

Introduction

This report provides a rapid review of the available environmental baseline information to support the completion of environmental and social assessments associated with Project Lightening.

Project Lightning proposes to import electricity from the national power grid of UAE at onshore to offshore centralized power hubs by means of High Voltage Direct Current (HVDC) subsea transmission. This new infrastructure will serve as a steppingstone for any offshore facility (within the Group Companies of the Abu Dhabi National Oil Company (ADNOC)) to adopt a more energy efficient power source by interconnecting to the nearest centralized power hub by means of High Voltage Alternating Current (HVAC) connections. Under Project Lightning two offshore centralized power hubs are proposed – one in ZAKUM Island and another in DAS Island.

Project structure

The Project seeks to appoint a developer to form a project company with ADNOC and Abu Dhabi Power Company (ADPC). The ownership of the future company will comprise ADNOC 30%, ADPC 30%, and the developer 40%. It is the intention for the Project Company to obtaining project financing from international finance institutions. In anticipation of the environmental and social governance requirements of prospective lenders the environmental assessments and studies required to support the development of the proposed project shall align with international, group company and national environmental assessment requirements. In the case of the former the international requirements referred to are the Performance Standards of the IFC.

Gaps and deficiencies summary

The available project baseline environmental and social information has been reviewed against the relevant sections of international, national and group company standards and guidance in relation to the completion of environmental and social assessments.

The review has sought to identify deficiencies and omissions within the available baseline including environmental and social topics covered, availability of current primary data, and the spatial and temporal coverage of data.

The review has identified that there are omissions in the availability of primary data for the following:

Review element	Marine	Coastal and terrestrial	Social
Environmental Topics and disciplines covered	No project specific primary information relating to marine fauna or birds is available	No project specific primary information relating to soil quality and noise at landfall locations, marine fauna or birds	Limited information in relation to nearshore community demographics. No project specific inventory for marine users, transport infrastructure, health, land acquisition.
Spatial coverage	Insufficient baseline in the nearshore areas subject to dredging and trenching. Uncertainty over spatial data requirements for all required disciplines	Insufficient project specific baseline in the coastal and terrestrial areas subject to landfall and tie in activities.	Some information available for landfall areas and Das. Uncertainty over spatial data requirements for social factors including marine receptors (tourism, fisheries, navigation)
Temporal coverage	No seasonal data for marine fauna No seasonal data for ocean currents	No data and therefore no seasonal information in relation to mangroves or other coastal habitat types. No bird data and therefore no seasonality to consider	Types, limits and extents of data not defined therefore no element of time (current and projected baseline) is provided.

The main risks associated with a deficient baseline are subsequent impact to the overall programme including delays to financial close if the basis of environmental and social assessment is deemed inadequate. This may also result in more onerous ongoing monitoring and assessment commitments related to ongoing disbursements.

The application of the precautionary principle when using older and or incomplete baseline data risks the identification of a greater number of impacts and or the reporting of more adverse (significant) impacts which would then lead to a more onerous compensation and monitoring programme. More onerous requirements typically have associated time, resource and cost implications.

Recommendations

A series of recommendations and actions are proposed including approaches to further surveys. Of these the following are recommended as priority actions to further develop the baseline:

- Combine collected benthic and seabed features data for each cable route in a geographical information system (GIS) and compare against published habitat data to further refine approach to surveys to fill data gaps in areas likely to require trenching.
- Define project area of influence (AOI) to fully determine the likely spatial extents for each data type required.
- Complete initial surveys of the landfall areas at Mirfa and Shuweihat as soon as possible to document the types and extents of coastal and terrestrial habitats present at the onshore landfall locations and to include a mangrove survey at each location.
- Complete an initial bird survey at each of the coastal landfall locations.
- Engage with prospective lenders to understand ESG priorities specific to the Project.
- Consult with Environment Agency - Abu Dhabi to confirm available data with a focus on critical habitats and species, and to agree further surveys that may be required to satisfy regulatory expectations.
- Complete scoping study to define elements taken forward for assessment and confirm the nature and scale of available data to support these studies. Provide this to the appointed developer as soon as possible.
- Defining permitting and environmental and social assessment approach and identify available resources and budget in relation to environmental and social governance.

1. INTRODUCTION AND BACKGROUND

Project Lightning ('the Project') brings a long-term fundamental technological innovation and energy efficiency step-change in the way all Abu Dhabi offshore oil and gas facilities are powered. It offers reliable power at lower energy cost along with reduced environmental emissions at offshore, which is strategically aligned with the country's environmental vision 2030 for sustainability. It will be yet another building block towards the Abu Dhabi National Oil Company (ADNOC) mission to maximize the value of energy resources through partnership, innovation, and a relentless focus on high-performance and efficiency.

The Project proposes to import electricity from the country's national power grid at onshore to offshore centralized power hubs by means of High Voltage Direct Current (HVDC) subsea transmission. This will serve as a steppingstone for any offshore facility to adopt energy efficient power source by interconnecting to the nearest centralized power hub by means of High Voltage Alternating Current (HVAC) connections. Two offshore centralized power hubs are proposed – one in ZAKUM Island and another in DAS Island.

Project Lightning is intended to create two (2) offshore HVDC transmission networks as follows:

- ZAKUM Cluster – HVDC link(s) between alternating current (AC) Substation at Mirfa and Offshore Centralized Island at LOWER ZAKUM[1].
- DAS Cluster – HVDC link(s) between AC Substation at Shuweihat and Offshore Centralized Island at DAS.

The battery limits of each HVDC transmission network are as follows:

- Onshore tie-ins with the Abu Dhabi Transmission and Dispatch Company (TRANSCO) network at various voltage levels and various locations up to the termination point in HVDC converter stations complete with associated onshore routing (transmission lines, cabling etc.)
- Onshore and offshore HVDC converter stations complete with HVDC cabling including onshore cabling (mainland), onshore transition joints, subsea cabling, offshore transition joints, cabling on the offshore islands etc.
- Necessary HVAC distribution downstream of offshore HVDC converter stations in each island.

[1] Under construction

1.1 PROJECT LOCATION

The Project will be developed within the Western Region of Abu Dhabi Emirate within the United Arab Emirates (UAE). The sub-sea electricity transmission cables will run from existing onshore power supply stations at Mirfa and Shuweihat to the offshore locations of Das Island and a recently constructed island at Lower Zakum (Figure 1). The Project area includes Abu Dhabi Western Region coastal areas, shallow coastal waterways, coastal islands and deeper offshore areas.

The coastal zones have areas of critical natural marine habitat, the most important of which is located in the Marawah Marine Protected Area (MPA), which is both nationally protected by law and internationally registered under the United Nations Educational, Scientific and Cultural Organisation (UNESCO) Man and Biosphere Programme global network of biosphere reserves.

Route 1 - Zakum Cluster, passes through the south east corner of the Marawah MPA area including buffer and transition zones of the MPA which contain critical habitats, but does not pass through core zones of the MPA. Route 2 – Das Cluster passes to the west of Sir Bani Yas Island close to the border of a proposed MPA and in areas identified as containing critical habitats.

For route the cable approach to the offshore hub (either Das or Zakum) there will be a new riser platform which will include a connection bridge to the island locations. Each platform will incorporate a J-tubes to allow the cables to be pulled-in, as well as a cable termination deck. Table 1 provides summary details for each cable route.

Table 1 Cable route summaries

	Route 1 – Zakum Cluster	Route 2 – Das Cluster
Total length	133km	138km
Cable arrangement	2 separate cable routes: 2 x Bundle of 2x HV power cables and 1x Fibre Optic Cable (FOC)	3 separate cable routes: 2 x High voltage cable bundled to a FOC 1 x Medium voltage metallic return cable (MRC)
Continuous power rating	1000MW per circuit	600 MW per HV cable
Total dredged length	24km	11km
Dredged width	1.2km	1.3km
Total length within the Marawah MPA	24km (all dredged) (buffer zone – 14km) (transition zone – 10km)	N/A

	Route 1 – Zakum Cluster	Route 2 – Das Cluster
Crossings	50 (25 for each cable bundle)	135 (45 for each cable bundle)
Landfall	Mirfa	Shuweihat

(Source: Mott MacDonald, 2020)

Figure 1 Project Lighting Location Map

1.2 ROUTE SELECTION

The cable routes have been selected through consideration of a number of alternative options. The selection took into account a number of criteria:

- The route should give a minimum clearance of 2km from any existing platform or offshore facility, unless the same is not feasible in some area.

- The number of crossings with existing subsea pipes or cables should be minimized.
- Insofar as is possible corridors already identified, surveyed and used for other pipes and cables (running parallel to existing pipes when possible) should be adopted.
- In locations where the route runs parallel to an existing pipe, the cable should be preferrable located around the existing pipe so that one cable lies either side with a clearance of approximately 200-300 metres.
- The overall route lengths should be minimized to account for high cost of the cable and installation.
- The MMBR should be avoided as much as possible.
- Existing shipping and fishing channels should be avoided as much as possible.
- Extremely shallow waters are to be avoided.

Through detailed design and further survey the appointed developer will refine the route including identification of areas where micro-routing of the cable may be used to avoid identified receptors as well as identifying other means to minimize impacts to sensitive receptors including habitats and existing infrastructure.

1.3 CONSTRUCTION ACTIVITIES

The works can be broadly divided as nearshore landfall activities that connect each cable to existing facilities and Mirfa and Shuweihat, offshore cable laying activities and offshore connections at Das and Zakum.

The detailed construction methods and sequencing will be determined by the appointed bidder. This will include a refinement of route sections laid to seabed, route sections buried buried and the approach to cable protection through the use of mattresses and rock protection.

It is expected that the cable installation will include the need to trench some section which will be achieved through a range of methods. At this stage these are assumed to consist of the following:

- **Nearshore / landfall (approximately 0m to 3m water depth)**
  Mechanical excavation of the cable trench whereby the excavated material is side cast, the cable is installed, and the trench is backfilled.
- **Offshore shallow area (approximately 3m -12m water depth)**
  The cable route would be excavated by using a backhoe dredger with the material again sidecast and then used to backfill once the cable has been installed.
- **Offshore deeper area (approximately 12+m water depth)**
  A Trailing Hopper Suction Dredger will be used to excavate areas and then used again to backfill the trench.

Installation of the cables will be by use of a shallow water cable lay barge (CLB) for the nearshore areas and cable lay vessel (CLV) for deeper areas. The Zakum Cluster cables will be installed in two bundles. Each will consist of 2 x HVDC cables and 1x FOC. The two cable bundles will be laid along separate cable routes, (1A and 1B). The two HVDC power cables for the Das Cluster will each be bundled to a FOC and laid along separate routes (2A and 2B). The medium voltage metallic return cable will also be laid separately along route 2. The offshore end of the nearshore cable will be jointed to the offshore cables after which the CLV will continue to lay the remaining cable lengths to the riser location. At each of the offshore hubs the riser platforms will be installed. These are expected to be preconstructed and shipped to location for installation.

Cable protection in the form of concrete mattresses and or rock placement is also required for up to one third of the route and at all crossing locations. Special vessels will be used to ship rock to the project location for deposit in the required location. Special vessels will also be used to install pre-fabricated concrete mattresses.

At each of the landfall locations ‘pull in’ sites will be set up including temporary site offices and welfare facilities. The landfall works will also include completion of transition joint bays and connections to each of the tie ins at Mirfa and Shuweihat.

Upon completion of installation works further as built surveys will be completed and landfall locations will be reinstated.

A summary of the installation activities is provided in Table 2.

Table 2 Project installation activities summary

Works location	Installation Activities
Nearshore works to bring the cable to the land and tie in location	Preparatory studies and seabed surveys including geophysical, environmental, and geotechnical works Pre laying surveys and route clearance activities Trenching in the shallow, intertidal and beach areas, cable installation and jointing to offshore cable sections and backfilling of trench Placement of cable protection Tie in works at Shuweihat and Mirfa including transition joint bays, civils and mechanical electrical works. Reinstatement works.
Offshore cable laying	Preparatory studies and seabed surveys including geophysical, environmental, and geotechnical works Pre laying surveys, cable burial assessment, and route clearance activities

Works location	Installation Activities
	Use of cable lay vessels to complete the installation of the cable
	Use of specialist equipment for cable burial at some locations along the routes
	Crossings of existing utilities assets (water, oil, power, communications cables)
	Placement of cable protection at selected locations along the routes
	Post construction surveys
Offshore Connections	Preparatory studies and seabed surveys including geophysical, environmental, and geotechnical works
	Dredging in some locations
	Installation of riser platforms
	Construction of converter stations
	Tie in works at Das and Zakum including civils and mechanical electrical works
	Post construction surveys

1.4 PROJECT FINANCING

The financing model for the project may involve the creation of a Project Company in the form of a Special Purpose Vehicle (SPV[2]). The Project Company may seek to secure loans from financial institutions that may be signatories to the Equator Principles[3] (EP). The EPPs provide a risk management framework used to determine, assess and manage environmental and social risk in projects.

Institutions adopting the EPs are termed Equator Principles Financial Institutions (EPFIs) and apply the Equator Principles (EP) s to new projects. EPFIs will confirm that a project, if under Eps scope, complies with all the applicable host country environmental laws, as well as the International Finance Corporation (IFC) Performance Standards and the World Bank Group Environmental Health and Safety (EHS) Guidelines.

Projects funded by EPFIs typically do not permit loans to be drawn until due diligence is satisfactory (technical, financial and legal) and financial close conditions are met. This includes environmental and social assessment requirements.

1.5 PROJECT DELIVERY

[2] A single-asset legal entity that is created for the sole and exclusive purpose of acting as the project owner in a project financing.

[3] a risk management framework, adopted by financial institutions, for determining, assessing and managing environmental and social risk in project finance.

The Project will be executed on a build, own, operate transfer (BooT) basis. A developer will be appointed to set up the Project Company with ADNOC and Abu Dhabi Power Company (ADPC). The ownership of the future company will comprise ADNOC 30%, ADPC 30%, and the developer 40%.

1.6 PROJECT PROGRAMME

The Project is currently at the tendering stage to appoint a developer and form the Project Company. The Project Company will commence the design of the facilities immediately after financial close[4] with a commercial operation target scheduled from Q4-2024 for DAS cluster and Q1-2025 for ZAKUM cluster. Fugro were commissioned by ADNOC to complete early geotechnical and environmental baseline surveys along the cable route corridors. These surveys are intended to support advance studies and design works. The anticipated approach to environmental surveys, assessment and ongoing monitoring is summarised as follows:

- Advanced marine environmental surveys for each proposed cable route (completed in 2020)
- Environmental screening report for each proposed cable route (completed in 2020)
- Advanced selected environmental studies (preliminary impact assessment, sediment dispersion studies, ecosystem services assessment and critical habitat assessment) (in progress)
- Completion of environmental and social impact assessment (including further surveys) for each cable route (2021-2022 – expected)
- construction phase monitoring and adaptive management (estimated 2022 – 2025)
- Post construction monitoring (to be confirmed but anticipated 3 years post project environmental monitoring)
- Operational monitoring in accordance with ADNOC Standards.

1.7 OBJECTIVES

This report presents a summary of available baseline environmental information collected to date in relation to the Project and reviews it against the relevant aspects of host country environmental laws and environmental guidance (Federal Law of the UAE and Environment Agency - Abu Dhabi (EAD) Environmental Technical Guidance applicable to Abu Dhabi Emirate), ADNOC Standards and International Finance Corporation (IFC) Performance Standards. Due to the type and location of the Project the document provides a focus on the marine and coastal environmental baseline and a high-level review in relation to other environmental aspects.

[4] In international project finance transactions the common definition of financial close is:

When the project documentation has been executed and the conditions precedent have been satisfied or waived. Drawdowns of the loan will then be now allowed (EY, 2015) Available at: The Hongkong and Shanghai Banking Corporation Limited (unescap.org).

The review considers the scope of the Project specific environmental surveys completed to date, identifies full, partial and non-compliance with the reference standards and guidelines identified, and proposes approaches to further works required to develop a baseline align with the reference standards.

This report is structured as follows:

Section	Description
1 Introduction	Project background, document purpose, assumptions and limitations
2 Abbreviations and definitions	Key definitions and abbreviations referenced within the document
3 Baseline gap analysis	Analysis of gaps within the available baseline provided for the review Summary of Project risks related to deficient or incomplete baseline Recommended further surveys and data acquisition approaches to provide a developed baseline. High level programme.
4. Proposed surveys and actions to fill data gaps	Proposed sources of primary and secondary data and proposed additional surveys to fill data gaps. Identification of likely data holders.
4. Recommendations	Recommended pre financial close actions to develop baseline
5. References	Information referred to in this report.

1.8 ASSUMPTIONS AND LIMITATIONS

The following assumptions and limitations should be taken into account in the context of this report.

1.8.1 Project categories

The following are assumed in relation to Project category determining environmental and social impact assessment (ESIA) approach[5] in accordance with national and international guidance:

- Under the ADNOC Standard on Health Safety and Environmental Impact Assessment (HSEIA) Requirements (ADNOC, 2020a) and the ADNOC Standard on Environmental Impact Assessment

[5] EAD and ADNOC standards specify the requirements for the preparation of and EIA. IFI requirements typically refer to the completion of an environmental and social impact assessment which are intended to include both an environmental and social focus to assessments where national regulations and company standards so fulfil the breadth of coverage to adequately cover social elements of assessment.

(EIA) (ADNOC, 2020) the Project would be subject to EIA assessment for a Combined Phase EIA[6]. This should include screening, scoping, ENVID and assessment stages.
- Under the Environment Agency - Abu Dhabi (EAD) EIA Technical Guidance (EAD, 2014) the Project would be considered as an EIA assessment scheme and would include the requirement for the preparation of a Terms of Reference (TOR) (scoping document) approved by EAD.
- As the proposed scheme is located partially within the boundary of the protected area and likely to impact critical habitat, under the Abu Dhabi Critical Habitat Guidance (Al Dhaheri et al , 2017) the Project would have to be deemed critical infrastructure (as determined by the General Secretariat for the Executive Council (GSEC) of Abu Dhabi Emirate)..
- Under the Equator Principles (EP) the project would be considered as a Category A – Project with potential significant adverse environmental and social risks and/or impacts that are diverse, irreversible or unprecedented (IFC category A: Business activities with potential significant adverse environmental or social risks and/or impacts that are diverse, irreversible, or unprecedented).

1.8.2 Ongoing assessment programme

Recognising the project financing model and the potential involvement of international finance institutions (IFIs) that refer to the requirements of the IFC it is assumed that the Project intends to complete a full IFC compliant ESIA for the Project. The resulting ESIA would be developed to cover the requirements of the IFC performance standards, the ADNOC EIA Standard, and the requirements of the relevant EAD Technical Guidance. The resultant ongoing assessment would include the development of a scoping report to define the approach to the ESIA. At this stage it is assumed that this would be one assessment incorporating each of the proposed cable routes. This assessment would be completed in a way that meets national and international requirements.

The detailed ESIA studies will not include decommissioning of the Project which has an expected design life of up to 40 years or the decommissioning of existing decentralised power infrastructure. These elements would be subject to separate assessments on a case by case basis when details of decommissioning activities are available.

[6] ADNOC Standard No.: HSE-RM-ST02 2019 Section 7.2.7 which states that the Combined Phase HSEIA is required for special operations/projects that do not follow the standard project lifecycle. Examples are Seismic, drilling, infrastructure projects etc. A 9 part approach to the HSEIA is indicated with Part 5 being completion of the EIA. HSEIA Screening study shall determine the requirement of full-fledged or part requirements of EIA study and baseline requirements.

1.8.3 Use of this report

Conclusions and recommendations are solely based on the information that was made available for this review (see section 2.2.1) and it cannot be guaranteed that the Project has no additional baseline deficiencies beyond those observed during the review process.

It is expected that it will be necessary to modify the findings presented once additional information becomes available at a later date when further primary and secondary baseline information and detailed design, including the approach and duration of construction methods has been progressed. This report was compiled for the benefit of the ADNOC only. This report is not intended to be relied upon by third parties without prior written authorisation by the authors.

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Forecasts presented in this document were prepared using the Data and the Report is dependent or based on the Data. Inevitably, some of the assumptions used to develop the forecasts will not be realised and unanticipated events and circumstances may occur. Consequently, we do not guarantee or warrant the conclusions contained in the Report as there are likely to be differences between the forecasts and the actual results and those differences may be material. While we consider that the information and opinions given in this Report are sound all parties must rely on their own skill and judgement when making use of it.

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1.8.4 ABBREVIATIONS AND DEFINITIONS

1.8.4.1 Definitions

Critically endangered, endangered, threatened or vulnerable species: As defined within EAD Habitat Classification Guidance (Al Dhaheri et al., 2017) these are species' global extinction risk categories as determined by the International Union for Conservation of Nature's (IUCN) Red List assessments[7].

Critical marine or terrestrial habitats: As defined within EAD Habitat Classification Guidance (Al Dhaheri et al , 2017) these are defined as an ecosystem type of high biodiversity value including:

- Habitat of significant importance to Critically Endangered and/or Endangered species;
- Habitat supporting globally or regionally significant concentrations of migratory species and/or congregatory species population;
- Highly threatened and / or unique ecosystems; and /or
- Areas associated with key evolutionary processes.

Critical projects [in Abu Dhabi]: Strategic local transport, infrastructure, development, industrial or military projects as defined and determined by the General Secretariat for the Executive Council of Abu Dhabi Emirate[8].

Environmentally sensitive terrestrial, intertidal or marine habitats: As defined within EAD Habitat Classification Guidance (Al Dhaheri et al, 2017) these are defined as ecosystem types that:

- Any further loss of its natural habitat or deterioration of condition in these habitat types could result in it becoming critical; and / or
- The ecosystem types are likely to have lost some of their structure and function, and will be further compromised if they continue to lose natural habitat or deteriorate in condition.

MEBS Reports: Collectively refers to the Marine Environmental Baseline Survey completed in 2020 by Fugro for each of the cable routes.

Proponent: As defined within EAD EIA Technical Guidance (EAD, 2014) the agency or developer applying for an Environmental Permit for a development or infrastructure project in Abu Dhabi.

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7 www.iucnredlist.org

8 ad-em-habitat-classificationprotection-guideead2017.pdf (connectwithnature.ae)

Protected area: As defined within EAD Habitat Classification Guidance (Al Dhaheri et al , 2017) a clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long term conservation of nature with associated ecosystem services and cultural values.

Red List (also known as IUCN Red List or Red Data Book): an inventory of the global conservation status of biological species. It uses a set of criteria to evaluate the extinction risk of thousands of species and subspecies.

Scoping: The process by which the scope of the subsequent phases of the EIA are determined, including the baseline scope and is based on an initial review of project details, applicable regulations and guidelines, and an understanding of the surrounding environmental conditions.

No Objection Certificate: UAE Federal Law No. 24 of 1999 requires that all projects or establishments obtain a license in the form of no objection certificate (NOC) or operating permit prior to starting an activity. EAD issues NOCs or permits for construction and operation to developers or companies involved in development and infrastructure projects. These typically include conditions to ensure that the proposed schemes implement necessary measures to protect the environment during the construction, operation, and decommissioning phases of the project. A proponent should obtain a Construction NOC before beginning construction and an Operating Permit before commencing operations[9].

1.8.4.2 Abbreviations

ADCP	Acoustic Doppler Current Profiler
ADNOC	Abu Dhabi National Oil Company
ADPC	Abu Dhabi Power Company
ADTCA	Abu Dhabi Tourism and Culture Authority
AOI	Area of Influence
BOOT	Build Own Operate Transfer
CAA	Competent Administrative Authority
CIA	Cumulative Impact Assessment
CLB	Cable Lay Barge
CLV	Cable Lay Vessel
CSR	Corporate Social Responsibility
DDV	Drop Down Video
DOT	Department of Transport
EAD	Environment Agency - Abu Dhabi
EDD	Environmental Data Deliverable
EIA	Environmental Impact Assessment
ENVID	Environmental Impact Identification
EP	Equator Principles

[9] 1460_4_SOP_DevInf_v2.docx (ead.ae)

EPFI	Equator Principles Financial Institution
ESG	Environmental and Social Governance
E&S	Environmental and Social
ESIA	Environmental and Social Impact Assessment
ESS	Environmental, Social and Sustainability
FEED	Front End Engineering Design
FOC	Fibre Optic Cable
GC	Group Company
GIS	Geographical Information System
GSEC	General Secretariat for the Executive Council of Abu Dhabi Emirate
GHSEF	Group Health Safety and Environment Function
ha	Hectare
HR	Human Resources
HSE	Health Safety Environment
HSEIA	Health Safety Environment Impact Assessment
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
IBA	Important Bird Area
IESC	Independent Environmental and Social Consultant
IFC	International Finance Corporation
IFI	International Financial Institution
IMMA	Important Marine Mammal Area
INNS	Invasive non native species
IUCN	International Union for Conservation of Nature
km	kilometre
m	metre
MEBS	Marine Environmental Baseline Survey
NOC	No Objection Certificate
OHS	Occupational Health and Safety
PPA	Petroleum Port Authority
PS	Performance Standard
RFI	Request for Information
SCAD	Statistics Centre Abu Dhabi
SDG	Sustainable Development Goals
SPV	Special Purpose Vehicle
TJB	Transition Joint Bay
UAE	United Arab Emirates
UPC	[Abu Dhabi] Urban Planning Council
UTM	Universal Transverse Mercator
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organisation

2. BASELINE GAP ANALYSIS

The following steps have been taken to complete a review of the available baseline information collected as part of the Project:

- Step 1 – Identification of the reference framework (legislation, standards and guidance) to assess baseline suitability
- Step 3 – Collection and initial review of the Project baseline information. Initial review of disciplines covered.
- Step 3 – Gap analysis against reference framework
- Step 4 – High level analysis of risk to Project from deficient baseline
- Step 5 – Suggested data sources for data and proposed approaches to fill and data gaps and deficiencies.

2.1 STEP 1 – IDENTIFY REFERENCE FRAMEWORK

2.1.1 Guidance and Standards

The following legislation, standards and guidance are identified as providing the reference framework for the environmental baseline gap analysis:

National legislation

- The UAE Federal Law 24, 1999 and its associated executive orders set out the types of activities for which an EIA is required. In the Emirate of Abu Dhabi the “Competent Authority” for the implementation of this Law is the Environment Agency - Abu Dhabi (EAD).

National guidance

- EAD Technical Guidance Environmental Impact Assessment (EIA) Doc. ID: EAD-EQ-PCE-TG-02 Issue Date: April 2010 Rev. Date: 14 April 2014 Rev. No.: 01
- EAD Technical Guidance Technical Guidance Document for Submission of Environmental Applications and Reports EAD-EQ-PCE-TG-09 Issue Date: April 2010 Rev. Date: 14 April 2014 Rev. No.: 01

ADNOC Group Company Standards

- ADNOC (2020) ADNOC HSE Management System Environmental Standards Environmental Impact Assessment Standard No.: HSE-EN-ST01

International Standards

- IFC (2012) Performance Standards 1: Assessment and Management of Environmental and Social Risks and Impacts
- IFC (2012) Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources
- IFC (2016) Guidance Notes to Performance Standards on Environmental and Social Sustainability
- The following guidance has also been reviewed to provide context for the review: Gullison, R.E., J. Hardner, S. Anstee, M. Meyer. (2015) Good Practices for the Collection of Biodiversity Baseline Data. Prepared for the Multilateral Financing Institutions Biodiversity Working Group & Cross-Sector Biodiversity Initiative[10].
- IFC (2007) Environmental Health and Safety Guidelines Electric Power Transmission and Distribution.

2.1.1.1 International Environmental and Social Standards

This section provides a brief overview of potentially applicable EPFI Standards and Principles that the project may be required to adhere to in relation to satisfying prospective lender expectations for Environmental and Social Governance (ESG). The ten (10) Equator Principles (EPs) are listed below:

Table 3 Equator Principles IV

Principle	Content	Relevant in specifying the environmental baseline requirements
Principle 1	Review and Categorisation	
Principle 2	Environmental and Social Assessment	Yes
Principle 3	Applicable Environmental and Social Standards	Yes (as UAE is a non designated country Principle 2 defers to IFC Performance Standards)
Principle 4	Environmental and Social Management System and Equator Principles Action Plan	
Principle 5	Stakeholder Engagement	Not specific to baseline but consultation with regulators and other stakeholders in relation to identification of baseline information and developing an understanding of receptors would be part of

[10] www.csbi.org.uk/wp-content/uploads/2017/11/Biodiversity_Baseline_JULY_4a-2.pdf

Principle	Content	Relevant in specifying the environmental baseline requirements
		the overall suite of engagement activities.
Principle 6	Grievance Mechanism	
Principle 7	Independent Review	
Principle 8	Covenants	
Principle 9	Independent Monitoring and Reporting	
Principle 10	Reporting and Transparency	

Source: The Equator Principles (June 2020) ("EPs IV")

The EP were revised in 2020 and the current version is EP4. The main differences between EP3 and 4 are detailed below.

Table 4 Key Differences Between EP3 and EP4*

Area	EP3	EP4
Scope and applicability	Applies to Project-related corporate loans over and including US$100 million Project-related refinancing and Project-related acquisition financing are out of scope	Applies to Project-related corporate loans over and including US$50 million Project-related refinancing and Project-related acquisition financing are within scope
"Designated Countries"	Projects located in countries on the Designated Countries list are deemed to satisfy Principles 2, 4, 5, and 6 if they are in compliance with host-country laws	All Category A and Category B Projects will be reviewed for compliance with the EPs Projects located in Designated Countries will be separately evaluated for specific Project-related risks to determine if IFC PS could be applied to address those risks
Human Rights and Indigenous Peoples	Preamble acknowledges a responsibility to respect human rights No necessity for Environmental and Social Impact Assessments to consider human rights impacts Projects must obtain free prior informed consent of any Indigenous Peoples who may potentially be affected	Preamble includes a statement that EPFIs will abide by the UN Guiding Principles on Business and Human Rights Projects' Environmental and Social Impact Assessments to include an assessment of potential adverse impacts to human rights For all Projects (including those in Designated Countries), Indigenous Peoples who may potentially be affected must be consulted in a manner compliant with IFC PS 7, including where applicable obtaining FPIC of such peoples in relation to the Project. This compliance will be assessed by an independent consultant
Climate Change	Climate change is "recognized as important", but specific actions in relation to climate change are not considered Alternative analyses of greener solutions to be carried out for Projects above a certain threshold of Scope 1 and Scope 2 GHG emissions	Preamble includes a recognition of EPFIs' role in achieving targets under the 2015 Paris Agreement Climate Change Risk Assessments necessary for Category A and, as appropriate, Category B Projects Requirements to: (i) consider transition risks; (ii) conduct alternative analyses of greener solutions; and (iii) annually report emissions levels and the GHG efficiency ratio, for Projects above a certain threshold of Scope 1 and Scope 2 GHG emissions

The following eight (8) Performance Standards (PS) establish standards that need to be met, as required by IFC, and prospective lenders whose protocols require that projects must benchmark against IFC Performance Standards (Table 5).

Table 5 IFC Performance Standards

Performance Standard	Content	Applicable to Project Lightning	Relevant in specifying the environmental baseline requirements
Performance Standard 1	Assessment and Management of Environmental and Social Risks and Impacts	Yes	Yes – fundamental to ESIA process
Performance Standard 2	Labour and Working Conditions	Yes	Informed by social baseline in relation to labour force demographics incidence of child and forced labour within the area of the proposed project.
Performance Standard 3	Resource Efficiency and Pollution Prevention	Yes	Indirectly – as baseline to identify potential adverse impacts on ambient conditions as well as understanding local and regional capacity to manage different waste types as a result of the project.
Performance Standard 4	Community Health, Safety and Security	Yes	Indirectly – as baseline to identify potential affected community in order to fulfil requirements of PS4
Performance Standard 5	Land Acquisition and Involuntary Resettlement	Yes	Refers to involuntary resettlement and the need to develop an appropriate socio-economic baseline
Performance Standard 6	Biodiversity Conservation and Sustainable Management of Living Natural Resources	Yes	Yes – fundamental requirement to have baseline on ecosystems including critical and threatened species and habitats
Performance Standard 7	Indigenous People	No	
Performance Standard 8	Cultural Heritage	Yes	Indirectly – baseline of tangible and non tangible assets and resources is required to complete required assessment of cultural heritage

Source: The International Finance Corporation ("IFC") Performance Standards ("PSs") 2012 on Environmental and Social Sustainability

PS1 establishes the importance of (i) integrated assessment to identify the environmental and social impacts, risks, and opportunities of projects; (ii) effective community engagement through disclosure of project-related information and consultation with local communities on matters that directly affect them; and (iii) management of environmental and social performance throughout the life of the project.

PS2 through PS8 establish objectives and requirements to avoid, minimize, and where residual impacts remain, to compensate/offset for risks and impacts to workers, affected communities, and the environment.

Of these the elements relevant to the collection of baseline environmental information have been drawn from PS1 and PS6 and the accompanying Performance Standard Guidance Notes (IFC,2012a) Guidance Note 1 Assessment and Management of Environmental and Social Risks and Impacts.

IFC Performance Standard 1 Assessment and Management of Environmental and Social Risks and Impacts

The PS 1 paragraph 4 and associated guidance note paragraphs 9 -11 set out the considerations in the development of environmental (and social) baseline. PS 1 Social and Environmental Assessment paragraph 4 indicates the need to base assessments on current information and appropriate baseline data:

4. …… The assessment process will be based on current information, including an accurate project description, and appropriate social and environmental baseline data. The Assessment will consider all relevant social and environmental risks and impacts of the project, including the issues identified in Performance Standards 2 through 8, and those who will be affected by such risks and impacts.

The accompanying PS Guidance Note further expands on the expectation on terms of the baseline content. In summary the baseline should comprise primary data (i.e. collected from site specific surveys), information from stakeholders and existing literature and published material in relation to the area of influence. Notably seasonal surveys should be adopted for those areas identified as critical habitat.

GN9. As part of the ESIA, baseline studies should be conducted for the relevant biodiversity attributes and ecosystem services. Baseline studies should comprise some combination of literature review, stakeholder engagement and consultation, field surveys, and other relevant assessments. The requirements for the baseline study will vary depending on the nature and scale of the project. For sites with potentially significant impacts on natural and critical habitats and ecosystem services, the baseline should include field surveys over multiple seasons, to be undertaken by competent professionals and with the involvement of external experts, as necessary. Field surveys and assessments should be recent, and data should be acquired for the direct project footprint, including related and associated facilities, the project's area of influence, and potentially beyond (see paragraph GN58 of this note).

GN10. Baseline studies should be informed by a literature review and initial desktop analysis. The extent of the literature review will depend on the sensitivity of the biodiversity attributes associated with the project's area of influence and the ecosystem services that may be affected. Literature reviews could include sources such as (i) peer-reviewed journals, (ii) regional assessments, (iii) national or regional planning documents (for example, the National Biodiversity Strategy and Action Plan and Local Biodiversity Action Plans), (iv) assessments and studies in the location of the project and its area of influence, (v) web- based data such as information provided in the International Union for Conservation of Nature (IUCN) Red List of Threatened Species, (vi) national Red Books and Lists, (vii) landscape prioritization schemes including Key Biodiversity Areas, (viii) systematic conservation planning assessments and plans, and (ix) masters and doctoral theses, among others.

GN11. Depending on the nature, scale, and location of the project, spatial data and landscape mapping may form part of the initial desktop analysis. This is important for projects located in any habitat—modified, natural, or *critical—or areas where Affected Communities are highly dependent on ecosystem services. This initial analysis should draw on land-classification and land-use maps, satellite imagery or aerial photographs, vegetation type and ecosystem maps, and topographical and hydrological mapping, such as mapping of watersheds and interfluvial zones. Numerous regional ecosystem mapping efforts have been completed or are underway by academic and governmental institutions, intergovernmental organizations, and nongovernmental organizations (NGOs). This information can directly inform the ESIA and any related assessments of landscape integrity, resource development and management analyses, ecosystem services valuations, and reporting and prediction of environmental trends.*

IFC Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources

PS6 defines the expectation in relation to the safeguarding of biodiversity including critical habitat. Paragraph 16 sets out expectations in relation to the completion of assessments and consequently information needed to support these assessments. Accordingly, the baseline should provide sufficient information to:

- Enable the definition of habitat important to Critically Endangered and Endangered species.
- Enable the identification and definition of habitat important to range restricted or endemic species.
- Define areas that support significant populations of migratory / congregatory species.
- Define areas that are associated wot key evolutionary processes.

More generally the baseline shall include details of Legally Protected and Internationally Recognized Areas that interact with the area of influence. In relation to the definition of critical habitat (Paragraph 11 of PS6) the baseline should include information required to determine critical habitat including:

- IUCN Red List species.
- National or regionally listed species and rational and purpose of the listing.

It is noted that in the definition of critical habitat there may be the need to consult with national specialists and knowledge holders in order to reach consensus on a project specific definition of critical habitat.

Critical Habitat

16. Critical habitats are areas with high biodiversity value, including (i) habitat of significant importance to Critically Endangered and/or Endangered11 species; (ii) habitat of significant importance to endemic and/or restricted-range species; (iii) habitat supporting globally significant concentrations of migratory species and/or congregatory species; (iv) highly threatened and/or unique ecosystems; and/or (v) areas associated with key evolutionary processes.

PS6 paragraph 18 makes reference to the need for Biodiversity Action Plans (BAP) in the case where the proposed project is expected to result in unavoidable impacts to critical habitat. Appropriate baseline information is required to support the development of a suitable mitigation strategy that enables to achieve net gains of those biodiversity values for which the critical habitat was designated. In the case of marine habitats this would include understanding the conditions in areas intended or considered for compensatory measures including but not limited to:

- Substrate type including existing benthic habitats
- Water quality and temperature regime
- Prevailing currents / wave environment / tidal regime
- Bathymetry
- Ecological connectivity potential
- Existing / planned anthropogenic pressures
- Existing conservation management practices including restoration and enhancement schemes.

18. In such cases where a client is able to meet the requirements defined in paragraph 17, the project's mitigation strategy will be described in a Biodiversity Action Plan and will be designed to achieve net gains15 of those biodiversity values for which the critical habitat was designated.

The baseline should indicate details of whether or not the area of influence is known or suspected to include established invasive non-native species (INNS).

Invasive Alien Species

23. Where alien species are already established in the country or region of the proposed project, the client will exercise diligence in not spreading them into areas in which they have not already been established. As practicable, the client should take measures to eradicate such species from the natural habitats over which they have management control

2.1.1.2 ADNOC EIA Standards

Within ADNOC's EIA Standard two sections relate to baseline collection:

- Section 7.3.1. Procedural Requirements; and
- Section 7.3.2. EIA Process part D) Baseline.

7.3.1. includes '*a requirement to include a Scoping Study, which will determine the subsequent scope of the EIA process, including the extent and requirement for baseline studies, technical studies, etc*'.

7.3.2. EIA Process part (d) Environmental Baseline includes an extensive description of the baseline approach and content summarised as follows:

- Indicates that the EIA should include a detailed evaluation of the baseline environmental conditions at the project site and its surroundings, including those areas outside the project site boundary where impacts could arise during any phase of the project life cycle.

- Recognizes early collection of data provides for sufficient available in time to complete formal more detailed EIA required as part of the HSEIA process.
- Notes that assessment of the significance relies of understanding the magnitude of change in an environmental condition with a project, and that without adequate baseline data, any detailed analysis of impacts will be compromised.
- States that data acquisition can be through reviews of existing data sources, if available, but notes that often the collection of primary field data is needed.
- Where relevant, the environmental baseline study shall establish a social baseline and shall include the identification of social impacts.
- Data from previous studies can be used to support the baseline but only when the existing data are a) recently acquired b) relevant and c) of sufficient quality to be used for subsequent impact assessment analysis. The use of such data should be approved by ADNOC Group Health Safety and Environment Function (GHSEF), and may be done within the scoping process.
- In general, data should however not be more than five years old.
- The baseline collection exercise, including social baseline should commence during Front End Engineering Design (FEED) stage of the project life cycle, after the completion of the Scoping Study[11].
- Those completing studies should consult ADNOC or other ADNOC Group Companies (GCs) for availability of previous baseline studies.
- Baseline data must be documented electronically and referenced spatially using Universal Traverse Mercator (UTM) coordinates. It is mandatory that baseline data be compiled in Geographical Information System (GIS) format.

Baseline data collection in relation to marine environments may include:

- The environmental sensitivity of the area and ecosystem type.
- Presence of any rare or endangered species of flora and fauna on or near the project site.
- Identification of any sensitive ecological features such as:
  - Mangrove areas,
  - Important bird habitats, and
  - Turtle nesting areas etc. which might be affected by the project either during normal operation or during an accidental release.
- Water quality in the vicinity of any planned discharges from the proposed project.
- Socio economic indicators such as population numbers, demographics, economic activity etc.
- Marine ecological surveys are to be included in the environmental baseline studies to evaluate the existing conditions for projects which include discharges to the marine environment.

[11] Or as defined for a combined phase EIA

- For the monitoring of baseline of marine water quality and marine ecology (sediments and biota) as well as monitoring the impact of discharges to the marine environment, the parameters shall be considered based international best practice references, guidelines, published papers, etc. and the potential for the interaction of such parameters.

The ADNOC EIA Standard also specifies considerations for social factors, archeology, groundwater, existing land use, air quality, ambient noise and proposed future land uses. These are not explicitly described for the marine environment however the following should be considered for the baseline covering the marine area:

- Marine transport and navigation
- Fisheries
- Tourism
- Proposed development and use within the marine offshore area

In terms of air quality, the standard requires that background air quality in the area (e.g. ambient concentrations of sulphur dioxide (SO_2), oxides of nitrogen (NO_x), particulate matter with an aerodynamic diameter < 10 µm (PM_{10}) and hydrocarbons) should be identified. (In the context of the local airshed in the offshore locations of the Project establishing a current baseline may support future monitoring and demonstration of the project benefits associated with removing aging decentralized power facilities at offshore operational centres).

The ADNOC EIA Standard notes that the availability of any existing sources of baseline data should be identified at the scoping stage. Similarly, any gaps in the baseline information must also be identified at this stage, so that appropriate field surveys can be planned to acquire the necessary data.

2.1.1.3 EAD Technical Guidance

The EIA Technical Guidance[12] of EAD specifies the following in relation to the collection and reporting of the baseline:

- *The baseline should describe the current status (baseline condition) of the environmental component and the methods and/or sources of information used to determine the baseline condition.*
- *This should include areas and conditions that may be directly and indirectly affected by any of the proposed project activities conducted during the construction, operation, and decommissioning phases (if applicable).*

[12] Doc. ID: EAD-EQ-PCE-TG-02 Issue Date: April 2010 Rev. Date: 14 April 2014 Rev. No.: 01

- *Analysis should be performed to identify existing and valid baseline data and additional baseline monitoring / survey required based on extent of the project footprint and existing data, the validity of the existing data in manner of time, conformance with EAD standards and applicability of these data with project anticipated impacts.*
- *Existing data from previous studies can be used to supplement the data collected as part of the specific EIA but the report should clearly describe the data source data and clearly demonstrated that these data adequately represent the condition of the environment. Potentially suitable data sources include results from previous baseline condition assessments conducted on the project site and data from studies, literature, or reference documents that describe the environmental condition of a sufficiently comparable site. For data from such sources, the EIA report should contain a detailed description of the source and the methods used to collect the data (to the level of detail contained within the source document).*
- *The baseline should address all existing physical, chemical, biological, and socio-economic conditions relevant to the environmental component. This should include the conditions for the project area, the extent of the area beyond the project footprint that is likely to be directly or indirectly impacted by the proposed project. These areas are to be clearly described and delineated with maps in the EIA report.*
- *Specific information that should be addressed in this section for marine environments includes:*
    - *The current levels of nutrients, pollutants, contaminants, and other relevant compounds [for water quality] should be evaluated and described.*
    - *All relevant pollutants, contaminants, turbidity, and temperature should be assessed in both the water and sediments, and if applicable and available, information on bathymetry, currents, water flow patterns, and existing intakes and outfalls (at the project site and in the area of probable impact) should be presented.*
    - *An evaluation and description of all habitats, ecosystems, and flora and fauna that could or will be impacted by the proposed project, with special emphasis on habitats, systems, and flora and fauna that are threatened, endangered, uniquely sensitive, or of regional or international importance. For flora and fauna, information on local, regional, national, and international abundance, habitat requirements, territory or home-range size, migration patterns, and other behavioral characteristics that could be impacted by the proposed project should also be included. The sources of data or methods used to collect the baseline data should account for seasonal and annual variations in the presence and the abundance of flora and fauna. Therefore, the sampling regime used to characterize the baseline condition of flora and fauna may require sampling across multiple seasons and years. The selection of the sampling regime should be justified in the EIA report and be based on the flora and fauna present in the project area and area of probable impact.*

The EAD EIA Technical Guidance document also provides details in relation to noise, traffic, socio-economic, air quality, waste, geology, soils, and groundwater. These are not explicitly described for the marine environment; however, in recognition of the disciplines referred to above it is anticipated that the following should be considered for the baseline covering the marine area:

- Marine transport and navigation
- Other users and uses of the marine environment (such as cables, pipelines, resource exploitation, tourism)
- Fisheries
- Proposed development and use within the marine offshore area
- Waste including ballast water
- Offshore springs and hydrogeological connectivity between the coast and the near shore environment
- Noise including underwater noise

The EAD EIA Technical Guidance states how data should be presented including the provision of '*maps and other relevant visual information that orient reviewers to the distribution of important features and their proximity to the project site (covering the project site and area of probable impact)*'. Specifics in relation to map formats and cross references to the EAD-issued document titled General Guidelines for Submission of Baseline Environmental Data (EAD, 2016) which provides guidance regarding data collection, formatting, and reporting methods.

2.2 STEP 2 – COLLATE AND REVIEW PROJECT INFORMATION RECEIVED

This section identifies Project information received in relation to the Gap Analysis for the environmental baseline and identifies the environmental topics covered.

2.2.1 Project documents

Table 6 summarises information reviewed to identify any baseline data gaps.

Table 6 Available Project Information

No.	Document title or item Fil	Reference number
1	Blue Sea (2009) PROJECT "DAS ISLAND":ENVIRONMENTAL BASELINE STUDY	File 1-07092-E
2	Dome (2016) SATAH & ARZANAH ISLAND OFFSHORE FACILITIES Phase III HSEIA Environmental Impact Assessment Scoping Report	D14.94/EIA Scoping Report Rev0
3	Dome (2012) Phase III EIA for Zirku Island Scoping report	D.11.74/Zirku Island/Scoping
4	Fugro (2020) Environmental Baseline Survey Results Report Route 1 Rev 04 16-09-2020	AD41-457-G-24202-04
5	Fugro (2020) Environmental Baseline Survey Results Report Route 2 Rev 04 16-09-2020	AD41-457-G-24203-02

No.	Document title or item Fil	Reference number
6	Fugro (2020) Weather Report - Statistical Report Eastern Route (Route 1) Location North	AD41-457-G-24210-04 OMU037-Eastern Route-1 (Location North)
7	Fugro (2020) Weather Report - Statistical Report Eastern Route (Route 1) Location South	AD41-457-G-24219-01 OMU037-Eastern Route-1 (Location South)
8	Fugro (2020) Environmental Baseline Survey Results Report – Route 1 E-0395 - Document Rev 04	NO.: AD41-457-G-24202 (OEU021-V01-Route-1).
9	Fugro (2020a) Environmental Baseline Survey Results Report - Route 2 E-0395 - LIGHTNING PROJECT Rev 02	Document No.: AD41-457-G-24203 (OEU021-V02-Route-2)
10	Fugro (2020c) Geophysical Survey Report – Cable Route 1A from Mirfa Landfall to Lower Zakum Island G Rev 02	Document No: AD41-457-G-24197 (MRU093-V02-Route-1A)
11	Fugro (2020d) Weather Report – Statistical Report Eastern Route (Route 1) Location North A	DOCUMENT NO.: AD41-457-G-24210 (Northern Location) Rev 04
12	Fugro (2020e) Weather Report – Statistical Report Eastern Route (Route 1) Location South	AD41-457-G-24219 (Southern Location) Rev 01
13	Fugro (2020f) Weather Report – Statistical Report Eastern Route (Route 2) Location North	AD41-457-G-24209 (Northern Location) Rev04
14	Fugro (2020g) Weather Report – Statistical Report Eastern Route (Route 2) Location South	AD41-457-G-24218 (Southern Location) Rev01
15	Fugro (2020h) Geophysical Survey Report – Cable Route 1-A from Mirfa to Landfall to Lower Zakum Island G	DOCUMENT NO.: AD41-457-G-24197 (MRU093-V02-Route-1A) Rev02
16	Fugro (2020i) Geophysical Survey Report – CABLE ROUTE-1B from Mirfa to Landfall to Lower Zakum Island G	DOCUMENT NO.: AD41-457-G-24197 (MRU093-V02-Route-1B) Rev02
17	Fugro (2020j) Geophysical Survey Report – CABLE ROUTE-2 from Shuweihat to Landfall to Das	DOCUMENT NO.: AD41-457-G-24199-01 (MRU093-V04-Route-2)
18	Fugro (2020k) Geophysical Survey Report – CABLE ROUTE-2A from Shuweihat to Landfall to Das	DOCUMENT NO.: AD41-457-G-24200-01 (MRU093-V05-Route-2A)
19	Fugro (2020l) Geophysical Survey Report – CABLE ROUTE-2B from Shuweihat to Landfall to Das	DOCUMENT NO.: AD41-457-G-24201-01 (MRU093-V06-Route-2B)
20	Mott MacDonald (2020) Environmental Screening Report 18 June 2020 Rev 02	No Reference

2.2.2 Data coverage by topics

Available data were reviewed to understand the available coverage of topics within the various source materials and the nature of the data as being primary data (recently collected by the Project to inform specific aspects of the project design and or assessment), secondary data available from ADNOC Group Companies or publicly available secondary data.

Table 7 Environmental topic coverage within available Project documents

Topic	Primary Data	GC Secondary Data	Secondary Data – Publicly Available
Air quality	There is an Air Quality Monitoring (AQM) station at Das and hourly data are available for use.	Previous air quality monitoring for Das Island and the Zakum oil field mentioned for NOX and	General data are referenced for climate and air quality

Topic	Primary Data	GC Secondary Data	Secondary Data – Publicly Available
		SO2. Data older than 5 years (Dome, 2012, Blue Sea 2009)	
Noise	No data are provided	Some provided for Das and Zakum field, but data is over 5 years old (Dome, 2012, Blue Sea 2009)	2017 information referred to for E11 road in the Al Dhafra region
Underwater noise	No data are provided	No data are provided	No data are provided
Vibration	No data are provided	No data are provided	No data are provided
Soils & Geology	No data are provided	General	General information provided at emirate level. General assumptions made for soils at the onshore proposed Project sites at Shuweihat and Mirfa
Groundwater	No data are provided	General	General information provided at emirate level
Landscape	No data are provided	No data are provided	Screening report does reference landscape in general terms and identify Sir Bani Yas as a potential receptor
Marine water quality	MEBS reports available specific to each cable route with gaps in the nearshore area	Some provided for Das and Zakum field but data is over 5 years old (Dome, 2012, Blue Sea 2009)	General information provided at emirate level
Marine sediment quality	MEBS reports available specific to each cable route with gaps in the nearshore area	Some provided for Das and Zakum field but data is over 5 years old (Dome, 2012, Blue Sea 2009)	Project MEBS referred to
Marine ecology – fish and fisheries	No data are provided	Some provided for Das but data is over 5 years old	No data
Marine ecology – marine mammals	No data are provided	Some provided for Das but data is over 5 years old (Dome, 2012, Blue Sea 2009)	General information provided for Marawah reserve area of project
Marine ecology – marine reptiles	No data are provided	Some provided for Das but data is over 5 years old (Dome, 2012, Blue Sea 2009)	General information provided for Marawah reserve area of project
Marine ecology – benthic habitats	Information provided specific to each cable route with MEBS and Geophysical Reports (Figure 2020, 2020h – l)	Some provided for Das and Zakum field but data is over 5 years old (Dome, 2012, Blue Sea 2009)	Each route identified against available habitat information from EAD
Coastal ecology – mangroves and coastal sabkha	No data are provided	No data are provided	General information provided for Shuweihat
Ornithology	No data are provided	No data are provided	No data are provided
Heritage and archaeology	No data are provided	No data are provided	General information provided at emirate level

Topic	Primary Data	GC Secondary Data	Secondary Data – Publicly Available
Social baseline – communities / demographics	No data are provided	Some provided for Das but data is over 5 years old (Dome, 2012, Blue Sea 2009)	Some general information provided for populations at Das, Mirfa and Ruwais
Social baseline – infrastructure	No data are provided	Some provided for Das but data is over 5 years old (Dome, 2012, Blue Sea 2009)	No data
Social baseline – other marine users	No data are provided	Some provided for Das but data is over 5 years old (Dome, 2012, Blue Sea 2009)	Some general information provided in relation to fishing activities with the MPA and at Das
Social baseline – economic	No data are provided	Some provided for Das but data is over 5 years old (Dome, 2012, Blue Sea 2009)	General information provided at emirate level
Transport – navigation	No data are provided	Some provided for Das but data is over 5 years old (Dome, 2012, Blue Sea 2009)	No data
Transport – onshore	No data are provided	Some provided for Das but data is over 5 years old (Dome, 2012, Blue Sea 2009)	No data
Waste and resources	No data are provided	Some provided for Das but data is over 5 years old (Dome, 2012, Blue Sea 2009)	No data

2.3 STEP 3 – REVIEW AGAINST REFERENCE FRAMEWORK TO DETERMINE OMISSIONS, DEFICIENCIES AND UNCERTAINTIES

The following section sets out the identified gaps in the environmental baseline data sources listed within Table 6.

2.3.1 Adherence to defined assessment process

The scope of the baseline (temporal, spatial, parameters, aspects) and approach to collection (primary and secondary data) are typically defined through the screening and scoping processes as recognised within the reference framework. ADNOC is seeking to advance the baseline stage prior to the commencement of the formal EIA process (as defined by EAD and ADNOC GC). In doing so it is seeking to avoid programme delays and uncertainty for the appointed EIA consultant(s).

The Screening Report satisfies the screening stage under GC and EAD requirements and has a well-developed section that provides a preliminary identification of potential impacts. Notwithstanding the ESIA process steps taken do not fully align with the typical ESIA steps of scoping items to be taken forward for inclusion within the ESIA and for setting the scope for the acquisition of baseline data. Accordingly, the definition of the area of influence for which the baseline is required does not fully meet the reference framework. The main omission at this stage is that is no clear scope for further surveys and assessment. It is noted that the planned future ESIA tasks provide opportunity to rectify this.

2.3.2 Baseline survey and area of influence

The Project area of influence (AOI) is typically defined by the project activities that have a physical footprint during both the construction and operational phases. PS1 paragraph 8 states that:

Where the project involves specifically identified physical elements, aspects, and facilities that are likely to generate impacts, environmental and social risks and impacts will be identified in the context of the project's area of influence. This area of influence encompasses, as appropriate:

The area likely to be affected by:

(i) the project[13] and the client's activities and facilities that are directly owned, operated or managed (including by contractors) and that are a component of the project[14];***

(ii) impacts from unplanned but predictable developments caused by the project that may occur later or at a different location; or

(iii) indirect project impacts on biodiversity or on ecosystem services upon which Affected Communities' livelihoods are dependent.

Similarly, the ADNOC EIA Standard (Section 7.3.1.) and EAD EIA Technical Guidance includes a requirement to complete a Scoping Study or Term of Reference (TOR), which indicates the extent and requirement for baseline studies, and supporting technical studies. The AOI can therefore be considered as comprising the following:

- The directly affected area i.e. the permanent development footprint and the footprint of any construction phase components such as lay down areas, batching plants and dedicated access roads as well as areas which may be affected by the operational phase such as altered traffic/navigational patterns; and
- Areas which may be indirectly affected; these include locations which may experience induced or cumulative changes in combination with activities not under the direct control of the project.

[13] Examples include the project's sites, the immediate airshed and watershed, or transport corridors.

[14] Examples include power transmission corridors, pipelines, canals, tunnels, relocation and access roads, borrow and disposal areas, construction camps, and contaminated land (e.g., soil, groundwater, surface water, and sediments).

Indirectly affected areas or entities may be remote from the project footprint, particularly when considering primary supply chains.

- In the absence of a scoping stage the AOI is not yet defined and the data collected area has not been derived to cover the likely area of influence. Subsequently the primary data collected covers the majority of each proposed route through both the MEBS surveys and the Geophysical Surveys, however the following deficiencies are noted:
- There is limited supporting literature review to provide habitat context for the wider area. The screening report does provide a range of general information however this is not discussed specifically in the context of each route and some sources do not provide current data i.e. data and references are undated or older than 5 years.
- There are no references to habitat maps published by the EAD and the value that these bring in terms of defining survey approaches and boundaries
- There is no spatial coverage for the cable route surveys in the shallow near shore areas requiring dredging and or trenching.

2.3.3 Survey approach and methods

The marine survey strategy within the Project specific MEBS completed for each cable comprised a programme of water sampling and in situ measurement, sediment sampling and quality testing and the acquisition of seabed video data:

- Sediment sampling (including soil samples taken every 8 km along each of the proposed routes) was to be undertaken to determine the physico-chemical properties of the marine sediments.
- Water column sampling and water profiling was undertaken to assess water column physico-chemistry at the time of sampling.
- Eleven video transects were completed along Route 1 and ten along Route 2[15]. Acquisition of seabed video data was required to assess the benthic habitats and communities.

The survey limits, sample locations, sample density and rationale and or standards or guidance adopted to define the survey limits and approach are not documented in either MEBS document. Insufficient quantum and or poorly located samples and transect locations are likely to hinder the completion of a robust assessment of impacts.

[15] Report states 11 in the text but 10 stations are indicated within Table 3.1 Completed camera transects Route 2 ADNOC DOCUMENT NO.: AD275-27-SUR-06025 (OEU021-V02-Route-2)

Information is provided in relation to the sample acquisition methods including equipment details. These details are sufficient to understand how data was obtained to plan repeat comparable benthic surveys and to understand the limitations of the methods used.

There is no primary data and therefore no methods defined for the following aspects:

- Soil and groundwater quality at landfall locations
- Noise and air quality at landfall locations
- Underwater noise
- Terrestrial and coastal ecology
- Underwater noise
- Social factors
- Marine users
- Ornithology
- Marine fauna (including non-native species)
- Cultural heritage and archaeology

2.3.4 Baseline aspects

2.3.4.1 Marine environmental

The available baseline survey does not include Project area specific primary information relating to marine fauna, macrofauna, fish and fisheries, coastal habitats, invasive species and birds. Primary and secondary data for these elements would need to be included within a comprehensive marine environmental baseline in order to complete an assessment of environmental impacts. This approach aligns with GC, EAD and IFC approaches.

Some secondary data are provided in the Screening Report (Mott MacDonald, 2020) in relation to marine fauna, fish and fisheries, coastal habitats, and birds as well as archaeological resources. These are data not specific to the project area but either generic to a broad project area or at a national scale.

Legally protected or internationally recognized areas are indicated within the Screening Report (Mott MacDonald, 2020); however, Important Bird Area (IBAs) and important marine mammal areas (IMMAs) are not referenced.

No documents identified if non-native species are identified within the project area or regionally.

2.3.4.2 Terrestrial & Coastal

Some secondary data are provided in the screening report in relation to soils, water, climate, air quality, fauna, coastal habitats, and birds. These data are not specific to the project area. Primary and secondary data for these elements would need to be included within the environmental baseline in order to scope the approach to assessment and complete the subsequent assessment of environmental impacts.

No primary data (mangroves, coastal habitats, birds) are available for either cable route and landfall areas.

2.3.4.3 Social

Some general secondary data are provided in the Screening Report (Mott MacDonald, 2020) in relation to landscape, socio economic and cultural heritage baseline. However, no primary or disaggregated secondary data are available for either cable route. It is recognized that the landfall areas are adjacent to existing power (industrial) facilities and it is assumed that there is no resettlement required for either residential or commercial entities.

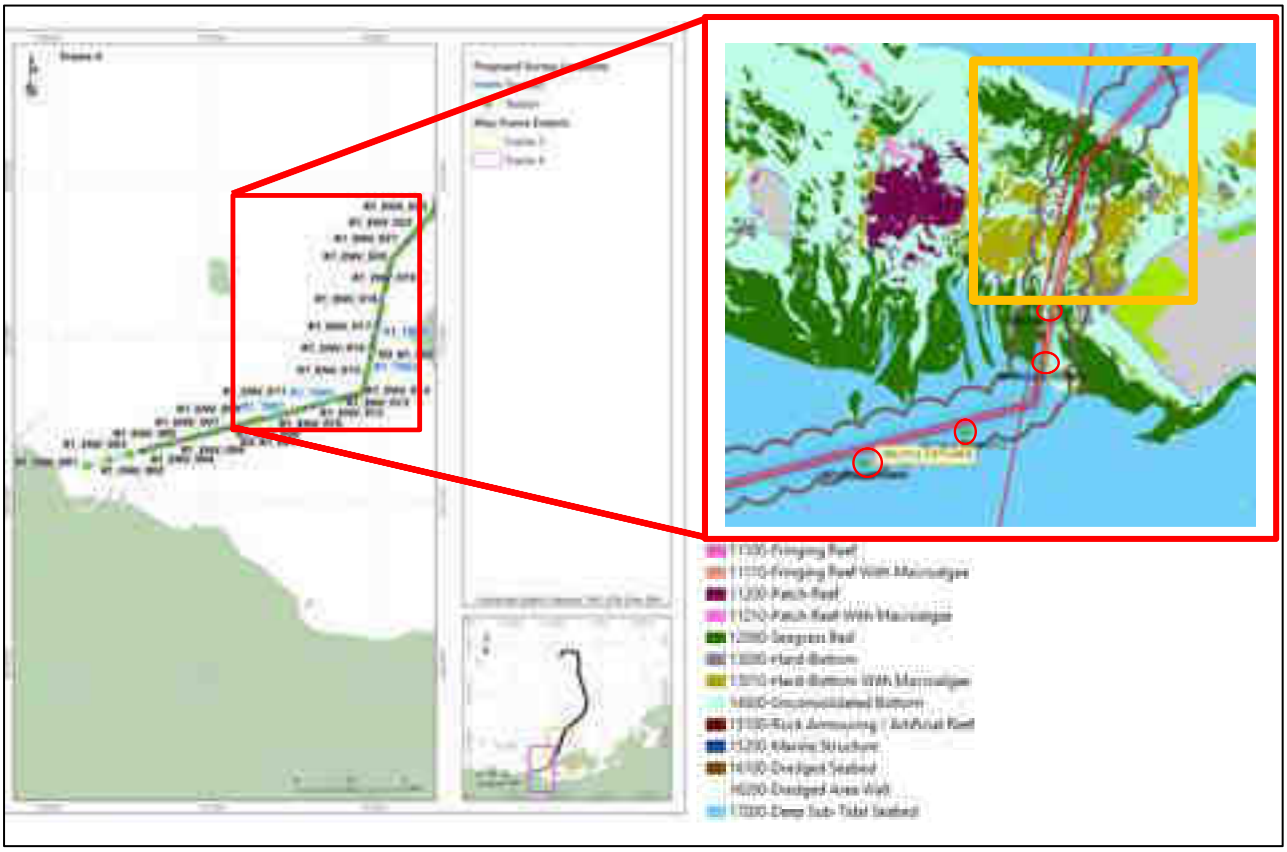
Primary and secondary data on community, health, education, land uses, economic activities, proposed future developments would need to be identified in order to set the scope for further surveys and ongoing assessment of environmental and social impacts.

2.3.5 Temporal and spatial coverage of data

The following focusses on the temporal and spatial coverage of the primary data available within each of the MEBS reports only. The Screening Report (Mott MacDonald 2020) does not contain recent Project specific data.

The rationale for the selection of transect points to build up and understanding on benthic habitat is not clearly set out within the MEBS reports. In the near shore areas of each cable route, where more invasive trenching is required, the primary data to understand the type and extent of baseline habitat is not likely to be sufficient to confidently demonstrate a full understanding of the potential impacts of the proposed activities.

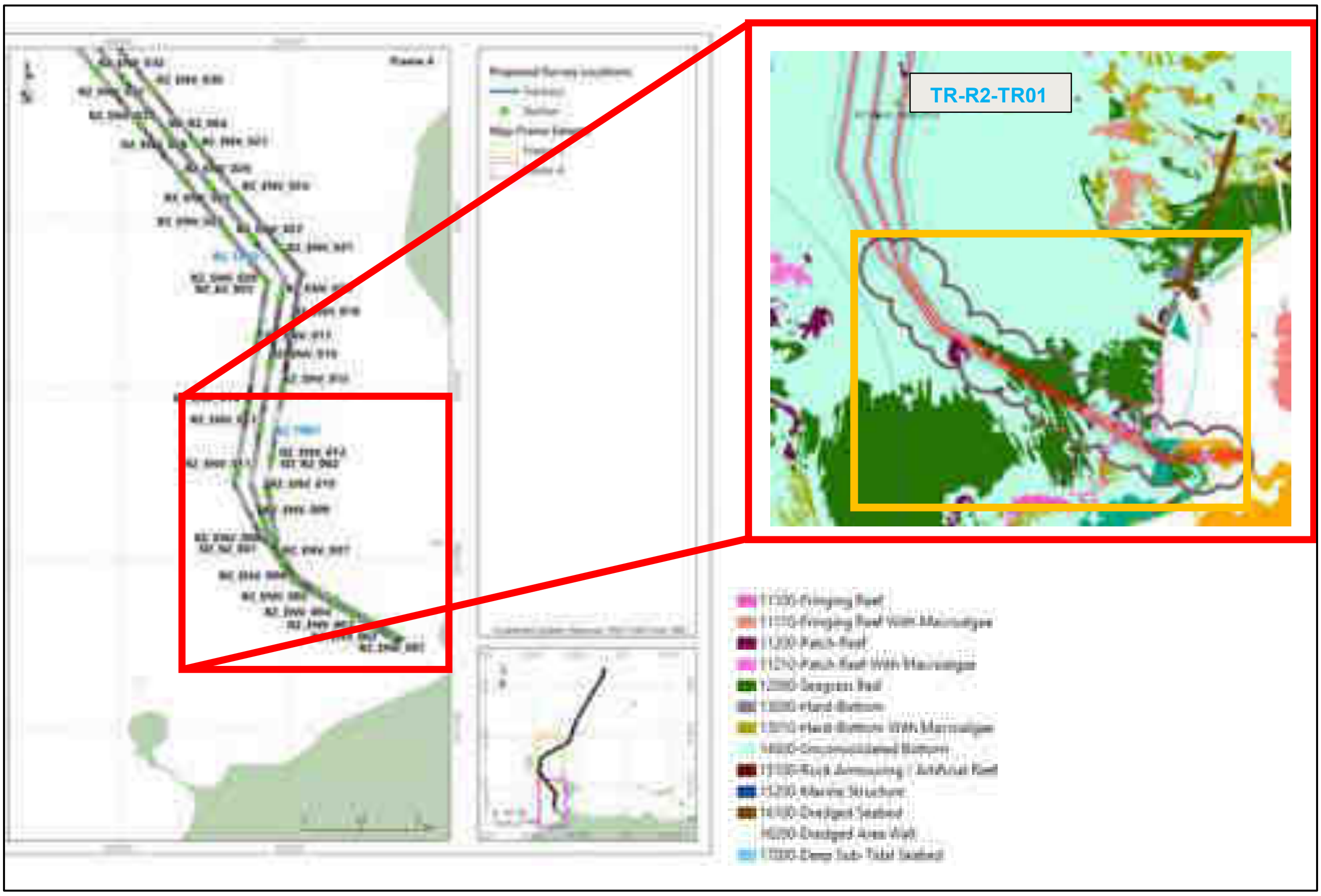
Figure 2 below compares the transects along Route 1 to the published habitat map by EAD. This area is within the Marawah Biosphere Reserve and within 2km of the Abu Al Abwad IBA. No transects have been completed within the area identified in yellow box.



Source: EAD (2014) Enviroportal Data Layers, Fugro (2020) MEBS Route 1

Figure 2 Cable route 1 dredge area baseline review

Similar to Route 1, Route 2 also has limited primary data in the nearshore area to be affected by trenching dredging. Published habitat maps that the proposed routes are likely to affect critical habitat (corals, seagrass, mudflat, saltmarsh and mangroves) and priority habitat types (hard bottom with algae) (Figure 3).



Source: EAD (2014) Enviroportal Data Layers, Fugro (2020) MEBS Route 2

Figure 3 Cable route 2 dredge area baseline review

To date one project specific marine survey campaign has been completed. To fully satisfy host country and IFC requirements the primary data collected should include a consideration of seasonal changes. In the context of the Project this is expected to include (this is not exhaustive and would need to be confirmed through consultation with EAD):

- Water quality and temperature
- Ocean currents
- Seagrass habitats
- Species distributions including a consideration of migratory seasons

2.3.6 Identification of data limitations and assumptions

There are no specific assumptions or limitations identified in relation to the data referred to within the Screening Report (Mott MacDonald 2020), however the report recognizes that any uncertainties associated with impact prediction or the sensitivity of receptors due to the absence of data or other limitations will be explicitly stated [within the future EIA report].

There are no data assumptions or limitations listed in either MEBS reports. Reference is made to scope of works reports [not available for review] which may list some assumptions and limitations available with the survey.

2.3.7 Data presentation and format

The EAD document Technical Requirements for the Submission of Environmental Data sets out the requirements for the submission of environmental data as part of an environmental assessment or monitoring report. The data is to be packaged as an Environmental Data Deliverable (EDD) and the EAD have issued templates on how each type of EDD is to be provided. The EDDs must be used for all new data collected but are not required for previously collected data or for modelling results. The deliverables reviewed do not meet the EAD Environmental Data Deliverables criteria however they are in a format that can be readily converted into the required format.

ADNOC Standards have a mandatory requirement that baseline data be compiled in Geographical Information System (GIS) format. The data provided is partially compliant and it is understood that data are likely to be available in an appropriate format for use in ongoing studies.

There are no specific requirements within the IFC PS; however, these do require that host country requirements are satisfied.

Table 8 Baseline compliance summary

Guidance / Standard	Environmental Baseline Requirement *Adherence to EIA process*	*Area of influence / survey area*	*Data collection methods and approach*	*Temporal and spatial coverage*	*Content / Aspects of survey*	*Assumptions and limitations*	*Data presentation and format*
ADNOC EIA Guidance	Screening completed for the project, but no scoping report prepared or approved. **PARTIAL**	No clear description of the project area of influence indicated in the Screening report of MEBS reports. AOI to include consideration of direct, indirect, and cumulative areas of influence. Not clear how the study area was selected or the spacing of the transects was concluded. **NOT COMPLIANT**	For those data collected clear methods and reporting is provided. **COMPLIANT** for the data available	Insufficient to meet temporal requirements for water quality, met-ocean. Deficient spatial coverage to adequate assessed impacts in dredge / landfall areas. **NOT COMPLIANT**	MEBS does not include any specific fauna surveys – marine mammals, reptiles, fish, invertebrates or ornithology. No reference to marine archaeological resources although the seabed features mapping within the Geophysical Survey outputs do show the position of anomalies and wrecks. **PARTIAL**	Does not meet requirements. Limitations relating the age and coverage of data referred to is not consistent or absent. **NOT COMPLIANT**	Data provided are GIS compatible but not systematically recorded between difference deliverables **NOT COMPLIANT**
EAD EIA Technical Guidance	Screening completed and consultation completed on the findings of the MEBS completed for each cable route. **PARTIAL** – formal process not yet initiated with EAD	As above **NOT COMPLIANT**	As above **COMPLIANT** for the data available	One survey campaign has been completed. No specific seasonality referenced in the MEBS. Insufficient to meet temporal requirements for water quality, met-ocean. Insufficient spatial coverage at landfall and areas to be dredged or trenched. **NOT COMPLIANT**	As above. There is insufficient data to provide robust plans to deliver no net loss [of critical habitat within protected areas]. There is not yet any site-specific information for landfall areas, marine fauna. **NOT COMPLIANT**	As above **NOT COMPLIANT**	Data format does not meet the requirements. **NOT COMPLIANT**

Guidance / Standard	Environmental Baseline Requirement *Adherence to EIA process*	*Area of influence / survey area*	*Data collection methods and approach*	*Temporal and spatial coverage*	*Content / Aspects of survey*	*Assumptions and limitations*	*Data presentation and format*
IFC PS 1	Host and GC process not followed therefore not currently fully compliant to PS. **PARTIAL**	As above **NOT COMPLIANT**	No details included for stakeholders consulted, team composition and qualifications, or general information to support reviewers in understanding the baseline process. **PARTIAL**	Not expected to meet requirements for seasonality Spatial coverage insufficient. **NOT COMPLIANT**	As above **NOT COMPLIANT**	Does not meet requirements. Limitations relating the age and coverage of data referred to is not consistent or absent. **NOT COMPLIANT**	No specific requirements for IFC but as the national standard is not met this would be a minor deficiency since national requirements are to be fulfilled. **NA**
IFC PS6	As above **PARTIAL**	As above. Gaps in data mean not fully able to understand risks to critical habitat. **NOT COMPLIANT**	Priority biodiversity values not defined through consultation with experts, organizations, and communities. **PARTIAL**	Seasonal distributions including known migratory movements across the study area of red-list species should be included. Baseline not sufficient to support robust assessment of critical habitat **NOT COMPLIANT**	As above **NOT COMPLIANT**	Does not meet requirements. Limitations relating the age and coverage of data referred to is not consistent or absent. **NOT COMPLIANT**	As above **NA**

2.4 STEP 4 – PROJECT RISK

Very High – Substantial time and financial costs associated with consequence. Issue(s) are complex to resolve and require extensive involvement with Proponent, advisors, lenders and competent authority. Programme delay of a year of more. Serious knock on effects for project in terms of programme and the available funding sources.

High – Large time and financial costs. Programme delay of months. Resolution requires coordinated effort and committed resources. Resolution requires ongoing discussions with competent authorities. Large effort and input potentially needed to prevent serious programme risks. Uncertainty into ongoing programme and budget needs.

Moderate – Manageable time and moderate cost inputs to resolve. Requires coordinated effort of core team to resolve. May require short term additional resource inputs. Requirements are established and can be easily budgeted and programmed.

Low – Can be accommodated in existing programme with existing resources. Minimal cost or within identified agreed budgets. Resources are available or can readily be made available to support.

Table 9 summarizes the risks associated with an incomplete or deficient environmental and social baseline.

A qualitative approach to defining consequences of the risk has been used:

Very High – Substantial time and financial costs associated with consequence. Issue(s) are complex to resolve and require extensive involvement with Proponent, advisors, lenders and competent authority. Programme delay of a year of more. Serious knock on effects for project in terms of programme and the available funding sources.

High – Large time and financial costs. Programme delay of months. Resolution requires coordinated effort and committed resources. Resolution requires ongoing discussions with competent authorities. Large effort and input potentially needed to prevent serious programme risks. Uncertainty into ongoing programme and budget needs.

Moderate – Manageable time and moderate cost inputs to resolve. Requires coordinated effort of core team to resolve. May require short term additional resource inputs. Requirements are established and can be easily budgeted and programmed.

Low – Can be accommodated in existing programme with existing resources. Minimal cost or within identified agreed budgets. Resources are available or can readily be made available to support.

Table 9 Risk of a deficient or non-compliant baseline to the Project

Ref	Type	Description	Consequence	Control
01	Programme	Risk that deficient baseline delays financial close as further information is requested.	**Very high** – potential for subsequent impacts to operational milestones. Proposal not initiated in desired timeframe of project sponsor. Potential knock on operational issues at areas benefitting from upgraded power supply arrangement. Complex and or numerous covenants are introduced into loan agreement with extensive	• Early and sustained coordination with EAD. • Engagement with prospective lenders to understand and or agree environmental and social assessment requirements prior to FC. • Prepare clear scope of works for further environmental surveys with

Ref	Type	Description	Consequence	Control
			ESAP complicating the ongoing series of disbursements.	identified delivery programme, resources and budget.
02	Programme	COVID-19 restriction hinder the collection of baseline information for air, noise, soils and ecological features coastal areas in 2021.	**Low –** Soil, air and noise data can be collected at a later date without major impact on assessment. Expected that reasonable assumptions can be made for the purpose of assessment.	• Early and sustained coordination with EAD. • Identification of existing data sources and initial impact assessments to be based on professional judgement and precautionary approach. • Plan advanced works that include a requirement to fill some data gaps through available secondary data sources.
			High - landfall coastal area baseline is more essential to resolve. In absence precautionary principle will likely lead to reporting of worse impacts and lead to a more complex series of mitigation measures.	• Complete coastal walkover and initial mangrove survey prior to FC. • Prepare clear scope of works for further surveys to demonstrate commitment to completion of adequate baseline.
03	Assessment robustness	Limited and general level of socio-economic information hinders ability to complete credible social impact assessment	**Moderate** – social baseline data likely to be available from numerous existing data sets. Project area does not directly affect private land with existing residences or businesses therefore the receptor inventory should be relatively simple to derive.	• Confirm that there is no economic displacement (permanent and temporary). • Plan advanced works that include a requirement to fill some data gaps through available secondary data sources. • Engagement with prospective lenders to understand and or agree environmental and social assessment requirements prior to FC.
03	Assessment robustness	Impact assessment adopts precautionary principle in assessment of impacts in the absence of adequate baseline. Reporting of a more severe impacts and a greater number of impacts for those elements with limited baseline.	**High** – could lead to more onerous (and costly) compensation and ongoing environmental quality monitoring requirements.	• Combine MEBS outputs and Seabed Features layer from Geophysical Survey and cross check to published Habitat maps to refine understanding of the presence of critical and sensitive habitats within the project area. • Early and sustained coordination with EAD to identify expectations in terms of mitigation including no net loss ratios.

Ref	Type	Description	Consequence	Control
				• Plan advanced works that include a requirement to fill some data gaps through available secondary data sources. • Complete baseline scoping exercise and define the area of influence to plan required surveys / and target literature search focus to cover the required area. • Prepare clear scope of works for further surveys to demonstrate commitment to completion of adequate baseline.
04	Reputation	Risk of reputational damage with regulator and lender(s) if assessment is based on spurious or deficient data.	Moderate – could lead setting pattern of high levels of scrutiny due to poor confidence in project to adequately assess and manage impacts. High if perceived that project is not adequately addressing safeguarding obligations to internationally recognised resource and or appropriate weighting to social factors	• Early and sustained coordination with EAD • Engagement with prospective lenders to understand Project specific ESG priorities. • Prepare project stakeholder engagement plan • Document any consultation exercises to provide audit trail of communications including details or regional biodiversity and other specialists consulted • Agree approach to social impact assessment elements defined in IFC PS and the baseline data required to support assessment.
05	Programme / cost	More complex and onerous Environmental and Social Action Plan (ESAP) as a result of assessment based on deficient baseline / numerous and complex conditions within NOC from EAD.	Moderate – High – ongoing data collection and monitoring obligations are likely in order to obtain data for ongoing assessment and to support adaptive management approaches in construction and operation	• Complete baseline scoping exercise and define the area of influence to plan surveys / literature search focus to cover the required area and to supporting refining scope of ongoing assessment • Prepare clear scope of works for further surveys to demonstrate commitment to completion of adequate baseline • Advancing of some study elements in advance of E(S)IA – critical habitat assessment, initial impact assessment (commenced)

Ref	Type	Description	Consequence	Control
06	Compliance	Risk project does not fully comply with GC Standard	Low – approach taken is project specific and advance study tasks devised to de-risk overall programme. Approach known by GC.	• Advancing of some study elements in advance of E(S)IA – critical habitat assessment, initial impact assessment. • Complete baseline scoping exercise and define the area of influence to plan surveys / literature search focus to cover the required spatial area and to supporting refining scope of ongoing assessment.
07	Compliance	Project assessment does not meet expectations of national competent authority	Moderate – High EAD may reject eventual EIA report and or comments response cycle is protracted and leads to more complex monitoring and management conditions. Absence of host country approval (in this case NOC) would mean Project does not meet international requirements	• Early and sustained coordination with EAD • Complete baseline scoping exercise and define the area of influence to plan surveys / literature search focus to cover the required area and to supporting refining scope of ongoing assessment. • Require appointed contractor to complete scoping study.
08	Scope of EIA	E(S)IA scope is demanding and time consuming Pre FC discussions and negotiations are protracted	Moderate – High Programme delay and increased cost associated with delivering an ESIA fully aligned with IFC PS. Additional resources are required to support lender discussions.	• Engagement with prospective lenders to understand Project specific ESG priorities. • Identify financing model and expected lender group and verify applicable standards the project should adopt

2.4.1 Project Opportunities

The ongoing development of the baseline including further engagement with EAD and other key stakeholders presents potential opportunities to the Project and ADNOC. These are described below:

- Baseline collection may be used to inform and complement GC Corporate Social Responsibility (CSR) objectives. The data collection [ongoing assessment and mitigation planning] may harmonize with GC CSR initiatives or aspirations in relation to conservation and biodiversity.
- Data may have dual benefit in supporting other GC schemes (planned or proposed).
- Development of a proportional compensation and construction monitoring programme.

- An appropriate robust baseline may support scoping so that some elements are not taken forward for assessment and others are limited. This may ultimately result in more manageable and focused monitoring and reporting obligations.
- Foster good working relationship with competent authorities and other not statutory stakeholders.
- Support the development of a project which aligns with UN Sustainable Development Goals (SDGs) through partnership working including national and international stakeholders.

The engagement and data collection programme will require the Project team representatives to coordinate with the EAD and other stakeholders and support building of mutually beneficial working arrangements. This may support the development of a sustained partnership approach to project delivery through knowledge sharing and deriving data collection programmes that support strategic conservation efforts.

Importantly the development of an environmental and social baseline sufficient to support the development of an ESIA aligned with the IFC may improve confidence in the Project approach to ESG and support more flexibility in the range and availability of potential finance institutions.

2.5 STEP 5 – PROPOSED APPROACH TO FILL DATA GAPS

The following sets out potential sources of additional primary and secondary data to support the ongoing development of the environmental baseline.

2.5.1 Collection of additional data – existing data

Table 10 provides a summary of existing data sources that may potentially fill baseline data gaps. It is noted that the use of data is covered within the ADNOC EIA standard which states that information from previous studies (including previous EIA studies) should be a) recently acquired b) relevant and c) of sufficient quality to be used for subsequent impact assessment analysis. The use of such data should be approved by the GC in consultation with ADNOC GHSEF, and can be completed with within the scoping process.

Table 10 Potential data sources

Aspect or item	Source	Required for	Associated data acquisition costs	Other costs
MetOcean	PERGOS	Support development of a representative HD model for prediction of water quality / sediment dispersion	$10000- 20000 US - depends on number of data points required	Cost to update existing HD model and re calibrate and re run scenarios
	Baseline for Hail Gasha project*	Provision of background data with seasonality component for temperature, conductivity, turbidity	None	Cost to update existing HD model and re calibrate and re run scenarios
Near shore bathymetry	Satellite derived DEM / Bathymetry	Support development of a representative HD model for prediction of water quality / sediment dispersion	8000 USD for area of interest	Cost to update existing HD model and re calibrate and re run scenarios
Marine Habitat	Baseline for Hail Gasha project	To support marine impact assessment. It is likely that some of the baseline would support the acquisition of data collection across summer and winter	None	Costs to update baseline and habitat maps
Marine Fauna	Ongoing monitoring data associated with the Hail and Gasha Project	Provision of species data (marine mammals, fish, reptiles, birds).	Uncertain assume none	Costs to update baseline and habitat maps
	EAD monitoring data from within the protected area and nearby marine monitoring locations	Provision of species data (distribution, status, feeding / breeding ground and nursery areas) • Dugong • Sharks and rays • Cetaceans • Reptiles • Fisheries / fish surveys	None or EAD charges for each data request	Costs to update baseline and habitat maps
	SWOT[16] and OBIS - SEAMAP[17]	Turtle tracking data	TBC	Updating baseline
Marine Water Quality	Ongoing monitoring data associated with the Hail and Gasha Project	Provision of background data with seasonality component for temperature, conductivity, turbidity	None	Costs to update baseline

[16] https://www.seaturtlestatus.org/online-map-data
[17] OBIS-SEAMAP - Explore Marine Megavertebrates (duke.edu)

Aspect or item	Source	Required for	Associated data acquisition costs	Other costs
	Monitoring data from plant intake at Shuweihat	Support assessment of potential water quality changes at Route 2 landfall works To use most relevant data within Dispersion Model to understand magnitude of change from baseline	None	Costs associates with model updates and rerunning model
Underwater Noise	Ongoing monitoring data associated with the Hail and Gasha Project	To support assessment of construction impacts to marine mammals	None	Costs to update baseline Costs if set up impact model
Noise	Existing information held by SCAD	Assessment of potential construction phase changes at landfall locations. Including impacts to ecological receptors (birds).	None	Costs to update baseline
Air quality	Existing information held by SCAD, ADNOC Offshore (Das) Abu Dhabi Open Data[18]	Assessment of air quality changes during construction. Assessment of benefits at Das in the operational phase.	None	Costs to update baseline
Soil quality	None expected	NA	NA	NA
Bird data	EAD, wildlife groups	Understanding ornithological value and receptors (including endangered species) at landfall locations	Uncertain assumed free or low cost	Costs to update baseline
Mangroves and coastal habitats	EAD, wildlife groups	Confirm extents of critical habitat potentially impacted by the project	Uncertain assumed free or low cost	Costs to update baseline
Maritime transport	PPA, ADPC, Abu Dhabi Maritime Abu Dhabi Open Data[19]	Understanding presence of maritime users in the project areas	Uncertain	Costs to update baseline
Cultural heritage and archaeology	Literature search and research papers Abu Dhabi Islands Archaeological Survey (ADIAS)	Understanding the potential for heritage resources in the marine and coastal environment that may be disturbed or destroyed by the project	Costs to purchase access key sources	Costs to update baseline
Socio-economic		To identify potential receptors including those that may benefit from the social value of the project. Desk based search for information such as Statistics Centre Abu Dhabi (SCAD):	SCAD data no cost	Costs to update baseline

[18] Abu Dhabi Open Data Platform

[19] Abu Dhabi Open Data Platform

Aspect or item	Source	Required for	Associated data acquisition costs	Other costs
		• Population and demographics • Social statistics • Labour force statistics • Energy Water And Department of Health Dashboard [20] Abu Dhabi Open Data[21] Data requests to / focussed consultation meetings with relevant stakeholders (PPA, EAD, ADTCA, UPC, SCAD, Dept for Economic Development)		

2.5.2 Completion of further baseline surveys

Table 11 sets out recommended further surveys to obtain project specific data upon which assessments and mitigation can be developed. It is recommended that further surveys are developed as part of the scoping stage of the ESIA process and that the scope should be discussed and agreed with EAD.

Table 11 Recommended further baseline surveys

Aspect or item	Rationale for further survey / acquisition of additional information	Proposed solution	Associated cost considerations
Marine – underwater noise	Enable assessment of potential impacts from construction on marine mammals and reptiles (including red list species) known to be present within the area.	If data from existing studies are not available hydrophone readings at 5 representative locations along each of the routes should be collected.	Depends on if a standalone campaign or embedded within a wider survey campaign
Marine – met ocean data	For use in representative modelling of trenching and dredging activities in order to understand direct and indirect impacts to ecological and social receptors. To support development of Dredging Management Plan. To more confidently understand potential areas of habitat	If data from existing studies are not available complete further studies as defined in Fugro Weather Reports Section 6: ▪ Phase 1; Preliminary met ocean criteria study, based on a suite of existing wave, current and water level hindcast models of the Arabian Gulf; ▪ Phase 2; A site specific met ocean measurement campaign, with the	Depends on if a standalone campaign or embedded within a wider survey campaign Cost to deploy and recover ADCP from a minimum of 2 locations Cost to process data and re-calibrate and re run models to incorporate current velocity data

[20] Open Data Dashboards - Resources - Department of Health (doh.gov.ae)

[21] Abu Dhabi Open Data Platform

Aspect or item	Rationale for further survey / acquisition of additional information	Proposed solution	Associated cost considerations
	indirectly impacted by the project.	collection of wave, water level and current data; ▪ Phase 3; Validation of the numerical models used in Phase 1 against the measurements (part or all) collected in Phase 2, integration of the site-specific data and provision of a revised metocean criteria study using the validated numerical models	from a minimum of 2 locations
Marine & terrestrial ecology – ornithological survey as nearshore landfall areas	To adequately assess potential impacts of landfall works on receptors within the coastal zone and having sufficient data to support ecological compensation proposals. Accurately determine the extents of habitats that may be lost to avoid under and over estimating losses. To meet the PS6 requirements data should be sufficient to determine the presence and extents of potentially affected critical habitat meeting IUCN criteria.	If data from existing studies are not available completion of a overwintering survey at xxx and the landfall locations at Shuweihat and Mirfa to be completed to include HW/LW surveys on 3 occasions within the October – March period.	Depends on if a standalone campaign or embedded within a wider survey campaign
Mangrove survey at Shuweihat	To provide a baseline upon which impacts can be monitored during construction. To meet the PS6 requirements data should be sufficient to determine the presence and extents of potentially affected critical habitat meeting IUCN criteria.	Completion of baseline survey to document the areal extent, and health status of the mangrove extent	Depends on if a standalone campaign or embedded within a wider survey campaign
Mangroves and coastal habitats	To provide a baseline upon which impacts can be monitored during construction. To understand potential compensation requirements including suitability of nearby areas for restoration and or enhancement proposals.	Walkover survey and mapping of surface features Recording of species (plants) Defined mangrove surveys at Mirfa and Shuweihat	Depends on if a standalone campaign or embedded within a wider survey campaign A minimum of 2 suitably qualified specialist required to complete surveys.
Marine – suspended sediment data	For use in representative modelling of trenching and dredging activities in order to understand direct and indirect	If data from existing studies are not available suspended sediment concentration (SSC) data can be collected as part of further met-ocean surveys this	Depends on if a standalone campaign or embedded within a wider survey campaign

Aspect or item	Rationale for further survey / acquisition of additional information	Proposed solution	Associated cost considerations
	impacts to ecological and social receptors. To support ongoing construction phase monitoring.	as best practice include collection of data in the near and offshore locations and include seasonality.	
Marine – fisheries	To adequately assess potential impacts of construction and operation on existing users of the marine environment. To understand specific impacts to established fishing grounds. To understand potential enhancement opportunities.	If data from existing studies are not available a survey approach should be agreed with the EAD. Often trawling and other survey methods can be damaging to the seabed as well as resulting in fish mortality. In such cases a precautionary approach based on literature search and professional opinion may provide a better option particularly as the project does not include intakes and outfalls.	Depends on if a standalone campaign or embedded within a wider survey campaign
Air quality	To provide a baseline upon which impacts (including operational benefits) can be assessed.	Operational occupational monitoring data from Das may provide a suitable baseline for Route 2. Route 1 connects to a new island and it is assumed existing data for any undeveloped offshore location provides a surrogate baseline. Spot surveys at Mirfa and Shuweihat including within and outside the proposed project footprint.	Depends on if a standalone campaign or combined with noise with co-located survey locations.
Noise	To provide a baseline upon which construction impacts can be compared. To assess potential construction noise impacts to receptors (including social and ecological receptors) at Das, Mirfa and Shuweihat.	Operational occupational monitoring data from Das may provide a suitable baseline for Route 2. Route 1 connects to a new island and it is assumed existing data for any undeveloped offshore location provides a surrogate baseline. Spot surveys at Mirfa and Shuweihat including within and outside the proposed project footprint.	Allow up to $5000 for sampling testing and reporting
Soil quality	To rule out potential impacts associated with landfall ground break.	Visual survey along groundbreak areas at landfall sites Selected sampling if land use history indicates potential for legacy contamination. Appointed developer to include geo-environmental parameters as part of further GI studies	Allow up to $5000 for sampling testing and reporting
Groundwater	To rule out potential impacts associated with landfall ground break.	Appointed developer to investigate option for the collection of shallow samples as part of GI studies	TBC dependant on need for wells
Ornithological data	To provide a baseline upon which impacts can be monitored during construction. To understand	Defined overwintering surveys at Mirfa and Shuweihat	Depends on if a standalone campaign or embedded within a wider survey campaign

Aspect or item	Rationale for further survey / acquisition of additional information	Proposed solution	Associated cost considerations
	potential compensation requirements. To meet the PS6 requirements data should be sufficient to determine the presence and extents of potentially affected red list species meeting IUCN criteria.		Allow $3-4000 for each campaign to cover Mirfa and Shuweihat
Maritime transport	To understand marine traffic volumes with the project area. To support navigational studies and construction phase vessel traffic control activities.	Desk based inventory of receptors incl maritime assets (navigation channels, anchorages, ports, jetties, ferry routes) AIS data	TBD
Other maritime users	To understand existing facilities and users of the marine environment that may be temporarily and permanently impacted by the proposed project.	Inventory of other maritime receptors – desk-based search for offtakers (abstractions), aquaculture facilities, existing utilities routes, dive sites. Social survey outcomes in relation to artisanal and commercial fishing, tourism including sport fishing, diving, snorkelling. Data requests to / focussed consultation meetings with relevant stakeholders (PPA, EAD, ADTCA, UPC	TBD
Cultural heritage and archaeology	To document known resources and to identify any areas with a higher potential for resources.	Data requests to / focussed consultation meetings with relevant stakeholders (EAD, ADTCA, universities) to understand presence of resources such as historic pearl beds, ancient settlements, wrecks. Literature search and combination of information into baseline report with appropriate mapping.	TBD
Socio-economic	To identify potential receptors including those that may benefit form the social value of the project.	Desk based search for information such as Statistics Centre Abu Dhabi (SCAD): • Population and demographics • Social statistics • Labour force statistics • Energy Water Data requests to / focussed consultation meetings with relevant stakeholders (PPA, EAD, ADTCA, UPC, SCAD) Surveys in affected communities at the land fall and offshore sites. Identification of fisherman and commercial and artisanal fishing	SCAD data no cost Cost of surveys and ongoing consultation exercise TBC

Aspect or item	Rationale for further survey / acquisition of additional information	Proposed solution	Associated cost considerations
		stakeholders and programme of targeted surveys	

2.5.3 Stakeholder Engagement

In understanding the biodiversity resources within an area proposed for development including in internationally protected areas it should be demonstrated that local knowledge holders have been consulted. Local knowledge holders shall support the development of the baseline understanding particularly in relation to critical habitat and the use of the area(s) by critically endangered, endangered, and vulnerable species.

The ongoing programme is to include consultation with the following organizations in order to understand the availability of additional data to support the baseline as well as obtaining information from local specialists specifically in relation to satisfying the requirements of IFC. Table 12 identifies stakeholders and likely data holders.

Table 12 Identified stakeholders and likely data holders

Stakeholder	Statutory / Non Statutory	Items of interest
Environment Agency - Abu Dhabi (EAD)	Government body responsible for environmental licencing, regulation and monitoring. Lead authority for the management of protected areas	Marawah reserve conservation management priorities Restoration and enhancement schemes within the project area Status of critically endangered marine fauna Consensus on EEAA as part of the CHA New and proposed aquaculture sites (sea cages, intertidal sites)
Urban Planning Council UPC	Government body responsible for Urban Planning in Abu Dhabi including marine spatial planning	Understanding of strategic maritime plans within the potentially affected area
Abu Dhabi Department of Culture and Tourism (ADTCA)	Government body responsible for heritage and tourism	Marine archaeological resources within the potentially affected areas Agreement on future chance finds and recording protocols to be reflected in construction management plans Tourism activities
Emirates Wildlife Group (EWG)	Non-governmental	Biodiversity knowledge including specific survey outcomes relevant to the project area
Aquaculture and Marine Studies Center, Abu Al Abyad Island	Governmental	Corals and coral health Marine mammals Fish and fisheries Turtles

Stakeholder	Statutory / Non Statutory	Items of interest
Abu Dhabi Global Environmental Data Initiative (AGEDI)	Governmental	Blue carbon data Seagrass, mangrove and coastal sabkha data
Elasmo Project[22]	Non-governmental	Information on sharks and rays within Abu Dhabi

2.5.4 Additional surveys

The following sets out potential further surveys that may be required to further develop the baseline data. The surveys proposed should be discussed with the regulator and updated once the Project has a mutually agreeable approach to the baseline upon which ongoing assessments and management activities can be based.

2.5.4.1 Route 1 and 2 landfall areas

The MEBS for each of the cable routes do not extend into the shallow intertidal area and landfall areas. Specific surveys are proposed to understand the baseline environmental conditions within the landfall areas for each route. As landfall works typically involve trenching and therefore direct disturbance to the seabed, intertidal and beach areas as well as the presence of shoreline equipment and work teams it is essential that the potential receptors in this location are identified and that potential impacts to these can be assessed.

Table 13 Recommended approach to coastal / landfall surveys

Aspect or item	Rationale	Proposed approach to survey	Sample / survey locations	Parameters / outputs
Ornithology	Route 1 is within the Marawah reserve and the various habitats and islands within the reserve support a range of bird species Route 2 lies within a relatively undisturbed stretch of coastline very close to an existing mangrove stand.	High and low water counts Survey at each of the mangrove stands Observations for foraging, nesting and loafing activities	To be confirmed but assume to include area potentially disturbed during construction	Bird list using site HW / LW bird counts 3 events within winter season Survey reports (including time, date, personnel details, weather, survey start finish, geo referenced photos)
Shoreline habitats	To accurately enumerate the types of habitats directly and indirectly affected by the landfall activities	Walkover survey Georeferenced photo survey	To be confirmed but assume to include area potentially	Species list Habitat map Survey event reports (including time, date,

[22] www.elasmoproject.com/

Aspect or item	Rationale	Proposed approach to survey	Sample / survey locations	Parameters / outputs
		Recording of extents of coastal plants,, coastal sabkha extents, - Checks on signs of turtle nesting	disturbed during construction	personnel details, weather, survey start finish, geo referenced photos)
Sediment quality	Collection and analysis of additional sediment samples to understand sediment quality of areas that will be disturbed during trenching, installation and backfilling	Collection of sediment samples at predefined locations and analysis at accredited laboratory facility	To be agreed allow for up to 8 plus 1 control site at each location	Nutrients, TOC, Metals, pH, PAH, oils and grease Laboratory records including chain of custody forms
Benthic infauna	Requirement to be confirmed with EAD			
Benthic habitat along cable route	To accurately enumerate the types of habitats directly and indirectly affected by the landfall activities	Low water survey Georeferenced photo survey at pre-selected locations Recording of extents of coastal sabkha and seagrass Anecdotal faunal observations	To be confirmed but assume to include area potentially disturbed during construction	Species list Habitat map Survey event reports (including time, date, personnel details, weather, survey start finish, geo referenced photos)
Mangrove	Collect baseline record of mangrove pockets close to trenching corridor to assess potential impacts from sedimentation and to provide a baseline upon which changes can be monitored	Recording of aerial extent (GPS survey) Photo record Root density quadrats at preselected locations Ad hoc observations (littering, smothering, leaf health) Leaf health checks Fish fry surveys	Number of sample sites at each of the mangrove stands to be confirmed	Photo record Root density records Areal extent Survey event reports (including time, date, personnel details, weather, survey start finish, geo referenced photos)
Noise	Collect baseline noise information to understand impacts to ecological and social receptors.	Attended monitoring for noise at locations within and outside the project boundary at identified potential receptor locations to determine day and nighttime noise baseline.	To be confirmed by appointed developer	Day and nighttime noise at each location for a minimum of 30 mins Lmax, Lmin , La_{eq}
Air	Collect air quality data for selected parameters to meet EAD impact assessment expectations Requirement to be confirmed with EAD – PM10 naturally elevated and	Spot sampling at nearshore and offshore landfall sites (Das). Explore use of diffusion tubes.	To be determined by appointed bidder assume 1 to represent each of the landfall locations as well as locations near identified receptors	SOx, NOX Survey event reports (including time, date, personnel details, weather, survey start finish, geo referenced photos)

Figure 4 and Figure 5 below provide an overview of each of the landfall areas and summary of potential further surveys.

Figure 4 Mirfa & Route 1 landfall area proposed further surveys

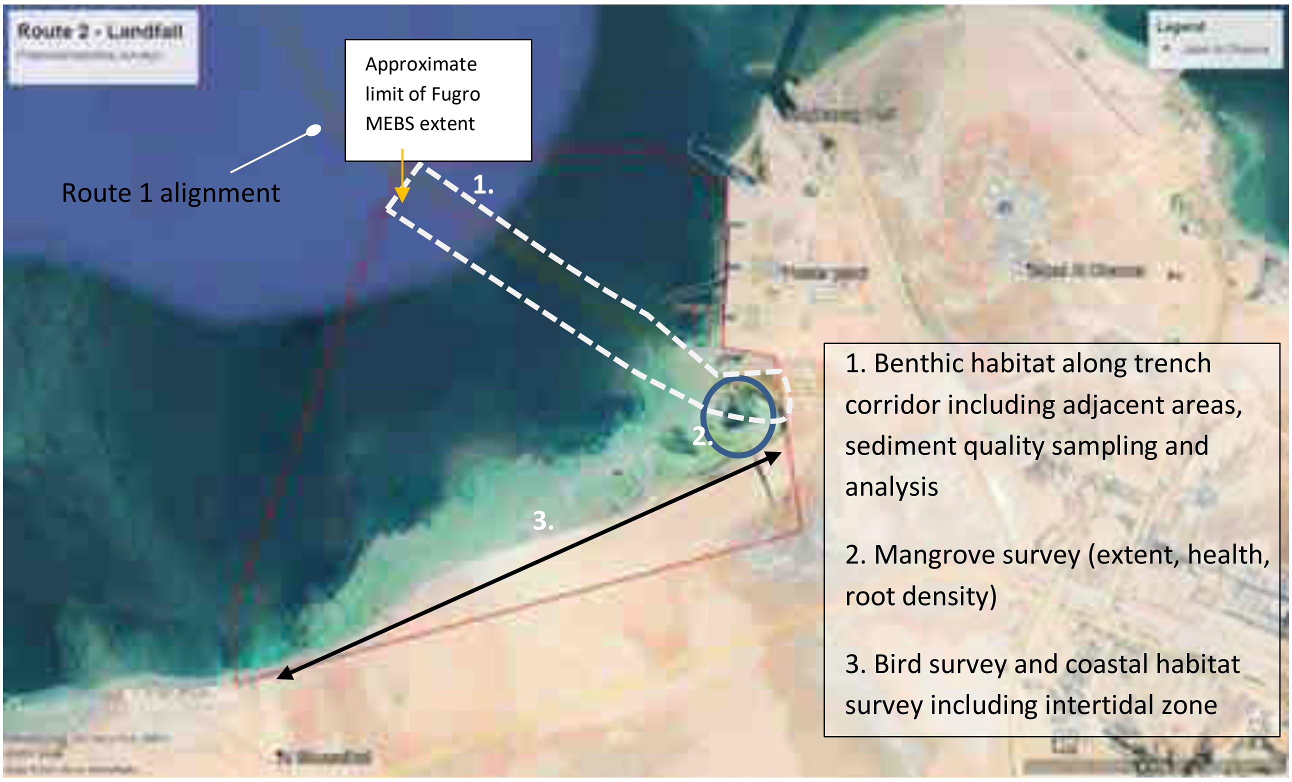


Figure 5 Shuweihat / Route 2 landfall area proposed further surveys

2.5.4.2 Cable routes

Data collected for each of the cable route survey campaigns covers benthic habitat, sediments, and water quality. No specific surveys have been completed for seabirds, marine mammals, turtles, or fish. Before final specification of further surveys, the regulator, EAD, should be contacted to understand what data are available that may be of use completing detailed impact assessments.

In the near shore areas known to require trenching and or dredging for the purpose of cable installation further surveys should be completed in areas where there is critical and sensitive habitat potential as indicated by the EAD habitat mapping. Table 14 presents a recommended approach to further offshore surveys.

Table 14 Recommended approach to further offshore surveys

Aspect or item	Rationale	Proposed approach to survey	Sample / survey locations	Parameters / outputs
Sediment quality	Collection and analysis of additional sediment samples to understand sediment quality of areas that will be disturbed during trenching, installation and backfilling	Collection of sediment samples at predefined locations and analysis at accredited laboratory facility	To be agreed allow for up to 8 plus 1 control site at each location	Nutrients, TOC, Metals, pH, PAH, oils and grease Laboratory records including chain of custody forms
Benthic infauna	Requirement to be confirmed with EAD			
Benthic habitat along cable route	To accurately enumerate the types of habitats directly and indirectly affected by the landfall activities	Video transects or and spot surveys to ground truth published habitat maps Anecdotal faunal observations	To be confirmed but assume to include area potentially disturbed during construction	Species list Habitat map Survey event reports (including time, date, personnel details, weather, survey start finish, geo referenced photos)
Underwater noise	To assess potential changes to underwater noise through the use of cable lay vessels including dynamic positioning, the use of dredgers and trenchers and rock dumping or cable protection activities. To consider impacts to endangered and vulnerable marine mammals and reptiles within the project area.	Underwater noise measurements (hydrophone recordings) at predefined locations along each cable route.	Allow 3 – 4 locations per route as a minimum.	Underwater noise baseline Survey event reports
Other maritime users	To adequately assess direct and indirect impacts to other maritime users and assets	Desk top inventory of assets and use of seabed survey details already prepared	Defined buffer at each of the cable routes and any associated sites needed to construct and operate	Existing cables, pipelines, moorings, anchorages, intakes, jetties, marinas, fishing areas, fish landing sites, launch sites and slip ways

2.5.5 High level survey programme

Figure 6 provides a high-level survey programme for further marine and coastal baseline surveys. The optimum survey times for marine fauna should be concluded through discussion with the EAD and other relevant stakeholders.

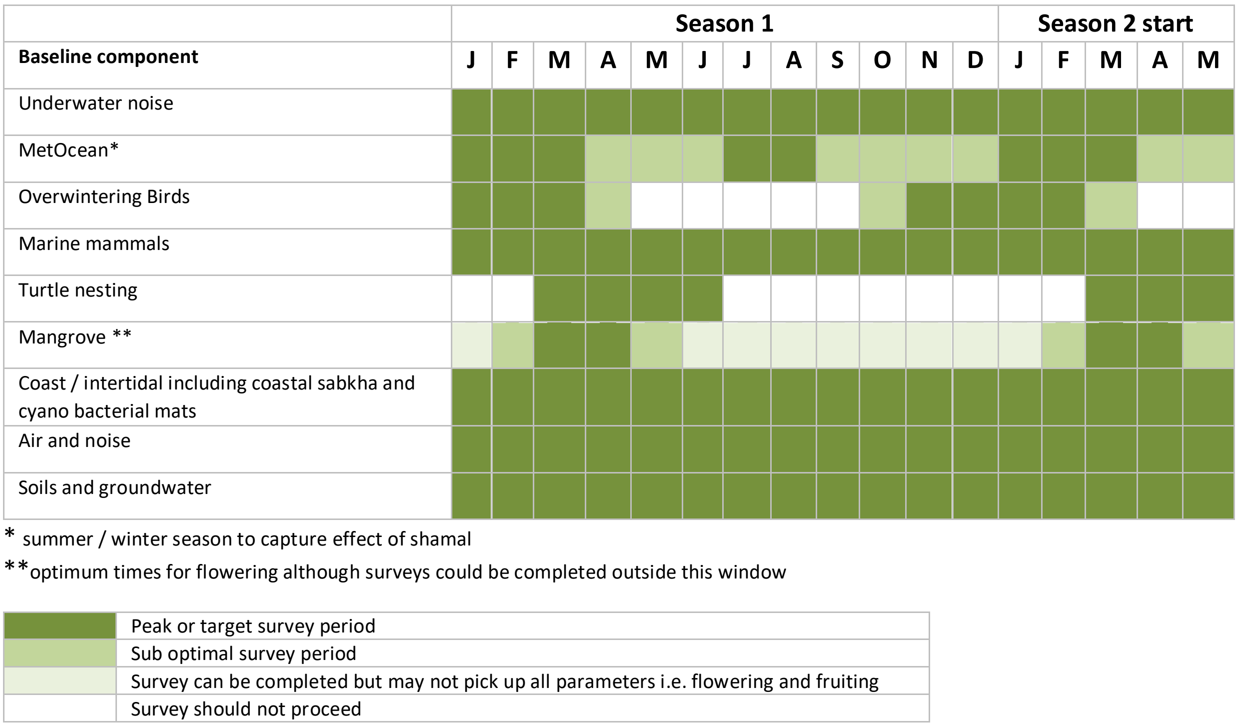


Figure 6 High level survey programme

3. RECOMMENDATIONS

The following provides recommended actions prior to financial close in relation to the ongoing development of the Project environmental baseline and reducing uncertainty for the appointed contractors.

Table 15 Recommended actions to further develop environmental baseline

Baseline requirement	Actions
Adherence to EIA process	Define clear permitting and consenting roadmap including pre and post financial close including collection of baseline information
Area of influence / survey area	Reach mutual agreement of spatial study limits by aspect with EAD linked to aspects scoped in for inclusion within the E(S)IA
Data collection methods and approach	Define remaining surveys and then set robust repeatable methods as a requirement within the survey scope Prepare detailed future survey programme and define monitoring / sample locations Identify required resources and budgets
Temporal and spatial coverage	Reach mutual agreement of spatial and temporal study limits by aspect with EAD

Baseline requirement	Actions
	Combine MEBS outputs and Seabed Features layer from Geophysical Survey and cross check to published Habitat maps to refine understanding of the presence of critical and sensitive habitats within the project area. Critical Habitat Assessment (CHA) outputs to inform elements where seasonality is critical in terms of PS6. Reach mutual agreement on aspects where seasonality is required by EAD. Identify existing datasets through consultation and literature search.
Aspects of survey	Complete literature search for marine mammals, fish & fisheries, marine reptiles, ornithology. (In part included in CHA and impact assessment tasks in progress) Seek available data from Hail Gasha project Confirm key data holders and seek available data from EAD, ADTCA. etc
Assumptions and limitations	Clarify limitations of existing data in all future deliverables. Define within survey scope and methods the requirement to log limitations and assumptions Flag limitations of any data referred to that is over 5 years old
Data presentation and format	Define compliance with EDD as a requirement of future survey deliverables Convert existing data to GIS compliant format

4. REFERENCES

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- ADNOC (2020) HSE Management System Environmental Standards Environmental Impact Assessment Standard No.: HSE-EN-ST01
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- Fugro (2020) Environmental Baseline Survey Results Report – Route 1 E-0395 - Document Rev 04 NO.: AD41-457-G-24202 (OEU021-V01-Route-1).
- Fugro (2020a) Environmental Baseline Survey Results Report - Route 2 E-0395 - LIGHTNING PROJECT Rev 02 Document No.: AD41-457-G-24203 (OEU021-V02-Route-2)
- Fugro (2020c) Geophysical Survey Report – Cable Route 1A from Mirfa Landfall to Lower Zakum Island G Rev 02 Document No: AD41-457-G-24197 (MRU093-V02-Route-1A)
- Fugro (2020d) Weather Report – Statistical Report Eastern Route (Route 1) Location North A DOCUMENT NO.: AD41-457-G-24210 (Northern Location) Rev 04

- Fugro (2020e) Weather Report – Statistical Report Eastern Route (Route 1) Location South D41-457-G-24219 (Southern Location) Rev 01
- Fugro (2020f) Weather Report – Statistical Report Eastern Route (Route 2) Location North AD41-457-G-24209 (Northern Location) Rev04
- Fugro (2020g) Weather Report – Statistical Report Eastern Route (Route 2) Location South AD41-457-G-24218 (Southern Location) Rev01
- Fugro (2020h) Geophysical Survey Report – Cable Route 1-A from Mirfa to Landfall to Lower Zakum Island G DOCUMENT NO.: AD41-457-G-24197 (MRU093-V02-Route-1A) Rev02
- Fugro (2020i) Geophysical Survey Report – CABLE ROUTE-1B from Mirfa to Landfall to Lower Zakum Island G DOCUMENT NO.: AD41-457-G-24197 (MRU093-V02-Route-1B) Rev02
- Fugro (2020j) Geophysical Survey Report – CABLE ROUTE-2 from Shuweihat to Landfall to Das DOCUMENT NO.: AD41-457-G-24199-01 (MRU093-V04-Route-2)
- Fugro (2020k) Geophysical Survey Report – CABLE ROUTE-2A from Shuweihat to Landfall to Das DOCUMENT NO.: AD41-457-G-24200-01 (MRU093-V05-Route-2A)
- Fugro (2020l) Geophysical Survey Report – CABLE ROUTE-2B from Shuweihat to Landfall to Das DOCUMENT NO.: AD41-457-G-24201-01 (MRU093-V06-Route-2B)
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Appendix 5 – Control of Major Environmental Accidental Hazards Report Related to Risk Assessment (Not Applicable)

Appendix 6 – Correspondence, Presentations and Minutes of Meetings (MoM)

Anthesis

Appendix 6.1 – Anthesis MoM for EAD Meeting on the 21st September 2021

Anthesis

Anthesis

Meeting Minutes

Project	Project Lightning
Project No.	1176
Date	21st September 2021
Time	14.00-15.00 UAE Time
Location	Online
Subject	ESIA Approach and Baseline Methodology Presentation to EAD
Attendees	EAD, ADNOC, Mott MacDonald, Sponsors (KEPCO, EDF, Kyushu), Anthesis

Notes		Action
1	Anthesis confirmed that the intention of the meeting was to obtain initial EAD comments on the detailed technical scope and approach for baseline surveys and impact assessment methodologies for the ESIA for Project Lightning. Anthesis prepared and gave a presentation to set out the proposed approach for undertaking baseline surveys and impact methodologies for the ESIA. A copy of the presentation is attached to this MoM for information. Anthesis identified that time is limited in terms of surveying within the summer period and therefore would welcome EAD comments and approval of the proposed scope at the soonest possible opportunity. Anthesis explain that in addition to the presentation, a more detailed Scoping Letter has also been compiled to submit to EAD to obtain their approval on the proposed approach to the ESIA, which will be, in effect, an additional Scoping Report to supplement the previously approved Gap Analysis.	Anthesis to finalise the Scoping Letter following comments received from EAD and issue to EAD as soon as possible.
2	EAD comments: The accuracy of the marine hydrodynamic model only using 2 ADCPs is queried since it is stated that the two marine areas being represented by each ADCP are very different. EAD suggest splitting the model to account for these variations.	Anthesis to confirm with WKC on the model set up and accuracy levels and update Scoping Letter accordingly.
3	EAD comments: EAD monitors the nearshore areas closely and are very familiar with the conditions present. During November to March, particularly in the channel near Mirfa, large numbers of Dugong are present and seagrass is very dense. EAD identify that the channel provides shelter from the Shamal and therefore is effectively a nursery area for juvenile Dugong and therefore highly sensitive. Timing of construction will be vital to ensure minimal disruption to these habitats and Dugongs present.	Note
4	Anthesis to include Seagrass Watch Methodology within Scoping Letter.	Confirmation to be included within Scoping Letter
5	EAD comments: What will be the criteria against which the model will assess impacts from construction activities etc.	Confirmation to be included within Scoping Letter

Anthesis

Notes		Action
6	EAD comments: please keep the Scoping Letter simple to facilitate quick review. Perhaps tabulate the proposed studies under the following headings: Marine Intertidal Terrestrial	Scoping Letter to be structed as per EAD's comment.
7	EAD confirmed that once prepared the Scoping Letter should be formally submitted through EAD Customer Happiness.	Note
8	ADNOC informed the LOA (letter of Authorisation) will be issued to EAD within a few days.	Note

PROJECT LIGHTNING

Meeting with EAD to determine scope and methodology for ESIA

September 2021

Anthesis

CONTENTS

FINAL

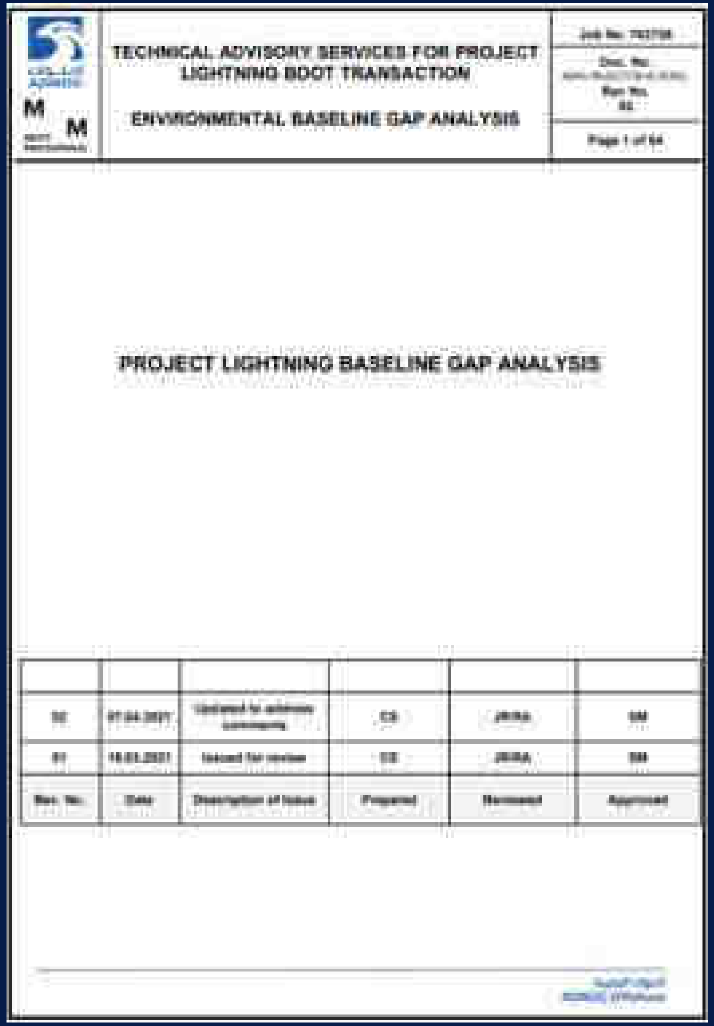
Anthesis

01 INTRODUCTION

INTRODUCTION

Purpose of the meeting:

- Anthesis has reviewed the Gap Analysis Report prepared by Mott MacDonald for Project Lightning
- The purpose of the Gap Analysis was to analyse existing baseline data and provide recommendations on where further data is required
- It is understood that the Gap Analysis Report has been approved by EAD in place of a ToR and comments provided. (Response to these comments are provided within this presentation)
- Anthesis has utilized the Gap Analysis Report to guide the proposed baseline and impact assessment methodologies for the ESIA
- Our intention for this meeting is to discuss our approach and baseline methodologies for the ESIA and obtain EAD comment and approval
- A Scoping Letter with detailed baseline methodologies has been prepared and will be issued to EAD


TECHNICAL ADVISORY SERVICES FOR PROJECT LIGHTNING BOOT TRANSACTION

ENVIRONMENTAL BASELINE GAP ANALYSIS

PROJECT LIGHTNING BASELINE GAP ANALYSIS

02 ESIA TEAM

THE ESIA TEAM

The following will be involved in the preparation of the ESIA:

- **Lead ESIA Consultant - Anthesis**
  - **Simon Pickup - Project Director**
  - **Apolline Boudier - Project Manager**
  - **Anna Blackwell - EIA Lead**
- **Marine Specialist - WKC**
  - **Greg Ashcroft - WKC PM / Marine Modeling**
  - **Ray Visitacion - Marine Survey Lead**

Specific experience to ensure successful delivery:

Anthesis
- Experience in Abu Dhabi
- Experience with Internationally funded projects

WKC
- Marine baseline / modelling experience
- Detailed knowledge of ADNOC requirements

03 POTENTIAL SCOPE OF ESIA STUDIES

POTENTIAL SCOPE OF ESIA STUDIES

Sensitive receptors

Anthesis

POTENTIAL SCOPE OF ESIA STUDIES

Sensitive receptors

POTENTIAL SCOPE OF ESIA STUDIES

Sensitive receptors

POTENTIAL SCOPE OF ESIA STUDIES

Initial study area

Initial study area based upon:

- 30km within marine environment
- 2km onshore

These will however be refined as part of the impact assessments

Anthesis

POTENTIAL SCOPE OF ESIA STUDIES

Initial study area

Initial study area based upon:

- 30km within marine environment
- 2km onshore

Note that the converter station to existing substation is tentative, waiting ADNOC instruction.

These will however be refined as part of the impact assessments

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POTENTIAL SCOPE OF ESIA STUDIES

Initial study area

Initial study area based upon:

- 30km within marine environment
- 2km onshore

These will however be refined as part of the impact assessments

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POTENTIAL SCOPE OF ESIA STUDIES

Baseline surveys - marine

Key gap identified by Mott MacDonald for nearshore areas.

The following surveys will be undertaken:

- Water quality sampling
- Sediment sampling
- Benthic ecology surveys
- Fish survey
- Infauna sampling
- Incidental sightings of marine mammals, reptiles and birds

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POTENTIAL SCOPE OF ESIA STUDIES

Baseline surveys - marine

Key gap identified by Mott MacDonald for nearshore areas.

The following surveys will be undertaken:

- Water quality sampling
- Sediment sampling
- Benthic ecology surveys
- Fish survey
- Infauna sampling
- Incidental sightings of marine mammals, reptiles and birds

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POTENTIAL SCOPE OF ESIA STUDIES

Baseline surveys - marine

Key gap identified by Mott MacDonald for the MMBR area.

The following surveys will be undertaken:

- Sediment quality sampling
- Benthic ecology surveys
- Fish survey
- Infauna sampling
- Incidental sightings of marine mammals, reptiles and birds

POTENTIAL SCOPE OF ESIA STUDIES

Baseline surveys - marine

The following surveys will be undertaken for the new Zakum route:

- Water quality sampling
- Sediment sampling
- Benthic ecology
- Incidental sightings of marine mammals, reptiles and birds

Note also that EDD for Fugro surveys are not available - these will need to be prepared

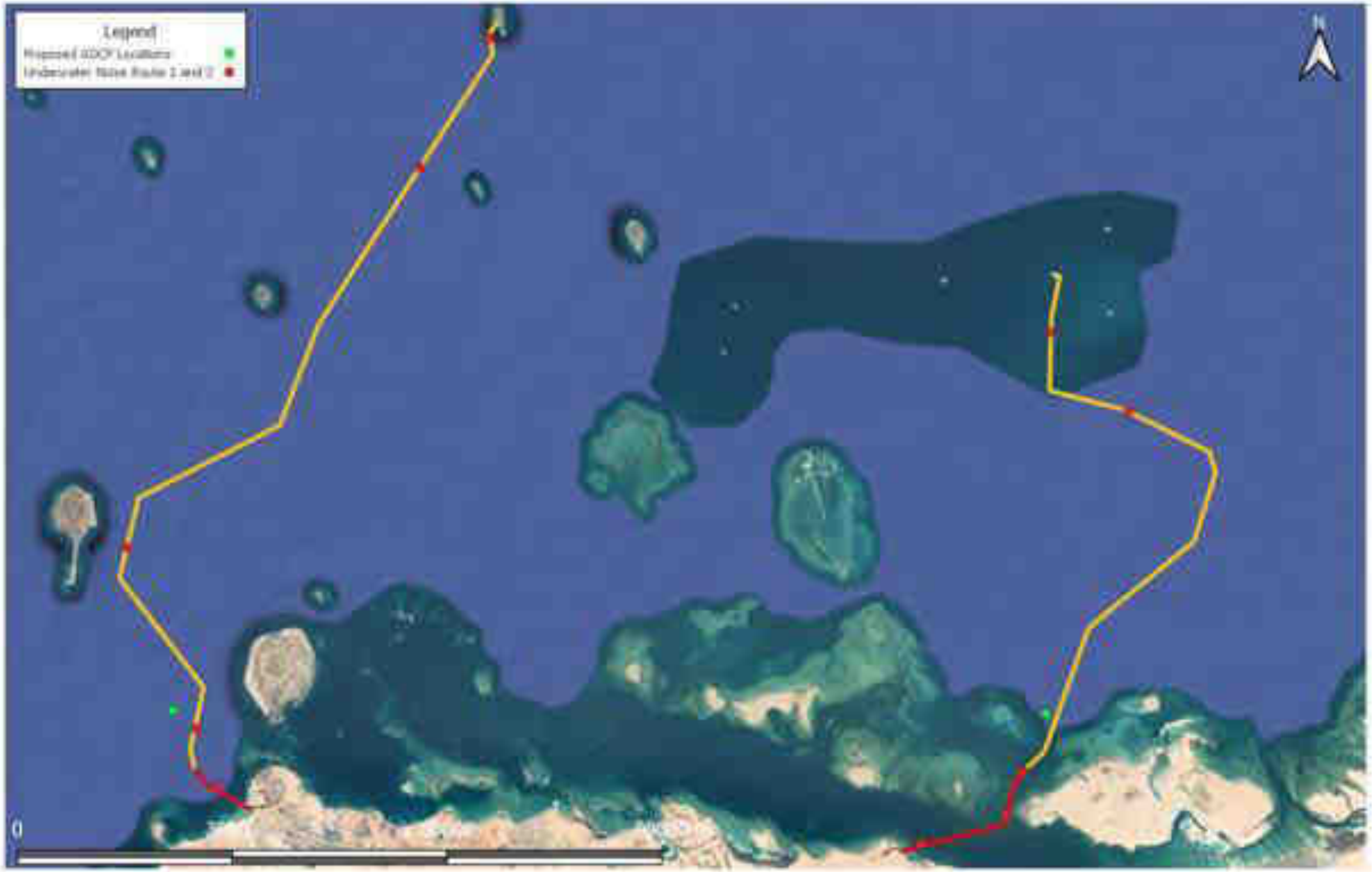
Anthesis

POTENTIAL SCOPE OF ESIA STUDIES

Baseline surveys - marine

Other surveys include:

- Deployment of 2 ADCPs
- Noise monitoring at 5 locations per route



Project Name: Project Lightning
Datum: WGS 84
Units: meters

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POTENTIAL SCOPE OF ESIA STUDIES

Baseline surveys – terrestrial / shoreline ecology

Key gap identified by Mott MacDonald for nearshore areas.

The following surveys will be undertaken:

- Habitat & vegetation surveys
- Mangrove surveys (including estimate of individuals)
- Night-time fauna surveys – Sherman & camera traps
- Vantage point bird surveys
- These surveys will be repeated for seasonal data. Especially birds

POTENTIAL SCOPE OF ESIA STUDIES

Baseline surveys – terrestrial / shoreline ecology

Key gap identified by Mott MacDonald for nearshore areas.

The following surveys will be undertaken:

- Habitat & vegetation surveys
- Mangrove surveys (including estimate of individuals)
- Night-time fauna surveys – Sherman & camera traps
- Vantage point bird surveys
- These surveys will be repeated for seasonal data. Especially birds

POTENTIAL SCOPE OF ESIA STUDIES

Baseline surveys – terrestrial / shoreline ecology

Key gap identified by Mott MacDonald for nearshore areas.

The following surveys will be undertaken:

- Habitat & vegetation surveys
- Mangrove surveys (including estimate of individuals)
- Night-time fauna surveys – Sherman & camera traps
- Vantage point bird surveys
- These surveys will be repeated for seasonal data. Especially birds

Anthesis

POTENTIAL SCOPE OF ESIA STUDIES

Baseline surveys – noise

Shuweihat and Das Island: Nautica undertook the following monitoring in 2021:

- 3 short term noise monitoring locations – 15 mins during both day-time and night-time, for weekends and weekdays
- (Total of 4 monitoring periods per location equaling 1-hour total monitoring per location)
- No exceedances noted
- It is considered that this provides sufficient baseline data and no further monitoring is required
- Note that air quality baseline is not considered to be useful and existing data will be collected, where available

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POTENTIAL SCOPE OF ESIA STUDIES

Baseline surveys – noise

Mirfa: Nautica undertook the following monitoring in 2021:

- 3 short term noise monitoring locations – 15 mins during both day-time and night-time, for weekends and weekdays
- (Total of 4 monitoring periods per location equaling 1-hour total monitoring per location)
- 2 small exceedances recorded (less than 2db), no obvious reason for these; it is likely to be due to recreational activities e.g. offroading
- It is considered that this monitoring provides sufficient baseline data and no further monitoring is required
- Note that air quality baseline is not considered to be useful and existing data will be collected, where available

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POTENTIAL SCOPE OF ESIA STUDIES

Baseline surveys – soil & groundwater

Shuweihat and Das Island: Nautica undertook the following survey in 2021:

- Phase 1 walkover survey
- 8 soil samples collected and analysed at ENAS accredited laboratory
- Groundwater sampling undertaken at one location outside project boundary, no groundwater encountered within Project area
- No exceedances recorded
- No further sampling considered necessary

Note that the converter station corridor to existing substation is tentative, waiting ADNOC instruction.

POTENTIAL SCOPE OF ESIA STUDIES

Baseline surveys – soil & groundwater

Mirfa: Nautica undertook the following survey in 2021:

- Phase 1 walkover survey
- 8 soil samples collected and analysed at ENAS accredited laboratory
- No exceedances recorded
- No groundwater encountered
- No further sampling considered necessary

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POTENTIAL SCOPE OF ESIA STUDIES

Baseline surveys – social

For Zakum route we propose:

- Collection of desk-based socio-economic data
- Consultations with EAD’s Marawah management team
- Consultations with EAD / MoCCaE fisheries teams
- Consultation with local residents / businesses
- Consultation with ADTCA

Anthesis

POTENTIAL SCOPE OF ESIA STUDIES

Baseline surveys – social

For Das route we propose:

- Collection of desk-based socio-economic data
- Consultation with local residents / businesses
- Consultation with ADTCA
- Abu Dhabi Ports
- TAQA / ADWEA / EWEC

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POTENTIAL SCOPE OF ESIA STUDIES

Baseline surveys – impact assessments

We propose:

- Marine modelling – based on detailed construction methodologies being developed to feed into marine water assessment
- Marine ecology – based upon baseline and marine modelling results. Impacts are largely expected during construction, although operational impacts will be considered
- Terrestrial ecology- impacts will be largely limited to the construction phase, although operation will be considered
- Noise – largely limited to construction, therefore operational impacts will be scoped out
- Air quality – largely limited to construction, therefore operational impacts will be scoped out (although carbon emissions in line with EP4 will be assessed)
- Waste Management – largely limited to construction although operational waste will be considered
- Soil & groundwater – largely limited to construction, therefore operational impacts will be scoped out
- Social - as per IFC / EP
- Culture & heritage – based on ADTCA advise and, if required, PCR

04 EAD COMMENTS

EAD COMMENTS

EAD Comment	Anthesis Response
The most sensitive path of the Zakum cable from Mirfa power plant passes through the MMBR. EIA must address (a) why a deviated route cannot be considered, (b) seasonality, duration etc. of the operational aspect of the Project for the MMBR patch of the route, (c) impact of the Project within and outside of the MMBR.	Noted and agreed. Consultations will be undertaken with ADNOC relating to initial route selection and this will be reviewed following the results of marine modelling and impact assessments and appropriate mitigation measures will be presented.
Please review and follow the EAD TGD for hydrodynamic modelling (EAD-EQ-PR-TG-13) and TGD for Dredging and Reclamation in Abu Dhabi Emirate (EAD-EQ-PR-TG-12). Both TGDs can be found on: https://eservices.ead.ae/en/web/guest/info-center	Noted. WKC are very familiar with undertaking hydrodynamic modelling and associated assessments within Abu Dhabi Emirate and will incorporate all requirements specified within these documents.
The bathymetry survey is required to calibrate and validate the HDM and the bathymetry should cover the edge of the maximum potential impacts (worst case scenario(s)) of sediments dispersion during dredging and reclamation.	Noted. This will be included within the bathymetry data collection process.
2 ADCPs must be installed in parallel for 15 days minimum for each route.	Please note that only one marine model will be developed covering both routes simultaneously. We therefore propose to install one ADCP for each route only (2 in total), for 15 days. It is proposed that it will not be necessary to install two per route since one overarching model will be developed to cover the entire Project area i.e. both cable routes, and as such it is considered that 2 ADCPs to cover the wider Project area will be sufficient.
Animation videos for the model must be provided	Noted. These will be provided.
The mesh growth rate should not exceed 10% to make sure it works efficiently.	Agreed. However, please note that mesh growth rate restriction of 10% is not applicable for flexible mesh models. This will be explained within the report. However, please note that during initial hydrodynamic simulation testing, the mesh size is varied in order to ensure model stability and accuracy. Once the model is proved to be stable, the mesh size is reduced to conclude if accuracy is improved by reducing the mesh size.
The sensitivity test for the mesh size must be provided.	Please see response above.

05

TIMESCALES

TIMESCALES

	Estimated ESIA approval date
Schedule 2 – will EAD / Lenders accept initial ESIA approval with seasonal survey addendum	End March 2022
Schedule 3 – EAD / Lenders require seasonal surveys within final ESIA	End April 2022

* Both schedules are subject to site survey availability and the timings are at this stage tentative

08 Q&A

THANK
YOU

Anthesis

FINAL

Appendix 6.2 – Anthesis Email Exchange with EAD from the 21st November 2021 to the 24th November 2021

Apolline Boudier

From:	**Alaa Ahmad Rezeq <arezeq@ead.gov.ae>**
Sent:	**Wednesday, November 24, 2021 2:36 PM**
To:	**Simon Pickup; Customer Happiness - Environment Agency**
Cc:	**MinHyeok Kang (Dan); Apolline Boudier; Hemachandran Sundaresan (ADNOC Offshore - CETE-TEL); amalhai@adnoc.ae; Anna Blackwell**
Subject:	**RE: Project Lightning (DPA2104081) - Scoping Letter**
Follow Up Flag:	**Flag for follow up**
Flag Status:	**Completed**

Dear Simon

After discussion with the EAD related personnel, kindly not the following:

Marine Environment

1- Area where pipeline will be extended is critical habitat mainly for dugong mothers and their calves.
2- The area includes healthy seagrass which is crucial for dugong and green sea turtles feeding.
3- Any works in the region must take in consideration the dugongs, green sea turtles, and the sea grass. So that; any works will be prohibited during the months Jun, July, and August.
4- No dredging is the most preferable techniques for laying the cables. Otherwise; the dredging method with minimum impact must be used.
5- Surveys are required for Dugongs, Green Sea Turtles, Seagrass species composition and distribution, and marine invertebrates.
6- As we agreed earlier, 2 ADCPs to be installed for each site.

Terrestrial environment

Agreed as its in the submitted scope of work.

Best Regards

Ala'a Ahmad Rezeq
Senior Environmental Consultant | Environment Agency-Abu Dhabi | www.ead.ae
T 971 2 6934444 Ext:236 | F +971 2 4997283 | E.mail arezeq@ead.ae

Classification: Confidential - سري

From: Simon Pickup <Simon.Pickup@anthesisgroup.com>
Sent: Wednesday, November 24, 2021 9:34 AM
To: Alaa Ahmad Rezeq <arezeq@ead.gov.ae>; Customer Happiness - Environment Agency <Customerhappiness@ead.gov.ae>
Cc: MinHyeok Kang (Dan) <elecsparrow@gmail.com>; Apolline Boudier <Apolline.Boudier@anthesisgroup.com>; Hemachandran Sundaresan (ADNOC Offshore - CETE-TEL) <hsundaresan@adnoc.ae>; amalhai@adnoc.ae; Anna Blackwell <Anna.Blackwell@anthesisgroup.com>
Subject: RE: Project Lightning (DPA2104081) - Scoping Letter

Hi Ala'a

Have you had a response from your marine team yet?

Many thanks

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Simon Pickup
Managing Director – Middle East
+971 50 554 4219
Dubai, United Arab Emirates, PO Box 392563

From: Simon Pickup
Sent: Sunday, November 21, 2021 3:16 PM
To: 'Alaa Ahmad Rezeq' <arezeq@ead.gov.ae>; Customer Happiness - Environment Agency <Customerhappiness@ead.gov.ae>
Cc: MinHyeok Kang (Dan) <elecsparrow@gmail.com>; Apolline Boudier <Apolline.Boudier@anthesisgroup.com>; Hemachandran Sundaresan (ADNOC Offshore - CETE-TEL) <hsundaresan@adnoc.ae>; amalhai@adnoc.ae; Anna Blackwell <Anna.Blackwell@anthesisgroup.com>
Subject: RE: Project Lightning (DPA2104081) - Scoping Letter

Many thanks Ala'a

Understood, look forward to receiving the marine comments also.

Kind regards

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Twitter, LinkedIn, Instagram
anthesisgroup.com

Simon Pickup
Managing Director – Middle East
+971 50 554 4219
Dubai, United Arab Emirates, PO Box 392563

From: Alaa Ahmad Rezeq <arezeq@ead.gov.ae>
Sent: Sunday, November 21, 2021 3:14 PM
To: Simon Pickup <Simon.Pickup@anthesisgroup.com>; Customer Happiness - Environment Agency <Customerhappiness@ead.gov.ae>
Cc: MinHyeok Kang (Dan) <elecsparrow@gmail.com>; Apolline Boudier <Apolline.Boudier@anthesisgroup.com>; Hemachandran Sundaresan (ADNOC Offshore - CETE-TEL) <hsundaresan@adnoc.ae>; amalhai@adnoc.ae; Anna Blackwell <Anna.Blackwell@anthesisgroup.com>
Subject: RE: Project Lightning (DPA2104081) - Scoping Letter

Dear Simon

You have full approval regarding the terrestrial surveys.

Regarding the marine survey I did not get any response yet, I will try to get the final response by tomorrow.

Best Regards

Ala'a Ahmad Rezeq
Senior Environmental Consultant | Environment Agency-Abu Dhabi | www.ead.ae
T 971 2 6934444 Ext:236 | F +971 2 4997283 | E.mail arezeq@ead.ae

هيئة البيئة - أبوظبي
Environment Agency - ABU DHABI

Classification: Confidential - سري

From: Simon Pickup <Simon.Pickup@anthesisgroup.com>
Sent: Sunday, November 21, 2021 3:12 PM
To: Alaa Ahmad Rezeq <arezeq@ead.gov.ae>; Customer Happiness - Environment Agency <Customerhappiness@ead.gov.ae>
Cc: MinHyeok Kang (Dan) <elecsparrow@gmail.com>; Apolline Boudier <Apolline.Boudier@anthesisgroup.com>; Hemachandran Sundaresan (ADNOC Offshore - CETE-TEL) <hsundaresan@adnoc.ae>; amalhai@adnoc.ae; Anna Blackwell <Anna.Blackwell@anthesisgroup.com>
Subject: RE: Project Lightning (DPA2104081) - Scoping Letter

Hi Ala'a

I hope you are well?

Do you have the responses back yet from the specialists?

Many thanks

Anthesis

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anthesisgroup.com

Simon Pickup
Managing Director – Middle East
+971 50 554 4219
Dubai, United Arab Emirates, PO Box 392563

From: Alaa Ahmad Rezeq <arezeq@ead.gov.ae>
Sent: Thursday, November 11, 2021 3:29 PM
To: Simon Pickup <Simon.Pickup@anthesisgroup.com>; Customer Happiness - Environment Agency <Customerhappiness@ead.gov.ae>
Cc: MinHyeok Kang (Dan) <elecsparrow@gmail.com>; Hemachandran Sundaresan (ADNOC Offshore - CETE-TEL) <hsundaresan@adnoc.ae>; amalhai@adnoc.ae; Anna Blackwell <Anna.Blackwell@anthesisgroup.com>
Subject: RE: Project Lightning (DPA2104081) - Scoping Letter

Dear Simon

I am truly sorry for the late response but some related personnel did not sent me there responses and comments yet.

So that, I will follow up with everybody and I will get you the final response at the earliest next week.

Best Regards

Ala'a Ahmad Rezeq
Senior Environmental Consultant | Environment Agency-Abu Dhabi | www.ead.ae
T 971 2 6934444 Ext:236 | F +971 2 4997283 | E.mail arezeq@ead.ae

Classification: Confidential - سري

From: Simon Pickup <Simon.Pickup@anthesisgroup.com>
Sent: Thursday, November 11, 2021 2:52 PM
To: Customer Happiness - Environment Agency <Customerhappiness@ead.gov.ae>; Alaa Ahmad Rezeq <arezeq@ead.gov.ae>
Cc: MinHyeok Kang (Dan) <elecsparrow@gmail.com>; Hemachandran Sundaresan (ADNOC Offshore - CETE-TEL) <hsundaresan@adnoc.ae>; amalhai@adnoc.ae; Anna Blackwell <Anna.Blackwell@anthesisgroup.com>
Subject: RE: Project Lightning (DPA2104081) - Scoping Letter

Hi Ala'a

Thanks for your time on the phone just now. See below and attached for info.

Grateful if you could arrange a review asap?

Hope you have a good weekend!

Kind regards

Connect with Anthesis:
Twitter, LinkedIn, Instagram
anthesisgroup.com

Simon Pickup
Managing Director – Middle East
+971 50 554 4219
Dubai, United Arab Emirates, PO Box 392563

From: Simon Pickup
Sent: Sunday, October 10, 2021 9:12 AM
To: EAD Customer Happiness <customerhappiness@ead.gov.ae>; Alaa Ahmad Rezeq <arezeq@ead.gov.ae>
Cc: MinHyeok Kang (Dan) <elecsparrow@gmail.com>; Hemachandran Sundaresan (ADNOC Offshore - CETE-TEL) <hsundaresan@adnoc.ae>; amalhai@adnoc.ae; Anna Blackwell <Anna.Blackwell@anthesisgroup.com>
Subject: Project Lightning (DPA2104081) - Scoping Letter

Dear EAD Customer Happiness Team, Ala'a

Further to our meeting with EAD on the 21st September, and as agreed during that meeting, please find attached the Scoping Letter for the above captioned project.

We would be grateful if you could review and provide comments asap so that we can commence on the first seasonal bird surveys in October.

Kind regards

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Twitter, LinkedIn, Instagram
anthesisgroup.com

Simon Pickup
Managing Director – Middle East
+971 50 554 4219
Dubai, United Arab Emirates, PO Box 392563

Appendix 6.3 – Anthesis MoM for EAD Meeting on the 29th November 2021

Meeting Agenda

Project	Project Lightning
Project No.	1176 (DPA2104081)
Date	29/11/2021
Time	10:00 to 10:40
Location	Team Meeting. ID 77995f1d-ca21-4130-90e3-6a12cfa20d59
Subject	Project Lightning – Scoping Letter, Clarification on EAD Comments

Attendees	*Entity Representative*	*Entity Project Role*	*Contact (E-mail / Phone Number)*
Alaa Ahmad Rezeq	EAD	Environmental Authority	arezeq@ead.gov.ae
Dr. Himansu Sekhar Das	EAD	Environmental Authority	hsd069@ead.gov.ae
Abdulla Mohamed Alhai	ADNOC	Project Proponent	amalhai@adnoc.ae
Representatives from EDF, KEPCO and Kyuden	EDF, KEPCO & KYENDUN Consortium	Project Developers	admin@KEPCO909.onmicrosoft.com admin@KEPCO909.onmicrosoft.com
Simon Pickup	Anthesis	Environmental Consultant	Simon.Pickup@anthesisgroup.com
Apolline Boudier	Anthesis	Environmental Consultant	Apolline.Boudier@anthesisgroup.com
Greg Ashcroft	WKC	Environmental Marine Expert	Greg.Ashcroft@wkcgroup.com

	Notes	**Action**
1	Anthesis highlighted that following the following marine comments received by EAD on the 24/11/21, they wished to clarify Comment 5: **“*Surveys are required for dugongs, green sea turtles, seagrass species composition and distribution, and marine invertebrates*”**	-
2	**<u>EAD Comment 5: Seagrass Discussion</u>** – WKC presented the methodology of seagrass survey which will be done via photographic quadrat. The survey results will present the species composition, coverage and health. Five quadrats will be made per transect. WKC confirmed that that the survey; – Dr. Das (EAD) confirmed that EAD selected quadrat size is 50x50cm; – Dr. Das (EAD) informed that EAD require species composition and abundance data to be collected. However, the percentage cover within the quadrat would be sufficient. WKC confirmed that we will follow this method; and – Discussion on fish species and macroalgae species presence within the quadrat. WKC confirmed that this will also be picked up, together with potential seasonal changes for the macroalgae.	-

	Notes	Action
3	**<u>EAD Comment 5: Marine Mammals and Reptiles Discussion</u>** – WKC confirmed that the survey regarding marine mammals and reptiles would be incidental sightings throughout the survey period (which is extensive as the surveys will take some time to complete); – Dr. Das (EAD) confirmed that incidental sighting method would be acceptable for the purpose of the EIA study. This could be supplemented by secondary evidence during seagrass surveys, which can identify Dugong grazing tracks and therefore confirms these areas are used for grazing. Dr. Das (EAD) presented photographs to illustrate the marks left on seagrass grazing made by the Dugongs. WKC therefore proposed to set up horizontal cameras, which will be incorporated into the survey method to identify these areas of grazing; – Anthesis queried if EAD have any data on migratory routes / nursery areas which could be shared and to feed into the ESIA. Dr. Das (EAD) confirmed that mapping section can assist. Dr. Das (EAD) mentioned that a migratory study has been undertaken but only limited data are available (transmitter was rejected). The data can be requested from the relevant team through EISOM whom can share the relevant maps. – EAD mentioned that any questions regarding scope and/or methodology that are more of an academic nature can be directed to Dr Das (EAD).	-
4	**<u>EAD Comment 5: Marine Invertebrates</u>** – WKC confirmed that infauna sampling together with species identification and statistical analysis will be undertaken in-house. The survey method is acceptable to EAD.	-
5	**<u>EAD Comment 3:</u>** ***"Any works in the region must take in consideration the dugongs, green sea turtles, and the sea grass. So that; any works will be prohibited during the months Jun, July, and August."*** – Dr. Das (EAD) clarified that the comment was incorrect as the key sensitive periods are during the winter and that the ideal construction period on key sensitive areas to limit impacts on dugongs, sea turtles and seagrass is during the summer; – Anthesis queried about what is generally the depth where good densities of seagrass are observed. Dr. Das (EAD) confirmed that this ranges usually from 4m to 6m (and up to 8m) depth. Anthesis therefore conclude that sensitive areas will be generally where the bathymetry is up to 8m depth and this is in these areas where construction works should be completed during the summer period to avoid and mitigate any impacts onto sensitive marine receptors.	**Anthesis** to send an email to Ala'a (EAD) to rectify the comment as per this discussion **EAD** to provide confirmation
6	**<u>Post Meeting Clarification (09/12/21) from EAD:</u>** – The months allowed for construction work are <u>May, June, July, August and September</u>. – Months are completely prohibited to construction work are <u>December, January, February and March</u>. – The other months (<u>April, October and November</u>) must be avoided as the for marine mammals might be available there depend on temperature.	**-**

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Appendix 6.4 – Anthesis MoM for EAD Meeting on the 16th March 2022

Anthesis

Meeting Agenda

Project	Project Lightning
Project No.	1176
Date	16th March 2022
Time	14h00-14h30 (UAE Time)
Location	Online Teams Meeting
Subject	Presentation of changes to the proposed cable routes and presentation of offshore disposal areas

Attendees	*Entity Representative*	*Entity Project Role*	*Contact (E-mail / Phone Number)*
Khaled Al Ameri	EAD	EAD Acting Head	khaled.alameri@ead.gov.ae
Hemachandran Sundaresan	ADNOC	Engineer, Electrical	hsundaresan@adnoc.ae
Dr. Vijaya Bhaskar Reddy	ADNOC	Environmental Advisor	-
David Dulac	BHC	Project Director	david.dulac@edf.fr
Shigeru Sugimoto	BHC	Business Manager	shigeru_sugimoto@kyuden-intl.co.jp
Damien Beloyan	BHC	Contract Manager	damien.beloyan@edf.ae
Leena Abdul-Latif	BHC	Interface Manager	leena.abdul-latif@edf.fr
Min Hyeok Kang	BHC	Cable Manager	minhyeok.kang@kepco.co.kr
Yu Iwashita	BHC	Cable Manager Deputy	yuu_iwashita@kyuden.co.jp
Jehee Lee	BHC	Cable Manager	jeheelee96@kepco.co.kr
Sonia Benzidane	BHC	PMO	sonia.benzidane@lightning.ae
Eric Delort	BHC	Environmental advisor	eric.delort.consult@gmail.com
Peter Kuppers	Primo Marine	Offshore cable installation advisor	peter.kuppers@primo-marine.com
Christophe Gauthier	EDF	Senior Project Management	christophe-denis.gauthier@edf.fr
Francis Rodriguez	SNC	Project Director	francis.rodriguez@snclavalin.com
Karthik	ERM	Environmental Expert	karthikb@erm.ae
Benjamin Rogiers	Jan De Nul	-	Benjamin.Rogiers@jandenul.com
Servaas Waelkens	Jan De Nul	-	Servaas.Waelkens@jandenul.com
John Mackenzie	Jan De Nul	-	John.Mackenzie@jandenul.com
Kristof Schreurs	Jan De Nul	-	Kristof.Schreurs@jandenul.com
Simon Pickup	Anthesis	Project Director	Simon.pickup@anthesisgroup.com
Apolline Boudier	Anthesis	Project Manager	Apolline.boudier@anthesisgroup.com
Anna Blackwell	Anthesis	Project Assistant Manager	Anna.blackwell@anthesisgroup.com

	Notes	Action
1	Anthesis confirmed that the intention of the meeting was to: a) present the positive changes which have been made in relation to the cable routes for the nearshore areas for both routes in order to reduce and/or avoid impacts upon critical and sensitive marine habitats; b) provide an overview of expected offshore construction activities and identify the locations and capacity of the expected offshore disposal areas; and c) present the change in cable routes near Al Ghallan Island. Anthesis presented and discussed the information identified above. A copy of the presentation is attached to this MoM for information.	Note
2	Slide 18 In relation to the use of floatation channels, EAD requested to provide further information and justifications on why it is necessary for the floatation channels to be 60 m in width. Jan de Nul explained that the floatation / dredged channels are required to be dredged to allow access of the cable lay barge (CLB) 'Ulisse' selected for the Project which has a breadth of 33.50 m. Furthermore, the CLB 'Ulisse' is already an optimal vessel for nearshore cable installation (5.41 m draught) compared to the cable lay vessel (CLV) 'Leonardo da Vinci' which will execute the offshore cable installation with a draught of 8.5 m. An additional factor defining the 60 m width is the minimum separation distance of 50 m between the two cables routes of the Zakum cluster (cable repair requirement). **Post meeting: two new slides (19 & 20) have been added in the presentation which provides details on the cable lay barge 'Ulisse' and details on the floatation / dredged channels cross-section.**	Anthesis to update the presentation with additional justifications and issue to EAD
3	Slide 23 Anthesis mentioned that it is unlikely that the southern disposal area identified will be required since the proposed reroute of the Zakum / Al Gallan nearshore cable is located in a deeper area where therefore the floatation / dredged channels are not expected to be required. However, it is confirmed that the northern disposal route will be required for the Project. Finally, it is confirmed that within the hydrodynamic modelling studies completed for the ESIA, to ensure that a worst-case scenario is presented, the southern and northern disposal areas will be modelled.	Note
4	EAD confirmed that once the updated presentation is received, it will be distributed and reviewed by all relevant members of EAD and comments issued, where appropriate.	Note

Attachment:

- Project Lightning Presentation – 16/03/2022

PROJECT LIGHTNING

Meeting with EAD - Project Updates

DPA2104081

March 2022

Anthesis

CONTENTS

FINAL

Anthesis

01 INTRODUCTION

INTRODUCTION

Purpose of the meeting:

- Presentation of the positive changes in the cable routes for the nearshore areas for both routes (Das and Zakum / Al Ghallan Routes) selected to reduce and avoid impacts on critical and sensitive marine habitats
- Overview of the offshore construction activities and presentation of expected offshore disposal area(s)
- Presentation of the change in the cable routes near Al Ghallan Island
- Our intention for this meeting is to discuss those above changes and obtain EAD comments (if any)

INTRODUCTION

Previous Overall Routes

Das Cable Route

Zakum / Al Ghallan Route

Anthesis

02 NEARSHORE AREAS RE-ROUTING

NEAR-SHORE AREAS RE-ROUTING

Remote Sensing Purpose

Remote sensing survey completed via processing aerial imagery to determine sensitive and critical marine habitats near the cable routes. Purpose was to:

- Fully address EAD Comment no.1 on the Mott MacDonald Gap Analysis report
- Identify possible changes in the nearshore area route to avoid and/or minimise any impacts on sensitive and critical habitats
- Address EAD and IFC requirements for analysis of alternatives / selection of least impacting solution

<u>Marine Baseline Survey</u>

- Habitat confirmation to be undertaken in the coming weeks

Table 3-1 Response to EAD Comments on Mott MacDonald Gap Analysis

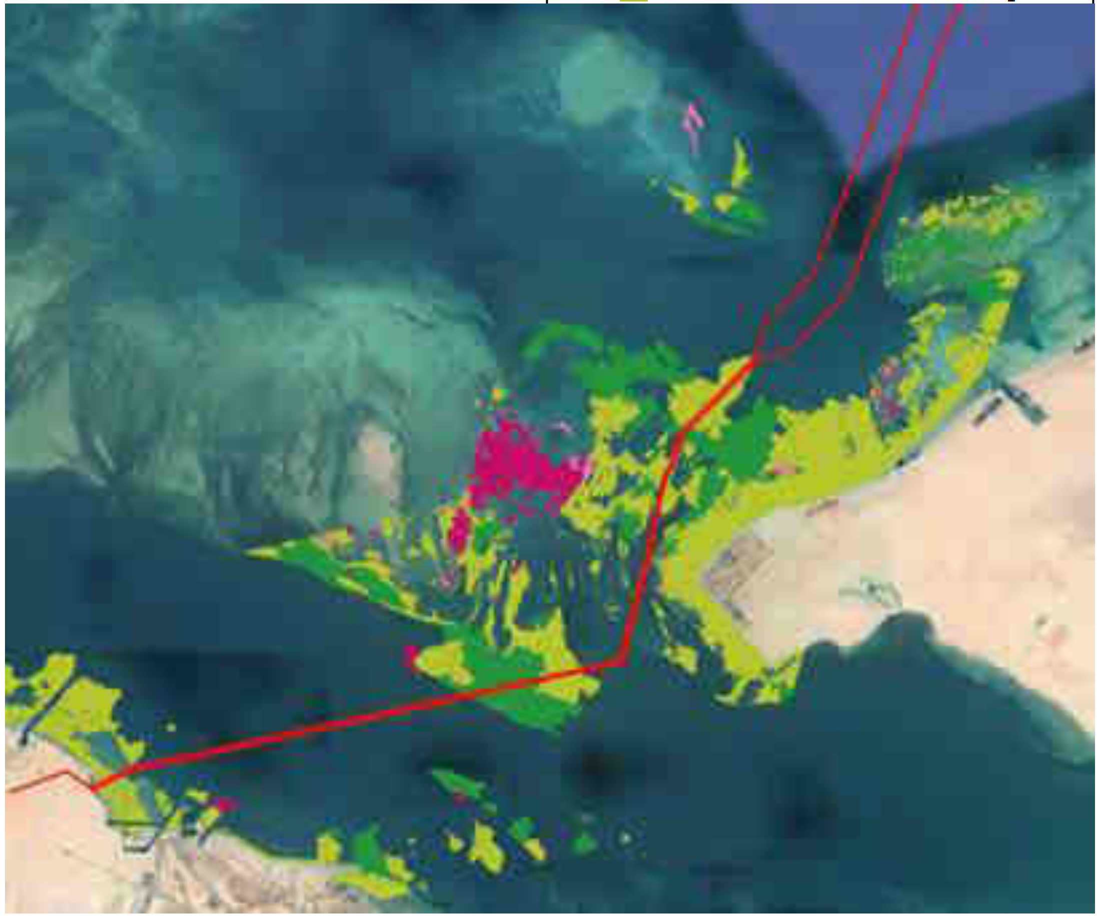
EAD Comment	Anthesis Response
The most sensitive path of the Zakum cable from Mirfa power plant passes through the MMBR. EIA must address (a) why a deviated route cannot be considered, (b) seasonality, duration etc. of the operational aspect of the Project for the MMBR patch of the route, (c) impact of the Project within and outside of the MMBR.	Noted and agreed. Consultations will be undertaken with ADNOC relating to initial route selection and this will be reviewed following the results of marine modelling and impact assessments and appropriate mitigation measures will be presented.

Critical
11100 - Fringing Reef
11100 - Fringing Reef
11200 - Patch Reef
11200 - Patch Reef
12000 - Seagrass Bed
12000 - Seagrass Bed
Sensitive
13010 - Hard-Bottom With Macroalgae
13010 - Hard-Bottom With Macroalgae

NEAR-SHORE AREAS RE-ROUTING

Remote Sensing Results

Das Cable Route

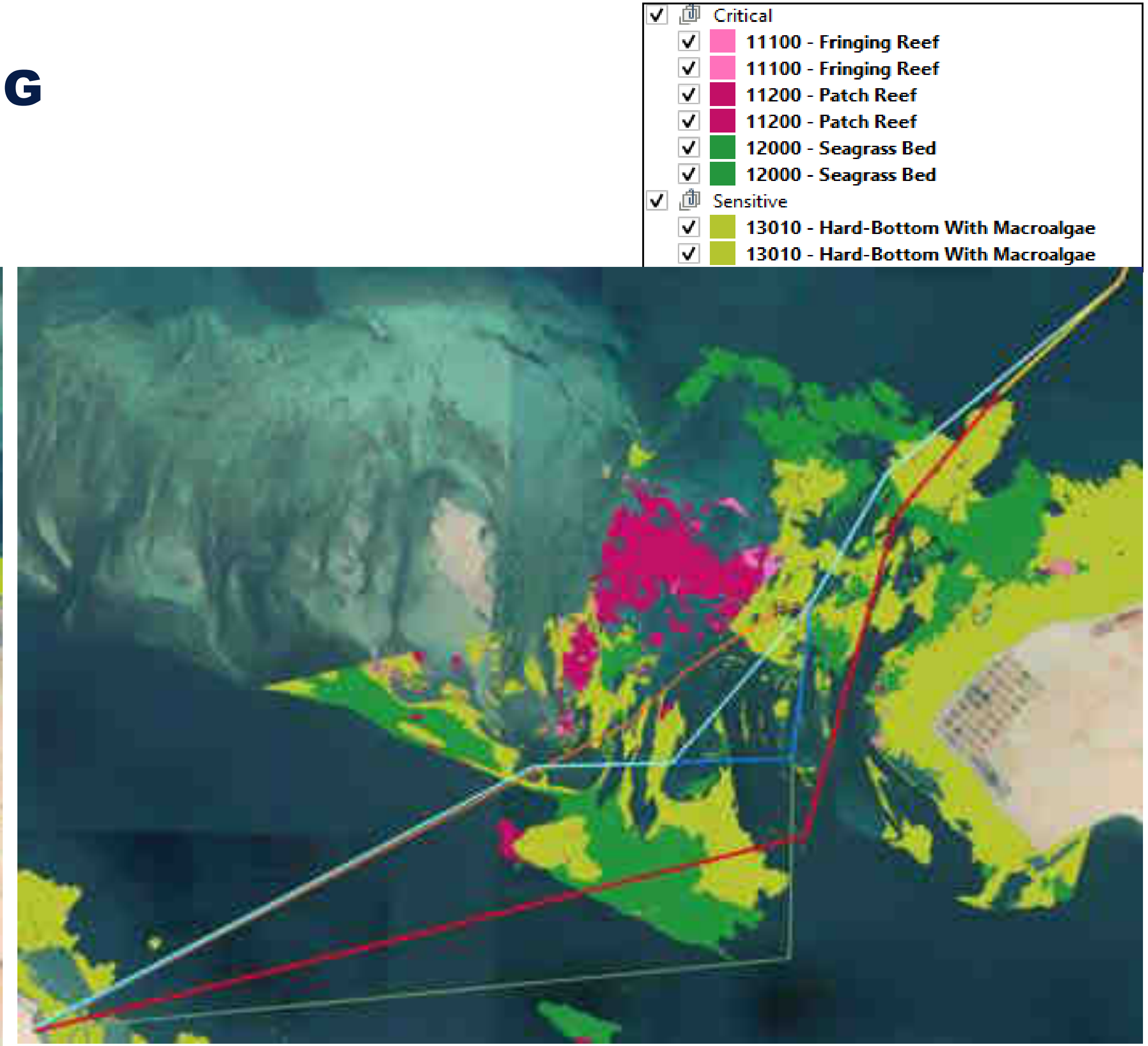


Zakum / Al Ghallan Route

NEAR-SHORE AREAS RE-ROUTING

Initial Re-routing Options

Das Cable Route



Zakum / Al Ghallan Route

NEAR-SHORE AREAS RE-ROUTING

Selected Re-routing Option for Das Route

<u>Das Route</u>

- Identified **constraints** for route changes:
  - If route shifted to the north: fall within anchorage areas
  - If route shifted to the south: shallower area with nearby seagrass
  - Maximum provision of cable length for the entire Project
  - General tight schedule constraint

NEAR-SHORE AREAS RE-ROUTING

Selected Re-routing Option for Das Route

<u>Das Route</u>

- Identified **constraints** for route changes:
  - If route shifted to the north: fall within anchorage areas
  - If route shifted to the south: shallower area with nearby seagrass
  - Maximum provision of cable length for the entire Project
  - General tight schedule constraint
- **Alternative solution:**
  - Localised diversion of the identified Patch Coral Reef – closest located approx. 120 m away

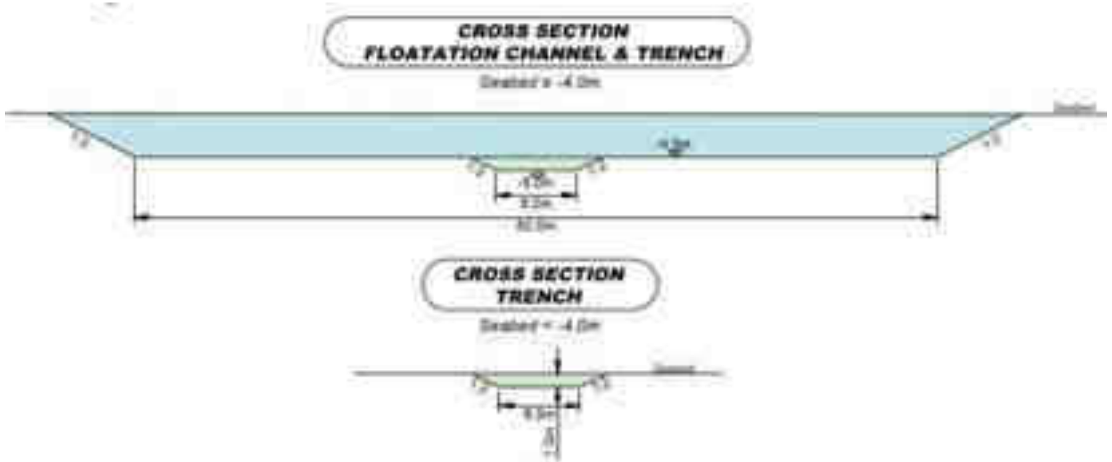
➢ **Result:**
- **No direct impacts upon the identified patch coral reef and seagrass** *(mitigation measures to apply)*
- **Unavoidable direct impacts upon the fringing coral reef** *(mitigation and compensation measures to apply)*

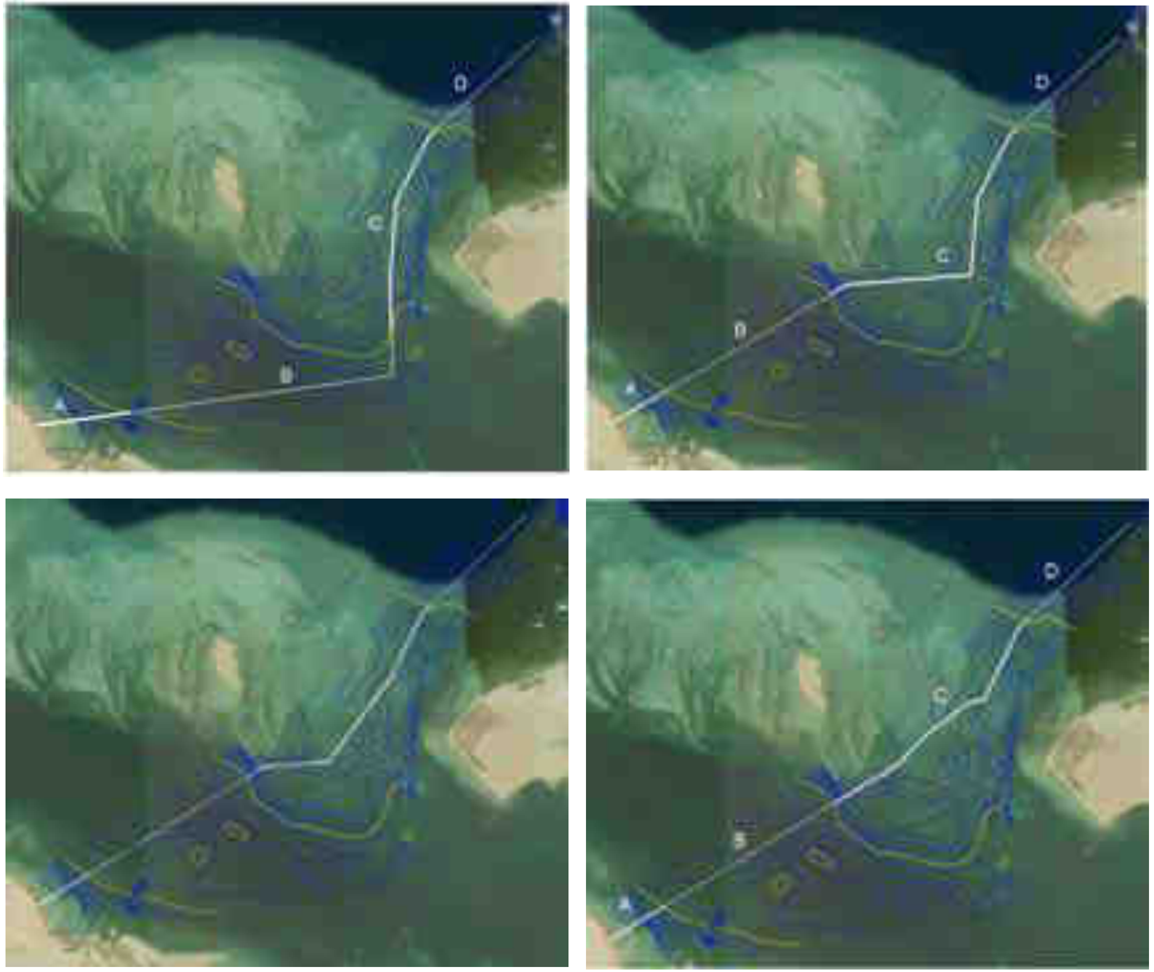
NEAR-SHORE AREAS RE-ROUTING

Selected Re-routing Option for Zakum / Al Ghallan Route

<u>**Zakum / Al Ghallan Route**</u>

- Identified **constraints** for route changes:
  - Limited areas without sensitive or critical habitats
  - To limit impacts on Al Marawah Protected Area
  - Bathymetry: avoidance of shallower areas to avoid requirement of floatation / dredged channels *(bathymetry to be completed soon)*
  - Maximum provision of cable length for the entire Project
  - General tight schedule constraint



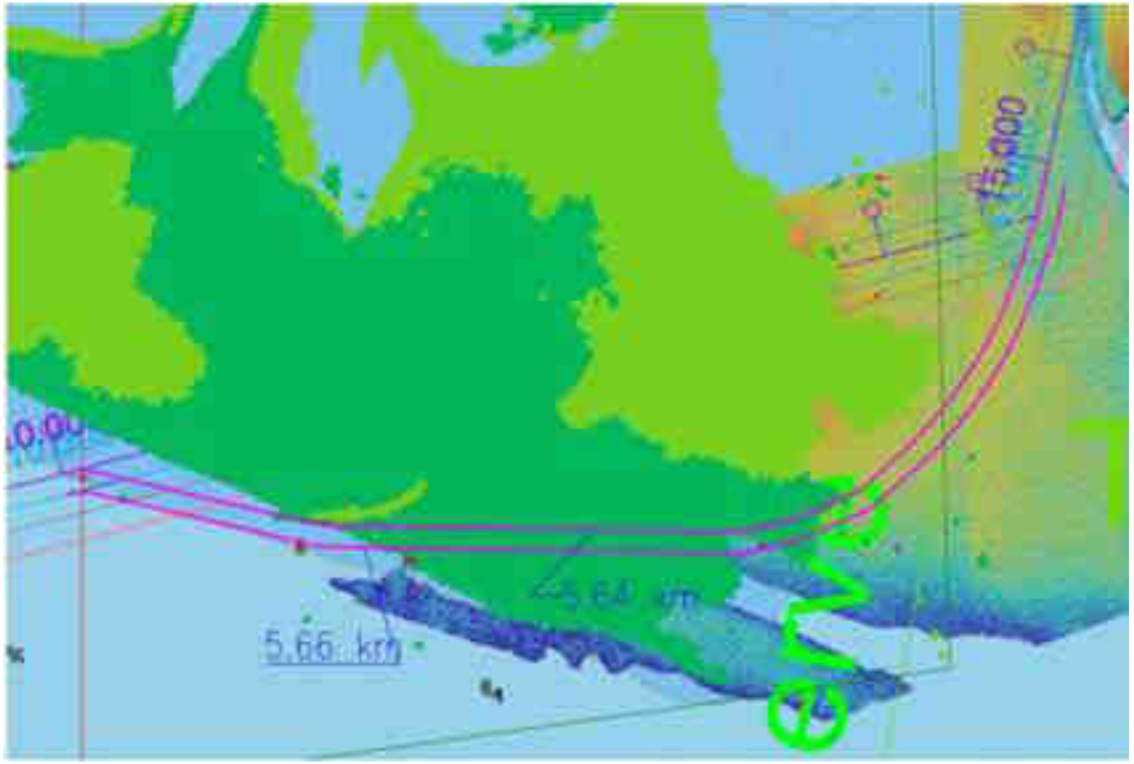


NEAR-SHORE AREAS RE-ROUTING

Selected Re-routing Option for Zakum / Al Ghallan Route

<u>**Zakum / Al Ghallan Route**</u>

- Identified **constraints** for route changes:
  - Limited areas without sensitive or critical habitats
  - To limit impacts on Al Marawah Protected Area
  - Bathymetry: avoidance of shallower areas to avoid requirement of floatation / dredged channels *(bathymetry to be completed soon)*
  - Maximum provision of cable length for the entire Project
  - General tight schedule constraint
- Alternative solution:
  - Diversion near the seagrass and hard-bottom with macro-algae habitats



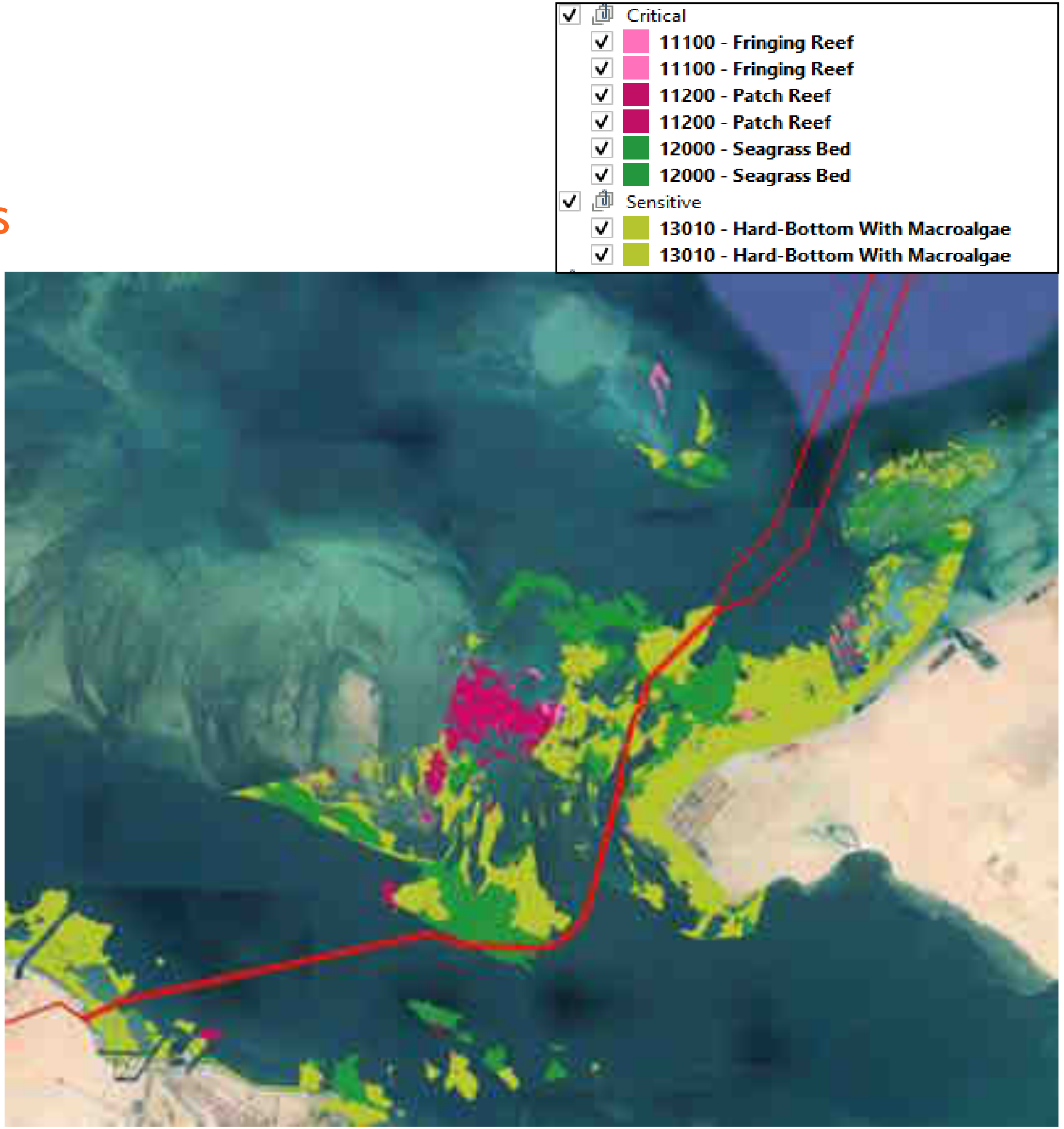
➢ **Result:**

- **Reduction of direct impacts on seagrass and hard-bottom with macro-algae** *(<u>- 1.2 km of direct impacts</u>) (mitigation measures to apply)*
- **<u>No floatation / dredging channels expected</u> to be required on this re-routed section** *(will be confirmed once bathymetry on this new Project area is completed)*

NEAR-SHORE AREAS RE-ROUTING

Conclusion: Final Routes With Reducing Impacts

Das Cable Route

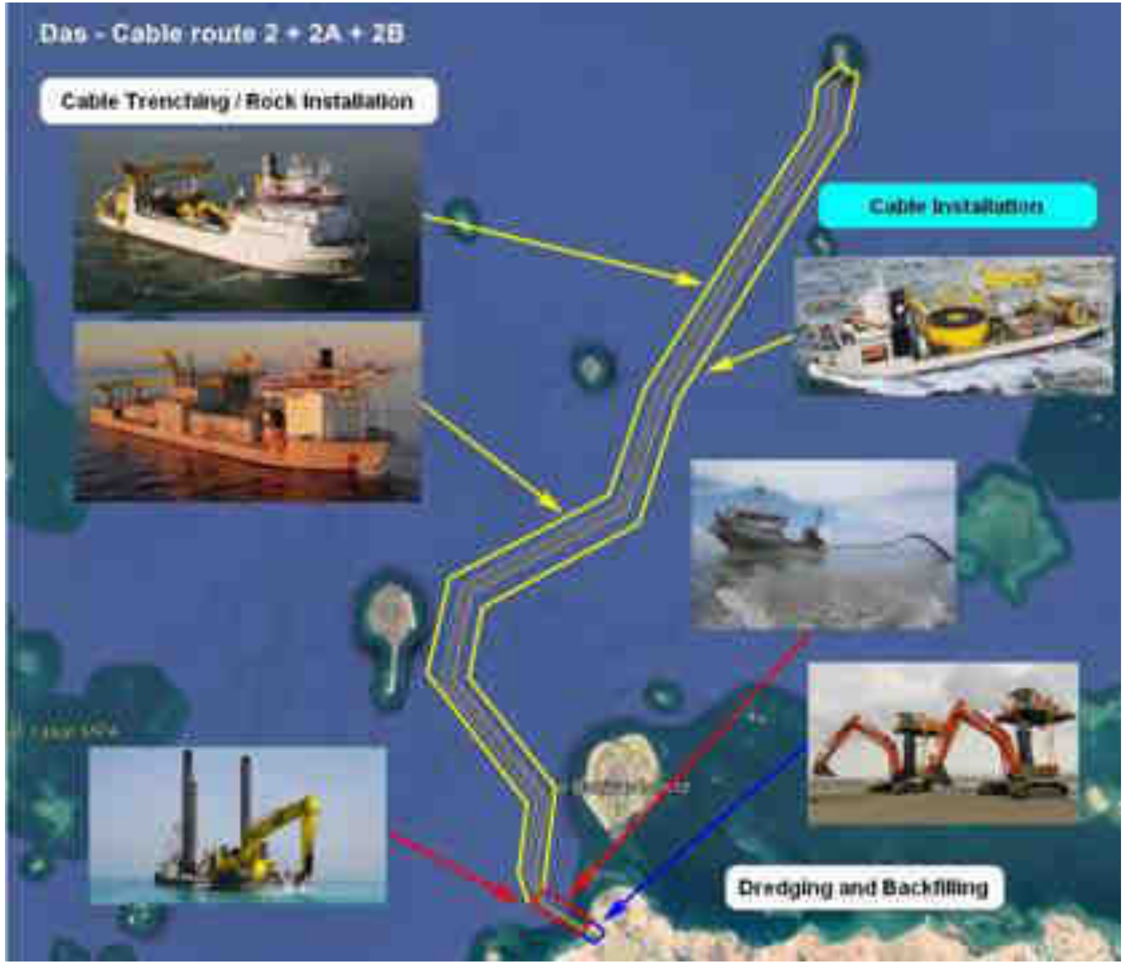


Zakum / Al Ghallan Route

03 CONSTRUCTION OVERVIEW & DISPOSAL AREAS

CONSTRUCTION OVERVIEW & DISPOSAL AREAS

Overview of the Offshore Cable Construction



CONSTRUCTION OVERVIEW & DISPOSAL AREAS

Overview of the Offshore Cable Construction

<u>Nearshore Areas</u>

- Dredging + backfilling:
  - Sidecasting materials on both sides of trench (10 m from each side of trench with Starfish & BHD / 25 m from each side with TSHD)
  - Sidecasted materials will be re-used to backfill the trench and provide protection for the cables

Trailing Suction Hopper Dredger (TSHD)

Starfish trenching

Backhoe Dredger (BHD)

CONSTRUCTION OVERVIEW & DISPOSAL AREAS

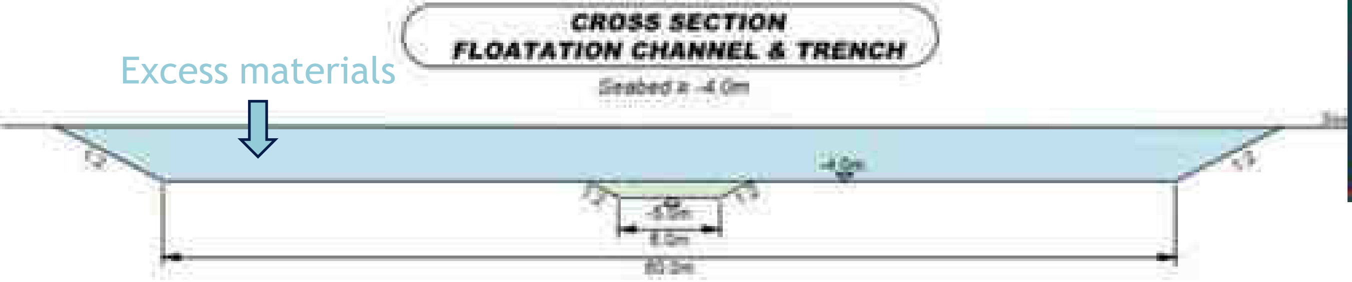
Overview of the Offshore Cable Construction

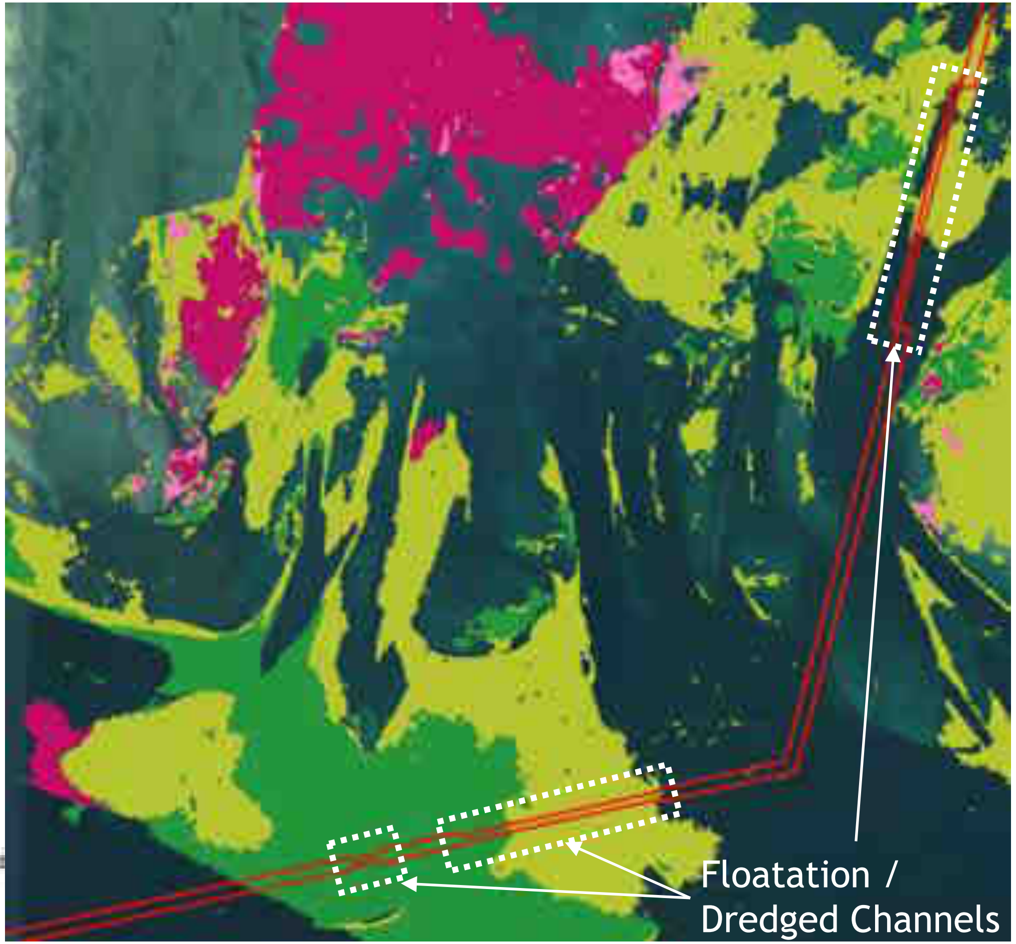
Nearshore Areas

- Dredging + backfilling:
  - Sidecasting materials on both sides of trench (10 m from each side of trench with Starfish & BHD / 25 m from each side with TSHD)
  - Sidecasted materials will be re-used to backfill the trench and provide protection for the cables

➢ **However:**

- **Zakum / Al Ghallan requires floatation / dredged channels of approx. 60 m width at shallow areas to allow construction vessels to work**
- **The material of the floatation / dredged channels cannot be reused for backfill as it will put additional stress on cables and therefore offshore disposal areas will be required for the Project**





CONSTRUCTION OVERVIEW & DISPOSAL AREAS

Overview of the Offshore Cable Construction

<u>Floatation / dredged channel</u>

- Nearshore cable installation by shallow cable lay barge (CLB) ‘Ulisse’
  - Minimum water depth and width required for CLB ‘Ulisse’

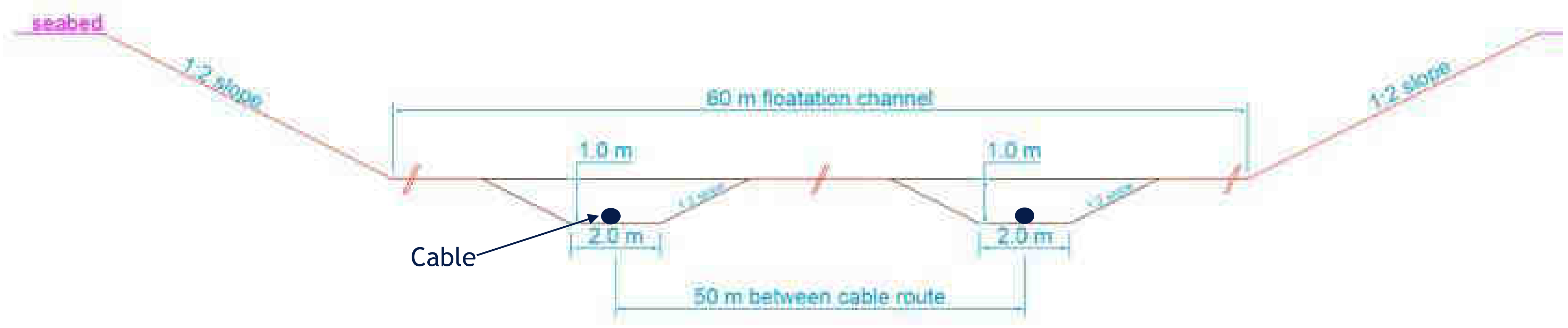
Length overall	122.2 m
Breadth	33.50 m
Depth	7.60 m
Summer draught	5.41 m

- No impact on the floatation channel due to the dredging equipment
- CLB ‘Ulisse’ is the optimal vessel for nearshore cable installation compared to cable lay vessel (CLV) ‘Leonardo da Vinci’ which will execute the offshore cable installation (draught: 8.5m)
- Minimum separation distance of 50m between two cables due to cable repair requirements by ADNOC

CONSTRUCTION OVERVIEW & DISPOSAL AREAS

Overview of the Offshore Cable Construction

<u>Floatation channel – Cross section</u>



CONSTRUCTION OVERVIEW & DISPOSAL AREAS

Proposed Disposal Areas

<u>Approach & Option Analysis</u>

- No existing disposal areas can be used
- As per original route: requirement for <u>two</u> disposal areas:
    - One area in the south
    - One area in the north
- Assessment of quantities and depth for potential disposal areas:

1. Disposal areas	Required volume capacity [m^3]
1.1 North disposal areas	240,000 m^3
1.2 South disposal area	590,000 m^3 *Approx.*
2. Minimum depth required at/to disposal area	**m LAT**
2.1 North disposal area	7.0
2.2 South disposal area	7.0

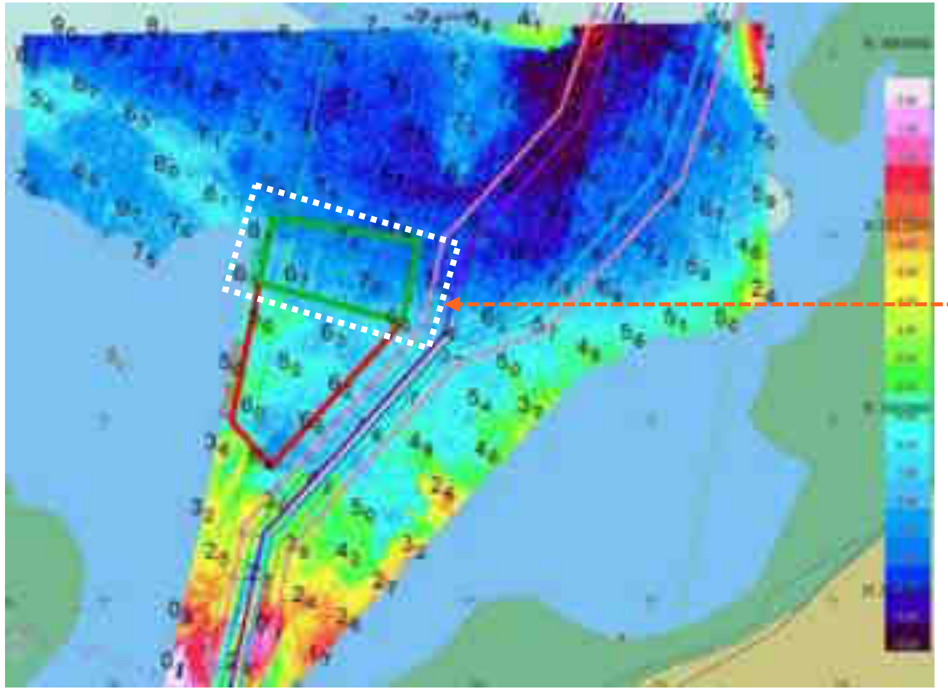
Note: calculated volumes are based on previously defined route (floatation / dredged channels required) and are worst-case quantities

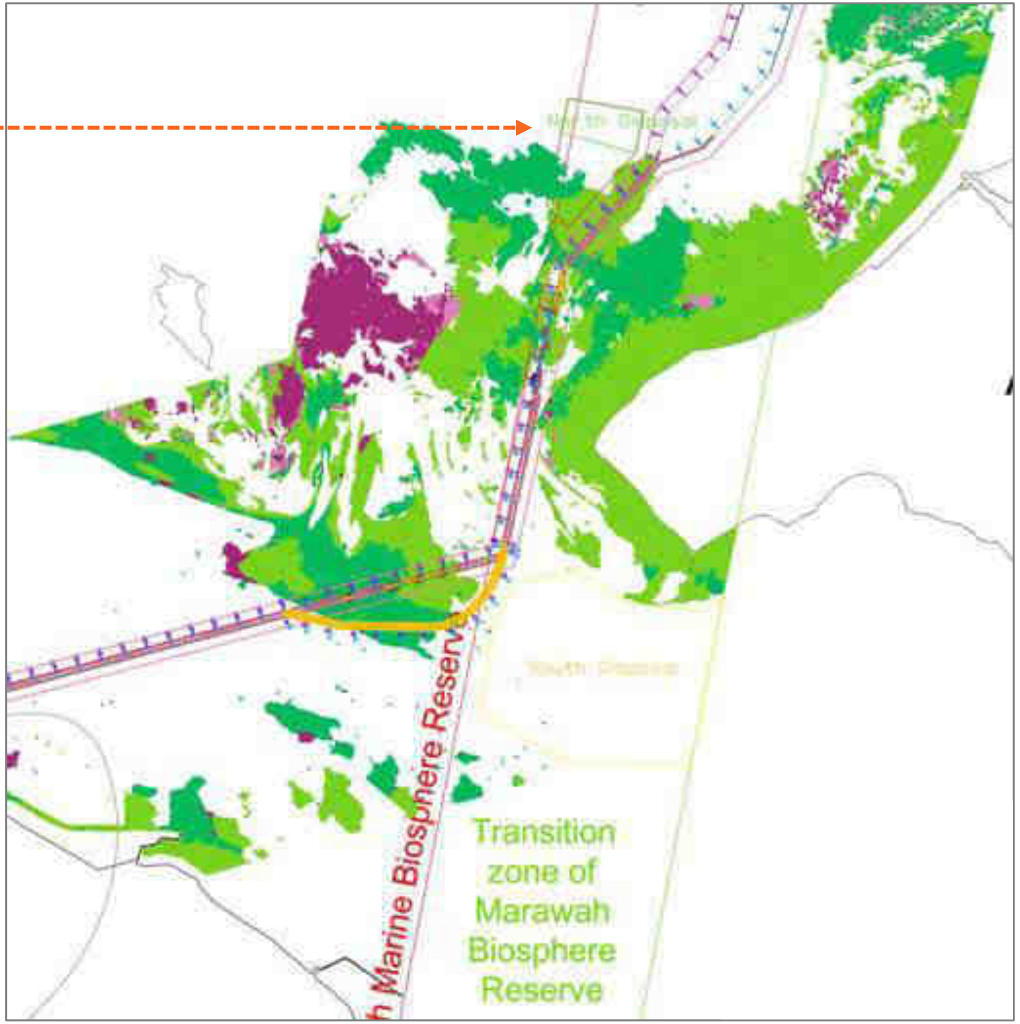
CONSTRUCTION OVERVIEW & DISPOSAL AREAS

Proposed Disposal Areas

Northern Disposal Area - Selected Option

- 3 M m^3 can be deposited as depth ranges from -6.0 m to -7.8 m
- Sufficient depth and sufficiently away from critical or sensitive receptors (approx. 160 m away to its nearest point)



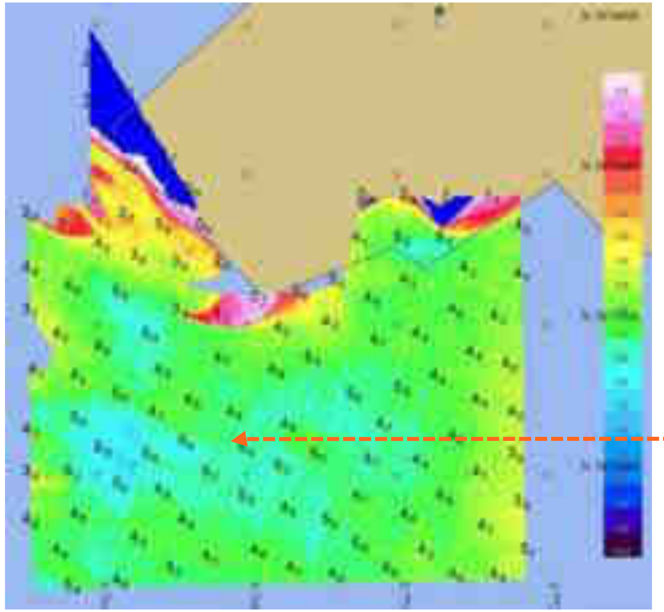


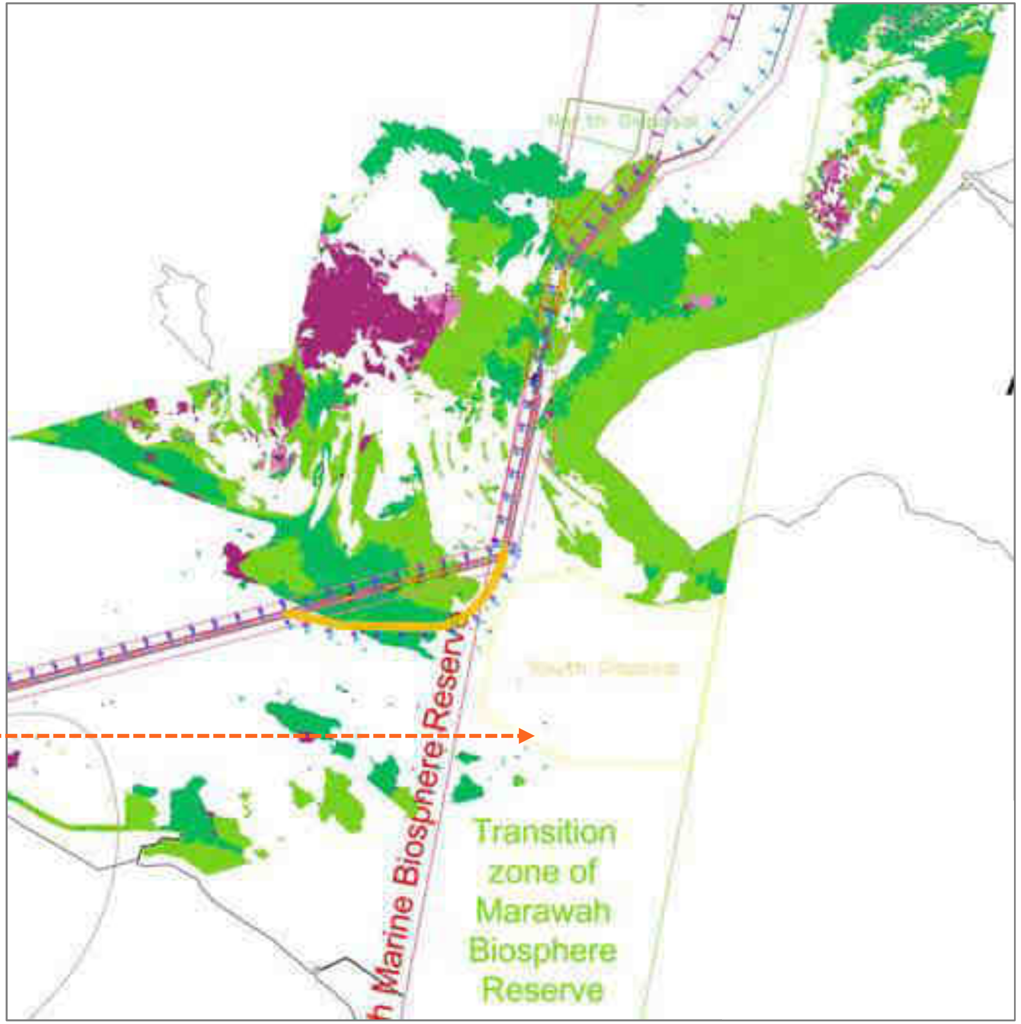
CONSTRUCTION OVERVIEW & DISPOSAL AREAS

Proposed Disposal Areas

Southern Disposal Area - Selected Option

- If required – will be assessed as worst-case scenario
- 1 M m^3 between -4.0 m and -5.9 m
- Sufficiently away from critical or sensitive receptors
- Area generally shallow, disposing materials possible if the material is spread out on a large surface to limit layer thickness



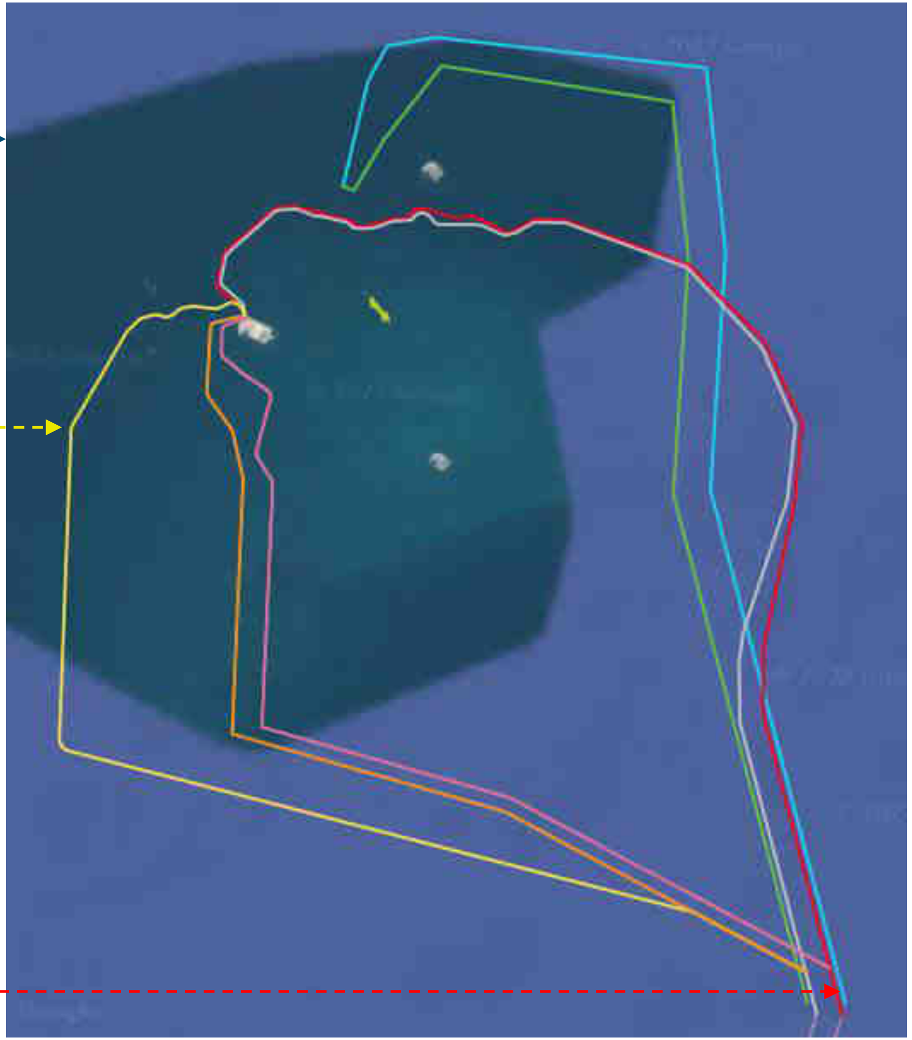


04 ZAKUM / AL GHALLAN NORTH AREAS RE-ROUTING

ZAKUM / AL GHALLAN NORTH AREAS RE-ROUTING

Re-routing Options

- Seven route options considered for the Project
- No dredging works in these areas
- No environmental sensitive areas nearby
- Selected routes (under final confirmation):
  - Cable 1A: Yellow Route
  - Cable 1B: Red Route
- Marine surveys approach for this area will remain as per our Scoping Letter approved by EAD in November 2021
  - Water & sediment samples + DDV along each route
  - Any other incidental sightings of marine mammals, pelagic birds or reptiles will be recorded



05 Q&A

THANK
YOU

Appendix 6.5 – EAD Comments on Anthesis Scoping Letter on the 8th April 2022

Anthesis

Apolline Boudier

From: Khaled Ali Saad Mohamed Al Ameri <Khaled.AlAmeri@ead.gov.ae>
Sent: Friday, April 8, 2022 12:33 PM
To: Apolline Boudier
Cc: Simon Pickup; Anna Blackwell; Eric DELORT; Alaa Ahmad Rezeq
Subject: RE: Project Lightning - Meeting Wednesday 16 March

Follow Up Flag: Follow up
Flag Status: Completed

Good Day Apolline,

I trust this email finds you well

I would like to first start that we highly appreciate the conducted efforts to reduce the project's impact on the surrounding environment which facilitate the progress of this project. Kindly refer to the comments below after reviewing the sent internally:

A- In reference to slide 11 which discuss the Das route at the nearshore area (Shuwiehat PDP) it is believed that the company can avoid the impacts on fringing coral reef by:
  1- applying HDD method with possibility of minor shifting
  2- Make more detail investigation of the area and define the location of the gaps among coral reef to make it the selected bath.

B- 03 Construction Overview and Disposal Area:
  1- The required dredging for the project is massive comparing to the direct foot print especially when we include the sloped sides. This cannot be approved and the project foot print must be limited to the cable itself.
  2- No offshore disposal, all disposal areas mut be onshore especially the project is in proximity of the land. Even if offshore disposal area going to be approved but an HDM study must be provided to make sure no impacts on the Marawah Protected area and the critical habitat in the region.

Thank you so much for your understanding and continuous cooperation and we're looking forward to hearing from you.

Best regards,

هيئة البيئة - أبوظبي
Environment Agency - ABU DHABI

خالد علي العامري
Khaled Ali Saad Mohamed Al Ameri

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إدارة التصريح والامتثال والتطبيق
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T: +971 (2) 693 4402 E: Khaled.AlAmeri@ead.gov.ae

T +971 (2) 693 4444
PO Box: 45553, Al M
Block A, Murour Roa
Abu Dhabi, UAE

www.ead.gov.ae

From: Apolline Boudier <Apolline.Boudier@anthesisgroup.com>
Sent: Monday, March 21, 2022 3:34 PM
To: Khaled Ali Saad Mohamed Al Ameri <Khaled.AlAmeri@ead.gov.ae>
Cc: Simon Pickup <Simon.Pickup@anthesisgroup.com>; Anna Blackwell <Anna.Blackwell@anthesisgroup.com>; Eric DELORT <eric.delort.consult@gmail.com>; Alaa Ahmad Rezeq <arezeq@ead.gov.ae>
Subject: RE: Project Lightning - Meeting Wednesday 16 March

Dear Khaled,

Hope you are well and thank you for attending our meeting last week regarding the ADNOC lightning Project.

As agreed in our meeting, please find attached:

1- our presentation <u>with two new slides (19 + 20) explaining the requirements for the floatation / dredged channels for the Project</u>
2- our MOM in a word version to allow for your comments / changes – if any
3- the pdf version including the MOM with the presentation

Would it be possible to get back to us on the MOM and our presentation this week to confirm if you have any comments or questions?

Many Thanks & Kind Regards,

Anthesis

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Twitter, LinkedIn, Instagram
anthesisgroup.com

Apolline Boudier
Head of Environmental Planning
+971 50 920 6254
Dubai, United Arab Emirates, PO Box 392563

From: Apolline Boudier
Sent: Thursday, March 10, 2022 11:11 AM
To: Alaa Ahmad Rezeq <arezeq@ead.gov.ae>
Cc: Simon Pickup <Simon.Pickup@anthesisgroup.com>; Anna Blackwell <Anna.Blackwell@anthesisgroup.com>
Subject: RE: Project Lightning - Meeting Wednesday 16 March

Hi Ala'a,

Ok that is noted and appreciated. We will keep it short and clear.

Many Thanks & Kind Regards,

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anthesisgroup.com

Apolline Boudier
Head of Environmental Planning
+971 50 920 6254
Dubai, United Arab Emirates, PO Box 392563

From: Alaa Ahmad Rezeq <arezeq@ead.gov.ae>
Sent: Thursday, March 10, 2022 11:09 AM
To: Apolline Boudier <Apolline.Boudier@anthesisgroup.com>
Cc: Simon Pickup <Simon.Pickup@anthesisgroup.com>; Anna Blackwell <Anna.Blackwell@anthesisgroup.com>
Subject: RE: Project Lightning - Meeting Wednesday 16 March

Dear Apolline

Yes I confirm the meeting time; however you need to make your best to minimize the meeting time and keep it 30 minutes only (reduce discussion, presentation, be always direct to the point and do not tell us something we already know it), and in case it required more than 30 minutes then we are available.

Best Regards

Ala'a Ahmad Rezeq
Senior Environmental Consultant | Environment Agency-Abu Dhabi | www.ead.ae
T 971 2 6934444 Ext:236 | F +971 2 4997283 | E.mail arezeq@ead.ae

Classification: Confidential - سري

From: Apolline Boudier <Apolline.Boudier@anthesisgroup.com>
Sent: Thursday, March 10, 2022 11:01 AM
To: Alaa Ahmad Rezeq <arezeq@ead.gov.ae>
Cc: Simon Pickup <Simon.Pickup@anthesisgroup.com>; Anna Blackwell <Anna.Blackwell@anthesisgroup.com>
Subject: Project Lightning - Meeting Wednesday 16 March

Dear Ala'a,

Thank you for the calls and arranging this meeting. As confirmed over the phone, we would like to have a meeting to present to EAD changes on the Project routes and overview of the construction for the cable routes.

I understand you and your colleague are free for a meeting on Wednesday 16 March at 2pm – appreciate if you could share with us the calendar invitation so I can share it with all relevant parties. Additionally, I believe our call might be a bit longer than 30min – is it ok if the call invitation is set for 1hour maximum?

Many Thanks & Kind Regards,

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Apolline Boudier

Head of Environmental Planning

+971 50 920 6254

Dubai, United Arab Emirates, PO Box 392563

Appendix 6.6 – Anthesis Response to EAD Comments on the 12th April 2022

Anthesis

PROJECT LIGHTNING – EAD COMMENTS ON ANTHESIS PRESENTATION (16/03/22)

Initial Responses to EAD Comments

12th April 2022

Item	#	EAD Comments / Recommendations	Initial Responses (12th April)
A		**In reference to slide 11 which discuss the Das route at the nearshore area (Shuwiehat PDP) it is believed that the company can avoid the impacts on fringing coral reef by:**	-
	1	– Applying HDD method with possibility of minor shifting	EAD concern and comment is well understood, however the HDD method is not considered as feasible for this section of the Project for the following reasons: – Construction constraints: – The HDD would require to be completed for more than 2km and HDDs exceeding 2km are becoming increasingly risky when it comes to collapsing risk or subsoil outburst/spills in underground ‘channels’. If this happens, it would be difficult to finish the HDD work and it may need to be restarted as the drill could experience failures and difficult recoveries. If the HDD requires to be restarted, in addition to significant impacts on the Project schedule and cost, this would cause additional impacts on the marine environment as the construction period will significantly increase in the area causing further underwater noise, sedimentation impacts etc. from the HDD activity; – In terms of environmental impacts from HDD, it should be noted that HDD will include a spill of bentonite (drilling mud) when punching out with the drill head (at the end of the HDD section) which will cause sedimentation impacts on the marine environment. The higher the difference between levels on both sides of the HDD, the bigger the spill will be (communicating barrels); – Operation & Maintenance constraints: – In case there is a failure of the cable inside the HDD during its lifetime, a repair will not be possible as the duct will not be replaceable due to corrosion (if steel conduit is used) or grouting, in the case of HDPE. Therefore, a new HDD and a new section of cable inside would be required to perform the repair adding potentially significant environmental impacts to the area during the operation phase. This may take several months to implement a repair as mobilization of a drill rig and conduit would be required. Without such HDD, a repair is easier, as the cable is easier to reach, and only the actual damaged section needs to be accessed instead of replacing the whole HDD section; – The additional burial depth of the cable within an HDD may be thermally limiting in certain portions of the cable, which as a consequence may have an impact on the ability of a cable to carry its rated capacity. If the cable rating cannot be achieved, this will have a long-term impact on the economic performance of the project. As the use of HDD for this Project and this section is not considered feasible, the impacts on the fringing reef cannot be avoided and the ESIA will therefore require the following to be undertaken: – Compensation measures to corals that will be directly impacted: the corals will be relocated near the Project site; – Mitigation measures to corals that will be indirectly impacted from sedimentation impacts: silt screen curtains will be installed near sensitive identified areas following the results of the ESIA marine surveys and modelling study; – Monitoring measures to relocated corals: the relocated corals will be monitored after their relocation to ensure the success of the relocation work; and – Monitoring measures near critical and sensitive areas impacted from indirect impact: monitoring of the water quality near the construction activities via on-site sampling monitoring and via the deployment of buoys measuring in real-time water quality parameters (eg. Turbidity).
	2	– Make more detail investigation of the area and define the location of the gaps among coral reef to make it the selected bath.	– This survey is on-going as part of the ESIA and results will be provided in the coming weeks which will provide sufficient information to confirm the coral locations, species and density.
B		**Construction Overview and Disposal Area:**	-
	1	– The required dredging for the project is massive comparing to the direct footprint especially when we include the sloped sides. This cannot be approved and the project footprint must be limited to the cable itself.	EAD concern and comment is well understood. However as previously discussed, the floating / dredging channels are required due to the shallow bathymetry in the Mirfa area and for the work required. The cable installer has selected the Cable Lay Barge (CLB) Ulisse to achieve the projects technical and economic requirements. It should be noted that the CLB Ulisse has been selected for the sole purpose of its very shallow draft compared to normal ocean-going cable lay vessels, in order to limit the requirements of floating / dredging channels. A summary of all the reasons that this barge was selected by the EPC are as follows: – During the tender process, it became clear that Prysmian Powerlink (the cable supplier) was the only possible OEM to provide the HVDC cables for the Zakum Cluster (Al Ghallan Area) due to availability to produce these cables within the required project timeframe. However, it was Prysmian’s condition to also lay the cable

Item	#	EAD Comments / Recommendations	Initial Responses (12th April)

			themselves with their vessels CLV Leonardo da Vinci and CLB Ulisse. Therefore, the use of CLB Ulisse has been unavoidable to execute these works from the very beginning. However, as CLB Ulisse is ideally suited for this operation as described below, it has been more of an advantage than a disadvantage;
			– Installation of the Zakum Cluster (Al Ghallan Area) cables is an exceptionally complex technical operation: each of the two cables bundles are actually a bundle of three cables each: two power cables and one fibre optic cable. This means that:
			  – The barge will have to carry all three cables at the same time resulting in a lot of weight and space required on the barge;
			  – The barge will have to install all three cables at the same time, requiring two carrousels for the power cable, a reel for the FOC and a bundling installation on board. This requires even more weight and space.
			CLB Ulisse is therefore the most technically suited to provide just enough space for the operations above while still maintaining limited draught. Smaller barges are simply not able to install these three cables while bundling them on board;
			– Because of the complexity of installing this bundled cable and need for modification to the CLB Ulisse, Prysmian has already been preparing this conversion for a year at this point.
			– Operations with CLB Ulisse are already foreseen to make maximum use of tidal windows. On shallow areas, Ulisse will not be able to work during low tide and will wait for higher tide. As a result, the floatation channels have been designed for this method of operation and have been made as shallow as possible, reducing the amount of dredged material at the floatation channel(s).
			
			To summarise, the EPC is technically not able to replace the CLB Ulisse for this Project as the barge is ideally suited for this operation. Please note that the purpose of the Project is to provide an alternative source of power for offshore facilities, which will replace the existing GTG power sources with electricity generated on the mainland, which will include renewable sources, thereby ensuring that operational carbon emissions are reduced and that future operational demand requirements can be met. This Project is expected to result in both economic and sustainability benefits to Abu Dhabi Emirate in terms of oil and gas activities and capabilities through reducing energy demands and associated maintenance costs, in addition to reducing the existing carbon footprint associated with the electrical power requirements for offshore activities. These objectives strongly align with the demonstrable and ongoing efforts made towards climate change and carbon footprint reduction described above. Therefore, without the Project, this will directly impact on the Emirate GHG reduction objectives.

	2	– No offshore disposal, all disposal areas mut be onshore especially the project is in proximity of the land. Even if offshore disposal area going to be approved but an HDM study must be provided to make sure no impacts on the Marawah Protected area and the critical habitat in the region	EAD concern and comment is well understood, however onshore disposal has a number of constraints that make this solution not feasible. This is detailed below.
			Onshore Techniques
			There are two ways to transport material from one location to the next: hydraulic or mechanical. Both have significant downsides for this particular case.
			– Hydraulic Transportation: With the current foreseen equipment (Backhoe Dredgers (BHD)), hydraulic transport by pumping the material from one location to the next is not possible. This means that the dredging of the floatation channel would have to change from mechanical to hydraulic as well (e.g. Cutter Suction Dredger (CSD)). This in turn has the following downsides:
			  – A CSD with sufficient power to break the rock, has a larger draught than the currently scheduled BHD's and even larger than the CLB. Therefore, the floatation channels would have to be wider and deeper resulting in more material to be dredged *(refer to our response to Comment A1 above)*;
			  – The dredged material would then need to be pumped ashore. Even the most powerful CSD in the world cannot pump the material over a distance of 15 km. This means additional booster pumps (with pontoons, anchors, generators, logistics) will have to be installed every 4-5km (on the water) over the whole trajectory. There is simply not enough pipeline available to pump the material over such a distance. This means additional pipelines would have to be fabricated which will impact on the Project overall feasibility;
			  – Hydraulic transport of dredged material over large distances can only be done at low densities. This means that a lot of water needs to be mixed with the soil and as such will be discharged to shore location. As a result of the fine material dissolving in this water during hydraulic transport, huge settlement ponds would be required to allow the fines to settle before returning the water to the ocean. This would result in a large and significant disturbance of onshore land and terrestrial habitats.
			– Mechanical Transportation: With a BHD, hydraulic transport per pipeline is not possible. The only possibility to get the material onshore would be to discharge it onto a flat top barge, bring the barge to a port and discharge it there. This is technically feasible but would lead to the following operational issues:
			  – The long sailing distance to shore (>15km) means that a fleet of multiple barges and assisting tugs would be needed to allow for continuous operations. The exact number will depend on size of the available barges and sailing distance. Besides this, a discharge facility for those barges needs to run continuously on the shore (i.e. wheel loaders driving on the barges and discharging the material into trucks). Not having continuous operations will endanger the project feasibility but this would also imply additional noise, light disturbance (24/7) and other environmental impacts on the Mirfa marine area and the onshore discharge location;
			  – The EPC team has been on site visit to explore the logistical possibilities, and no port with industrial capacity to allow for this kind of operations seems to exist in the vicinity of the Mirfa landfall. This means either investing time and money to extend the existing ports, or increasing the sailing distance which also increases the number of barges and tugboats would be needed to keep the project running. As above, this would also imply additional noise, light disturbance (24/7) and other environmental impacts on the Mirfa marine area;
			  – Considering the above, this solution would significantly increase the amount of vessels (barges, tugboats) on site, increase the working area and area of disturbance by continuous movements of vessels between dredging area and onshore disposal area and most likely result in an increased operational time due to the lower productions;
			  – Part of the material needs to be recovered at the disposal area in order to backfill the trench. This means that the same logistic challenges for backfilling would apply as we explained for the dredging activities;

Item	#	EAD Comments / Recommendations	Initial Responses (12th April)
			It should be noted that the EPC team has foreseen for the dredging works to be as efficient possible and minimising the environmental impact on the sensitive areas at the dredge area. As mentioned in our presentation, the rerouting on the nearshore location at Mirfa has strongly reduced the requirement of floating / dredged channels in the southern section. If it were technically feasible to transport the material to shore, it would certainly result in a change in dredging methodology which would no longer be the most efficient and therefore have a larger impact at the dredging area, which has been identified as the most environmentally sensitive area. **Material Quality** In terms of material quality if the material were to be disposed onshore for reuse, the material will not be considered suitable for the following reasons: – The material disposed will be very heterogeneous. It is sourced from a stretch of multiple kilometers, with soil varying from rock to silty sand. As such, we cannot see a specific purpose for the material apart from general fill; – The material is dredged in a marine environment, which means it contains chlorine from the salty water. As such, it is not fit for any purpose where it would come in contact with steel, as the chlorine causes corrosion; – For landfill purposes, the heterogeneity of the material will result in stability/settlement challenges; and – The dewatering of the dredged material might result in a burden on the onshore environment (salt water in non-saline onshore environment). Due to all the above comments, it seems appropriate to keep the material within a maritime environment is the best way to limit a number of significant environmental impacts as bringing it onshore might lead to more environmental issues than benefits. Finally, the selection of the disposal area(s) were selected to reduce impact upon critical and sensitive receptors and as presented in our presentation, whilst it is unlikely that a southern disposal area will be required (as we do not expect floatation / dredging channels in the southern section for the Mirfa area), the HDM study will assess both south and northern disposal area in order for us to present adequate mitigation and monitoring measures to reduce impacts from the disposal areas.

Appendix 6.7 – Anthesis MoM for EAD Meeting on the 13th April 2022

Anthesis

Meeting Agenda

Project	Project Lightning
Project No.	1176 (DPA2104081)
Date	13/04/2022
Time	11.30-12.00
Location	Team Meeting. ID 145 614 730
Subject	Project Lightning – Discussion on EAD Comments on Anthesis Presentation (16/03/22)

Attendees	*Entity Representative*	*Entity Project Role*	*Contact (E-mail / Phone Number)*
Alaa Ahmad Rezeq	EAD	Environmental Authority	arezeq@ead.gov.ae
Khaled Ali Saad Mohamed Al Ameri	EAD	Environmental Authority	Khaled.AlAmeri@ead.gov.ae
David Dulac	EDF	Consortium Member - Project Developers	david.dulac@edf.fr
Leena Abdul-Latif	EDF	Consortium Member - Project Developers	leena.abdul-latif@edf.fr
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Anna Blackwell	Anthesis	Environmental Consultant	Anna.Blackwell@anthesisgroup.com
Greg Ashcroft	WKC	Environmental Marine Expert	Greg.Ashcroft@wkcgroup.com

	Notes	**Action**
1.	Anthesis highlighted that the purpose of the meeting is to enable discussions between EAD, Anthesis and EDF on the EAD comments provided following the presentation by Anthesis on 16th March 2022, specifically in relation to: 1. Concerns relating to impacts upon fringing coral reefs within the nearshore area at Shuweihat; and 2. Concerns relating to dredging requirements and identified disposal areas.	-
2.	Anthesis mentioned that the recent comments received by EAD have been considered as part of the EIA process once details of the construction methodology were received by the EPC. Nevertheless, following discussions with the EPC and the Project developers, those solutions were not found feasible	-

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	Notes	Action
	as presented in detail in our Comment Response Sheet (CRS) issued on the 12th April 2022. Anthesis also confirmed that the re-routing solutions were proposed as part the EIA process in order to avoid direct impacts on sensitive habitats. Ala'a from EAD confirmed their appreciation for changes already made to the Project in order to ensure the facilitation of the Project approval.	
3.	Anthesis started the meeting by summarising the responses provided within the CRS:	-
4.	**<u>EAD Comment A1: HDD Methodology with minor shifting</u>** – Anthesis identified that the use of HDD method has been considered previously but was discounted due to a) construction constraints and b) operation and maintenance constraints; – The instability of the HDD construction method was emphasised for distances greater than 2km, which would apply in this situation in order to extend beyond the limits of the fringing coral reef. Operational risks were also identified with the HDD method including the risk of future impacts in case of cable failure inside the HDD during its lifetime. Resulting maintenance requirements would likely to result in re-impacting the marine environment; – EAD queried if the HDD would not be less than 2km based on satellite imagery. Anthesis mentioned that this will be checked with the EPC as it is unsure to where the closest point of drilling on land can start; – EAD stated that their concerns relating to fringing coral reef impacts are exacerbated by recent coral bleaching events; – Anthesis understood the concern and mentioned that all appropriate mitigation, coral relocation and monitoring would be undertaken to ensure the relocated corals are successful; – EAD clarified that it is really important to look at all possibilities to avoid damages to fringing coral reef impacts. The aim is to avoid fully or as much as possible direct impact upon the corals in the fringing reef location. EAD mentioned that another option to the HDD could be to undertake further survey assessment along the fringing reef to find a possible corridor in the reef where the cables could go through without the need of removing corals. Ala'a showed the Enviroportal critical habitat map in the area where it could be seen that potential gaps exists within the reef. EAD therefore suggest as an alternative to the HDD that the cable route is realigned in between coral growth areas; – Anthesis mentioned that this map are not necessarily accurate and that recent survey efforts by WKC will be analysed to determine the existing conditions and possibilities for rerouting. Discussions will then be held with the Consortium regarding the possibility for rerouting;	EPC to estimate the length of the required HDD Anthesis to review updated survey data for nearshore areas at Shuweihat to determine exact extent of fringing coral reef and explore options for rerouting
5.	**<u>EAD Comment B Construction Overview and Disposal Area</u>** – EAD has expressed his satisfaction about the efforts done to find an alternate cables route on the nearshore of Zakum cluster to minimise the impact on the sensitive areas and consider the alternate route satisfactory. However, EAD reiterated its concerns with utilising the CLB	-

	Notes	Action
	Ulisse within the floatation / dredging channels and expressed concern that the corridor will be wider than 60m and result in wider impacts; – Anthesis and EDF explained that the use of CLB Ulisse is the only viable option due to the characteristics (weight,…) of the cables required to be carried, in addition to the shallow bathymetry within the nearshore areas. In addition, the logistical issues are discussed, including the lack of other vessels with the required capabilities; – Anthesis emphasised on the national importance of the project in providing an alternative source of power to replace existing GTGs and that without using the CLB Ulisse barge in floatation/dredged channels, the Project will not be able to be executed; – Anthesis also reconfirmed that the results of the hydrodynamic modelling will enable the identification for the most appropriate locations for disposal areas offshore; – EAD understood the constraint and mentioned that this will be discussed internally.	
6.	**Next steps** – EAD requested that following completion of marine surveys, results are assessed to enable a calculation of the expected coral loss. Investigations should then be made on possible ways to avoid and minimised impacts upon the fringing coral reef.	HDD & rerouting options to be further explored with the EPC and the Consortium in light of updated habitat maps

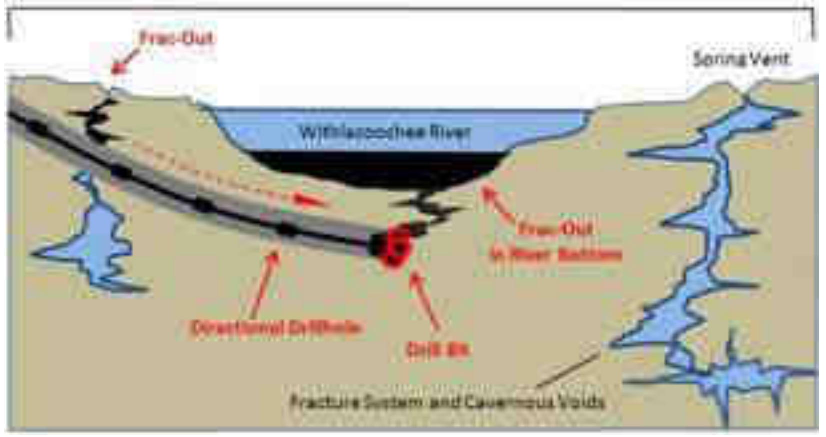
Appendix 6.8 – Anthesis Response to EAD Workshop on the 28th April 2022

Anthesis

PROJECT LIGHTNING – EAD COMMENTS ON ANTHESIS PRESENTATION (25/04/22)

Initial Responses to EAD Comments

28th April 2022

Item	#	EAD Comments / Recommendations	Initial Responses (12th April)	Responses (28th April)
A		**In reference to slide 11 which discuss the Das route at the nearshore area (Shuwiehat PDP) it is believed that the company can avoid the impacts on fringing coral reef by:**	-	-
	1	– Applying HDD method with possibility of minor shifting	EAD concern and comment is well understood, however the HDD method is not considered as feasible for this section of the Project for the following reasons: – <u>Construction constraints:</u> – The HDD would require to be completed for more than 2km and HDDs exceeding 2km are becoming increasingly risky when it comes to collapsing risk or subsoil outburst/spills in underground 'channels'. If this happens, it would be difficult to finish the HDD work and it may need to be restarted as the drill could experience failures and difficult recoveries. If the HDD requires to be restarted, in addition to significant impacts on the Project schedule and cost, this would cause additional impacts on the marine environment as the construction period will significantly increase in the area causing further underwater noise, sedimentation impacts etc. from the HDD activity; – In terms of environmental impacts from HDD, it should be noted that HDD will include a spill of bentonite (drilling mud) when punching out with the drill head (at the end of the HDD section) which will cause sedimentation impacts on the marine environment. The higher the difference between levels on both sides of the HDD, the bigger the spill will be (communicating barrels); – <u>Operation & Maintenance constraints:</u> – In case there is a failure of the cable inside the HDD during its lifetime, a repair will not be possible as the duct will not be replaceable due to corrosion (if steel conduit is used) or grouting, in the case of HDPE. Therefore, a new HDD and a new section of cable inside would be required to perform the repair adding potentially significant environmental impacts to the area during the operation phase. This may take several months to implement a repair as mobilization of a drill rig and conduit would be required. Without such HDD, a repair is easier, as the cable is easier to reach, and only the actual damaged section needs to be accessed instead of replacing the whole HDD section; – The additional burial depth of the cable within an HDD may be thermally limiting in certain portions of the cable, which as a consequence may have an impact on the ability of a cable to carry its rated capacity. If the cable rating cannot be achieved, this will have a long-term impact on the economic performance of the project. As the use of HDD for this Project and this section is not considered feasible, the impacts on the fringing reef cannot be avoided and the ESIA will therefore require the following to be undertaken: – Compensation measures to corals that will be directly impacted: the corals will be relocated near the Project site; – Mitigation measures to corals that will be indirectly impacted from sedimentation impacts: silt screen curtains will be installed near sensitive identified areas following the results of the ESIA marine surveys and modelling study; – Monitoring measures to relocated corals: the relocated corals will be monitored after their relocation to ensure the success of the relocation work; and	In addition to the responses provided on the 12th April, further advice from ADNOC and the EPC on the HDD was received and unfortunately this method remains considered as not feasible for the reasons already mentioned on the 12th April in addition to the following: – <u>Construction constraints:</u> – HDD will start in offshore area and end in intertidal area, creating a very challenging environment for HDD drilling. This combined with the challenging length (>1km) would be pioneering and cannot be considered a proven technology in the industry. As such, this is not considered acceptable as execution methodology for such a critical project; – Considering the long HDD length (>1km), it will be required to sustain a large pressure of the drilling fluid. The larger the pressure, the larger the chance of frac-out of the drilling fluid into the above laying ocean (illustration shown in the below Figure 1). Drilling deeper would mitigate this risk but would increase the ampacity problem; – <u>Operation & Maintenance constraints:</u> – For such long HDD (>1km), the cable will probably be installed at a depth of 10 to 20m deep (to avoid frac-out during drilling process) instead of only 1m deep when installed in a trench. The cable size is expected to change due to installation depth that comes along with this type of installation. The deeper a cable is installed, the more difficult it is for the cable to dissipate its heat and at a certain depth, it is simply not possible anymore to do this.  <u>Figure 1: Illustration of frac-out</u>

Item	#	EAD Comments / Recommendations	Initial Responses (12th April)	Responses (28th April)
			– Monitoring measures near critical and sensitive areas impacted from indirect impact: monitoring of the water quality near the construction activities via on-site sampling monitoring and via the deployment of buoys measuring in real-time water quality parameters (eg. Turbidity).	
	2	– Make more detail investigation of the area and define the location of the gaps among coral reef to make it the selected bath.	– This survey is on-going as part of the ESIA and results will be provided in the coming weeks which will provide sufficient information to confirm the coral locations, species and density.	EAD clarified this comment during our call on the 13th April 2022 (Refer to the MOM in **Appendix 1**) which was to investigate the fringing reef habitat to identify if any natural gaps / corridors are existing. Following the recent marine survey in the area, the fringing habitat map was updated and is presented in **Appendix 2**. Furthermore, initial results of the marine surveys done in the area have been provided and are presented in **Appendix 3**. Overall, the initial results indicate that the fringing reef is an old reef developed by coral species several years back. Nevertheless, massive mortality has occurred within the corals and whilst the cause of mortality cannot be determined, it might be associated with coral bleaching. The survey also shown that some young coral colonies were forming but were sparse in its density and distribution. The age of these young coral colonies found are estimated to be 2-3 years old. Coral Reef as described in EAD classification (11000) *''Areas characterized by a substrate or environment setting largely constructed by the reef building activities of corals and associated organism''*, therefore the study area is still considered as critical habitat. As a result, and following EAD comment, a number of options have been further studied between all parties and are detailed in the below paragraphs. **Option 1 – Cables placed within natural fringing reef gaps** As illustrated in the figure, potential 'options' of corridors were identified by the environmental consultants (Anthesis & WKC) and submitted to the EPC to identify the feasibility of these options. It should be noted that the options all presented generally small gaps ranging for a minimum of 17m width to 50m width. This option was analysed by the EPC and found as not viable technically for a number of reasons which are details in the below paragraphs. The EPC anticipates to float-out the cable from the cable lay vessel Isaac Newton towards the mainland. In this method, the stand-off position of the vessel would be around 2.5km before the shoreline. The cable is over boarded by pulling it over the chute by a winch that is positioned onshore. The cable is provided with buoys to make it float. Then the buoys are removed and the cable is sunk into its trench. See below example pictures with the cable floating (left) and submerged in its trench (right).  Figure 2: Examples of shore approaches by float-out method This method does not require a cable lay vessel or cable lay barge to go through the shallow area to lay the actual cable, and as a result avoids the dredging of a floatation channel through the fringing reef. Avoiding this remain the main objective as dredging such floatation / dredged channel would have much more significant impacts than the

Item	#	EAD Comments / Recommendations	Initial Responses (12th April)	Responses (28th April)
				trenches of the cables alone. Nevertheless, this method also has his limitations which are the following: – Floating length must be limited to avoid high pulling tensions and weather/current impacts increasing the risk to the product during this already critical operation; – Since current cable design does not allow for high cable tensions, any increase in pull in lengths may result in cable design changes resulting in significant project impacts; and – The methodology can only be operated during very good weather windows. A longer cable floating length also implies a longer required good weather windows. Therefore, in order to avoid having to use a floatation channel for a cable lay barge (such as with Al Ghallan / Zakum Route), it is unfortunately not possible to lay the cable in between patches of the reef from an operational point of view. Furthermore, many of the proposed optional routes would exceed the maximum length of 3km for the floating of the cable as the cable lay vessel's draught does not allow it to position more to the south-west of the current cable route. Finally, the optional landing points will need to join back to the onshore project location. Some of these options exceed the limits for cable installation/operation and convertor station parameters design. It is therefore not possible to have cables up to this length. **Option 2 – Re-routing to the south of Shuweihat** This option has been analysed which is to re-route the cables further in the south where (as per EAD map) there is a 500m gap within the fringing reef – refer to **Appendix 3** for illustration. However, this re-routing would include an addition of approximately 11.2km (+1.5km offshore and 12km onshore). For the reasons mentioned below, this option is not feasible nor considered as a good environmental alternative for the following reasons: 1- Technically not feasible: this option exceeds the limits for cable installation/operation and convertor station parameters design. It is therefore not possible to have cables up to this length; 2- Environmentally not recommended: if technically this option was feasible, this would have caused additional environmental impacts in undisturbed areas as the detour will add an extra 11.2km of route (+1.5km of impacts in the offshore area and +12km on the onshore area). Whilst the route would not crossed onto the fringing reef with this option, it is expected that the proposed route located near the Mugharraq Port Limits and Shuweihat Power Complex is generally more disturbed by the nearby port activities rather than the 9km south route option where habitats are most likely thriving as shown by the large patch of seagrass in the EAD map as illustrated in **Appendix 4**. **Option 3 – Re-routing to the north of Shuweihat** The environmental consultant queried also about options further in the north to the Project as illustrated in **Appendix 5.** ADNOC confirmed that these options are not viable as the cables are required to be outside Mugharraq Port limits and anchoring areas. Additionally, the EPC mentioned the following expected construction constraints: – Landing approach is between the Shuweihat Power Plant water intake and outfall and therefore the buried cables will require to cross the connection between intake and outfall; – The subsea and onshore cables arrive in developed/industrial area and therefore the chance on obstructions and existing utilities is much larger than on contractual landing area.

Item	#	EAD Comments / Recommendations	Initial Responses (12th April)	Responses (28th April)
				<u>Option 4 – No re-routing but reduction of the construction footprint area</u> None of the re-routing options were found viable for a number of reasons listed above. Therefore, the current route remain the only feasible alignment. Nevertheless, it should be noted that two new hybrid options are being explored but will require further investigations from the EPC – including EPC site survey data and therefore cannot be integrated in the EIA and will need to be presented – if viable – in the Project CEMP. These potential options (if feasible) include: – Lay cables directly on top of the fringing reef – Minimise the indirect impacts of the cable construction by concentrating the construction footprint to its minimum **<u>a – Cable Laying on top of the fringing reef</u>** This option is highly likely to not be feasible but will be investigated by the EPC and environmental consultants in the coming months. Due to the Project schedule constraint and if this solution is found viable, it will be presented in the CEMP as a positive alternative methodology to minimise impacts on the fringing reef. However please note that this option also carries significant technical and environmental constraints which are as follows: – The stability of the cable and fibre are expected to be an issue. Even with cast iron shelves, the cables will be very exposed since the fringing reef will create an increase in water flow and the cable cannot settles in the seabed; – Installation of mattresses is not easy in very shallow areas and stability needs to be checked as well. The mattresses can be positioned close to the fringing reef area but there will be a need to use a low draft vessel to install the mattress or work with a barge on spuds or anchors which can then again cause more harm to the corals and other critical or sensitive areas; – ADNOC specifications are very strict towards cable stability and the location is after the wave break zone so there is a large impact on the cable. If a rock berm is installed in this location, the rockberm would be very large; – There would be higher risk for the cable to be damaged by boats due to the shallow areas as a small vessel can easily hit the stabilised / unburied cable on top of the fringing reef area; – This option will also damage the existing fringing reef and therefore a long-term operational impact will remain in the cable area; and – It should be noted that the cable will be dynamic when not fully stabilised. As such this movements can also damage the existing fringing reef; and – The structure on the cables will be large and overall significant which will impact on the landscape and visual amenity in the area. **<u>b – Construction footprint to be localised</u>** The current planned construction cross section of the three cables is illustrated in the below image. For each construction footprint area required per cable (approx. 33m width), a 50m width buffer is required as per ADNOC specifications on this Project.  This option is therefore to identify if the 50m gap can be reduced as shown in the below image.

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				 It is clear that the reducing this 50m gap will not reduce the direct impacts on the fringing reef however this would localise the impact further to an area and therefore reduce indirect impacts on the fringing reef during the construction phase. This solution needs to further be explored as a number of technical constraints have been highlighted by ADNOC and the EPC. It should also be noted that the 33m width required by trenches has been also studied to find a reduction of the construction footprint, however, due to the methodology required for this shallow area, reduction would be limited to a couple meters and this would be depending on the site conditions. **Conclusion** Therefore, no feasible options avoiding the fringing reef in its entirety has been identified from all parties. However, the following is noted: – Based on the initial results of the survey done in the Project site area, the estimation of coral loss is expected to be considered relatively minimal due to the high coral mortality that occurred in the area. The estimation will be provided in our EIA. Additionally, as mentioned in our initial responses, appropriate mitigation, compensation and monitoring measures will be presented in the EIA to ensure reduction of impacts to its minimum and to ensure detailed, tailored and successful compensation and monitoring plans. In regard to compensation measures, the EIA will include the requirement of the installation of coral balls and relocation of live corals to ensure the repropagation of the corals in a suitable identified area. Ultimately with the proposed compensation measures, it will be expected that a net gain of corals will be provided as the compensation would be over and above loss; – Finally, whilst this cannot be explored at the EIA stage, the options 4a (Cable Laying on top of the fringing reef) and 4b (Construction footprint to be localised) are being checked by all parties and if viable, these options will be implemented as an alternative to the current project methodology. Due to scheduling constraints, these best-case scenario solutions will therefore be presented and included in the EPC CEMP if found viable / feasible; and – As mentioned in our initial responses, appropriate mitigation, compensation and monitoring measures will be presented in the EIA to ensure reduction of impacts to its minimum and to ensure detailed, tailored and successful compensation and monitoring plans.
B	**Construction Overview and Disposal Area:**		-	
	1	– The required dredging for the project is massive comparing to the direct footprint especially when we include the sloped sides. This cannot be approved and the project footprint must be limited to the cable itself.	EAD concern and comment is well understood. However as previously discussed, the floating / dredging channels are required due to the shallow bathymetry in the Mirfa area and for the work required. The cable installer has selected the Cable Lay Barge (CLB) Ulisse to achieve the projects technical and economic requirements. It should be noted that the CLB Ulisse has been selected for the sole purpose of its very shallow draft compared to normal ocean-going cable lay vessels, in order to limit the requirements of floating / dredging channels. A summary of all the reasons that this barge was selected by the EPC are as follows: – During the tender process, it became clear that Prysmian Powerlink (the cable supplier) was the only possible OEM to provide the HVDC cables for the Zakum	No additional comment were added as no other options or solutions are found viable for this location.

Item	#	EAD Comments / Recommendations	Initial Responses (12th April)	Responses (28th April)

			Cluster (Al Ghallan Area) due to availability to produce these cables within the required project timeframe. However, it was Prysmian's condition to also lay the cable themselves with their vessels CLV Leonardo da Vinci and CLB Ulisse. Therefore, the use of CLB Ulisse has been unavoidable to execute these works from the very beginning. However, as CLB Ulisse is ideally suited for this operation as described below, it has been more of an advantage than a disadvantage;
			– Installation of the Zakum Cluster (Al Ghallan Area) cables is an exceptionally complex technical operation: each of the two cables bundles are actually a bundle of three cables each: two power cables and one fibre optic cable. This means that:
			  – The barge will have to carry all three cables at the same time resulting in a lot of weight and space required on the barge;
			  – The barge will have to install all three cables at the same time, requiring two carrousels for the power cable, a reel for the FOC and a bundling installation on board. This requires even more weight and space.
			CLB Ulisse is therefore the most technically suited to provide just enough space for the operations above while still maintaining limited draught. Smaller barges are simply not able to install these three cables while bundling them on board;
			– Because of the complexity of installing this bundled cable and need for modification to the CLB Ulisse, Prysmian has already been preparing this conversion for a year at this point.
			– Operations with CLB Ulisse are already foreseen to make maximum use of tidal windows. On shallow areas, Ulisse will not be able to work during low tide and will wait for higher tide. As a result, the floatation channels have been designed for this method of operation and have been made as shallow as possible, reducing the amount of dredged material at the floatation channel(s).
			
			To summarise, the EPC is technically not able to replace the CLB Ulisse for this Project as the barge is ideally suited for this operation. Please note that the purpose of the Project is to provide an alternative source of power for offshore facilities, which will replace the existing GTG power sources with electricity generated on the mainland, which will include renewable sources, thereby ensuring that operational carbon emissions are reduced and that future operational demand requirements can be met. This Project is expected to result in both economic and sustainability benefits to Abu Dhabi Emirate in terms of oil and gas activities and capabilities through reducing energy demands and associated maintenance costs, in addition to reducing the existing carbon footprint associated with the electrical power requirements for offshore activities. These objectives strongly align with the demonstrable and ongoing efforts made towards climate change and carbon footprint reduction described above. Therefore, without the Project, this will directly impact on the Emirate GHG reduction objectives.	

	2	– No offshore disposal, all disposal areas mut be onshore especially the project is in proximity of the land. Even if offshore disposal area going to be approved but an HDM study must be provided to make sure no impacts on the Marawah Protected area and the critical habitat in the region	EAD concern and comment is well understood, however onshore disposal has a number of constraints that make this solution not feasible. This is detailed below. **Onshore Techniques** There are two ways to transport material from one location to the next: hydraulic or mechanical. Both have significant downsides for this particular case. – Hydraulic Transportation: With the current foreseen equipment (Backhoe Dredgers (BHD)), hydraulic transport by pumping the material from one location to the next is not possible. This means that the dredging of the floatation channel would have to change from mechanical to hydraulic as well (e.g. Cutter Suction Dredger (CSD)). This in turn has the following downsides: – A CSD with sufficient power to break the rock, has a larger draught than the currently scheduled BHD's and even larger than the CLB. Therefore, the floatation channels would have to be wider and deeper resulting in more material to be dredged *(refer to our response to Comment A1 above)*;	No additional comment were added as no other options or solutions are found viable for this location.

Item	#	EAD Comments / Recommendations	Initial Responses (12th April)	Responses (28th April)
			– The dredged material would then need to be pumped ashore. Even the most powerful CSD in the world cannot pump the material over a distance of 15 km. This means additional booster pumps (with pontoons, anchors, generators, logistics) will have to be installed every 4-5km (on the water) over the whole trajectory. There is simply not enough pipeline available to pump the material over such a distance. This means additional pipelines would have to be fabricated which will impact on the Project overall feasibility; – Hydraulic transport of dredged material over large distances can only be done at low densities. This means that a lot of water needs to be mixed with the soil and as such will be discharged to shore location. As a result of the fine material dissolving in this water during hydraulic transport, huge settlement ponds would be required to allow the fines to settle before returning the water to the ocean. This would result in a large and significant disturbance of onshore land and terrestrial habitats. – Mechanical Transportation: With a BHD, hydraulic transport per pipeline is not possible. The only possibility to get the material onshore would be to discharge it onto a flat top barge, bring the barge to a port and discharge it there. This is technically feasible but would lead to the following operational issues: – The long sailing distance to shore (>15km) means that a fleet of multiple barges and assisting tugs would be needed to allow for continuous operations. The exact number will depend on size of the available barges and sailing distance. Besides this, a discharge facility for those barges needs to run continuously on the shore (i.e. wheel loaders driving on the barges and discharging the material into trucks). Not having continuous operations will endanger the project feasibility but this would also imply additional noise, light disturbance (24/7) and other environmental impacts on the Mirfa marine area and the onshore discharge location; – The EPC team has been on site visit to explore the logistical possibilities, and no port with industrial capacity to allow for this kind of operations seems to exist in the vicinity of the Mirfa landfall. This means either investing time and money to extend the existing ports, or increasing the sailing distance which also increases the number of barges and tugboats would be needed to keep the project running. As above, this would also imply additional noise, light disturbance (24/7) and other environmental impacts on the Mirfa marine area; – Considering the above, this solution would significantly increase the amount of vessels (barges, tugboats) on site, increase the working area and area of disturbance by continuous movements of vessels between dredging area and onshore disposal area and most likely result in an increased operational time due to the lower productions; – Part of the material needs to be recovered at the disposal area in order to backfill the trench. This means that the same logistic challenges for backfilling would apply as we explained for the dredging activities; It should be noted that the EPC team has foreseen for the dredging works to be as efficient possible and minimising the environmental impact on the sensitive areas at the dredge area. As mentioned in our presentation, the rerouting on the nearshore location at Mirfa has strongly reduced the requirement of floating / dredged channels in the southern section. If it were technically feasible to transport the material to shore, it would certainly result in a change in dredging methodology which would no longer be the most efficient and therefore have a larger impact at the dredging area, which has been identified as the most environmentally sensitive area. **Material Quality** In terms of material quality if the material were to be disposed onshore for reuse, the material will not be considered suitable for the following reasons: – The material disposed will be very heterogeneous. It is sourced from a stretch of multiple kilometers, with soil varying from rock to silty sand. As such, we cannot see a specific purpose for the material apart from general fill;	

Item	#	EAD Comments / Recommendations	Initial Responses (12th April)	Responses (28th April)
			– The material is dredged in a marine environment, which means it contains chlorine from the salty water. As such, it is not fit for any purpose where it would come in contact with steel, as the chlorine causes corrosion; – For landfill purposes, the heterogeneity of the material will result in stability/settlement challenges; and – The dewatering of the dredged material might result in a burden on the onshore environment (salt water in non-saline onshore environment). Due to all the above comments, it seems appropriate to keep the material within a maritime environment is the best way to limit a number of significant environmental impacts as bringing it onshore might lead to more environmental issues than benefits. Finally, the selection of the disposal area(s) were selected to reduce impact upon critical and sensitive receptors and as presented in our presentation, whilst it is unlikely that a southern disposal area will be required (as we do not expect floatation / dredging channels in the southern section for the Mirfa area), the HDM study will assess both south and northern disposal area in order for us to present adequate mitigation and monitoring measures to reduce impacts from the disposal areas.	

APPENDIX 1 – MINUTE OF MEETING 14TH APRIL 2022

Anthesis

Meeting Agenda

Project	Project Lightning
Project No.	1176 (DPA2104081)
Date	13/04/2022
Time	11.30-12.00
Location	Team Meeting. ID 145 614 730
Subject	Project Lightning – Discussion on EAD Comments on Anthesis Presentation (16/03/22)

Attendees	*Entity Representative*	*Entity Project Role*	*Contact (E-mail / Phone Number)*
Alaa Ahmad Rezeq	EAD	Environmental Authority	arezeq@ead.gov.ae
Khaled Ali Saad Mohamed Al Ameri	EAD	Environmental Authority	Khaled.AlAmeri@ead.gov.ae
David Dulac	EDF	Consortium Member - Project Developers	david.dulac@edf.fr
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Simon Pickup	Anthesis	Environmental Consultant	Simon.Pickup@anthesisgroup.com
Apolline Boudier	Anthesis	Environmental Consultant	Apolline.Boudier@anthesisgroup.com
Anna Blackwell	Anthesis	Environmental Consultant	Anna.Blackwell@anthesisgroup.com
Greg Ashcroft	WKC	Environmental Marine Expert	Greg.Ashcroft@wkcgroup.com

	Notes	**Action**
1.	Anthesis highlighted that the purpose of the meeting is to enable discussions between EAD, Anthesis and EDF on the EAD comments provided following the presentation by Anthesis on 16th March 2022, specifically in relation to: 1. Concerns relating to impacts upon fringing coral reefs within the nearshore area at Shuweihat; and 2. Concerns relating to dredging requirements and identified disposal areas.	-
2.	Anthesis mentioned that the recent comments received by EAD have been considered as part of the EIA process once details of the construction methodology were received by the EPC. Nevertheless, following discussions with the EPC and the Project developers, those solutions were not found feasible	-

	Notes	Action
	as presented in detail in our Comment Response Sheet (CRS) issued on the 12th April 2022. Anthesis also confirmed that the re-routing solutions were proposed as part the EIA process in order to avoid direct impacts on sensitive habitats. Ala'a from EAD confirmed their appreciation for changes already made to the Project in order to ensure the facilitation of the Project approval.	
3.	Anthesis started the meeting by summarising the responses provided within the CRS:	-
4.	**<u>EAD Comment A1: HDD Methodology with minor shifting</u>** – Anthesis identified that the use of HDD method has been considered previously but was discounted due to a) construction constraints and b) operation and maintenance constraints; – The instability of the HDD construction method was emphasised for distances greater than 2km, which would apply in this situation in order to extend beyond the limits of the fringing coral reef. Operational risks were also identified with the HDD method including the risk of future impacts in case of cable failure inside the HDD during its lifetime. Resulting maintenance requirements would likely to result in re-impacting the marine environment; – EAD queried if the HDD would not be less than 2km based on satellite imagery. Anthesis mentioned that this will be checked with the EPC as it is unsure to where the closest point of drilling on land can start; – EAD stated that their concerns relating to fringing coral reef impacts are exacerbated by recent coral bleaching events; – Anthesis understood the concern and mentioned that all appropriate mitigation, coral relocation and monitoring would be undertaken to ensure the relocated corals are successful; – EAD clarified that it is really important to look at all possibilities to avoid damages to fringing coral reef impacts. The aim is to avoid fully or as much as possible direct impact upon the corals in the fringing reef location. EAD mentioned that another option to the HDD could be to undertake further survey assessment along the fringing reef to find a possible corridor in the reef where the cables could go through without the need of removing corals. Ala'a showed the Enviroportal critical habitat map in the area where it could be seen that potential gaps exists within the reef. EAD therefore suggest as an alternative to the HDD that the cable route is realigned in between coral growth areas; – Anthesis mentioned that this map are not necessarily accurate and that recent survey efforts by WKC will be analysed to determine the existing conditions and possibilities for rerouting. Discussions will then be held with the Consortium regarding the possibility for rerouting;	EPC to estimate the length of the required HDD Anthesis to review updated survey data for nearshore areas at Shuweihat to determine exact extent of fringing coral reef and explore options for rerouting
5.	**<u>EAD Comment B Construction Overview and Disposal Area</u>** – EAD has expressed his satisfaction about the efforts done to find an alternate cables route on the nearshore of Zakum cluster to minimise the impact on the sensitive areas and consider the alternate route satisfactory. However, EAD reiterated its concerns with utilising the CLB	-

	Notes	Action
	Ulisse within the floatation / dredging channels and expressed concern that the corridor will be wider than 60m and result in wider impacts; – Anthesis and EDF explained that the use of CLB Ulisse is the only viable option due to the characteristics (weight,…) of the cables required to be carried, in addition to the shallow bathymetry within the nearshore areas. In addition, the logistical issues are discussed, including the lack of other vessels with the required capabilities; – Anthesis emphasised on the national importance of the project in providing an alternative source of power to replace existing GTGs and that without using the CLB Ulisse barge in floatation/dredged channels, the Project will not be able to be executed; – Anthesis also reconfirmed that the results of the hydrodynamic modelling will enable the identification for the most appropriate locations for disposal areas offshore; – EAD understood the constraint and mentioned that this will be discussed internally.	
6.	**Next steps** – EAD requested that following completion of marine surveys, results are assessed to enable a calculation of the expected coral loss. Investigations should then be made on possible ways to avoid and minimised impacts upon the fringing coral reef.	HDD & rerouting options to be further explored with the EPC and the Consortium in light of updated habitat maps


Project Lightning
Route 2 Landfall Cable Reroute Options
WKC
Legend
Reef Extent
Landfall
Reroute Options
Option 1
Option 2
Option 3
Option 4
N
0
500
1000 m
Project Code: J21071
Drawn by: MAB
Date: 13/04/22
CRS: WGS84 / UTM Zone 39N

APPENDIX 3 – INITIAL MARINE SURVEY RESULTS ON THE FRINGING REEF

23rd April 2022

Initial Observations from WKC Survey on the nearshore areas

Fringing Reef (1100)

The condition of the fringing reef at Shuweihat landfall site where project lightening cable layout route is proposed is an old reef developed by coral species several years back. At the time of the survey and the survey methods employed (DDV) the reef condition is not a functional coral reef. Majority of the area is considered dead and reef structures are covered with turf algae, sediments and macro algae such as Padina sp. and Ulva species (common species). Most of the reef structure is still intact which is utilized by several reef associated species like Hamour, Ehrenberg's snapper, Arabian Yellow Bar Angelfish etc. Along the DDV transect, there were young coral colonies forming but where sparse in its density and distribution. The age of these young coral colonies found are estimated to be 2-3 years old. There were no massive living corals seen though out the transect along the proposed cable route.

The cause of massive mortality on this reef is not determined by this study but it might be associated with coral bleaching. The reef is located on the shallow coastal areas where it is susceptible to high temperature stress.

The fringing reef still maintains its structure and continue to provide a hard substrate to opportunistic marine flora and fauna. It was observed that molluscan bivalves colonize several reef head along with ascidians such as tunicates (common species). The Reef structure still provides refuge and feeding ground to fishes species both demersal reef dwelling and semi pelagic species. Macro algae was seen to be the most dominant biological group that colonized the reef.

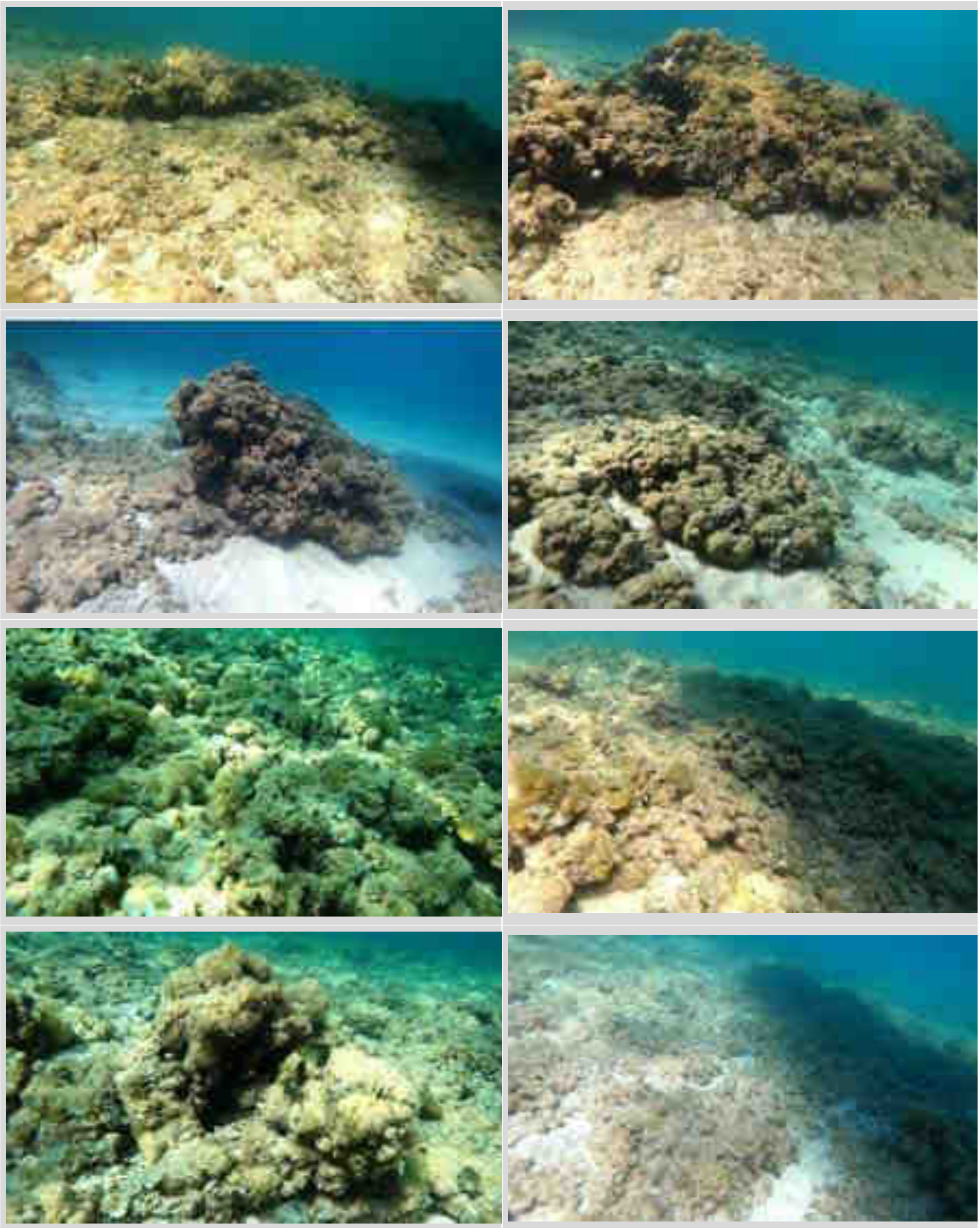
It is also to be considered that, as there are signs of coral recovery, this could be a period where the reef is undergoing process of succession for coral recolonization. But this present reef condition will also indicate that the coral colonies growing could be last few corals in a trend of coral reef health decline.

Coral Reef as described in EAD classification (11000) '' Areas characterized by a substrate or environment setting largely constructed by the reef building activities of corals and associated organism'', therefore the study area is still considered as critical habitat.

Photographs of the fringing reef are presented in the below pages.

Fringing Reef Profile at Shuweihat Landfall

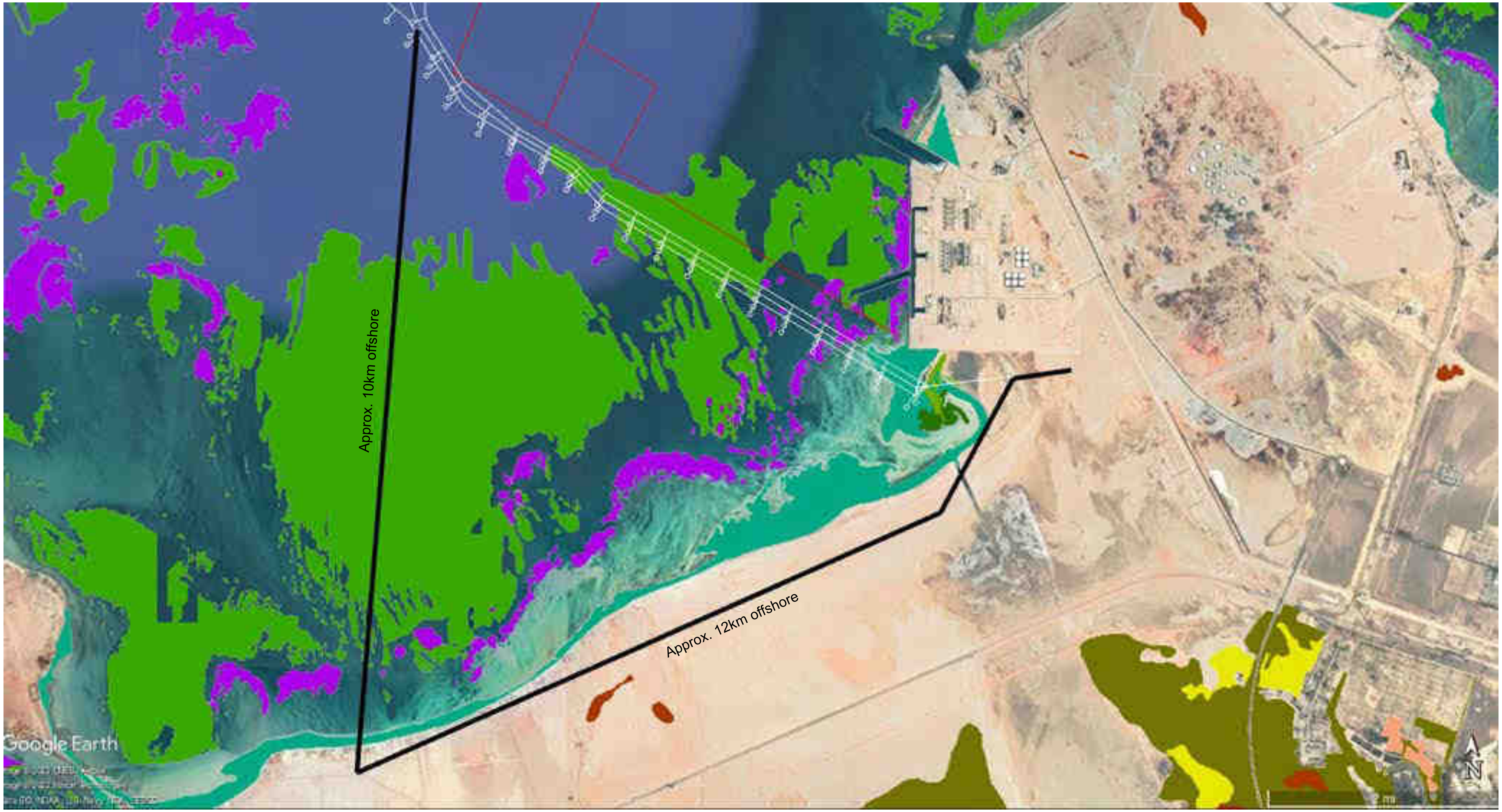
Fringing Reef Condition at Shuweifat Landfall Site



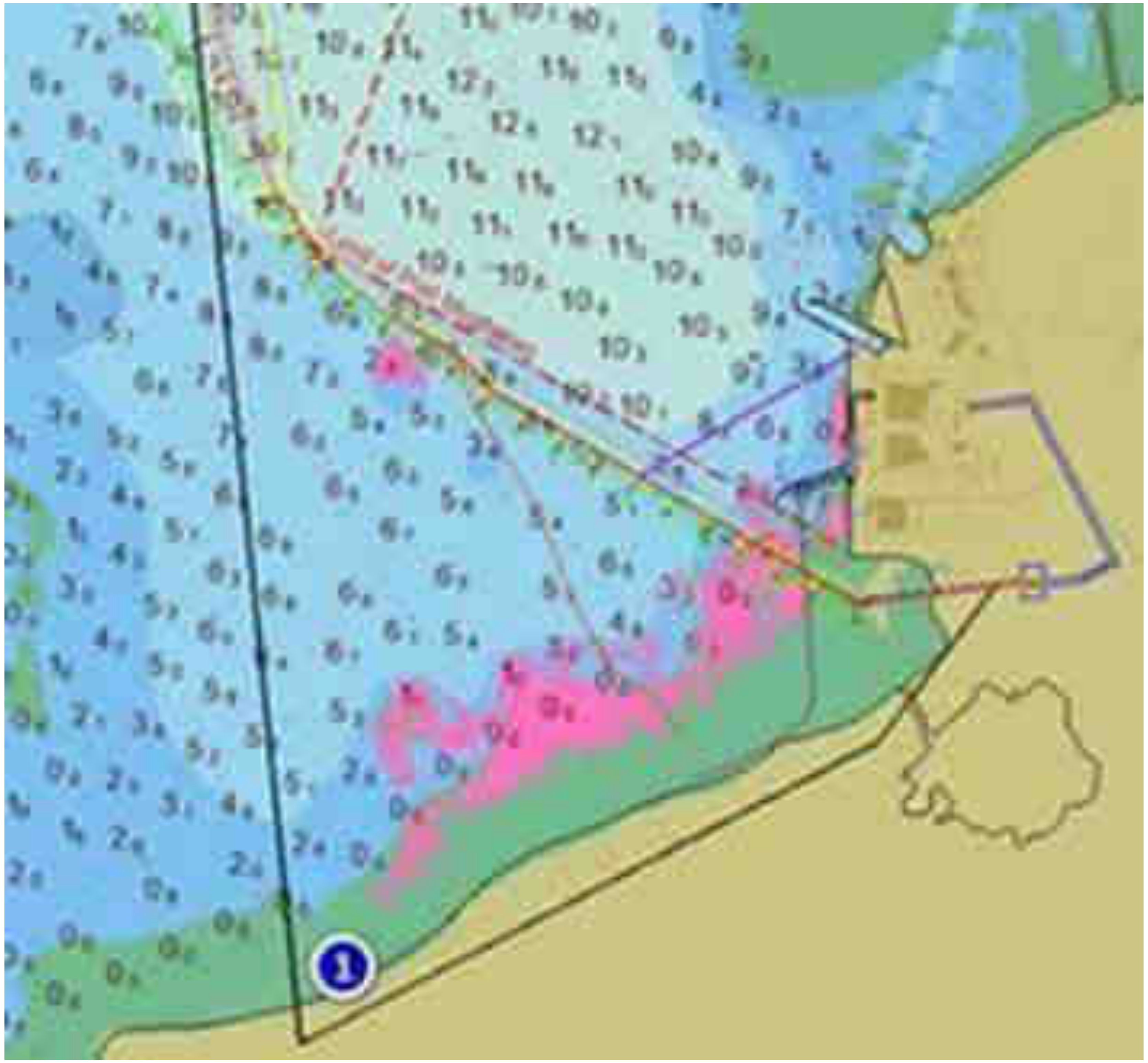
Conditions at the Outer border of the Fringing Reef

Coral Rubble (*Acropora sp.*)

APPENDIX 4 – PROPOSED ROUTE OPTION IN THE SOUTHERN AREA

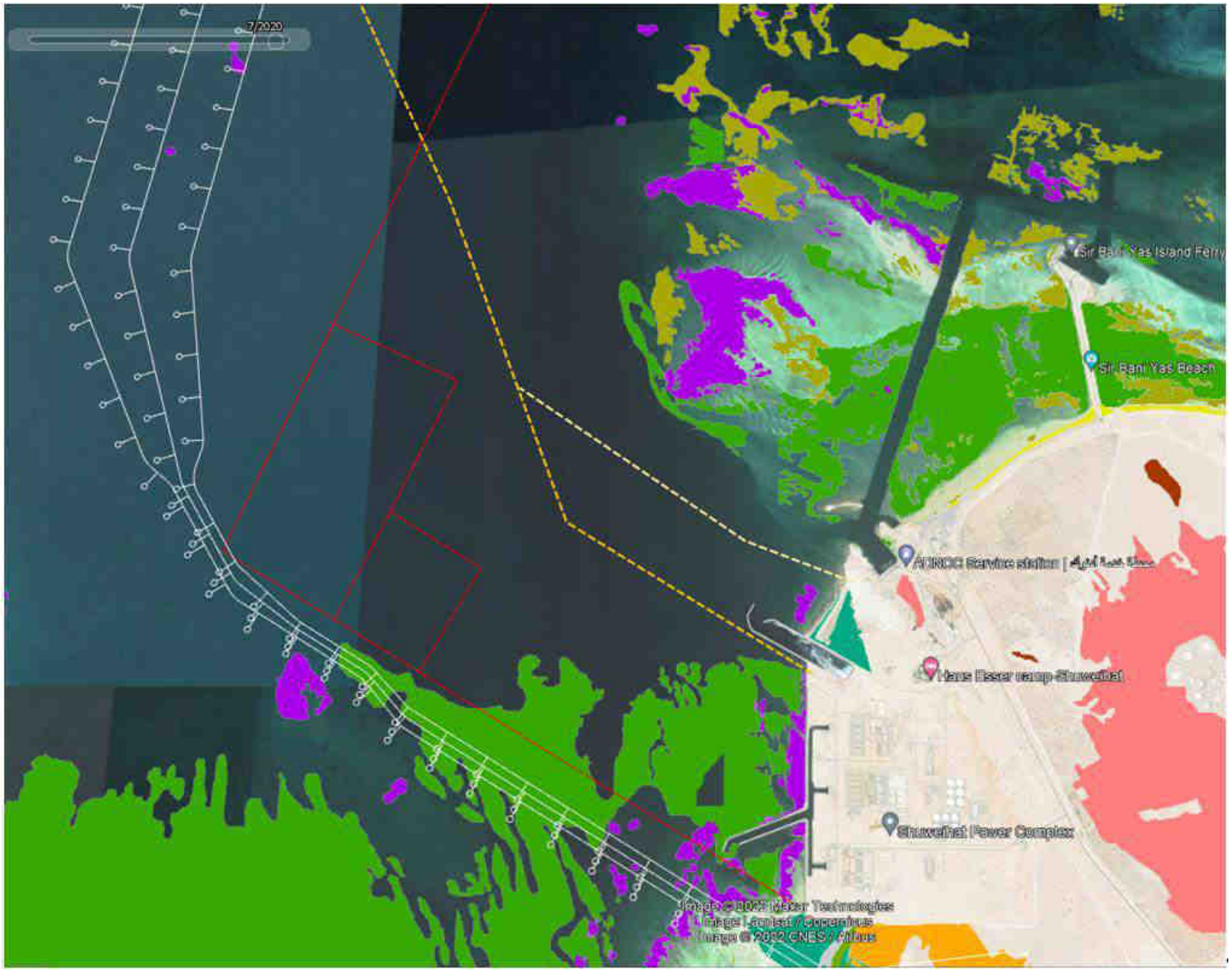


Proposed southern reroute option (black line) in relation to sensitive and critical habitats extracted from EAD enviroportal data

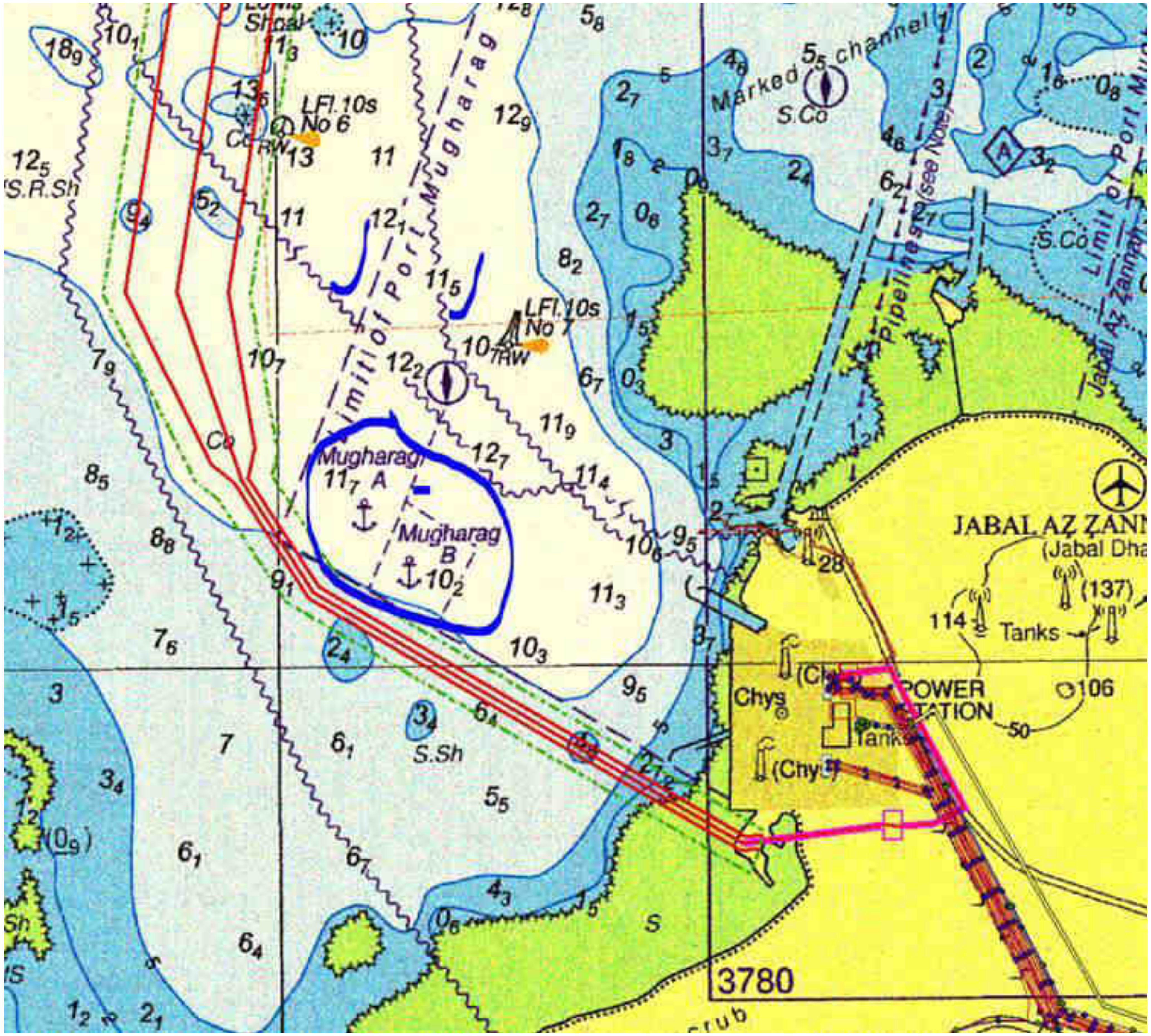


Proposed southern reroute option (black line) in relation to depth and identified coral patch (pink area) as per WKC recent survey (refer to Appendix 2)

APPENDIX 5 – PROPOSED ROUTE OPTIONS IN THE NORTHERN AREA AND MUGHARRAQ PORT LIMITS



Proposed Project and options (yellow lines) falling into Mugharraq Port Limits and anchoring areas in relation to sensitive and critical habitats extracted from EAD enviroportal data



Location of the Project and Mugharraq Port Limits and anchoring areas

Anthesis

Appendix 6.9 – DCT Email Correspondence

Anthesis

Apolline Boudier

From:	Richard Thorburn Howard Cuttler <RCuttler@dctabudhabi.ae>
Sent:	Wednesday, March 23, 2022 12:59 PM
To:	Anna Blackwell
Cc:	Mark Jonathan Beech; Tariq Yousif Alhammadi; Apolline Boudier
Subject:	Request for Archaeological/Cultural Heritage Information - Project Lightning
Attachments:	PL Offshore route.JPG; Mirfa Onshore.JPG; Shuweihat Onshore.JPG

Dear Anna,

Many thanks for send the footprint of the proposed project. I have attached and images for Shuweihat and Mirfa onshore developments that show the nearest known areas of cultural heritage on land. Within the marine areas the route does intersect with some known 'Obstructions' (shown as green dots) but we are not clear what these are. The route also navigates through some former pearl diving areas where there are likely to be more in terms of shipwrecks etc.

We would like to understand more about cultural heritage within the marine environment. To do this we need to review the geophysical/geotechnical data captured for the project. This includes sidescan sonar, multibeam bathymetry and sub-bottom profiles. Would it please be possible to forward copies of the relevant geophysical data to us for review?

In the meantime the project needs a No Objection Certificate that covers both the onshore and offshore proposals. This can be applied for through the DMT planning portal and provides government entities with the opportunity to respond. In particular the EAD should have the opportunity to respond as they have a cultured pearl farm located at 24.104277° 53.467228° and the route is aligned through the Marawah Biosphere Reserve.

I have attached a link to the NOC website below.

https://www.dmt.gov.ae/en/adm

Please get back to me if you want to clarify any of the above.

Kind regards,

Richard

ريتشارد ثوربرن كاتلر

Richard Thorburn Howard Cuttler

آثاري

إدارة البيئة التاريخية

Archaeologist

Historic Environment Department

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D : +971 2 599 5828 |

M : +971 50 236 7659

From: Anna Blackwell <Anna.Blackwell@anthesisgroup.com>
Sent: Wednesday, March 23, 2022 9:20 AM
To: Richard Thorburn Howard Cuttler <RCuttler@dctabudhabi.ae>
Cc: Mark Jonathan Beech <mark.beech@dctabudhabi.ae>; Tariq Yousif Alhammadi <THammadi@dctabudhabi.ae>; Noura Hamad Al Hameli <NHAlhameli@dctabudhabi.ae>; Apolline Boudier <Apolline.Boudier@anthesisgroup.com>
Subject: RE: Request for Archaeological/Cultural Heritage Information - Project Lightning

Dear Richard,

Apologies for this oversight, I have attached a KML file showing both offshore routes.

Many thanks,
Anna

Anna Blackwell
Environmental Consultant – Middle East
+971 52 748 1060
Dubai, United Arab Emirates, PO Box 392563

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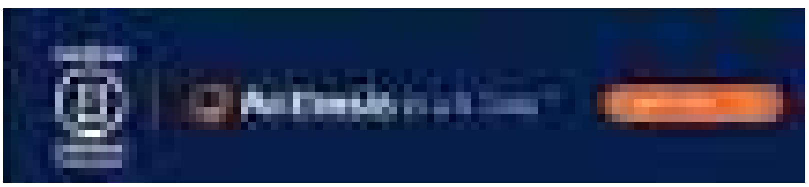
anthesisgroup.com



From: Richard Thorburn Howard Cuttler <RCuttler@dctabudhabi.ae>
Sent: Tuesday, March 22, 2022 2:26 PM
To: Anna Blackwell <Anna.Blackwell@anthesisgroup.com>
Cc: Mark Jonathan Beech <mark.beech@dctabudhabi.ae>; Tariq Yousif Alhammadi <THammadi@dctabudhabi.ae>; Noura Hamad Al Hameli <NHAlhameli@dctabudhabi.ae>; Apolline Boudier <Apolline.Boudier@anthesisgroup.com>
Subject: RE: Request for Archaeological/Cultural Heritage Information - Project Lightning

Dear Anna,

Thanks for this. The two files show the onshore cable routes for facilities at Shuweihat and Mirfa. Do you have the KML or shp files for the offshore routes?

Kind regards,

Richard

ريتشارد ثوربرن كاتلر
Richard Thorburn Howard Cuttler
آثاري
إدارة البيئة التاريخية
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From: Anna Blackwell <Anna.Blackwell@anthesisgroup.com>
Sent: Tuesday, March 22, 2022 1:47 PM
To: Richard Thorburn Howard Cuttler <RCuttler@dctabudhabi.ae>
Cc: Mark Jonathan Beech <mark.beech@dctabudhabi.ae>; Tariq Yousif Alhammadi <THammadi@dctabudhabi.ae>; Noura Hamad Al Hameli <NHAlhameli@dctabudhabi.ae>; Apolline Boudier <Apolline.Boudier@anthesisgroup.com>
Subject: RE: Request for Archaeological/Cultural Heritage Information - Project Lightning

Dear Richard,

Many thanks for your email and apologies for the issues with the files I sent. We are using QGIS so perhaps it is easier to send as KMLs (attached).

I hope these are suitable.

Kind regards,
Anna

Anthesis

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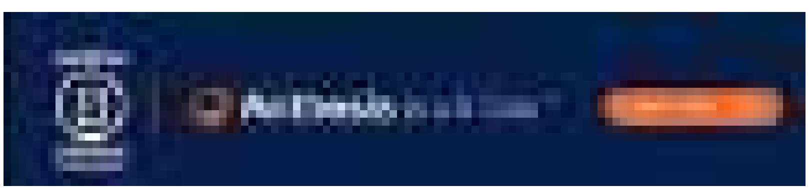
+971 52 748 1060
Dubai, United Arab Emirates, PO Box 392563



From: Richard Thorburn Howard Cuttler <RCuttler@dctabudhabi.ae>
Sent: Tuesday, March 22, 2022 11:54 AM
To: Anna Blackwell <Anna.Blackwell@anthesisgroup.com>
Cc: Mark Jonathan Beech <mark.beech@dctabudhabi.ae>; Tariq Yousif Alhammadi <THammadi@dctabudhabi.ae>; Noura Hamad Al Hameli <NHAlhameli@dctabudhabi.ae>; Apolline Boudier <Apolline.Boudier@anthesisgroup.com>
Subject: Request for Archaeological/Cultural Heritage Information - Project Lightning

Dear Anna,

Many thanks for your email.

At the moment I cannot open the files you have sent either in AutoCAD or in ArcGIS. As these are compiled shapefiles, would it be possible to zip the original shapefiles and send them to us?

Kind regards,

Richard

ريتشارد ثوربرن كاتلر

Richard Thorburn Howard Cuttler

آثاري

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From: Anna Blackwell <Anna.Blackwell@anthesisgroup.com>
Date: Friday, March 18, 2022 at 2:43 PM
To: Mark Jonathan Beech <mark.beech@dctabudhabi.ae>
Cc: Apolline Boudier <Apolline.Boudier@anthesisgroup.com>
Subject: Request for Archaeological/Cultural Heritage Information - Project Lightning

Dear Mark,

Many thanks for your time on the phone earlier today. As I mentioned, Anthesis has been commissioned to undertake an ESIA in relation to an ADNOC energy infrastructure development involving the installation of HVDC cables, known as Project Lightning. You may be aware of this project as previous studies, surveys and reports have been undertaken in support of this development.

The Project involves the supply of power from the Abu Dhabi utility grid network from Abu Dhabi Transmission and Dispatch Company (TRANSCO) to the Abu Dhabi offshore oil and gas facilities (ADNOC) to Das Island and Lower Zakum clusters (specifically, Al Ghallan Island). The power supply will consist of two high voltage direct current (HVDC) sub-sea transmission links to supply power from the Al Mirfa Power and Water Complex to Al Ghallan artificial island within the Lower Zakum cluster (known as Route 1) and Al Shuweihat Power and Water Complex to Das artificial island (known as Route 2).

I have attached two shape files (one for each route) identifying the project footprint of both onshore and the offshore cable routes/facilities proposed. As you will see, the Project is located partially within the Marawah Marine Protected Area and we are aware that there are a number of archaeological features of interest within this area.

Therefore, in order to inform the ESIA process and ensure that appropriate avoidance of such features is ensured, we would be very grateful if you could provide further information and maps identifying areas of archaeological or cultural heritage significance within these areas.

I look forward to hearing from you,

Kind regards,
Anna

Anthesis

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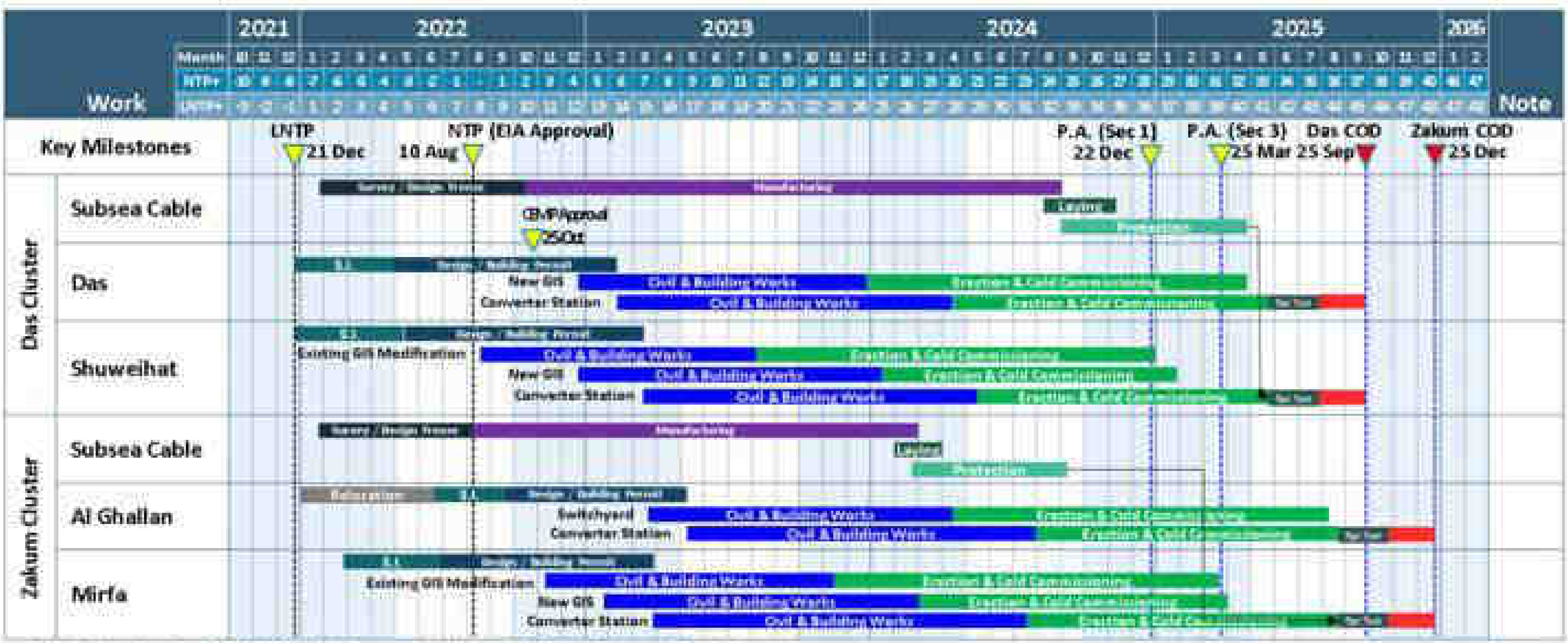
+971 52 748 1060
Dubai, United Arab Emirates, PO Box 392563

Appendix 7 – Project Information

Anthesis

Appendix 7.1 – Construction Schedule

ATT#1 - Main Schedule

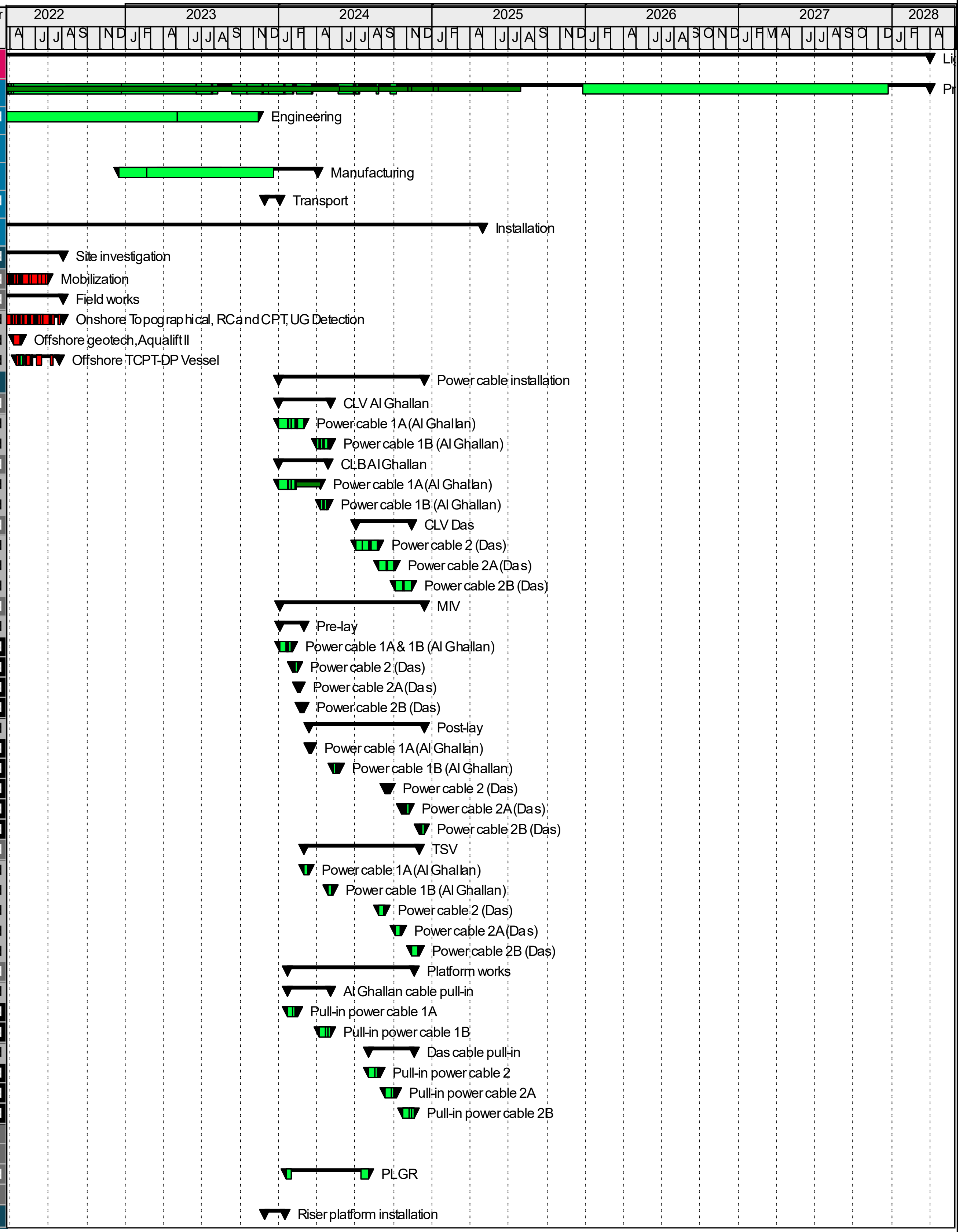


- Months in shades : TRANSCO shutdown available period (October to mid-April)

Abu Dhabi - Project Lightning | HVDC Subsea Cable Load, Transport, Installation & Protection

Jan De Nul Dredging Ltd.

Activity ID	Activity Name	Planned Duration	Start	Finish	Total Float	Calendar
	Lightning baseline programme	2292.00	22-12-21	01-04-28	0.00	
	Project Management	2292.00	22-12-21	01-04-28	0.00	
	Engineering	690.00	22-12-21	12-11-23	1553.00	Global 24h/7d
	Procurement	0.00			0.00	
	Manufacturing	474.00	17-12-22	04-04-24	1430.00	
	Transport	35.00	29-11-23	03-01-24	1543.00	Global 24h/7d
	Installation	1168.47	17-02-22	30-04-25	1066.20	
	Site investigation	170.00	17-02-22	05-08-22	0.00	Global 8h/7d
	Mobilization	132.50	17-02-22	29-06-22	0.00	Global 8h/7d
	Field works	152.00	07-03-22	05-08-22	0.00	Global 8h/7d
	Onshore Topographical, RC and CPT, UG Detection	152.00	07-03-22	05-08-22	0.00	Global 8h/7d
	Offshore geotech, Aqualift II	18.00	10-04-22	27-04-22	0.00	Global 8h/7d
	Offshore TCPT-DP Vessel	102.00	16-04-22	26-07-22	0.00	Global 8h/7d
	Power cable installation	346.50	01-01-24	12-12-24	1205.50	
	CLV Al Ghallan	122.00	01-01-24	02-05-24	1430.00	Global 24h/7d
	Power cable 1A (Al Ghallan)	61.00	01-01-24	02-03-24	1491.00	Global 24h/7d
	Power cable 1B (Al Ghallan)	32.00	31-03-24	02-05-24	1430.00	Global 24h/7d
	CLB Al Ghallan	118.00	01-01-24	28-04-24	1434.00	Global 24h/7d
	Power cable 1A (Al Ghallan)	98.00	01-01-24	08-04-24	402.00	Global 24h/7d
	Power cable 1B (Al Ghallan)	20.00	08-04-24	28-04-24	1434.00	Global 24h/7d
	CLV Das	134.30	03-07-24	14-11-24	1233.70	Global 24h/7d
	Power cable 2 (Das)	53.30	03-07-24	25-08-24	965.20	Global 24h/7d
	Power cable 2A (Das)	39.40	25-08-24	03-10-24	1017.40	Global 24h/7d
	Power cable 2B (Das)	39.30	06-10-24	14-11-24	1233.70	Global 24h/7d
	MIV	343.60	03-01-24	12-12-24	1052.50	Global 24h/7d
	Pre-lay	56.10	03-01-24	29-02-24	377.20	Global 24h/7d
	Power cable 1A & 1B (Al Ghallan)	28.60	03-01-24	01-02-24	377.20	Global 24h/7d
	Power cable 2 (Das)	12.70	01-02-24	14-02-24	377.20	Global 24h/7d
	Power cable 2A (Das)	6.90	14-02-24	21-02-24	377.20	Global 24h/7d
	Power cable 2B (Das)	7.90	21-02-24	29-02-24	377.20	Global 24h/7d
	Post-lay	275.10	12-03-24	12-12-24	1052.50	Global 24h/7d
	Power cable 1A (Al Ghallan)	8.00	12-03-24	20-03-24	377.20	Global 24h/7d
	Power cable 1B (Al Ghallan)	15.00	08-05-24	23-05-24	340.60	Global 24h/7d
	Power cable 2 (Das)	10.80	11-09-24	22-09-24	1070.70	Global 24h/7d
	Power cable 2A (Das)	16.20	21-10-24	06-11-24	1060.00	Global 24h/7d
	Power cable 2B (Das)	10.80	01-12-24	12-12-24	1052.50	Global 24h/7d
	TSV	276.70	29-02-24	01-12-24	1052.50	Global 24h/7d
	Power cable 1A (Al Ghallan)	12.40	29-02-24	12-03-24	377.20	Global 24h/7d
	Power cable 1B (Al Ghallan)	12.40	26-04-24	08-05-24	340.60	Global 24h/7d
	Power cable 2 (Das)	17.90	24-08-24	11-09-24	1070.70	Global 24h/7d
	Power cable 2A (Das)	17.90	03-10-24	21-10-24	1060.00	Global 24h/7d
	Power cable 2B (Das)	17.90	13-11-24	01-12-24	1052.50	Global 24h/7d
	Platform works	301.80	21-01-24	17-11-24	1230.20	Global 24h/7d
	Al Ghallan cable pull-in	102.00	21-01-24	02-05-24	1430.00	Global 24h/7d
	Pull-in power cable 1A	26.00	21-01-24	16-02-24	1506.00	Global 24h/7d
	Pull-in power cable 1B	26.00	06-04-24	02-05-24	1430.00	Global 24h/7d
	Das cable pull-in	107.00	02-08-24	17-11-24	1230.20	Global 24h/7d
	Pull-in power cable 2	26.00	02-08-24	28-08-24	1311.20	Global 24h/7d
	Pull-in power cable 2A	26.00	11-09-24	07-10-24	1271.80	Global 24h/7d
	Pull-in power cable 2B	26.00	22-10-24	17-11-24	1230.20	Global 24h/7d
	Beach and nearshore works	0.00			0.00	
	Guard vessel	0.00			0.00	
	PLGR	197.50	19-01-24	03-08-24	946.20	Global 24h/7d
	Accomodation vessel	0.00			0.00	
	Riser platform installation	49.00	29-11-23	17-01-24	1536.00	



Remaining Work
Remaining Level of Effort
Critical Remaining Work
Milestone
Summary

Durations are based on 24h/7d operations.

Date	Revision	Check...	Approved
	JDN.AEHVDC.AN.PES.84.99.07		

Jan De Nul Dredging Ltd.

Abu Dhabi - Project Lightning | HVDC Subsea Cable Load, Transport, Installation & Protection

Activity ID	Activity Name	Planned Duration	Start	Finish	Total Float	Calendar
Riser platform installation vessel		49.00	29-11-23	17-01-24	1536.00	Global 24h/7d
Al Ghallan		42.00	29-11-23	10-01-24	1536.00	Global 24h/7d
Das		42.00	06-12-23	17-01-24	1536.00	Global 24h/7d
Electrical outfitting		0.00			0.00	
Civil & onshore works		414.00	26-06-23	20-10-24	1078.00	12h/d 6d/w (Friday
Mirfa		339.00	26-06-23	24-07-24	1153.00	12h/d 6d/w (Friday
Preparation		174.00	26-06-23	14-01-24	343.00	12h/d 6d/w (Friday
IN.ON.MR.1000	Preparation	90.00	26-06-23*	08-10-23	0.00	12h/d 6d/w (Friday
IN.ON.MR.1010	Mobilization & site setup	60.00	31-07-23	08-10-23	343.00	12h/d 6d/w (Friday
IN.ON.MR.1020	Visa & permits	60.00	09-10-23	17-12-23	343.00	12h/d 6d/w (Friday
IN.ON.MR.1030	Trench excavation	24.00	18-12-23	14-01-24	343.00	12h/d 6d/w (Friday
IN.ON.MR.1040	Gravel road along the trench	24.00	18-12-23	14-01-24	343.00	12h/d 6d/w (Friday
TJB		141.00	15-01-24	26-06-24	1153.00	12h/d 6d/w (Friday
IN.ON.MR.1050	Construction of TJB	12.00	15-01-24	28-01-24	343.00	12h/d 6d/w (Friday
IN.ON.MR.1060	TJB finishing	3.00	24-06-24	26-06-24	1153.00	12h/d 6d/w (Friday
DC land cables installation		66.00	18-12-23	03-03-24	1276.00	12h/d 6d/w (Friday
Power cable 1A (Mirfa)		51.00	18-12-23	14-02-24	1291.00	12h/d 6d/w (Friday
Power cable 1B (Mirfa)		15.00	15-02-24	03-03-24	1276.00	12h/d 6d/w (Friday
Finish		123.00	04-03-24	24-07-24	1153.00	12h/d 6d/w (Friday
IN.ON.MR.2020	Trench backfilling	96.00	04-03-24	23-06-24	343.00	12h/d 6d/w (Friday
IN.ON.MR.2030	Demobilization & site cleanup	12.00	11-07-24	24-07-24	1153.00	12h/d 6d/w (Friday
Al Ghallan		228.00	18-12-23	08-09-24	1114.00	12h/d 6d/w (Friday
Preparation		168.00	18-12-23	30-06-24	237.00	12h/d 6d/w (Friday
IN.ON.ALG.1000	Preparation	90.00	18-12-23*	31-03-24	237.00	12h/d 6d/w (Friday
IN.ON.ALG.1010	Mob & site setup	60.00	22-01-24	31-03-24	237.00	12h/d 6d/w (Friday
IN.ON.ALG.1020	Visa & permits	60.00	01-04-24	09-06-24	237.00	12h/d 6d/w (Friday
IN.ON.ALG.1030	Trench excavation	18.00	10-06-24	30-06-24	237.00	12h/d 6d/w (Friday
DC land cables installation		182.00	13-01-24	11-08-24	237.00	12h/d 6d/w (Friday
Power cable 1A (Al Ghallan)		167.00	13-01-24	24-07-24	237.00	12h/d 6d/w (Friday
Power cable 1B 1A (Al Ghallan)		15.00	25-07-24	11-08-24	237.00	12h/d 6d/w (Friday
Finish		24.00	12-08-24	08-09-24	1114.00	12h/d 6d/w (Friday
IN.ON.ALG.1180	Trench backfilling	6.00	12-08-24	18-08-24	295.00	12h/d 6d/w (Friday
IN.ON.ALG.1200	Demobilization & site cleanup	12.00	26-08-24	08-09-24	1114.00	12h/d 6d/w (Friday
Shuweihat		264.00	18-12-23	20-10-24	1078.00	12h/d 6d/w (Friday
Preparation works		168.00	18-12-23	30-06-24	1003.00	12h/d 6d/w (Friday
IN.ON.SH.1000	Preparation	90.00	18-12-23*	31-03-24	0.00	12h/d 6d/w (Friday
IN.ON.SH.1010	Mobilization & site setup	60.00	22-01-24	31-03-24	1003.00	12h/d 6d/w (Friday
IN.ON.SH.1020	Visa & permits	60.00	01-04-24	09-06-24	1003.00	12h/d 6d/w (Friday
IN.ON.SH.1030	Trench excavation	18.00	10-06-24	30-06-24	1003.00	12h/d 6d/w (Friday
IN.ON.SH.1040	Gravel road along the trench construction	18.00	10-06-24	30-06-24	1003.00	12h/d 6d/w (Friday
TJB		72.00	01-07-24	22-09-24	1078.00	12h/d 6d/w (Friday
IN.ON.SH.1050	Construction of TJB	11.00	01-07-24	13-07-24	1003.00	12h/d 6d/w (Friday
IN.ON.SH.1060	TJB finishing	3.00	19-09-24	22-09-24	1078.00	12h/d 6d/w (Friday
DC land cables installation		74.00	18-05-24	11-08-24	1003.00	12h/d 6d/w (Friday
Power cable 2 (Shuweihat)		54.00	18-05-24	18-07-24	1003.00	12h/d 6d/w (Friday
Power cable 2A (Shuweihat)		5.00	25-07-24	30-07-24	1003.00	12h/d 6d/w (Friday
Power cable 2B (Shuweihat)		5.00	06-08-24	11-08-24	1003.00	12h/d 6d/w (Friday
Finishing works		60.00	12-08-24	20-10-24	1078.00	12h/d 6d/w (Friday
IN.ON.SH.1160	Trench backfilling	33.00	12-08-24	18-09-24	1003.00	12h/d 6d/w (Friday
IN.ON.SH.1170	Demob & site cleanup	12.00	07-10-24	20-10-24	1078.00	12h/d 6d/w (Friday
Das		199.00	03-12-23	21-07-24	1156.00	12h/d 6d/w (Friday
Preparation		156.00	03-12-23	01-06-24	1069.00	12h/d 6d/w (Friday
IN.ON.DS.1000	Preparation	90.00	03-12-23*	16-03-24	0.00	12h/d 6d/w (Friday
IN.ON.DS.1010	Mobilization & site setup	60.00	07-01-24	16-03-24	1069.00	12h/d 6d/w (Friday
IN.ON.DS.1020	Visa & permits	60.00	17-03-24	25-05-24	1069.00	12h/d 6d/w (Friday

Remaining Work
Remaining Level of Effort
Critical Remaining Work
Milestone
Summary

Durations are based on 24h/7d operations.

Date	Revision	Check...	Approved
	JDN.AEHVDC.AN.PES.84.99.07		

Abu Dhabi - Project Lightning | HVDC Subsea Cable Load, Transport, Installation & Protection

Activity ID	Activity Name	Planned Duration	Start	Finish	Total Float	Calendar
IN.ON.DS.1030	Trench excavation	6.00	26-05-24	01-06-24	1069.00	12h/d 6d/w (Friday
DC land cables installation		68.00	13-04-24	30-06-24	1069.00	12h/d 6d/w (Friday
Cable 2 (Das)		48.00	13-04-24	06-06-24	1069.00	12h/d 6d/w (Friday
Cable 2A (Das)		5.00	13-06-24	18-06-24	1069.00	12h/d 6d/w (Friday
Cable 2B (Das)		5.00	25-06-24	30-06-24	1069.00	12h/d 6d/w (Friday
Finishing		18.00	01-07-24	21-07-24	1156.00	12h/d 6d/w (Friday
IN.ON.DS.1130	Trench backfilling	3.00	01-07-24	03-07-24	1069.00	12h/d 6d/w (Friday
IN.ON.DS.1140	Demobilization & site cleanup	12.00	08-07-24	21-07-24	1156.00	12h/d 6d/w (Friday
Subsea rock installation		445.80	10-02-24	30-04-25	946.20	Global 24h/7d
SRV S1		236.10	23-05-24	14-01-25	1052.50	Global 24h/7d
Power cable 1B (Al Ghallan)		92.00	23-05-24	23-08-24	1072.10	Global 24h/7d
Power cable 2A (Das)		16.50	12-12-24	29-12-24	1052.50	Global 24h/7d
Power cable 2B (Das)		16.50	29-12-24	14-01-25	1052.50	Global 24h/7d
SRV S2		338.90	10-02-24	13-01-25	1053.10	Global 24h/7d
Power cable 1A (Al Ghallan)		129.80	10-02-24	18-06-24	327.00	Global 24h/7d
Power cable 1B (Al Ghallan)		78.20	18-06-24	05-09-24	327.00	Global 24h/7d
Power cable 2 (Das)		130.90	05-09-24	13-01-25	1053.10	Global 24h/7d
SRV L		401.80	25-03-24	30-04-25	946.20	Global 24h/7d
Power cable 1A (Al Ghallan)		80.10	25-03-24	13-06-24	341.30	Global 24h/7d
Power cable 1B (Al Ghallan)		69.60	13-06-24	21-08-24	341.30	Global 24h/7d
Power cable 2 (Das)		58.40	24-08-24	22-10-24	946.20	Global 24h/7d
Power cable 2A (Das)		91.50	22-10-24	21-01-25	946.20	Global 24h/7d
Power cable 2B (Das)		99.10	21-01-25	30-04-25	946.20	Global 24h/7d
Offshore services		520.00	01-08-23	02-01-25	1065.00	
BHD 1		475.80	01-08-23	18-11-24	1109.20	Global 24h/7d
Trenching		450.00	01-08-23	24-10-24	0.00	Global 24h/7d
Navigational channel (Al Ghallan)		43.00	01-08-23	13-09-23	174.00	Global 24h/7d
Power cable 1A (Al Ghallan)		22.00	10-01-24	01-02-24	55.00	Global 24h/7d
Power cable 1B (Al Ghallan)		76.00	01-02-24	17-04-24	0.00	Global 24h/7d
Power cable 2 (Das)		18.00	17-07-24	04-08-24	21.30	Global 24h/7d
Power cable 2A (Das)		20.00	25-08-24	14-09-24	0.00	Global 24h/7d
Power cable 2B (Das)		18.00	06-10-24	24-10-24	0.00	Global 24h/7d
Backfilling		255.80	08-03-24	18-11-24	1109.20	Global 24h/7d
Power cable 1A (Al Ghallan)		47.00	08-03-24	24-04-24	419.00	Global 24h/7d
Power cable 1B (Al Ghallan)		42.00	25-04-24	06-06-24	418.00	Global 24h/7d
Power cable 2 (Das)		6.00	01-11-24	07-11-24	1109.20	Global 24h/7d
Power cable 2A (Das)		6.00	07-11-24	13-11-24	1109.20	Global 24h/7d
Power cable 2B (Das)		5.00	13-11-24	18-11-24	1109.20	Global 24h/7d
BHD 2		199.00	01-08-23	16-02-24	446.00	Global 24h/7d
Trenching		199.00	01-08-23	16-02-24	446.00	Global 24h/7d
Navigatioinal channel (Al Ghallan)		37.00	01-08-23	07-09-23	530.00	Global 24h/7d
Power cable 1A (Al Ghallan)		16.00	16-01-24	01-02-24	399.00	Global 24h/7d
Power cable 1B (Al Ghallan)		15.00	01-02-24	16-02-24	446.00	Global 24h/7d
TSHD		309.80	18-01-24	22-11-24	1105.20	Global 24h/7d
Trenching		280.00	18-01-24	24-10-24	1018.00	Global 24h/7d
Power cable 1A (Al Ghallan)		14.00	18-01-24	01-02-24	0.00	Global 24h/7d
Power cable 1B (Al Ghallan)		76.00	01-02-24	17-04-24	385.00	Global 24h/7d
Power cable 2 (Das)		3.00	01-08-24	04-08-24	949.10	Global 24h/7d
Power cable 2A (Das)		3.00	11-09-24	14-09-24	966.20	Global 24h/7d
Power cable 2B (Das)		3.00	21-10-24	24-10-24	1018.00	Global 24h/7d
Backfilling		283.80	13-02-24	22-11-24	1105.20	Global 24h/7d
Power cable 1A (Al Ghallan)		71.00	13-02-24	24-04-24	395.00	Global 24h/7d
Power cable 1B (Al Ghallan)		66.00	25-04-24	30-06-24	394.00	Global 24h/7d
Power cable 2 (Das)		9.00	26-10-24	04-11-24	1105.20	Global 24h/7d
Power cable 2A (Das)		9.00	04-11-24	13-11-24	1105.20	Global 24h/7d
Power cable 2B (Das)		9.00	13-11-24	22-11-24	1105.20	Global 24h/7d
Starfish		346.00	22-01-24	02-01-25	1065.00	Global 24h/7d
Trenching		276.00	22-01-24	24-10-24	1018.00	Global 24h/7d

Remaining Work
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Summary

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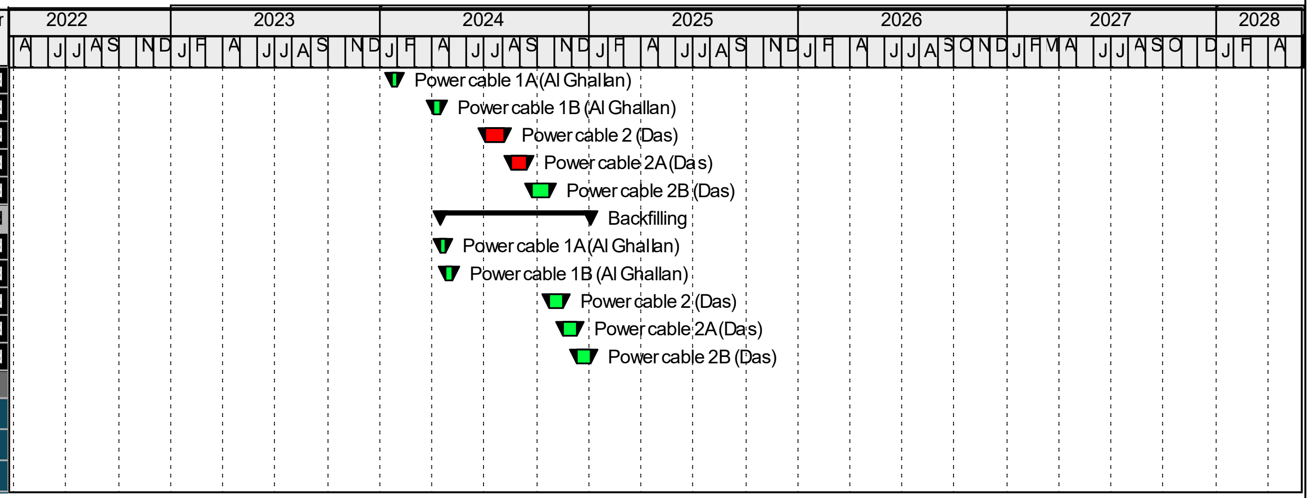
	JDN.AEHVDC.AN.PES.84.99.07		

Abu Dhabi - Project Lightning | HVDC Subsea Cable Load, Transport, Installation & Protection

Jan De Nul Dredging Ltd. ABU DHABI BRANCH

Activity ID	Activity Name	Planned Duration	Start	Finish	Total Float	Calendar
	Power cable 1A (Al Ghallan)	10.00	22-01-24	01-02-24	399.00	Global 24h/7d
	Power cable 1B (Al Ghallan)	12.00	02-04-24	14-04-24	388.00	Global 24h/7d
	Power cable 2 (Das)	31.00	04-07-24	04-08-24	0.00	Global 24h/7d
	Power cable 2A (Das)	29.00	16-08-24	14-09-24	0.00	Global 24h/7d
	Power cable 2B (Das)	31.00	23-09-24	24-10-24	1018.00	Global 24h/7d
	Backfilling	263.00	14-04-24	02-01-25	1065.00	Global 24h/7d
	Power cable 1A (Al Ghallan)	10.00	14-04-24	24-04-24	449.00	Global 24h/7d
	Power cable 1B (Al Ghallan)	12.00	25-04-24	07-05-24	448.00	Global 24h/7d
	Power cable 2 (Das)	24.00	24-10-24	17-11-24	1065.00	Global 24h/7d
	Power cable 2A (Das)	22.00	17-11-24	09-12-24	1065.00	Global 24h/7d
	Power cable 2B (Das)	24.00	09-12-24	02-01-25	1065.00	Global 24h/7d
	Accomodation vessel	0.00			0.00	
	Environmental activities	0.00			0.00	
	Logistics	0.00			0.00	
	Survey	0.00			0.00	



Remaining Work
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Appendix 7.2 – List of ADNOC Standards and Guidelines

Appendix A - List of Codes and Standards

Contents

HVDC Specifications

IEC 60146-1-2	Semiconductor converters - General requirements and line commutated converters - Part 1-2: Application guide
BS EN 60633	Terminology for high-voltage direct current (HVDC) transmission
IEC/TR 60919-1	Performance of high-voltage direct current (HVDC) systems with line-commutated converters - Part 1: Steady-state conditions
IEC/TR 60919-2	Performance of high-voltage direct current (HVDC) systems with line-commutated converters - Part 2: Faults and switching
IEC/TR 60919-3	Performance of high-voltage direct current (HVDC) systems with line-commutated converters - Part 3: Dynamic conditions
BS EN 61803	Determination of power losses in high-voltage direct current (HVDC) converter stations with line-commutated converters
BS EN 60700-1	Thyristor valves for high voltage direct current (HVDC) power transmission - Part 1: Electrical testing
BS EN 60146-2	Semiconductor converters - Part 2: Self-commutated semiconductor converters including direct DC converters
BS EN 62501	Voltage sourced converter (VSC) valves for high-voltage direct current (HVDC) power transmission - Electrical testing
DD/IEC/PAS 62001	Guide to the specification and design evaluation of AC filters for HVDC systems
IEC 60071-5	Insulation co-ordination - Part 5: Procedures for high-voltage direct current (HVDC) converter stations
BS EN 61975	High-voltage direct current (HVDC) installations - System tests
BS EN 61378-2	Convertor transformers. Transformers for HVDC applications
BS EN 60076-1	Power transformers - General
BS EN 60076-2	Power transformers. Temperature rise for liquid-immersed transformers
BS EN 60076-3	Power transformers. Insulation levels, dielectric tests and external clearances in air
BS EN 60076-4	Power transformers. Guide to the lightning impulse and switching impulse testing.
BS EN 60076-5	Power transformers. Ability to withstand short-circuit
BS EN 60076-6	Power transformers. Reactors
BS EN 60076-7	Power transformers. Loading guide for oil-immersed power transformers
BS EN 60076-10	Power transformers. Determination of sound levels
BS EN 60214-1	Tap-changers. Performance requirements and test methods
BS EN 60137	Insulated bushings for alternating voltages above 1000 V

BS EN 60422	Mineral insulating oils in electrical equipment. Supervision and maintenance guidance
BS EN 50216	Power transformer and reactor fittings.
CIGRE Ref 447	Components Testing of VSC System for HVDC Applications
CIGRE Ref 346	Protocol for reporting the operational performance of hvdc transmission systems
BS EN 60099-4	Surge arresters. Metal-oxide surge arresters without gaps for AC systems
BS EN 60099-5	Surge arresters. Selection and application recommendations
BS EN 60071-2	Insulation co-ordination. Application guide
ISO 9613	Attenuation of sound during propagation outdoors,
BS EN 55011	Industrial, scientific and medical equipment. Radio-frequency disturbance characteristics. Limits and methods of measurement
BS EN 60567	Oil-filled electrical equipment. Sampling of gases and analysis of free and dissolved gases. Guidance
BS EN 60085	Electrical insulation. Thermal evaluation and designation
BS EN 50110-1	Operation of electrical installations
BS 7430	Code of practice for earthing
BS EN 50522	Earthing of power installations exceeding 1 kV a.c.
BS 5839-1	Fire detection and fire alarm systems for buildings
BS 6867	Code of practice for maintenance of electrical switchgear and controlgear for voltages above 36 kV.
BS EN 61000-4	Electromagnetic compatibility (EMC) Testing and measurement techniques
BS EN 61000-4-7	Electromagnetic compatibility (EMC) Testing and measurement techniques. General guide on harmonics and interharmonics measurements and instrumentation, for power supply systems and equipment connected thereto
BS EN 61000-4-15	Electromagnetic compatibility (EMC)Testing and measurement techniques. Flickermeter. Functional and design specifications
BS EN 61000-4-30	Electromagnetic compatibility (EMC)Testing and measurement techniques. Power quality measurement methods
BS 159	Specification for high-voltage busbars and busbar connections
BS EN 60204-11	Safety of machinery. Electrical equipment of machines. Requirements for HV equipment for voltages above 1000 V a.c. or 1500 V d.c. and not exceeding 36 kV
BS EN 62271-1	High-voltage switchgear and controlgear. Common specifications
BS EN 62271-100	High-voltage switchgear and controlgear. Alternating current circuit-breakers

BS EN 62271-102	High-voltage switchgear and controlgear. Alternating current disconnectors and earthing switches
BS EN 62271-104	High-voltage switchgear and controlgear. Alternating current switches for rated voltages of 52 kV and above
BS EN 62271-109	High-voltage switchgear and controlgear. Alternating-current series capacitor by-pass switches
BS EN 60870-5-104	Telecontrol equipment and systems. Transmission protocols
BS EN 60871-1	Shunt capacitors for a.c. power systems having a rated voltage above 100 0 V
BS EN 62305-4	Protection against lightning. Electrical and electronic systems within structures
BS EN 60815 Part 1 to Part 3	Selection and dimensioning of high-voltage insulators intended for use in polluted conditions
IEC/TR 62544	High-voltage direct current (HVDC) systems. Application of active filters
IEC/TR 62001	High-voltage direct current (HVDC) systems. Guidebook to the specification and design evaluation of A.C. filters

ADNOC Standards

ADNOC Offshore Standards, Specifications, Code of Practices, Guidelines, Procedures, Policies etc

STD-00 Part-1	Standard for Measurement Units
STD-00 Part-2	Site Conditions & Data
A0-ENG-Y-STD-001	Survey Cartography Standard
A0-ENG-E-STD-211	Low Voltage Electrical Cables
A0-ENG-E-STD-221	High Voltage Electrical Cables
A0-ENG-E-STD-411	Low Voltage Motors
STD-149	High Voltage Induction Motors
STD-155	Standard for Transformers
A0-ENG-E-STD-511	DC Uninterruptible Power Systems (DC UPS)
A0-ENG-E-STD-512	AC Uninterruptible Power Systems (AC UPS)
A0-ENG-E-STD-113	Low Voltage Distribution Boards
SP-1084	Marine Navigational Aids
A0-ENG-E-STD-111	Low Voltage Switchgear - Indoor
STD-144	High Voltage Switchgear - Indoor
A0-ENG-E-STD-913	Neutral Earthing Resistors (NERs)
STD-154	Electrical Reactors

A0-ENG-E-STD-312	Cathodic Protection Transformer Rectifiers
A0-ENG-V-STD-001	Standard Details for Pressure Vessels, Heat Exchangers & Tanks
A0-ENG-P-STD-001	Standard for Flanges
A0-ENG-P-STD-002	Standard for Fittings
A0-ENG-S-STD-001	Standard for Design Criteria for Fixed Offshore Steel Structures
A0-ENG-S-STD-002	Standard for Boat Landing and Fenders
A0-ENG-C-STD-001	Design Criteria for Onshore Structures (In-Service)
A0-ENG-L-SP-002	Specification for Mechanical Design and Installation of Subsea Cables
A0-ENG-S-STD-001	Design Criteria for Fixed Offshore Structures.
A0-ENG-S-STD-002	Design Criteria for Boat Landing and Fenders.
A0-ENG-S-SP-001	Specification for Steel Material for Offshore Structures
A0-ENG-S-SP-002	Specification for Miscellaneous Structural Items for Offshore Structures.
A0-ENG-S-SP-004	Specification for Structural Design of Equipment Skids.
A0-ENG-S-SP-101	Specification for Geotechnical Investigations for Offshore Structures
A0-ENG-S-SP-102	Specification for Weight Control Requirements for Offshore Structures.
A0-ENG-S-SP-103	Specification for Loadout, Transportation and Installation of Offshore Structures.
A0-ENG-S-SP-104	Specification for Fabrication of Fixed Offshore Structures.
A0-ENG-S-SP-105	Specification for Riser Clamp.
A0-ENG-S-GDL-001	Guideline for Standardization of Structural Analysis Model (SACS).
A0-ENG-T-SP-001	Specifications for Offshore, Onshore and Subsea Fiber Optic Cables
A0-ENG-T-SP-002	Specification For CCTV Systems on Hired Marine Units
A0-ENG-T-SP-003	Specification for Communication Systems in Pedestal Cranes
A0-ENG-T-SP-004	Specification for Multichannel Voice Recording Systems
A0-ENG-T-SP-005	Specification for Offshore and Onshore Radio Paging Systems
A0-ENG-T-SP-006	Specification for Public Address and General Alarm (PAGA) System
A0-ENG-C-STD-004	Standard for Design Criteria for Assessment of Existing Onshore Structures
STD-100	Approval of Materials of manufacture mechanical equipment
GDL-015	Operations, Maintenance & Integrity Philosophy for Projects
A0-OP-Z-GDL- 003	Guideline for Integrated Readiness

A0-Q-PQ-CP-001	Code of Practice for Project Procurement Inspection
A0-Q-PQ-GDL- 001	Guideline for Project Quality Plan
A0-Q-PQ-PRO-001	Procedure for Project Non-conformity Management
A0-Q-PQ-PRO-002	Procedure for Prevention and Control of Counterfeit Material
A0-Q-PQ-PRO-003	Project Inspection Management Procedure
A0-Q-PQ-SP-001	EPC Contractor Quality Personnel Requirements
A0-Q-PQ-SP-002	Specification for Requirements for Projects Contractor Quality System
A0-Q-PQ-SP-003	Specification for Quality Assurance and Quality Control Requirements for Construction Works
A0-Q-PQ-STR-001	Project Quality Control Framework
A0-IG-POL-001	Asset Integrity Management Policy
------	Asset Integrity Policy Statement.
A0-IG-Z-SP-001	Specification for Integrity Requirements for Baseline Survey of New Equipment in Projects
A0-IG-Z-GDL-001	Guideline for Risk Based Inspection Baseline Passport
A0-IG-Z-CP-001	Code of Practice for Integrity Assurance in Projects
A0-IG-R-CP-001	Code of Practice for Evaluation, Repair, and Rerate of Heat Exchangers
A0-IG-R-PRO-001	Procedure for Failure Analysis for Exchangers
A0-IG-C-CP-001	Code of Practice For Dead Legs Management
A0-IG-C-GDL-001	Guideline For Pigging and Cleaning of Pipelines
A0-IG-C-GDL-002	Guideline For Preservation of Production and Process Facilities
A0-IG-C-PRO-001	Procedure For Use of Retrieval Tools in Corrosion Monitoring Operation
A0-IG-C-SP-005	Specification For Access Fittings Of Corrosion Monitoring & Chemical Injection
A0-IG-C-SP-006	Specification for Cathodic Protection of Submarine Pipelines
A0-IG-C-SP-007	Specification for Cathodic Protection-Offshore Steel Structures
A0-IG-C-SP-008	Cathodic Protection Specification for Above Ground Storage Tank Bottom External
A0-IG-C-SP-009	Specification For Cathodic Protection of Onshore Well Casings
A0-IG-C-SP-010	Cathodic Protection Specification for Tanks and Vessels Internal Surfaces
A0-IG-C-STD-001	Standard for Offshore Bracelet and Cast Galvanic Anodes
CP-104	Cathodic Protection of Corrosion Control Systems on Das Island.

SP-1021	Water Quality for Hydrostatic Test
STR-002	Corrosion Management Strategy
A0-IG-U-GDL-001	Guideline For Inspection of Subsea Pipelines using Magnetic Tomography
A0-IG-U-GDL-002	Guideline for Intelligent Pigging (IP) of Pipelines
A0-IG-U-GDL-003	Guideline for Subsea Pipelines Maintenance & Repair
A0-IG-U-GDL-004	Guideline for Long Term Storage and Preservation for Subsea Repair Clamps and Mechanical Connectors
A0-IG-U-PRO-001	Procedure for Under Water Inspection Work
A0-IG-U-PRO-002	Procedure For Inspection of High Pressure Gas Lines
A0-IG-U-SP-001	Specification for Control of ROV Inspection of Subsea Pipelines
A0-IG-F-GDL-001	Guidelines for Inspection and Maintenance of Glass Reinforced Plastic (GRP) Piping Systems in Operating Phase
A0-IG-F-GDL-001	Guidelines for Inspection and Maintenance of Glass Reinforced Plastic (GRP) Piping Systems in Operating Phase
A0-IG-F-GDL-003	Guideline For Inspection, Maintenance & Repair Of Piping
A0-IG-F-GDL-005	Guideline For Inspection, Maintenance and Repair of Crude Oil Storage Tanks
A0-IG-F-MS-001	Inspection Management System "IMS"
A0-IG-F-PRO-001	Procedure For Magnetic Particle Inspection
A0-IG-F-PRO-002	Procedure for Liquid Penetrant Inspection
CP-107 Part 2	Inspection and Testing of Plant in Service Part 2 Concrete Structures
PRO-117	Re-certification and Inspection of Offshore Platforms and Structures
GDL-026	Equipment Extension of Endorsement
PRO-121	Inspection and Test of Flexible Hose Assemblies
MSMS HSE-112	Marine Safety Management System (MSMS) ADMA-OPCO
GDL-065	Developing Marine HSE Assurance Plan in Compliance with Marine Safety Management System (MSMS)
AVS CAAP-71	Civil Aviation Advisory Publication, Helidecks (Off-Shore)
AVS CAP-1077	Specification For An Off-Shore Helideck Lighting System
AVS CAP-437	Standard For Off-shore Helicopter Landing Areas
AVS CAP-437A	Helideck Crash Box Equipment

MRS General Specification-01	GENERAL SPECIFICATIONS FOR VESSELS, BARGES, RIGS & AIRCRAFTS
PX 2031-JU-TSAB	Jack-up Topside Accommodation Barge (Umm Shaif Field)
PX 2030-SPJU-TSMB	Self-Propelled Jack-up Topside Maintenance Barge (US & ZK Fields)
CP-00 Part-1	Plant Design - Documentation & Archiving
CP-00 Part-2	Plant Design - Process
CP-00 Part-3	Plant Design - Plant & Piping
CP-00 Part-4	Plant Design - Instrumentation
CP-00 Part-5	Plant Design - Electrical
CP-00 Part-6	Plant Design - Hazardous Area Classification
CP-00 Part-7	Plant Design - Civil
CP-00 Part-8	Plant Design - Structure
CP-00 Part-10	Plant Design - Laser Scanning
A0-ENG-D-PRO-001	Numbering Procedure
A0-ENG-D-PRO-001- PART-A	Numbering Procedure- Part-A Numbering Procedure for Upper Zakum Field, Satah Field, Umm Al Dalkh Field , Arzanah & Zirku Island
A0-ENG-D-PRO-001- PART-B	Numbering Procedure- Part–B Numbering Procedure for Lower Zakum Field, Nasr Field, Umm Lulu Field, SARB Field, Umm Shaif Field & Das Island
A0-ENG-D-PRO-002	CADD Manual
A0-ENG-D-PRO-002- PART-A	CADD Manual-Part-A CADD Manual for Upper Zakum Field, Satah Field, Umm Al Dalkh Field, Arzanah & Zirku Island
A0-ENG-D-PRO-002- PART-B	CADD Manual- Part-B CADD Manual for Lower Zakum Field, SARB Field, Nasr Field, Umm Lulu Field, Umm Shaif Field and Das Island
A0-ENG-D-PRO-003	Final Dossier Handover Procedure
A0-ENG-I-SP-002	Specification for Implementation of SmartPlant P&ID
A0-ENG-I-SP- 003	Specification for Implementation of SmartPlant Instrumentation
A0-ENG-I-SP- 004	Specification for Implementation of SmartPlant 3D
A0-ENG-I-SP- 005	Specification for Implementation of SmartPlant Electrical
A0-ENG-I-SP- 008	Specification for Implementation of AVEVA Instrumentation
A0-ENG-Y-PRO-001	Procedure for Land Space Allocation for Artificial Islands
A0-ENG-Y-SP-001	Specification for Offshore Geophysical Surveys

SP-1043	Specification for Offshore Subsea Pipeline Survey
A0-ENG-Y-SP-002	Specification for Geotechnical Investigations at Offshore and Onshore Sites
A0-ENG-L-SP-002	Mechanical Design and Installation of Subsea Cables
A0-ENG-L-SP-001	Specification for Submarine Pipeline Systems (Based on DNV-OS-F101)
A0-ENG-S-SP-105	Riser Clamp
SP-1056	Offshore Trenching and Backfilling
SP-1063	Shore Approach of Sub-sea Pipelines
A0-ENG-J-SP-001	Specification for Instrument Installation
A0-ENG-J-SP-003	Specification for Fire and Gas Systems
A0-ENG-J-SP-004	Specification for Instrument Cables
A0-ENG-J-STD-001	Specification for GRP Cable trays and Ladders for Onshore and Offshore Facilities
A0-ENG-J-SP-005	Specification for Instrument tubing, fittings and Bulk Materials
A0-ENG-J-SP-006	Specification for Safety Instrumented Systems
A0-ENG-J-SP-008	Specifications for Process Control System
A0-ENG-J-SP-009	Specification for Instruments with equipment packages
A0-ENG-J-SP-010	Specification for Pressure Instruments
A0-ENG-J-SP-011	Specifications for Level Instruments
A0-ENG-J-SP-013	Specification for Flow Instruments
A0-ENG-J-SP-015	Specification for Temperature Instruments & Thermowells
A0-ENG-J-SP-025	Specification for Instrument Junction Box and Cable glands
SP-1080	Electrical Design Criteria
A0-ENG-E-SP-121	Electrical Installation Work
SP-1071	Electrical Control & Management Systems
A0-ENG-R-SP-001	Specification for Fire water Pump Package
SP-1100 Part- 2	Packaged Equipment-Diesel Engine Driven Fire Water Pumps package
A0-ENG-H-SP-001	HVAC - Design Criteria and Specification
A0-ENG-P-SP-015	Specification for Piping Design
A0-ENG-V-SP-003	Specification for Mechanical Design Criteria for Static Equipment
SP-1050 Part- 3	Mechanical Design Criteria for Rotating Machinery

A0-ENG-V-SP-007	Specification for Shell & Tube Heat Exchangers
A0-ENG-V-SP-008	Specification for Air Cooled Heat Exchangers
A0-ENG-V-SP-001	Specification for above Ground Atmospheric Storage Tank
A0-ENG-P-SP-001	Specification for Small Bore Piping Connections
STD-128	Pressure Relief Valves
SP-1131	SPECIFICATION FOR PIPING CLASSIFICATION
A0-ENG-P-SP-015	Specification for Piping Design Basis
A0-ENG-P-STD-006	Standard for Piping Bolting
A0-ENG-P-STD-007	Standard for Piping Gaskets
A0-ENG-P-SP-003	Specification for Fabrication, Erection and Testing of Metallic Pipe work
A0-ENG-P-SP-004	Specification for Piping System Stress Analysis
A0-ENG-P-SP-005	Plant Layout (On & Offshore)
SP-1023 Part-1	Piping Supports
SP-1162	Duplex and Super Duplex Material
A0-ENG-F-SP-001	Specification for drain system
A0-ENG-F-SP-003	Specification for Process Design Criteria
A0-ENG-C-SP-002	Specification for Onshore Plain and Reinforced Concrete Works
A0-ENG-S-SP-003	Specification for Helideck Timber
A0-ENG-C-SP-003	Specification for Onshore Structural Steel Works
A0-ENG-C-SP-001	Specification of Earthworks
A0-ENG-C-SP-005	Specification for Construction of Drainage System
A0-IG-P-SP-004	Coating Specification for New and Existing Constructions of Offshore and Onshore Structures
A0-ENG-R-GR-001	General Requirements for Packaged Equipment
A0-ENG-R-SP-004	Specification for Instrument air & Air Dryer Package
A0-ENG-C-GDL-002	Guideline for Standardization of Onshore Structural Analysis Models (STAAD)
A0-ENG-C-GDL-003	Guideline for Architectural Engineering for Onshore/Offshore Buildings
GDL-017	Preparation of Hazard Area Classification (HAC) Documents and Drawings
PRO-162	HAZOP and LOPA Facilitator Competency Assessment Process
PRO-003	Procedure for Engineering Review

SP-1160	Glass Reinforced Plastics (GRP) Piping Systems
PRO-139	Procedure for Finite Element Assessment of Dented & Dragged Subsea pipeline/Subsea Pipelines Repair
A0-ENG-F-GDL-001	Guideline for the Preparation of Memorandum on Process Safety Devices
GDL-009	Project Deliverables
GDL-056	Guideline For Engineering & Design Assurance In Projects
GDL-057	Suppliers Compliance Assurance of Critical Equipment's in Projects
GDL-020	Global Buckling Design of Subsea Pipelines
GDL-046	Electrical Equipment Integrity Management System (EIMS)
GDL-012	Material Selection guideline
A0-ENG-S-GDL-001	Guideline for Standardization of Structural Analysis Model (SACS)
GDL-049	Guideline For Civil Works Integrity Management System (CWIMS)
A0-ENG-G-GDL-001	Artificial Intelligence Guideline for Projects
A0-ENG-G-GDL- 002	Digital Oil Field (DOF) Guideline
A0-ENG-G-STR-001	ADNOC Offshore Artificial Intelligence Strategy-Technical
A0-ENG-G-STR-002	Strategy for ADNOC Offshore Upstream Big Data
A0-ENG-EMS-MNL-001	Energy Management System (EnMS) Manual
A0-ENG-EMS-PRO- 001	Procedure for Control of Energy Documents
A0-ENG-EMS PRO-002	Procedure for Control of Energy Records
A0-ENG-EMS -PRO-003	Procedure for Energy Management Communication
A0-ENG-EMS -PRO-004	Procedure for Calculating Energy Savings
A0-ENG-EMS -PRO-005	Procedure for Developing and Maintaining Energy Action Plan
A0-ENG-EMS -PRO-006	Procedure for Conducting Energy Review
A0-ENG-EMS-PRO-007	Procedure for Conducting Energy Competency
A0-ENG-EMS -PRO-008	Procedure for Establishing and Maintaining Energy Objectives and Targets
A0-ENG-EMS -PRO-009	Procedure for Energy Efficient Design
A0-ENG-EMS -PRO-011	Procedure for Energy Measurement and Verification Planning
A0-ENG-EMS -PRO-014	Procedure for Addressing Energy Management Nonconformity, Correction, Corrective Action and Preventive Action
A0-ENG-EMS -PRO-015	Procedure for Internal Audit of the Energy Management System

A0-ENG-EMS -PRO-016	Procedure for Conducting Energy Management Review
A0-IG-L-MS- 001	Lifting Integrity Management System
DST-001	Subsea Pipelines Datasheets
DST-003	Part-1: Computerized Maintenance Management System of Mechanical Equipment
	Part-2: Computerized Maintenance Management System of Electrical Equipment
	Part-3: Computerized Maintenance Management System of Instruments & Control Equipment

ADNOC Group HSE Code of Practices and Guidelines

ADNOC-COPV1-01	HSE Administration Systems
ADNOC-COPV1-02	HSEIA Requirements
ADNOC-COPV1-03	Determining Reportability of Occupational Injuries and Illnesses
ADNOC-COPV1-04	Management of Contractor HSE & Welfare
ADNOC-COPV1-05	HSE Definitions & Abbreviations
ADNOC-COPV1-06	Self-regulation, Governance & Assurance - Guidelines for ADNOC Senior Managers
ADNOC-COPV1-07	Health Safety and Environment (HSE) Performance Letter
ADNOC-COPV1-08	ADNOC Incident reporting and investigation process flow
ADNOC-COPV1-09	ADNOC HSE Management System
ADNOC-COPV1-10	Food & Water Safety & Welfare
ADNOC-COPV1-11	Audit of HSE Management Systems
ADNOC-COPV1-12	Reporting of Process Release Events
ADNOC-COPV1-13	Preparation of Project HSE Plans
ADNOC-COPV1-14	Training & Competence
ADNOC-COPV1-15	ADNOC Annual Sustainability Reporting
ADNOC COPV1-16	Non-Accidental Death Reporting and Investigation
ADNOC-COPV2-01	Environmental Impact Assessment
ADNOC-COPV2-02	Pollution Prevention and Control
ADNOC-COPV2-03	Energy Management Systems
ADNOC-COPV2-04	Environmental Management Systems
ADNOC-COPV2-05	Waste Management

ADNOC-COPV2-06	Environmental Performance Reporting
ADNOC-COPV2-07	Environmental Risk Assessment (ERA)
ADNOC-COPV2-08	Use of Oil Spill Dispersant
ADNOC-COPV3-01	Occupational Health Risk Management
ADNOC-COPV3-02	Physical Agents
ADNOC-COPV3-03	Chemical Agents
ADNOC-COPV3-04	Biological Agents
ADNOC-COPV3-05	Ergonomics
ADNOC-COPV3-06	Working with asbestos containing materials (ACM)
ADNOC-COPV3-07	Indoor Air Quality and Indoor Environments
ADNOC-COPV3-08	Occupational Exposure Monitoring & Health Surveillance
ADNOC-COPV4-01	Framework of Occupational Safety Risk Management
ADNOC-COPV4-02	Work Equipment Risk Assessment and Control
ADNOC-COPV4-03	Fire Risk Assessment (FRA)
ADNOC-COPV4-04	Personal Protective Equipment
ADNOC-COPV4-05	Non-Routine Operations
ADNOC-COPV4-06	Essential Features of Road Transport Operations, Risk Assessment and Control
ADNOC-COPV4-07	Essential Features of Air Transport Operations, Risk Assessment and Control
ADNOC-COPV4-08	Essential Features of Marine Transport Operations, Risk Assessment and Control
ADNOC-COPV4-09	Diving Operations - Risk Assessment and Control
ADNOC-COPV4-10	Management of H_2S
ADNOC-COPV4-11	Road Safety
ADNOC-COPV4-12	Lifesaving Appliances at Offshore Installations
ADNOC-COPV4-13	Personal Protective Equipment in the Middle East Environment
ADNOC-COPV4-14	Code of Practice for Provision of fire equipment and services
ADNOC-COPV4-15	Technical Guidance on Selecting RPE for Facial Hair Wearers
ADNOC-COPV5-01	Control of Major Accident Hazards (COMAH)
ADNOC-COPV5-02	Incident and Crisis Management
ADNOC-COPV5-03	Risk Assessment & Comah Qualitative & Quantitative Risk Assessment (QRA)

ADNOC-COPV5-04	Outline HSE Design Philosophy for Major Hazard Plant and Equipment
ADNOC-COPV5-05	"Incident Command System
ADNOC-COPV5-06	HSE Risk Management
ADNOC-COPV6-01	Identification and Integrity Assurance of HSE Critical Equipment and Systems

ADNOC Offshore HSE Standards, Specifications, Procedures etc.

	ADNOC Approved Corporate Risk Matrix
	Unified Group-wide HSE Policy
	ADNOC group Standardised HSE Welfare and Medical Req in Contracts
	ADNOC Group COVID-19 Site Personnel Management and Precautionary_Measures Guidelines v11
	Return of ADNOC Personnel from Restricted Countries
GDL-004	HAZID Study
GDL-005	HAZOP Study
GDL-010	Incident Investigation
PRO-135	Procedure for Root Cause analysis
GR-001	General Requirements for Pressurized Habitats
SP-1004	Packaging and Labeling of Dangerous Substances
A0-HSE-E-PRO-301	Environmental Aspects Identification and Impact Assessment Procedure
A0-HSE-E-PRO-304	Environmental Monitoring Procedure
A0-HSE-H-PRO-301	Health Surveillance Procedure
A0-HSE-H-PRO-302	Radiation Management Procedure
A0-HSE-H-PRO-303	Heat Stress Management Procedure
A0-HSE-OS-PRO-302	Management of Contractors HSE & Welfare Procedure
A0-HSE-TS-PRO-301	PHA Review Procedure
A0-HSE-TS-PRO-302	HAZOP Procedure
A0-HSE-TS-PRO-304	FERA Procedure
A0-HSE-TS-PRO-305	EERA Procedure
A0-HSE-TS-PRO-306	ESSA Procedure
A0-HSE-TS-PRO-307	HSEIA Procedure

A0-HSE-TS-PRO-308	CFD Dispersion and Explosion Procedure
A0-HSE-TS-PRO-309	Procedure for PHSER
A0-HSE-TS-PRO-310	PSSR Procedure
A0-HSE-TS-PRO-311	SBRA Procedure
HSE POL- 100/A	ADMA-OPCO Facial Hair Policy
HSE - 102	Health, Safety, Environment Regulations
HSE - 105	HSE Audit Protocol
HSE - 108	Hearing Conservation Policy
HSE-110	Health, Safety & Environmental Management System
HSE - 113	Environment and Energy Management System (E&EnMS)
Z0000-PB-GEN-N-121	HSECES identification and PS procedure
HSE-203	ADMA-OPCO HSE Training Standard
HSE-204	Safety Standards for Use of Tripod for Man Lifting
HSE-205	Safety Standards for Man-Lifting Operations
HSE-206	General Appendix to Contracts Terms and Conditions Applicable To HSE Protections
HSE-207	HSE Philosophy and Plan For Projects
HSE-208	Criteria for Risk Tolerability
HSE-210	HSE Clauses in Tender Enquiries and Contract Documents
HSE-211	HSE Standards for Jack-up Barge Utilised for Rigless Well Intervention Operations
HSE-212	Waste Management Strategy & Plan
HSE-213	Minimum Standards for Labour Welfare
HSE-300	ERC Procedures
HSE-300A	Incident Command System (ICS) Manual
HSE-301	Umm Shaif Super Complex (USSC) Emergency Procedures
HSE-301A	USGIF Emergency Procedures
HSE-301B	Nasr Field Phase-1 Emergency Procedures
HSE-302	ZWSC Emergency Procedures
HSE-303	ZCSC Emergency Procedures
HSE-304	AL Hyleh Emergency Procedures

HSE-305	Das Island ADMA - ADGAS Joint Emergency Procedure
HSE-305A	Das Island Facility Response Plan Procedures
HSE-306	ADMA-OPCO / ADGAS Headquarters Joint Emergency Procedures
HSE-308	Area Classification Procedures
HSE-311	Procedure for Prevention and Recovery ofCompressed Gas Cylinders & Objects Dropped Into the Sea
HSE-312	Helicopter Emergency Medical Services (HEMS) Procedure
HSE-313A	Offshore Oil Spill Contingency Plan Volume 1- Strategy Plan
HSE-313B	Offshore Oil Spill Contingency Plan - Volume 2
HSE-314	Das Emergency Procedure
HSE-315	Safety and Emergency Procedures for US Gas Towers
HSE-316	Occupational Health Assessment Procedure
HSE-317	Oil Spill Response Plans Das Island
HSE-318	Safety and Emergency Procedures for Zakum Pilot Gas Injection Towers
HSE-319	PHSER Procedures
HSE-320	Blow-out Contingency Plan
HSE-321	Waste Disposal Manual - Das Island
HSE-322	Emergency Contact Number List and Updating Procedure
HSE-323	Permit to Work System Offshore Procedures
HSE-324	Permit To Work System Das Procedures
HSE-326	Effluent Sampling Procedure
HSE-327	Permit To Work Guidelines (Abu Dhabi Facilities)
HSE-329	Occupational Health Management Procedure
HSE-331	Authorization Procedures To Work On ADMA-OPCO Power Distribution Network
Addendum to HSE-331	Interim Authorization Procedure
HSE-332A	Procedure for the Preparation of the HSE&QA Weekly Report
HSE-332B	Procedure for The Preparation of The HSE&QA Monthly Report
HSE-334	HSEIA Report Development Procedure
HSE-335	Environmental Monitoring Plan
HSE-336	SARB Waste Management Plan and Procedures

HSE-337	INTERIM Earthquake Safety - Precautions & Procedures
HSE-338	Waste Management Procedure for ADMA-OPCO Headquarter
HSE-339	Permit to Work Procedures SARB Artificila Islands (North & South)
HSE-340	Permit to Work System Procedures Zirku Island
HSE-341	Aerodrome Emergency Service (AES) Manual of Das Airport
HSE-342	SARB Artificial Islands Traffic Management Plan (TMP)
HSE-344	Simultaneous Maintenance And Construction Operations On Live oil/water Wellhead Towers Procedures
HSE -345	SARB Artificial Islands Emergency Response Procedure
HSE-347	ADMA-OPCO CENTRAL CORE CENTER EMERGENCY RESPONSE PLAN
HSE-402	Guidelines on HSE Management System for Contractors
HSE-403	OHSAS 18002:2000 Occupational Health & Safety Management Systems Guidelines for the implementation of OHSAS 18001
HSE-404	HSE Champion of the Month / Year- Awarding Program Guidelines
HSE-405	Guidelines for Dispensations
HSE-406	Development of ADMA-OPCO HSE Risk Registers and Risk Register Peer Review Committee
HSE-407	Gas Release Incident Reporting
HSE-409	Guideline for HSE Leadership Site Visits
HSE-410	Guideline for Welfare Management
HSE-500	Umm Shaif Super Complex COMAH Report
HSE-501	Zakum West Super Complex Safety Case
HSE-501A	ZWSC HSE Critical Equipment & Systems (HSECES) Register
HSE-502	NDC Jack-up Drilling Rig SpecificSafety Case
HSE-503A	Das Island Safety Case For ADMA-OPCO Facilities
HSE-503B	ADGAS & ADMA-OPCO Joint Safety Case Report
HSE-503C	Das Island HSE Critical Equipment & Systems Register
HSE-504	Safety Case for Al-Hyleh
HSE-505	Zakum Central Supercomplex - COMAH Report
HSE-506	QRA Studies Suite for US Field
HSE-507	QRA Studies Suite for ZCSC

HSE-509	Zakum West Super Complex Quantitative Risk Assessment Study
HSE-510	SIMPOS Guidelines - SARB Artificial Island Simultaneous Operations Guidelines
A0-HSE-OS-GDL-402	Launching Lifeboats and Fast Rescue Crafts During Sea Trials/Drills Guidelines
A0-HSE-OS-GDL-403	Guidelines On Health and Safety Requirements For Travelling To Offshore Sites
A0-HSE-TS-GDL-401	Risk Assessment & Management System Guidelines
A0-HSE-PHSE-SI-001	Standing Instructions For Handling, Storage And Disposal Of Flexible Intermediate Bulk Containers
A0-HSE-PHSE-H-PRO-001	Incident Disease Outbreak Procedure –Projects
A0-HSE-PHSE-S-SP-001	Minimum Safety Expectations for Project Execution
A0-HSE- PHSE-S-PRO-001	Project safety plan
A0-HSE-PHSE-PRO-002	PROJECTS COMPLIANCE ASSURANCE PLAN
A0-HSE-PHSE-GDL-001	PROJECTS HSE INCIDENT NOTIFICATION GUIDE
A0-DR-P-GDL-001	ADNOC Offshore SIMOPS

Miscellaneous

----	UAE Labor law and its amendments
---	ADNOC Incident Management System - Field Guide
----	ADNOC Marine Oil Spill – Incident Response Plan
----	Ambient Air Quality Standards
----	FEA Regulation-Protection of Maritime Environment
-----	Federal Law No. (11) of 2006, regarding the amendment of some provisions of the Federal Law No. 24 of 1999, concerning the Environment Protection and Development.
------	LAW NO (24)- Protection & Development of the Environment
-------	Noise Allowable Limits In Different Areas
-------	UAE FEDERAL REGULATIONS LIST
MR-STD-02	OPCO Acceptance Standards for Marine vessels
A0-Q-PQ-SP-002	Spec. for requirements for Projects Contractor Quality System
MR-STD-01	OPCO Standing Instructions for Marine Operations
MSMS-05-JUIMS	OPCO Jack-Up Unit Integrity Management Standard
MSMS - 03 Rev. 4 20104	ADNOC OFFSHORE Acceptance Standards for Marine Contractors (ASMC)

A0-LOG-V-STD-001	Acceptance Standards for Marine Contractors
PX 2002B-LSV	Large Supply Vessel
PX 2002B-PSV	Platform Supply Vessel
PX 2003(A)-DSV	Dive Support for Subsea Maintenance of Pipelines & Structures (Interim Vessel)
PX 2005-PMSV	ZK Field Production Maintenance Vessel
PX 2006-FMMV	Field Mooring Maintenance Vessel
PX 2008-TSMV	Topside Maintenance Vessel
PX 2009-CB-US	Small Crew Boat -US
PX 2009-CB-ZK	Small Crew Boat -ZK
PX 2009-FCB	Fast Crew Boat
PX 2009-FS	Fast Intervention Support Vessel
PX 2011-AHTS	Anchor Handling Towing Supply Vessel
PX 2011-CV	Cargo Vessel
PX 2012B-RMT	Rig Move Tug
PX 2012-GPT	General Purpose Offshore Tug
PX 2014-TLB	Terminal Line Boat (Bateen Replacement)
PX 2017-PCV	Paint Contract Vessel
PX 2018-UV	Utiliy Vessel
PX 2022-MPSRMV	Umm shaif Field - Multi Purpose Standby Recue Maintenance Vessel
PX 2029-CB	In-Field Transportation Crew Boat
PX 2031-LC	Landing Craft
PX 2032-DSMV	Diving Support & Maintenance Vessel (Hamour Replacement)
PX-2001-SRV (US2)	Umm Shaif Field Standby Rescue Vessel
PX 2000-RMAT	Rig Move Assistance Tug
A0-IG-P-PRO-003	Procedure For Technical Pre-Qualification & Qualification of Protective Coating & Lining Systems
A0-IG-P-SP-001	Specification for Polypropylene Corrosion Protection Coating of Concrete Weight Coated Carbon Steel Line Pipe
A0-IG-P-SP-002	Specification for Field Joint of Polypropylene Corrosion Protection Coating of Concrete Weight Coated Carbon Steel Line Pipe

A0-IG-P-SP-003	Specification for Spun Hot Dip Galvanization & Polytetrafluoroethylene (PTFE) Coating of Nuts/Bolts and Fasteners
A0-IG-P-SP-004	Coating Specification for New & Existing Constructions of Offshore and Onshore Structures
A0-IG-P-SP-006	Specification For Thermal Insulation (Hot & Cold) of Piping & Equipment
A0-IG-P-SP-007	Specification For Passive Fire Protection
PRO-133-Part-1	Riser Repair By Composite Materials
PRO-133-Part-2	Riser Repair By Metallic Materials
SP-1019	Composite Repair (Material & Application)
SP-1040	Polychloroprene (Neoprene) Corrosion Protective Coating of Riser Pipes and Clamps
A0-IG-J-CP-001	Code of Practice For Inspection & Testing Requirements for New Equipment and Materials in Manufacture
A0-IG-J-PRO-001	Procedure for Quality Assurance/Quality Control for Workshop Refurbishment of Pressure Vessels, Heat Exchangers and Valves
PRO-131	In-house Routine Procedure for 3rd Party Inspection of Materials / Equipment
SP-1002	Preservation of New Materials & Equipment
CP-108	Minimum Recommended Spacing For Welded Connections
PRO-172	Mitigation of Risks Associated with Hydrogen Gas in Cavity of Structures
STD-103	Approval of Welding Procedures & Welders Performance
A0-IG-W-CP-001	Code of Practice For Symbols for Welding and Non-Destructive Testing
A0-IG-W-MNL-001	Welding Manual
A0-IG-W-SP-001	Specification for Welding, Inspection & Testing of Hot Tap Connections
A0-IG-W-SP-002	Specification for Preheat and Post Weld Heat Treatment of Ferrous Materials
A0-IG-W-SP-003	Specification for Pipeline Welding

TRANSCO Standards

This section provides a non-exhaustive list of Specifications to be used for TRANSCO equipment and systems. Please refer to the TRANSCO Supporting Documentation provided with the RFP for a complete overview of all TRANSCO Specifications.

Transco General Codes

-	The Electricity Transmission Code
-	Electricity Transmission System Security Standard
CD/C01/02	The Metering and Data Exchange Code

Transco General Work's specifications

S-GEN-CDF	Civil Design Fundamental
S-TR-GEN-EDF	EI Design Fundamental
S-TR-GEN-GDF	General Condition
S-TR-GEN-ID	Component Marking
S-TR-GEN-PSTS	Planning & Scheduling Tech Spec
S-TR-GEN-SFL	System Characteristics
S-TR-GEN-SQA	ANNEX-01-1
S-TR-GEN-SQA	Safety & Quality
S-TR-GEN-STC	Specification Technical Requirements

Transco HV Switchgear specifications

S-SWG-HV-BUSH	High Voltage Outdoor Bushing
S-SWG-HV-GEN	General Requirements
S-SWG-HV-SA	High Voltage Surge Arresters
S-SWG-HV-VTCT	Voltage and Current Transformers
S-TR-SWG-HV-GIS	High Voltage Gas Insulated Switchgear

Transco Transformers Reactor specifications

S-TR-TRAFO-GEN	General Requirements
S-TR-TRAFO-PTR	Power Transformers

S-TR-TRAFO-SHR	Shunt Reactor
S-TR-TRAFO-ATR-O-Type1	Auxiliary/Distribution Transformers
S-TR-TRAFO-ETR	Earthing Transformers
S-TR-TRAFO-ETR-WSW	Earthing Transformers (Special Size with Secondary windings)
S-TR-TRAFO-NER	Neutral Earthing Reactors
S-TR-TRAFO-RES	Earthing Resistor
S-TR-TRAFO-FDR-A	Filter and Damping Reactors
S-TR-TRAFO-FR-G	Filter Reactors

Transco Overhead Transmission specifications

S-TR-OHL-AIR	Aircraft Warning System
S-TR-OHL-CON	Conductor Earth wires
S-TR-OHL-GEN	General Specifications
S-TR-OHL-HW	Hardware and Fittings
S-TR-OHL-INS	Insulators
S-TR-OHL-OPGW	Optical Ground Wires
S-TR-OHL-SURV	Surveying Works
S-TR-OHL-TOWER	HV Towers of Lattice Steel Design

Transco Cable Work's specifications

S-TR-CAB-GEN	General Specification
S-CAB-INST-132	Installation requirements for 132kV Underground Power Cables
S-CAB-INST-220-400-TROUGH	Installation requirements for 220kV/400kV Underground Power Cables
S-CAB-INST-400-220-132-OCCPJMT	Installation requirements for 400kV/220KV/132KV Underground Power Cables
S-CAB-INST-CONT-FOC-OHTL	Installation requirements for Fibre Optic Cable
S-CAB-INST-CONT-FOC-GEN	Installation requirements for Control & Fibre Optic Cable
S-CAB-132-PEST7-I	132KV XLPE-Insulated single-core underground cables with PEST7 Outer Sheath
S-CAB-132-PEST7-S	132KV XLPE-Insulated single-core underground cables with PEST7 Outer Sheath

S-CAB-132-PVC-I	132KV XLPE-Insulated single-core underground cables with PVC Outer Sheath
S-CAB-132-PVC-S	132KV XLPE-Insulated single-core underground cables with PVC Outer Sheath
S-CAB-400-220-132-LSZH-S&I	400/220/132KV XLPE-Insulated single-core underground cables with LSZH Outer Sheath
S-CAB-400-PEST7-S&I	400KV XLPE-Insulated single-core underground cables with PEST7 Outer Sheath
S-CAB-400-PVC-S&I	400KV XLPE-Insulated single-core underground cables with PVC Outer Sheath
S-CAB-400-PVC-S&I-LS	400KV XLPE-Insulated single-core underground cables with PVC Outer Sheath
S-CAB-400-PVC-S&I-TUNNEL	400KV XLPE-Insulated single-core underground cables with PVC Outer Sheath
S-TR-CAB-COAX	CO AXAIL Cables
S-TR-CAB-CONT	Control Signal Cables
S-TR-CAB-FOC	Fibre Optic Underground Cables
S-TR-CAB-LV-MC-S&I	LV XLPE-Insulated Multi Core Underground cables
S-TR-CAB-LV-SC-S&I	LV XLPE-Insulated Single Core Underground cables
S-TR-CAB-PROT-TEL	17 Pairs Protection/Telephone Underground Cables
S-CAB-ACC-132	132KV XLPE Insulated Underground Cable Accessories
S-CAB-ACC-400	400KV XLPE Insulated Underground Cable Accessories
S-TR-CAB-ACC-CLEAT-UG	Cable Cleats for Underground Cables
S-TR-CAB-ACC-DTS	Distributed Temperature Sensor
S-TR-CAB-ACC-FOC	Fibre Optic Cables
S-TR-CAB-ACC-LV-I	LV XLPE Insulated Underground Cable Accessories
S-TR-CAB-ACC-PROT-TEL	17 Pairs Protection/Telephone Underground Cables
S-CAB-MAR-INST-132-3C	Installation Requirements for 132KV three core submarine cables
S-CAB-MAR-INST-132-SC	Installation Requirements for 132KV Single core submarine cables
S-TR-CAB-MAR-INST-FOC-PROT-TEL	Fibre Optic and Protection/Telephone Submarine Cables
S-CAB-MAR-132-XLPE-3C-DRY	132KV XLPE Insulated three Core submarine cables (DRY)
S-CAB-MAR-132-XLPE-3C-WET	132KV XLPE Insulated three Core submarine cables (WET)
S-CAB-MAR-132-XLPE-3C-SC	132KV XLPE Insulated Single Core submarine cables
S-TR-CAB-MAR-FOC	Fibre Optic Submarine Cables

S-TR-CAB-MAR-PROT-TEL	17 Pairs Protection/Telephone Underground Cables
S-CAB-MAR-ACC-132-XLPE	132KV XLPE Insulated submarine cable accessories
S-CAB-MAR-ACC-132-CLEAT	Cable Cleats for Submarine Cables
S-CAB-MAR-ACC-132-FOC	Fibre Optics Submarine Cables
S-CAB-MAR-ACC-PROT-TEL	17 Pairs Protection/Telephone Underground Cables

Transco Power Compensation specifications

S-POC-SVC-CONT-PROT	Control, Supervision and Protection
S-POC-SVC-COOL	Cooling System for SVC
S-POC-SVC-GEN	General Requirements
S-POC-SVC-LOSS	Capitalisation of SVC Losses
S-POC-SVC-MVD	MVD Bus Ducts for SVC
S-POC-SVC-STUDY	Design Studies
S-POC-SVC-THYR	Thyristor Valves
S-TR-POC-GEN	General Requirements

Transco LV & SS AUX specifications

S-TR-AUX-110&48-DC-BOARD	110V & 48V DC Distribution Boards
S-TR-AUX-BAT&CH-LEAD-48-D	48V Batteries and Chargers, Dual Configuration
S-TR-AUX-BAT&CH-LEAD-48-S	48V Batteries and Chargers, Single Configuration
S-TR-AUX-BAT&CH-LEAD-110-D	110V Batteries and Chargers, Dual Configuration
S-TR-AUX-BAT&CH-LEAD-110-S	110V Batteries and Chargers, Single Configuration
S-TR-AUX-BAT&CH-NiCad-48-D	48V Batteries (NiCad) and Chargers, Dual Configuration
S-TR-AUX-BAT&CH-NiCad-48-S	48V Batteries (NiCad) and Chargers, Single Configuration
S-TR-AUX-BAT&CH-NiCad-110-D	110V Batteries (NiCad) and Chargers, Dual Configuration

S-TR-AUX-BAT&CH-NiCad-110-S	110V Batteries (NiCad) and Chargers, Single Configuration
S-TR-AUX-EMG	Emergency Standby Diesel Generators
S-TR-AUX-GEN	General Requirements
S-TR-AUX-LV-AC-BOARD	Station LV AC Distribution Boards
S-TR-AUX-UPS	Uninterruptible Power Supply
S-TR-STRL	Street Lighting Poles Including Accessories
S-TR-STRL-CUB	Street Lighting Control Cubicles

Transco Control Protection Supervision specifications

S-TR-CPS-FMS	Fault Monitoring System
S-TR-CPS-GEN	General Requirements
S-TR-CPS-HV-PROT	HV Substation Protection Schemes
S-TR-CPS-PSMS	Power System Monitoring Scheme
S-TR-CPS-SCMS	Substation control & Monitoring System
S-TR-CUB	Cubicles, marshalling boxes & Enclosure

Transco Metering specifications

S-TR-MET-AI	Analogue Indicating Instruments
S-TR-MET-CAL-BENCH	Stationary Calibration Bench for Meter
S-TR-MET-CAL-PORT	Portable Accuracy check Set For Meter
S-TR-MET-DI	Digital Indication Instruments
S-TR-MET-EMM-1P	Single Phase LV Operated Electro – Mechanical Energy Units
S-TR-MET-EMM-3PCT	Three Phase LV CT Operated Electro – Mechanical Energy Meters
S-TR-MET-EMM-3PWC	Three Phase LV Whole Current Operated Electro – Mechanical Energy Meters
S-TR-MET-GEN	General Requirements
S-TR-MET-PREPAID-KP	Prepayment Energy Metering System
S-TR-MET-PREPAID-SC	Prepayment Energy Metering System
S-TR-MET-STEM-CT-1P-1	One – Phase CT operated static energy meters
S-TR-MET-STEM-CT-3P-0.2S	Three Phase CT Operated Static Energy Meters

S-TR-MET-STEM-CT-3P-0.5S	Three Phase CT Operated Static Energy Meters (0.5S)
S-TR-MET-STEM-CT-3P-1	Three Phase CT Operated Static Energy Meters(1)
S-TR-MET-STEM-DC-1P-1	Single Phase Direct Current Static Energy Meters
S-TR-MET-STEM-DC-3P-1	Three Phase Direct Current Static Energy Meters
S-TR-MET-TRAD	Electric Measuring Transducers
S-TR-MET-VTCT	Voltage and Current Transformers for Energy Meters

Transco ICS Cyber Security

-	TRANSCO Cybersecurity Requirements for ICS
NESA UAEIA	UAE Information Assurance Standards
NIST 800-82 rev2	Guide to Industrial Control Systems (ICS) Security
NERC –CIP	Critical Infrastructure Protection
IEC 62443	Cyber security standards

Transco Communication specifications

S-TR-COM-DPLC	Digital Power Line Carrier
S-TR-COM-AF-MUX	Audio Frequency Multiplex Equipment
S-TR-COM-ALM	Alarm Equipment System
S-TR-COM-CCTV	Closed Circuit Television
S-TR-COM-GEN	General Requirements
S-TR-COM-LMS	Load Management Systems
S-TR-COM-OPT-SDH	Synchronous Digital Hierarchy
S-TR-COM-PCM	Pulse Code Modulation
S-TR-COM-PSE	Protection Signalling Equipment
S-TR-COM-RTU	Remote Terminal Unit
S-TR-COM-TELE	Telephone Equipment / Systems

Transco Earthing Corrosion specifications

S-TR-CORR	Corrosion Protection
S-TR-EARTH-GROUND	Earthing/Grounding Systems

S-TR-EARTH-LIGHTNING-GEN	General Requirements
S-TR-EARTH-LIGHTNING	Lightning Protection

Transco Fire Fighting specifications

S-TR-FIF	Fire Protection System

Transco Electro Mechanical specifications

S-INST-GEN	General Requirements
S-TR-ELEMS-CRANE	Gantry Crane
S-TR-ELEMS-GEN	General Requirements
S-TR-ELMS-HVAC+VENT	Air Conditioning and Ventilation
S-TR-ELMS-LIFT	Lifts (Elevators)

Transco civil works specifications

S-TR-CIVIL-BUILD	Substation and Buildings
S-TR-CIVIL-CAB	Civil Works for Underground Cables
S-TR-CIVIL-CONCRETE	Concrete and Reinforced Concrete
S-TR-CIVIL-DRAIN	Drainage Work
S-TR-CIVIL-FENCE	Security Fencing
S-TR-CIVIL-FINISH	Finishing Schedule
S-TR-CIVIL-GEN	General Requirements
S-TR-CIVIL-LIGHT	Lighting and other Electrical Installations in Electrical Rooms
S-TR-CIVIL-MAS	Masonry
S-TR-CIVIL-METAL	Metal Work
S-TR-CIVIL-OHL	Civil Works for Overhead Transmission/Distribution Lines
S-TR-CIVIL-ROAD	Roads and Pavements
S-TR-CIVIL-SAN	Plumbing and Sanitary Installation
S-TR-CIVIL-SITE	Site Installation
S-TR-CIVIL-SOIL	Soil Investigation
S-TR-CIVIL-STEEL	Structural Steel Work

S-TR-CIVIL-SURF	Surface Protection
S-TR-CIVIL-WORK	Civil Construction Works

TRANSCO Data Sheet

This section provides a non-exhaustive list of data sheets to be used for TRANSCO equipment and systems. Please refer to the TRANSCO Supporting Documentation provided with the RFP for a complete overview of all TRANSCO Data Sheets, Drawings and Photos.

Transco HV Switchgear Data Sheets

D-SWG-HV-GIS-CB-132	132 kV GIS Circuit Breaker
D-SWG-HV-GIS-CB-220	220 kV GIS Circuit Breaker
D-SWG-HV-GIS-CB-400	400 kV GIS Circuit Breaker
D-TR-SWG-HV-BUSH-132-POL	132 kV Outdoor Bushing
D-TR-SWG-HV-BUSH-220-POL	220 kV Outdoor Bushing
D-TR-SWG-HV-BUSH-400-POL	400 kV Outdoor Bushing
D-TR-SWG-HV-GIS-132x2.5	132 kV GIS 2500A
D-TR-SWG-HV-GIS-132x3.15	132 kV GIS 3150A
D-TR-SWG-HV-GIS-220	220 kV GIS
D-TR-SWG-HV-GIS-400	400 kV GIS
D-TR-SWG-HV-SA-132	132 kV Surge Arrester
D-TR-SWG-HV-SA-220	220 kV Surge Arrester
D-TR-SWG-HV-SA-400	400 kV Surge Arrester
D-TR-SWG-HV-VTCT-CT	HV CT
D-TR-SWG-HV-VTCT-VT	HV VT

Transco Metering Devices Data Sheets

D-TR-MET-AI	Analogue Indicating Instruments
D-TR-MET-CAL-BENCH	Stationary Calibration Bench for Meter
D-TR-MET-CAL-PORT	Portable Accuracy Check Set for Meter

D-TR-MET-DI	Digital Indicating Instruments
D-TR-MET-EMM-1P	Single-Phase LV Operated Electro-Mechanical Energy Meters
D-TR-MET-EMM-3PCT	Three-Phase LV CT Operated Electro-Mechanical Energy Meters
D-TR-MET-EMM-3PWC	Three-Phase LV Whole Current Operated Electro-Mechanical Energy Meters
D-TR-MET-PREPAID-KP	Prepayment Energy Metering System (Key-Pad)
D-TR-MET-PREPAID-SC	Prepayment Energy Metering System (Smart-Card)
D-TR-MET-STEM-CT-1P-1	One-Phase CT Operated Static Energy Meter Class 1
D-TR-MET-STEM-CT-3P-0.2S	Three-Phase CT Operated Static Energy Meter Class 0.2S
D-TR-MET-STEM-CT-3P-0.5S	Three-Phase CT Operated Static Energy Meter Class 0.5S
D-TR-MET-STEM-CT-3P-1	Three-Phase CT Operated Static Energy Meter Class 1
D-TR-MET-STEM-DC-1P-1	Single-Phase Direct Connected Static Energy Meter Class 1
D-TR-MET-STEM-DC-3P-1	Three-Phase Direct Connected Static Energy Meter Class 1
D-TR-MET-TRAD	Electric Measuring Transducers
D-TR-MET-VTCT-CT	Current Transformers for Energy Meters
D-TR-MET-VTCT-VT	Voltage Transformers for Energy Meters

Transco Communication Data Sheets

D-COM-DPLC	Digital Power Line Carrier
D-TR-COM-AF-MUX	Audio Frequency Multiplex Equipment (AF-MUX)
D-TR-COM-ALM	Alarm Equipment / Systems
D-TR-COM-CCTV	Closed Circuit Television (CCTV)
D-TR-COM-LMS	Load Management Systems (LMS)
D-TR-COM-OPT-SDH	Synchronise Digital Hierarchy (SDH) Optical Line Terminal Equipment
D-TR-COM-PCM	Pulse Code Modulation Multiplex Optical Equipment (PCM)
D-TR-COM-PCM	Pulse Code Modulation Multiplex Optical Equipment (PCM)
D-TR-COM-PSE	Protection Signalling Equipment (PSE)
D-TR-COM-TELE	Telephone Equipment / Systems

Transco Electro-Mechanical Data Sheets

D-TR-FIF	Fire Fighting System

D-TR-ELMS-CRANE	Gantry Crane
D-TR-ELMS-HVAC+VENT	Air-Conditioning and Ventilation Systems
D-TR-ELMS-LIFT	Lifts (Elevators)

Transco Civil Data Sheets

D-TR-CIV-CAB-HDD	Horicontal Directional Drilling (HDD)
D-TR-CIVIL-LIGHT	Lighting and other Electrical Installations in Substations

Transco LV & SS AUX Data Sheets

D-TR-AUX-110V-DC-BOARD	Station 48 V DC Distribution Board
D-TR-AUX-48V-DC-BOARD	Station 110 V DC Distribution Board
D-TR-AUX-BAT&CH-LEAD-110-D	110 V Batteries (Lead Acid) and Chargers, Dual Configuration
D-TR-AUX-BAT&CH-LEAD-48-D	48 V Batteries (Lead Acid) and Chargers, Dual Configuration
D-TR-AUX-BAT&CH-LEAD-48-S	48 V Battery (Lead Acid) and Charger, Single Configuration
D-TR-AUX-BAT&CH-NiCad-110-D	110 V Batteries (NiCad) and Chargers, Dual Configuration
D-TR-AUX-BAT&CH-NiCad-48-D	48 V Batteries (NiCad) and Chargers, Dual Configuration
D-TR-AUX-BAT&CH-NiCad-48-S	48 V Battery (NiCad) and Charger, Single Configuration
D-TR-AUX-EMG	Emergency Stand-by Diesel Generator Unit
D-TR-AUX-LV-AC-BOARD	Station LV AC Distribution Boards
D-TR-AUX-UPS	Uninterruptible Power Supply (UPS)
D-TR-STRL-10	10 m Height Street Lighting Poles including Accessories
D-TR-STRL-14	14 m Height Street Lighting Poles including Accessories
D-TR-STRL-18	18 m Height Street Lighting Poles including Accessories
D-TR-STRL-20	20 m Height Street Lighting Poles including Accessories
D-TR-STRL-305	30.5 m Height Street Lighting Poles including Accessories
D-TR-STRL-CUB-TYPEA	Street Lighting Control Cubicle (Type A)
D-TR-STRL-CUB-TYPEB	Street Lighting Control Cubicle (Type B)

Transco Control Protection Supervision Data Sheets

D-CPS-HV-PROT	(E)HV Substation Protection Schemes

D-TR-CPS-FMS	Fault Monitoring System (FMS)
D-TR-CPS-RTU	Remote Terminal Unit (RTU)
D-TR-CPS-SCMS	Substation Control & Monitoring System (SCMS)
D-TR-CUB	

Panels, Cubicles, Marshalling Boxes & Enclosures

Transco Earthing Data Sheets

D-TR-EARTH-GROUND	Earthing/Grounding System

Transco Cables Data Sheets

D-CAB-132-PEST7-1000	132 kV XLPE-Insulated Single-Core Underground Cables 1x1000mm2
D-CAB-132-PEST7-1200	132 kV XLPE-Insulated Single-Core Underground Cables 1x1200mm2
D-CAB-132-PEST7-1600	132 kV XLPE-Insulated Single-Core Underground Cables 1x1600mm2
D-CAB-132-PEST7-240	132 kV XLPE-Insulated Single-Core Underground Cables 1x240mm2
D-CAB-132-PEST7-300	132 kV XLPE-Insulated Single-Core Underground Cables 1x300mm2
D-CAB-132-PEST7-500	132 kV XLPE-Insulated Single-Core Underground Cables 1x500mm2
D-CAB-132-PEST7-800	132 kV XLPE-Insulated Single-Core Underground Cables 1x800mm2
D-CAB-220-PEST7-1200	220 kV XLPE-Insulated Single-Core Underground Cables 1x1200mm2
D-CAB-220-PEST7-1600	220 kV XLPE-Insulated Single-Core Underground Cables 1x1600mm2
D-CAB-400-PEST7-1000	400 kV XLPE-Insulated Single-Core Underground Cables 1x1000mm2
D-CAB-400-PEST7-1600	400 kV XLPE-Insulated Single-Core Underground Cables 1x1600mm2
D-CAB-400-PEST7-2500	400 kV XLPE-Insulated Single-Core Underground Cables 1x2500mm2
D-CAB-400-PEST7-500	400 kV XLPE-Insulated Single-Core Underground Cables 1x500mm2
D-CAB-400-PEST7-630	400 kV XLPE-Insulated Single-Core Underground Cables 1x630mm2
D-CAB-400-PEST7-800	400 kV XLPE-Insulated Single-Core Underground Cables 1x800mm2
D-CAB-COAX-PLC	Coaxial Cable for PLC
D-TR-CAB-11-3C	11 kV XLPE-Insulated Three-Core
D-TR-CAB-11-SC	11 kV XLPE-Insulated Single-Core
D-TR-CAB-22-3C	22 kV XLPE-Insulated Three-Core
D-TR-CAB-22-SC	22 kV XLPE-Insulated Single-Core

D-TR-CAB-33-3C	33 kV XLPE-Insulated Three-Core
D-TR-CAB-33-SC	33 kV XLPE-Insulated Single-Core
D-TR-CAB-COAX-CCTV	Coaxial Cable for CCTV
D-TR-CAB-CONT	Control Cables without Armouring (for different types)
D-TR-CAB-CONT-STA	Control Cables with Steel Tape Armouring (for different types)
D-TR-CAB-CONT-SWA	Control Cables with Steel Wire Armouring (for different types)
D-TR-CAB-LV-BCT	LV XLPE-Insulated Two-Core Underground Cables (for different types in Trench)
D-TR-CAB-LV-DB	LV XLPE-Insulated Two-Core Underground Cables (for different types directly buried)
D-TR-CAB-PROT-TEL	17 Pairs Protection/Telephone
D-CAB-ACC-132	132kV Cable Accessories
D-CAB-ACC-220	220 Cable Accessories
D-CAB-ACC-400	400kV Cable Accessories
D-TR-CAB-ACC-FOC	FO Cable Accessories
D-TR-CAB-ACC-LV	LV Cable Accessories
D-TR-CAB-ACC-PROT-TEL	17 Pairs Protection/Telephone Cable Accessories

International Electro - Technical Commission (IEC)

IEC 60034	Rotating Electrical Machines
IEC 60038	IEC Standard Voltages
IEC 60072	Dimensions and Output Ratings for Rotating Electrical Machines
IEC 60071	Insulation Co-ordination
IEC 60076	Power Transformers
IEC 60079	Electrical Apparatus for Explosive Gas Atmosphere
IEC 60092	Electrical Installations in Ships
IEC 60227	Polyvinyl chloride insulated cables of rated voltages up to including 450/750V
IEC 60228	Conductors of Insulated Cables
IEC 60229	Test on Extruded Over-sheaths Which Have Special Protection Functions
IEC 60255	Electrical Relays

IEC 60287	Electrical Cables – Calculation of the Current Rating
IEC 60331	Fire-resisting Characteristics of Electric Cables
IEC 60332	Tests on Electric Cables Under Fire Conditions
IEC 60298	AC Switchgear and Control Gear (1kV up to 72.5 kV)
IEC 60417	Graphical Symbols for Use of Equipment
IEC 60502	Power Cables 1kV thru 30 kV
IEC 60529	Degree of Protection Provided by Enclosures
IEC 61000	Electromagnetic Compatibility (EMC)
IEC 60694	Common Specifications for HV Switchgear and Control Gear
IEC 60947	Low Voltage Switchgear and Control Gear
IEC 60840	Power Cables with Extruded Insulation and their Accessories
IEC 61892	Mobile and Fixed Offshore Units – Electrical Installations
IEC60909	Short Circuit Currents in Three Phase System
IEC 62271	HV and Control Switchgear
IEC 62305-2	Part 2: Risk Management Protection Against Lightning
IEC 9000	Quality Management and Quality Assurance Standards
IEC 9001	Quality Systems - Model for Quality Assurance in Design/Development, Production, Installation and Servicing
IEC 60364	Low Voltage Electrical Installations
IEC 60870	Telecontrol Equipment and Systems
IEC 61131	Programmable Controllers
IEC 61508	Functional Safety Of Electrical/ Electronic /Programmable Electronic Safety Related Systems
IEC 61511	Functional Safety-Safety Instrumented Systems for Process Industry Sector
IEC 61850	Communication Networks and Systems

NFPA

NFPA 1	Fire Code
NFPA 10	Standard for Portable Fire Extinguishers
NFPA 11	Standard for Low-, Medium-, and High-Expansion Foam
NFPA 11A	Standard for Medium- and High-Expansion Foam Systems

NFPA 11C	Standard for Mobile Foam Apparatus
NFPA 12	Standard on Carbon Dioxide Extinguishing Systems
NFPA 13	Standard for the Installation of Sprinkler Systems
NFPA 14	Standard for the Installation of Standpipes and Hose Systems
NFPA 15	Standard for Water Spray Fixed Systems for Fire Protection
NFPA 16	Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems
NFPA 17	Standard for Dry Chemical Extinguishing Systems
NFPA 17A	Standard for Wet Chemical Extinguishing Systems
NFPA 20	Standard for the Installation of Stationary Pumps for Fire Protection
NFPA 22	Standard for Water Tanks for Private Fire Protection
NFPA 24	Standard for the Installation of Private Fire Service Mains and Their Appurtenances
NFPA 25	Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems
NFPA 30	Flammable and Combustible Liquids Code
NFPA 54	National Fuel Gas Code
NFPA 55	Compressed Gases and Cryogenic Fluids Code
NFPA 57	Liquefied Natural Gas (LNG) Vehicular Fuel Systems Code
NFPA 58	Liquefied Petroleum Gas Code
NFPA 59	Utility LP-Gas Plant Code
NFPA 59A	Standard for the Production, Storage, and Handling of Liquefied Natural Gas (LNG)
NFPA 68	Standard on Explosion Protection by Deflagration Venting
NFPA 69	Standard on Explosion Prevention Systems
NFPA 70	National Electrical Code
NFPA 72	National Fire Alarm and Signalling Code
NFPA 77	Recommended Practice on Static Electricity
NFPA 80	Standard for Fire Doors and Other Opening Protectives
NFPA 82	Standard on Incinerators and Was te and Linen Handling Systems and Equipment
NFPA 85	Boiler and Combustion Systems Hazards Code
NFPA 86	Standard for Ovens and Furnaces
NFPA 87	Recommended Practice for Fluid Heaters

NFPA 92	Standard for Smoke Management Sys tems
NFPA 101	Life Safety Code
NFPA 110	Standard for Emergency and Standby Power Systems
NFPA 251	Standard Methods of Tests of Fire Resistance of Building Construction and Materials
NFPA 303	Fire Protection Standard for Marinas and Boatyards
NFPA 306	Standard for the Control of Gas Hazards on Vessels
NFPA 307	Standard for the Construction and Fire Protection of Marine Terminals, Piers, and Wharves
NFPA 400	Hazardous Materials Code
NFPA 402	Guide for Aircraft Rescue and Fire-Fighting Operations
NFPA 407	Standard for Aircraft Fuel Servicing
NFPA 408	Standard for Aircraft Hand Portable Fire Extinguishers
NFPA 409	Standard on Aircraft Hangars
NFPA 496	Standard for purged and pressurised enclosure for electrical equipment
NFPA 497	Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas
NFPA 499	Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas
NFPA 551	Guide for the Evaluation of Fire Risk assessments
NFPA 654	Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids
NFPA 655	Standard for Prevention of Sulfur Fires and Explosions
NFPA 750	Standard on Water Mist Fire Protection Systems
NFPA 780	Standard for the Installation of Lightning Protection Systems
NFPA 801	Standard for Fire Protection for Facilities Handling Radioactive Materials
NFPA 850	Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations
NFPA 1851	Standard on Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting
NFPA 1852	Standard on Selection, Care, and Maintenance of Open-Circuit Self-Contained Breathing Apparatus (SCBA)

NFPA 1901	Standard for Automotive Fire Apparatus
NFPA 1964	Standard for Spray Nozzles
NFPA 1981	Standard on Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services
NFPA 2001	Standard on Clean Agent Fire Extinguishing Systems
NFPA 2010	Standard for Fixed Aerosol Fire-Extinguishing Systems
NFPA 8506	Standard on Heat Recovery Steam Generator Systems

Institute of Electrical and Electronic Engineers (IEEE)

IEEE80	*********
IEEE 141	IEEE Recommended Practice for Electric Power Distribution for Industrial Plants
IEEE 242	IEEE Recommended Practice for Protection and Coordination of Industrial and Commercial Power System
IEEE 399	IEEE Recommended Practice for Industrial and Commercial Power System Analysis
IEEE 525	Guide for the Design and Installation of Cable systems in Substations
IEEE 1100	Recommended Practice for Powering & Grounding Electronic Equipment, The Emerald Book
IEEE SI 10	Standard for Metric Practice

International Society of Automation

ISA 5.1	Instrument Symbols and Identification
ISA 5.2	Binary Logic Diagrams for Process Operations
ISA 5.3	Instrumentation, Logic and Computer Systems

International Organization for Standardization (ISO)

ISO 9000/9001	Quality Management Systems
ISO 80000-1	Quantities and Units
ISO 13628-5	Petroleum and natural gas industries – Design and operation of subsea production systems part 5
ISO 3046 Part 1 to 5	Reciprocating Internal Combustion Engines
BS EN ISO 5167-1	Measurement of fluid flow by means of pressure differential devices - Part 1: Orifice plates, nozzles and Venturi tubes inserted in circular cross-section conduits running full

ISO 13628-5	Petroleum and natural gas industries - Design and operation of subsea production systems Part 5: Subsea umbilicals

NEMA Standards

NEMA 250	Enclosures for Electrical Equipment
NEMA ICS6	Enclosures for Electrical Equipment
NEMA VE1 and VE2	

ASME

ASME B 20.1	Pipe Threads General Purpose (Inch)
ASME B 16.5	Steel Pipe Flanges and Flanged Fittings. NPS 1/2 through NPS 24
ASME B 16.10	Face-to-Face and End-to-End Dimensions of Valves
ASME B 16.25	Butt Welding Ends
ASME B 16.34	Valves - Flanged, Threaded and Welding End
ASME B 16.36	Orifice Flanges
ASME B 31.1	Power Piping
ASME B 36.10	Welded and Seamless Wrought Steel Pipe
ASME Section V	Non-Destructive Examinations
ASME SEC VIII	Boiler and Pressure Vessel Code
ASME PTC 19.3	Instrument and apparatus for temperature measurement

ASHRAE

ASHRAE Handbooks	Fundamentals, HVAC Systems and Equipment, HVAC Application
ASHRAE 55	Thermal Environmental Conditions for Human Occupancy
ASHRAE 62.1	Ventilation for Acceptable Indoor Air Quality

DNVGL Standards

DNVGL-RP-F109	On-Bottom Stability Design of Submarine Pipelines
DNVGL-RP-F105	Free spanning pipelines
DNVGL-RP-C205	Environmental Conditions and Environmental Loads

DNVGL-RP-F107	Risk Assessment of Pipeline Protection.
DNVGL-RP-0360	Subsea power cables in shallow water
DNVGL-RP-B401	Cathodic Protection Design
DNVGL-RP-C205	Environmental Conditions and Environmental Loads
DNV-RP-B401	Cathodic Protection Design

API

API 6FA	Specification for Fire Test for Valves
API 598	Valve Inspection and Testing
API 607	Fire Test for Soft Seated Quarter-turn Valves
API 2000	Venting Atmospheric and Low-Pressure Storage Tanks
API RP 2A-WSD	Recommended Practice for Planning, Designing and Constructing Fixed Offshore Platforms – Working Stress Design, 22nd Edition
API SPEC 5L	Specification for Line Pipe
API SPEC 2H	Specification for Carbon Manganese Steel Plate for Offshore Structures
API SPEC 2W	Specification for Steel Plates for Offshore Structures
API SPEC 17E	Specification for Subsea Umbilicals
API RP 551	Process Measurement Instrumentation
API Spec 2B	Specification for the Fabrication of Structural Steel Pipe
API STD 670	Machinery Protection Systems
API 610	Centrifugal Pumps for Petroleum, Petrochemical and Natural Gas Industries
API 611	General-Purpose Steam Turbines for Petroleum, Chemical, and Gas Industry Services
API 612	Petroleum, Petrochemical and Natural Gas Industries – Steam Turbines – Special – Purpose Applications
API 613	Special Purpose Gear Units for Petroleum, Chemical and Gas Industry Services
API 614	Lubrication, Shaft Sealing and Oil control Systems and Auxiliaries
API 617	Axial and Centrifugal Compressors and Expander-compressors for Petroleum, Chemical and Gas Industry Services
API 616	Gas Turbines for Petroleum, Chemical and Gas Industry Services
API 671	Special Purpose Couplings for Petroleum, Chemical and Gas Industry Services
API 676	Positive Displacement Pumps- Rotary

API 677	General Purpose Gear Units for Petroleum, Chemical, and Gas Industry Services
API 682	Pump Shaft Sealing Systems for Centrifugal and Rotary Pumps
API 520	Sizing, selection, and installation of pressure relieving devices in refineries; Part 1: Sizing and selection; Part 2: Installation
API 521	Pressure-relieving and Depressuring Systems
API 526	Flanged Steel Pressure Relief Valves

HSE Codes and Standards – UAE Standards and Regulations

The following UAE regulations shall apply:

Abu Dhabi Emirate Law No.8 of 1978, Conservation of Petroleum Resources;

UAE Fire and Safety Code of Practice – Latest Edition

UAE Federal Law No. 8 of 1980, for the Regulation of Labour Relations and its amendments Law No (24) of 1981, Law No (15) of 1985 and Law No (12) of 1986;

Ministry of Labour and Social Affairs, Ministerial Order No. 32 of 1982, for the Determination of the Ways and Means to Protect Employees against Occupational Hazards;

UAE Federal Law No. 24 of1999, for the Protection and Development of the Environment;

Executive Order of the Federal Law No. 24 of 1999 on the Protection and Development of the Environment for the UAE;

Federal Law No. 1 of 2002 Regarding Organization and Monitoring the Use of Radiation and Protection;

Cabinet Resolution No (12) of 2006 on the Protection of Air from Pollution;

Federal Law No (23) of 1999 for the Protection of Water Resources (living aquatic resources, including marine)

Federal Law No (37) of 2001 for Water Discharge Standards

Federal Law No No (21) of 2005 for waste management in the Abu Dhabi Emirate

Federal Law No No (6) of 2006 concerning organization of drilling of groundwater wells

EAD technical guidance document TG0003R Standards and limits for pollution to air and marine environments, occupational exposure, pesticides and chemical use (2003).

Regulation for the Protection of Air from Pollution developed by Federal Environment Authority based on The Executive Act of federal Law No 24, year 1999, "Protection and Development of the Environment

Ministerial Decree No.37 of 2001 (protection of the Marine Environment) of the Federal Law No 24 of 1999 "Protection and Development of the Environment" regarding Treated Industrial Wastewater at point of discharge to Sea.

Environment Health and Safety

The UAE is signatory to a number of international environmental treaties and agreements as listed below;

MARPOL (London Convention 1972) controlling marine pollution through dumping of wastes and other matter	1974
Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (LDC) (1972)	1974
Kuwait Regional Convention for Co-operation on the Protection of the Marine Environment from Pollution (ROPME) (1978)	1979
United Nations Convention on the Law of the Sea (1982)	1982
Convention on the Conservation of Migratory Species of Wild Animals (also known as CMS or Bonn Convention)(1979)	Participating but not yet Party to
International Convention on Civil Liability for Oil Pollution Damage (CLC) (1969)	1983
International Convention for the Safety of Life at Sea (SOLAS) (1974)	1983
International Convention for the Prevention of Pollution of the Sea by Oil (1954 and its amendments)	1983
International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Causalities (INTERVENTION) (1969)	1983
The Vienna Convention on Substances that Deplete the Ozone Layer (Vienna 1985) and the Montreal Protocol (1987) control the use of certain ozone depleting chemicals	1989/1990
Basel Convention (1989) regulating the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal	1990
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (1973)	1990
The UN Framework Convention on Climate Change (Rio de Janeiro 1992)	1995
1992 Protocol Concerning Amendments on International Convention on Civil Liability for Oil Pollution Damage (CLC) (1969) and International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (1971)	1997
Convention on Limitation of Liability for Maritime Claims (LLMC) (1976)	1997
United Nations Convention to Combat Desertification (1994)	1998
The Convention on Biological Diversity (1992)	2000
Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (PIC Convention) (1998)	2002
Convention on Persistent Organic Pollutants (POPS) (2001)	2002
Kyoto /Protocol (1997) setting specific targets for greenhouse gas reductions	2005
Montreal Amendments (London 1990, Copenhagen 1992, Montreal 1997, Beijing 1999)	2005
The Equator Principles III	2013

World Bank/International Finance Corporation (IFC) Performance Standards on Environmental and Social Sustainability	2012
World Bank/IFC Environmental Health and Safety (EHS) General Guidelines	2007
World Bank/IFC EHS Guidelines - Thermal Power Plants	2008
World Bank/IFC EHS Guidelines - Electric Power Transmission and Distribution	2007
World Bank/IFC EHS Guidelines - Offshore Oil and Gas Development	2007
International Petroleum Industry Environmental Conservation Association (IPIECA) guidelines	

Miscellaneous Standards

AASHTO	Guide for Design of Pavement Structures
ACI 301	Specifications for Structural Concrete for Buildings
ACI 318M	Building Code Requirements for Reinforced Concrete
AISC	American Institute of Steel Construction, 13th Edition
ANSI/AWS D1.1	Structural Welding Code – Steel - American Welding Society
ASCE	Design of Steel Structures
ASCE 7	Minimum Design Loads for Buildings and Other Structures
ASTM C150	Standard Specification for Portland Cement
ATEX	EU Equipment Directive 94/95. Equipment and protective systems intended for use in potentially explosive atmospheres.
CIGRE, Electra No. 171	Recommendations for Mechanical Tests on Submarine Cables
CIGRE Technical Brochure Ref No. 219	Recommendations for Testing DC Extruded Cable Systems for Power Transmission at Rated Voltage upto 250kV
CIGRE Technical Brochure No 490	Recommendations for testing of long AC submarine cables with extruded insulation forsystem voltage above 30 (36) to 500 (550) kV
EEMUA 140	Noise Procedure Specification
TIA / ITU / EIA Standards	Communication
PED	EU Pressure Equipment Directive 97/23/EC
IP 15	Area Classification Code for Petroleum Installation
ATEX 95	EU Directive 94/9/EC

Codes and Standards Applicable for Civil / Structural Works Onshore

ADIBC-2013	Abu Dhabi International Building Code
ACI 318-11	American Concrete Institute. Building Code Requirements for Structural Concrete and Commentary
ACI 350-06	Design of Concrete Structures for Retaining Aqueous Liquids
IBC – 2012	International Building Code
ASCE 7-05	American Society of Civil Engineers. Minimum Loads for Building and Other Structures
ACI 224R-1/07	Control of cracking in Concrete Structures
DIN 1072	Road and Foot Bridges
BRE Digest 1 – 2005	Concrete in Aggressive Ground
ACI 315-99	Details and Detailing of C2323oncrete Reinforcement
-	Use Guide for International Building Codes in the Emirate of Abu Dhabi

Building Design Codes & Standards

Listed below are the foreseen (but not limited to) codes and standards applicable to the design of onshore/offshore buildings and services:

IBC	International Building Code (2009 or later)
IMO - SOLAS	International Maritime Organization-The International Convention for Safety of Life at Sea, 1974 and its latest protocols ,articles ,annexures and certificates
IFC	International Fire Code
IPC	International Plumbing Code
IMC	International Mechanical Code
NFPA	National Fire Protection Association
IMO - FTP	International Maritime Organization-International Code for Application of Fire Test Procedures
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers Inc.
ASPE	American Society of Plumbing Engineers
ASTM	American Society for Testing and Materials
ANSI	American National Standard Institutions
UL	Under writers Laboratory, Inc
FM	Factory Mutual Inc.
BSI	British Standards Institution

CEN	Committee European de Normalisation
DIN	Deutsche Norm.
IEE	Institution of Electrical Engineers
IEC	International Electro -
ISO	International Organization of Standardization
ADDC	Abu Dhabi Distribution Company
ADM	Abu Dhabi Municipality
ADSSC	Abu Dhabi Sewerage Services Company
ADCD	Abu Dhabi Civil Defense Authority
LPC	The Loss Prevention Council, UK (Fire Office's Committee)
WHO	World Health Organization
EIA	Electronic Industries Association
TIA	Telecommunication Industries Association
NEMA	National Electrical Manufacturers Association
CCITT	Consultative Committee for International Telephone & Telegraph
AWS	American Welding Society
IES	Illumination Engineering Society
NORSOK	Norsok Standard
DNV	Det Norske Veritas
API	American Petroleum Institute
ABS	American Bureau of Shipping
GL	Germanischer Lloyd
LR	Lloyds Register
ABS	American Bureau of Shipping

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