

Significant Impacts	Recommended Mitigation Measures	Residual Effect	Monitoring Programme	Period of Implementation & Responsibility
	<p>monitored.</p> <ul style="list-style-type: none"> <li>Monitoring of internal sewerage system to ensure all pipelines and septic tanks are properly functioning.</li> <li>Drainage systems from wash areas and other sources must be strictly monitored.</li> <li>Regular vacuuming/ siphoning of septic tanks as needed by Sharjah Municipality authorized service providers for transport to the designated municipal sewage treatment plant.</li> </ul>			<p>Contractor/ Project Manager</p>
<p>Construction and demolition waste</p>	<ul style="list-style-type: none"> <li>Construction and Demolition Waste Management Plan as part of Construction Environmental Management Plan (CEMP) shall be developed and effectively implemented.</li> <li>Storage of leachable construction materials and solid waste will be in an impervious area separately to avoid any soil contamination;</li> <li>The solid wastes will be collected and</li> </ul>	<p>Neutral – There is no residual impacts</p>	<p>--</p>	<p>Construction Phase</p> <p>Contractor/ Project Manager</p>

Significant Impacts	Recommended Mitigation Measures	Residual Effect	Monitoring Programme	Period of Implementation & Responsibility
	<p>segregated as domestic wastes; recyclable solid wastes, construction &amp; demolition waste and hazardous wastes and these wastes will be stored properly in the separate area in different coloured bins.</p> <ul style="list-style-type: none"> <li>• The domestic wastes will be properly disposed to Sharjah Municipality authorized service providers for further treatment and safe disposal.</li> <li>• Recyclable solid wastes will be sold to Sharjah Municipality authorized recyclers for recycling.</li> <li>• Construction &amp; demolition waste will be stock piled separately and reused for road pavement, filling of low lying areas and other repairing works in the premises at possible extent and remaining should be disposed to Sharjah Municipality authorized service providers for safe disposal.</li> <li>• Hazardous wastes will be collected separately and properly disposed to Sharjah Municipality authorized</li> </ul>			

Significant Impacts	Recommended Mitigation Measures	Residual Effect	Monitoring Programme	Period of Implementation & Responsibility
	<p>service providers after obtaining NOC from Sharjah Municipality.</p> <ul style="list-style-type: none"> <li>Dredged wastes shall be disposed to the Sharjah Municipality (SM) authorized service providers in compliance with SM regulations. Dredged wastes shall be tested before disposal to comply with SM regulations.</li> </ul>			
<p>Spill, leak and improper management</p>	<ul style="list-style-type: none"> <li>Spill prevention and management plan shall be developed as part of CEMP and effectively implemented.</li> <li>All hazardous/flammable material, including fuels, will be stored at designated sites in accordance with MSDS requirements best practice procedures.</li> <li>MSDS to be available for hazardous materials stored on site.</li> <li>Hazardous materials will need to be suitably stored to prevent leaks and spills.</li> <li>Adequate bunding for fuel storage.</li> </ul>	<p>Neutral – There is no residual impacts</p>	<p>--</p>	<p>Construction Phase  Contractor/ Project Manager</p>

Significant Impacts	Recommended Mitigation Measures	Residual Effect	Monitoring Programme	Period of Implementation & Responsibility
	<ul style="list-style-type: none"> <li>Drip trays will be required to be used to intercept leaks and spills from equipment and during refueling.</li> </ul>			
Health issues	<ul style="list-style-type: none"> <li>All hazardous chemicals and substances must be stored in a protected /secured place with limited access.</li> <li>Chemicals handling, storage and instructions given in Material Safety Data Sheets &amp; product manuals, supplied by the manufacturer or supplier, must be understood and observed strictly.</li> <li>There shall be no open storage of any type of chemical in the premises.</li> <li>Hazardous chemicals shall be stored appropriately based on the compatibility of the chemical to avoid any reaction.</li> <li>Flammable and other highly flammable products storage should be stored in a controlled temperature and all the electrical fittings should be under classified category as per International</li> </ul>	Residual risks can be reduced As Low As Reasonable Practicable	--	Construction Phase  Contractor/ Project Manager

Significant Impacts	Recommended Mitigation Measures	Residual Effect	Monitoring Programme	Period of Implementation & Responsibility
	<p>standards.</p> <ul style="list-style-type: none"> <li>• Fire protection requirements shall be as per UAE Civil Defense Code, 2017 in the chemicals/hazardous materials storage areas</li> <li>• Appropriate training shall be provided to workers and Trained/competent persons shall be deployed for critical tasks such as handling of hazardous/flammable chemical, first aid, fire-fighting etc.,</li> <li>• Appropriate Personal Protective Equipment shall be provided to workforce involved with hazardous/flammable chemical handling.</li> </ul>			
<p>Discharge of outfall effluent into the Arabian Gulf will impact on marine biota.</p>	<ul style="list-style-type: none"> <li>• Use only anti-scalants with low toxicity to aquatic invertebrate and fish species; avoid the use of a polyphosphate anti-scalants.</li> <li>• Suitably neutralize residual chlorine with sodium bisulfite (SBS) in an emergency when intake water needs to be bypassed directly to the outfall,</li> </ul>	<p>Minor effect - Residual impacts can be reduced to acceptable level</p>	<p>Outfall effluent quality shall be periodically checked</p>	<p>Operation of the project  Plant Manager</p>

Significant Impacts	Recommended Mitigation Measures	Residual Effect	Monitoring Programme	Period of Implementation & Responsibility
	<p>residual chlorine in the outfall discharge must be below 0.2 mg/l.</p> <ul style="list-style-type: none"> <li>Monitor the outfall effluent characteristics to check the compliance with Sharjah Municipality sea discharge limits.</li> </ul>			
Impingement and Entrainment adversely affect biotic productivity in the Arabian Gulf	<ul style="list-style-type: none"> <li>Keep reduced velocity in intake tower by velocity cap structure to ensure that fish and other organisms can escape the intake current.</li> </ul>	Minor Effect - Residual impacts can be reduced to acceptable level	--	Operation of the project  Plant Manager
Operational dust emissions	<ul style="list-style-type: none"> <li>All the internal roads/working areas shall be paved by feasible materials (cement/asphalt/interlock) to avoid fugitive dust emissions.</li> <li>The movement of heavy trucks over unpaved or dusty surfaces should be restricted. In case of unavoidable situation, unpaved or dusty surfaces should be controlled by good maintenance and wetting of the road surface by water sprinkling.</li> <li>Speed Limit (20 km/hr) inforce on unpaved roads.</li> </ul>	There is residual impact	--	Operation of the project  Plant Manager

Significant Impacts	Recommended Mitigation Measures	Residual Effect	Monitoring Programme	Period of Implementation & Responsibility
Operational Combustion emissions	<ul style="list-style-type: none"> <li>Regular maintenance of vehicles for appropriate functioning of engine</li> <li>Company vehicles should undergo emission test to ensure emissions are within permissible limits.</li> <li>Commercially available Low sulphur diesel shall be used for vehicles/fuel fired equipment/machinery, in order to reduce excessive emissions of sulphur dioxides.</li> <li>Specification of fuel supply to turbine combustion shall be strictly monitored and followed</li> <li>Periodic monitoring of stack emissions to ensure that air emission characteristic is within the allowable limit for stationary sources</li> </ul>	Residual impacts can be reduced to acceptable level	<p>Undertake daily visual inspections and regular repairs, when appropriate, to ensure that equipment does not emit excessive fumes. If excessive fume, exhaust emission monitoring shall be conducted</p> <p>Stack emission main and bypass stack shall be regularly monitored</p>	<p>Operation of the project</p> <p>Plant Manager</p>
Operational noise	<ul style="list-style-type: none"> <li>Roadside tree plantation to be developed at a possible extent and maintained as a noise barrier</li> <li>Keep internal haul routes well maintained.</li> <li>Undertake regular maintenance by</li> </ul>	Residual impacts can be reduced to acceptable level	Ambient noise levels shall be monitored regularly	<p>Operation of the project</p> <p>Plant Manager</p>

Significant Impacts	Recommended Mitigation Measures	Residual Effect	Monitoring Programme	Period of Implementation & Responsibility
	<p>trained personnel to keep plant and equipment working as per manufacturer's specifications.</p> <ul style="list-style-type: none"> <li>• Undertake regular maintenance by trained personnel to keep plant and equipment working as per manufacturer's specifications.</li> <li>• All plant onsite should be low noise versions, and where needed, acoustic enclosure shall be provided according to manufacturer's recommendations.</li> <li>• The use of damping material such as thin rubber/sheet for shielding the work places like DG sets, compressor etc.,</li> <li>• Ear plugs/muffs for workers who are exposed to higher noise shall be provided and enforcement for its use by the workers.</li> </ul>			



Significant Impacts	Recommended Mitigation Measures	Residual Effect	Monitoring Programme	Period of Implementation & Responsibility
Domestic wastewater	<ul style="list-style-type: none"> <li>Toilets and septic tank facilities are to be appropriately designed and monitored.</li> <li>Monitoring of internal sewerage system to ensure all pipelines and septic tanks are properly functioning.</li> <li>Drainage systems from wash areas and other sources must be strictly monitored.</li> <li>Regular vacuuming/ siphoning of septic tanks as needed by Sharjah Municipality authorized service providers for transport to the designated municipal sewage treatment plant.</li> </ul>	Neutral – There is no residual impacts	--	Operation of the project  Plant Manager
Operation waste	<ul style="list-style-type: none"> <li>Storage of leachable operation materials and solid waste will be in an impervious area separately to avoid any soil contamination;</li> <li>The generated solid wastes will be collected segregated as domestic wastes, recyclable solid wastes, non-hazardous solid waste and hazardous wastes and these wastes will be stored</li> </ul>	Residual impacts can be reduced to acceptable level	--	Operation of the project  Plant Manager

Significant Impacts	Recommended Mitigation Measures	Residual Effect	Monitoring Programme	Period of Implementation & Responsibility
	<p>properly in the separate area in different coloured bins.</p> <ul style="list-style-type: none"> <li>The domestic wastes and non-hazardous solid wastes will be properly disposed to Sharjah Municipality authorized service providers for further treatment and safe disposal.</li> <li>Recyclable solid wastes will be sold to Sharjah Municipality authorized recyclers for recycling.</li> <li>Hazardous wastes will be collected separately and properly disposed to Sharjah Municipality authorized service providers after obtaining NOC from Sharjah Municipality.</li> </ul>			
Spills and Leaks	<ul style="list-style-type: none"> <li>Spill prevention and management plan shall be developed and effectively implemented.</li> <li>All hazardous/flammable material, including fuels, will be stored at designated sites in accordance with MSDS requirements best practice procedures.</li> <li>MSDS to be available for hazardous</li> </ul>	There is no residual risks	--	Operation of the project  Plant Manager

Significant Impacts	Recommended Mitigation Measures	Residual Effect	Monitoring Programme	Period of Implementation & Responsibility
	<p>materials stored on site.</p> <ul style="list-style-type: none"> <li>• Hazardous materials will need to be suitably stored to prevent leaks and spills.</li> <li>• Adequate bunding for fuel storage.</li> <li>• Drip trays will be required to be used to intercept leaks and spills from equipment and during 338efueling.</li> </ul>			
Health issues	<ul style="list-style-type: none"> <li>• All hazardous chemicals and materials must be stored in a protected /secured place with limited access.</li> <li>• Chemicals handling, storage and instructions given in Material Safety Data Sheets &amp; product manuals, supplied by the manufacturer or supplier, must be understood and observed strictly.</li> <li>• There shall be no open storage of any type of chemical in the premises.</li> <li>• Hazardous chemicals shall be stored appropriately based on the compatibility of the chemical to avoid any reaction.</li> </ul>	Residual risk can be reduced as low as reasonably practicable	--	<p>Operation of the project</p> <p>Plant Manager</p>

Significant Impacts	Recommended Mitigation Measures	Residual Effect	Monitoring Programme	Period of Implementation & Responsibility
	<ul style="list-style-type: none"> <li>• Flammable and other highly flammable products storage should be stored in a controlled temperature and all the electrical fittings should be under classified category as per International standards.</li> <li>• Fire protection requirements shall be as per UAE Civil Defense Code, 2017 in the chemicals/hazardous materials storage areas</li> <li>• Appropriate training shall be provided to workers and Trained/competent persons shall be deployed for critical tasks such as handling of hazardous/flammable chemical, first aid, fire-fighting etc.,</li> <li>• Appropriate Personal Protective Equipment shall be provided to workforce involved with hazardous/flammable chemical handling.</li> </ul>			

Significant Impacts	Recommended Mitigation Measures	Residual Effect	Monitoring Programme	Period of Implementation & Responsibility
Labour management	<ul style="list-style-type: none"> <li>Labour management (Project labour commitment, Workers Code of Conduct, Labour Grievance Mechanism) shall be strictly followed as per UAE Federal Labour Law</li> <li>Labour accommodation strategies with welfare facilities shall be provided as per UAE Federal Labour Law</li> <li>Occupational Health and Safety Management shall be developed and effectively implemented.</li> </ul>	There is no residual risk	--	Construction and Operation of the project  Plant Manager
Traffic	<ul style="list-style-type: none"> <li>Smooth entry and exit of vehicle, is provided at the entry and ensure smooth transition for merging of vehicles.</li> <li>Signboards are at the parking locations for drivers to control the speed.</li> <li>Security will guide the vehicles for safe parking.</li> <li>Proper footpath provided for pedestrian movement along with interlocking and barricaded for safety.</li> <li>Safety precautionary measures are</li> </ul>	There is no residual risk	--	Construction and Operation of the project  Plant Manager

Significant Impacts	Recommended Mitigation Measures	Residual Effect	Monitoring Programme	Period of Implementation & Responsibility
	<p>ensured.</p> <ul style="list-style-type: none"> <li>• Adequate Lighting will be providing as per norms.</li> <li>• Marking of road, stop line, parking lanes, slot numbers will be painted so as guide the drivers.</li> </ul>			

## 10.3. IMPLEMENTATION OF ENVIRONMENT AND SOCIAL MANAGEMENT PLAN

The Environment and Social Management Plan will be implemented by Environment, Health and Safety (EHS) Team which it is formed by the project Management. EHS Team is responsible for the implementation of the ESMP & Environmental Monitoring Plan (EmoP) and will regularly coordinate with the EPAA/Government of Sharjah. The EHS Team will also be responsible for ensuring compliance with other environmental rules and regulations that the EPAA/Government of Sharjah may impose.

### 10.3.1. ROLES AND RESPONSIBILITIES OF EHS TEAM

The **QHSE (Quality, Health, Safety and Environment) Manager** who is directly reporting to Plant Manager will lead the team of EHS. He will be in charge of implementing company policies regarding environment, health, and safety.

Role	Recommended Environmental Responsibilities
Plant Manager	<ul style="list-style-type: none"> <li>Overall responsibility for the facility operation;</li> <li>Ensure EHS Policy is adhered.</li> </ul>
QHSE Manager	<ul style="list-style-type: none"> <li>Report to the Plant Manager on EHS issues;</li> <li>Enforce compliance with EHS and all legal regulations on all levels;</li> <li>Allocate sufficient personnel and financial resources to ensure compliance and effectiveness of ESMP;</li> <li>Communicate with all staff on all environmental aspects;</li> <li>Allocate sufficient responsibility to all staff to perform their HSE duties;</li> <li>Ensure compliance with HSE Policy;</li> <li>Sustain the implementation of environment, health and safety procedures;</li> <li>Regularly check ESMP compliance with legal requirements and advise Operational Manager if any non-consistencies occur;</li> <li>Responsible for control of HSE reports;</li> <li>Responsible for reviewing HSE documents and performing reviews;</li> <li>Review HSE Management Systems Manual at least every 12 months;</li> </ul>
Operation Manager	<ul style="list-style-type: none"> <li>Overall responsibility for implementation of and</li> </ul>

Role	Recommended Environmental Responsibilities
	<ul style="list-style-type: none"> <li>compliance to relevant regulations in the operations;</li> <li>• Liaise with the HSE Manager in the implementation of the relevant regulations;</li> <li>• Ensure the implementation of all control measures;</li> <li>• Responsible for the incident management program;</li> <li>• Ensure that all avoidable incidents are reported to the HSE Manager. Initiate investigations into any reported non-compliance incidents;</li> <li>• Setup and implement corrective action plans for any non-compliance, including a management program for prevention of such misconduct or incident in the future;</li> </ul>
Administration Manager	<ul style="list-style-type: none"> <li>• Ensure compliance and implementation Environmental &amp; Social Management Plan, HSE Policy and all other relevant regulations in their respective department;</li> <li>• Execute all tasks in accordance with HSE rules.</li> </ul>

## 10.4. EMERGENCY PREPARATION AND RESPONSE PLAN

An emergency preparation and response Plan (EPRP) is pre-impact procedures and duties to be taken in response to extreme events that could endanger the lives or cause damages to the property in the worksite. An effective EPRP can reduce injuries, prevent or minimize environmental impacts, protect lives and reduce losses. In view of the safety and wellbeing of the management and the employees the client has specified a procedure which deals with potential emergency scenario and measures to be taken to monitor and control such situations. This procedure will also set minimum requirements for individuals to be able to handle emergency situations and mitigation measures.

### 10.4.1. SCOPE

The Emergency Response Plan (ERP) applies to emergency situations that occur at facility. To develop, implement and establish an emergency coordination procedure to be followed in an identified emergency situation. The recognized emergency plans shall be reviewed and tested regular interval to ensure its effectiveness and suitability.

### 10.4.2. ELEMENTS OF EPRP

Emergency Preparedness and Response Plan specifies procedures and measures to be taken in the event of Fire, Explosion, Flood, Failure or Collapse of Structure and Machinery or either probable emergency situation that could endanger lives or cause damages to property in the worksite. This plan aims to minimize the possible consequences of an emergency by



- Preventing Fatalities and Injuries
- Reducing damage to the environmental aspects
- Facilitating and accelerating business restoration and continuation

**Emergency Assembly/Muster Point** – Emergency assembly/muster points are a predetermined location where personnel will gather in the case of an emergency evacuation.

**Emergency Evacuation and Assembly Plan** – The site plot plan will indicate: access gates; streets; site offices; evacuation routes to emergency assembly/muster points; emergency meeting points, first aid room; fire extinguisher / air horn locations; controlled storage, manual call points, fire & gas detection system and Emergency Shutdown system.

**Emergency Alarm System** – The system will be complete with Fire & gas detection and alarm system including manual call points, automatic fire & gas detectors, sounders, and control/indication equipment. Fire alarm system shall consist of several alarm call points, audio visual alarm, smoke detectors and heat detectors. An alarm from the fire detector or manual alarm box shall be transmitted to the fire control panel which in turn indicates outbreak and location of fire and gives audible alarm in the control room and outside alarm.

#### 10.4.3. EMERGENCY RESPONSE TEAM

**Emergency Coordination** – HSE Manager must be able to respond to, and participate in, any emergencies that may occur. All workers/suppliers should participate by identifying their qualified first aid personnel. The main responsibility during an emergency coordination is to respond to the call for emergency help.

**On-Scene Commander** – A person involved in direct execution of Emergency Response Activities. He must be a trained fire warden may be in the level of Shift in-charge/ Shift supervisors/Operation Manager. He shall remain as on-scene Commander until a nominated person from Civil Defense takeover as incident commander of the scenario.

**Incident Commander** – A person responsible for overall management of the incident. He shall be a senior person from operations management, nominated from Civil Defense. He shall take over as Incident Commander soon after reaching the scenario. Thereafter On-Scene commander reports to incident commander. HSE Manager shall coordinate between Incident Commander and On-Scene Commander. HSE Manager shall coordinate with Control room and communicate the facility details to incident commander.

**Emergency Response Team** – Emergency Response Team (ERT) has been organized for

quick responding to emergency.

#### **10.4.4. EMERGENCY COMMUNICATION**

All emergencies as stipulated in the plans shall be communicated to staff, client and relevant interested parties. Immediate notification of emergency shall be forwarded by verbal or any other means of communication channel in the feasible time. Communication to relevant authorities shall be determined with respect to the degree of emergency. Emergency response team leader shall be consulted before any Activation of external agency or authorities.

#### **10.4.5. EMERGENCY RESPONSE TRAINING**

The effectiveness in the emergency response mitigation requires training of personnel in the areas of:

- Fire Warden/Fire Watcher Training
- Basic Fire Fighting Skills
- Basic First-Aid Course
- Emergency response team roles and responsibilities.
- Regular emergency evacuations, drills and exercises.
- Safe handling of hazardous materials/chemicals/flammables

#### **10.4.6. EMERGENCY RESPONSE PROCEDURES**

##### **10.4.6.1. Procedure for Notification and Rising of Alarms**

- In any emergency situation, the initial responder or person discovery of the emergency situation shall notify Emergency Response Team.
- An assessment shall be conducted to evaluate the emergency situation to decide on the means and measures of mitigating the emergency situations.
- Rising of emergency alarm, activation of any emergency response team and worksite evacuation if required.
- Any emergency that would cause an impact to the adjacent project worksite shall notify accordingly as per the Emergency response flow chart.
- Worksite accident or a dangerous occurrence that does not require the action of emergency response team shall be carried out in accordance to the accident notification procedure and action plan.

#### **10.4.6.2. Emergency Response Procedure for Fire/Explosion**

On observation of fire, observer activates manual call point for alert the personnel and emergency response team for evacuation. On-site Emergency response team should immediately begin gathering information and assessing the incident. Consider the following:

- Rescue of personnel in the immediate areas.
- Life safety hazard to site personnel.
- Extension.
- Confinement.
- Extinguishment.
- Environmental impact.
- Community impact.

After addressing the immediate issues, determine the type of fire. Determining the type of fire will determine the resources required and dictate the necessary incident action plan to fight the fire.

- On observation of fire, observer activates manual call point for alert the personnel and emergency response team for evacuation.
- Emergency response team should immediately begin gathering information and assessing the incident. Based on the information, ERT should activate alarm and evacuate the personnel from the area
- Immediately call '997' for Civil defence assistance and off site emergency response team for next course of fire-fighting.
- Evacuate the residents in the area and assemble them in the assembly point
- Isolate all electrical sources in the area.

#### **10.4.6.3. Emergency Response Procedure for Failure and Collapse of Structure**

- Rising of emergency alarm, activation of any emergency response team and worksite evacuation if required.
- Evacuate residents from the affected area
- Cordon off hazard zone and disallow unauthorized entry.

- Check for structural stability before re-enter the hazard zone. Structural designer shall be consulted
- Established temporary support system to prevent further collapse or failure of immediate or adjacent structure upon consultation with structural designer
- Verify any personnel entrapment or injury, if any, try rescue operations. Do not take risk. If any conditions deemed unstable or hazardous.
- Established sequence of structural removal or rescue plan.
- Call external assistance, if necessary.

#### **10.4.7. SPILL CONTINGENCY PLAN**

The purpose of this Spill Contingency Plan is to clearly identify potential spill risks associated with the facility, and to identify the procedures to be followed to facilitate the rapid deployment of resources to minimize impacts and risks to the environment.

It is understood and expected that client will have in place relevant inspection and maintenance regimes for any machinery, equipment and storages that will be installed and used on-site. This will be the first level of preventive measures to reduce the risk of spills of substances such as chemicals, flammables, hazardous wastes etc.,.

Material Safety Data Sheets (MSDS) for all substances used to be maintained on site in a predetermined location familiar to all employees. These sheets identify: product information; hazardous ingredients; physical data; fire and explosion hazard; reactivity data; toxicological properties; preventative measures; first aid measures; Risks associated with the occurrence of spills include:

- Environmental pollution/degradation;
- Human exposure, via dermal contact or inhalation possibly resulting in illness;
- Slipping, possibly resulting in personal injury; and/or,
- Fire.

In order to minimize the occurrence/consequences of spills it is important to ensure that:

- Equipment is properly maintained, ensuring all leaks are repaired;
- All onsite fuel is properly stored within double-walled tanks or within approved secondary containment facilities;

Workers are encouraged to provide information on weaknesses in current management control and prevention systems such that improvements can be made which may eliminate the occurrence of a spill.

Cleanup operations will be dictated by the situation and circumstances but generally consist of:

- Extraction and transfer of spilled material/substance into tanks or barrels;
- Extraction and transfer of contaminated soil, material or water into tanks or drums;
- Placement of damaged drums or containers into over packs;
- Extraction and transfer of used absorbents into drums;
- Placement of labels on drums, tanks and over packs; and
- Proper storage and transfer of materials or substances.

Transfer and disposal of hazardous waste will be conducted as per Dubai Municipality requirements and only by a licensed hauler/disposal agency with properly trained employee.

## **10.5. ENVIRONMENTAL MONITORING PROGRAMME**

The Environment and Social Management Plan should be monitored through well planned mechanism of environmental monitoring plan to comply the norms of environmental regulations. An Environmental Monitoring Plan provides feedback about the difference between actual environmental scenario and the impacts of the project on the environment and helps to judge the adequacy of the mitigation measures in protecting the environment. The purpose of Environmental Monitoring is to evaluate the effectiveness of implementation of Environmental Management Plan (EMP) by periodically monitoring the important environmental parameters within the impact area, so that any adverse effects are detected and timely action can be taken. An environmental monitoring program is important as it provides useful information and helps to:

- Evaluate the performance and effectiveness of mitigation measures proposed in the Environment Management Plan (EMP) and suggest improvements in management plan, if required,
- Identify training requirement at various levels.

### **10.5.1. MECHANISM OF ENVIRONMENTAL MONITORING PLAN**

The Environmental Monitoring Plan for the proposed project has been developed in view of the institutional, scientific and fiscal issues pertaining to the project. For developing the monitoring plan, appropriate Value Ecosystem Components (VEC's) has been identified which are based on suggested mitigation measures. For each component, suitable measurable environmental indicators which are appropriate to the impact mechanism and scale of disturbance and have a low natural variability, broad applicability and an existing data series have been defined.

## 10.5.2. SUGGESTED ENVIRONMENTAL MONITORING PLAN

An environmental monitoring plan has been suggested to monitor environmental parameters. The suggested Environmental Monitoring Plan (EmoP) during construction and operation phase is given in the **Table 92** and **Table 93**.

**Table 92 – Suggested Environmental Monitoring Programme during Construction Phase**

Components	Parameter to be monitored	Sampling and Measurement plan			
		Method	Frequency	Location	Responsibility
Ambient Air Quality	TSP, PM <sub>10</sub> , PM <sub>2.5</sub> , SO <sub>2</sub> , Nox, CO, TVOC, O <sub>3</sub> , Pb	24 hour monitoring by ENAS Accredited Laboratory	Bi-Annual	2 Ambient Locations (Upwind & Downwind directions)	Project Manager
	Visible dust and emissions	Visual Inspection	Daily	Project site	Project Manager
	TSP, PM <sub>10</sub>	1 hour monitoring by calibrated dust monitoring equipment	As required	Project site – As required by visual inspection	Project Manager
DG Stack Emission Monitoring	TSP, SO <sub>2</sub> , Nox, CO, CO <sub>2</sub> , O <sub>2</sub>	1 hour Monitoring by ENAS Accredited Laboratory	Annual	Stacks from DG	Project Manager
Noise Quality	Noise in dBA	Calibrated sound level meter – 15 min.	Daily	Project site boundary	Project Manager
	Noise in dBA (Leq, Lmin, Lmax)	24 hour monitoring by ENAS Accredited Laboratory	Quarterly	4 Ambient Locations at Project Site	Project Manager
Soil Quality	Soil contamination	Visual Inspection	Daily	Project Site – Excavated, imported soil, spilled area, waste storage area	Project Manager
	pH, Moisture content, TOC, Cl, Nitrogen,	Sampling and Analysis as per British	As required	Project site – As required by	Project Manager

Components	Parameter to be monitored	Sampling and Measurement plan			
		Method	Frequency	Location	Responsibility
	Phosphorus, K, Alkalinity, EC and Heavy Metals (Fe, Ni, As, Al, Hg, Se, Cu, Zn, Pb, Mn, Cd & Cr), BTX & TPH	Standard (BS 1377:1990) and Analysis by Accredited Laboratory		visual inspection	
Sea water quality	pH, Temperature, Turbidity, Dissolved Oxygen (DO), Salinity, Total Dissolved Solids (TDS), Total Suspended Solids (TSS), Boron, Bromide, Heavy Metals (Al, As, Cd, Cr, Cu, Fe, Hg, Zn), Surfactants, Total Petroleum Hydrocarbons, Chlorophyll and <i>E. coli</i> .	Sampling and Analysis by Accredited Laboratory	Weekly	2 locations at Arabian Gulf during dredging and onshore pipeline installation	Project Manager
Health & Safety	Machine failure, gaseous emission, Confined space hazard, Records of Injuries, Diseases and Dangerous Occurrences, HSE Statistics	Regular Inspection Third Party Inspection	Daily Annual/Bi-annual	Entire construction site Pressure vessels, valves, hoses, lifting equipment	Project Manager



**Table 93 – Suggested Environmental Monitoring Programme during Operation Phase**

Environmental Components	Parameter to be monitored	Sampling and Measurement plan			Responsibility
		Method	Frequency	Location	
Ambient Noise Quality	Noise in dBA (Leq, Lmin, Lmax)	24 hour monitoring by ENAS Accredited Laboratory	Annual	4 locations at boundary of the project site	Plant Manager
Stack Emission	Flue gas temperature, velocity, volume, SO <sub>2</sub> , NO <sub>2</sub> , CO, CO <sub>2</sub>	Isokinetic sampling by ENAS Accredited Laboratory	Bi-annual	Main HRSG stack and bypass stack	Plant Manager
Ambient Air Quality	TSP, PM <sub>10</sub> , SO <sub>2</sub> , NO <sub>x</sub> , CO, O <sub>3</sub> , Pb, TVOC	24 hour monitoring by ENAS Accredited Laboratory	Annual	4 locations at boundary of the project site	Plant Manager
Ground Water Quality	pH, Temperature, Conductivity, TSS, Ammonia – Nitrogen, Nitrate - Nitrogen, Total Organic Carbon, Phosphorous, BOD, COD, Oil & Grease, Phenol, Heavy Metals (As, Ba, Cd, Cr, CN, Pb, Hg, Se, Au, Cu, Na, Ni, Zn, Boron, Mn, Fe), VOC, PCB	Sampling and analytical method as per APHA, 2012	Annual	2 Groundwater samples (Existing boreholes) at project site	Plant Manager
Soil Quality	pH, Moisture content, TOC, Cl, Nitrogen, Phosphorus, K, Alkalinity, EC and Heavy Metals (Fe, Ni, As, Al, Hg, Se, Cu, Zn, Pb, Mn, Cd & Cr), BTX & TPH	Sampling and Analysis by ENAS Accredited Laboratory	Annual	2 locations at Project site	Plant Manager

Environmental Components	Parameter to be monitored	Sampling and Measurement plan			Responsibility
		Method	Frequency	Location	
Outfall effluent	pH, Temperature, Turbidity, Dissolved Oxygen (DO), Salinity, Total Dissolved Solids (TDS), Total Suspended Solids (TSS), Calcium, Magnesium, Sodium, Potassium, Carbonates, Chloride, Sulphate, Fluoride, Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Total residual chlorine, Total Nitrogen, Nitrate Nitrogen, Ammonia Nitrogen, Nitrite Nitrogen, Boron, Bromide, Heavy Metals (Al, As, Cd, Cr, Cu, Fe, Hg, Zn), Surfactants, Total Petroleum Hydrocarbons, Chlorophyll and <i>E. coli</i> .	Sampling and Analysis by ENAS Accredited Laboratory	Monthly	Outfall Channel	Plant Manager
Sea water quality			Annual	2 locations at Arabian Gulf	Plant Manager
Waste streams	Quantity of waste generated (Domestic wastewater, Non-hazardous solid waste & Hazardous solid waste) & its disposal	Inspection	Monthly	Generation & Disposal area	Plant Manager
Health & Safety	Machine failure, gaseous emission, Confined space hazard, Records of Injuries, Diseases and Dangerous Occurrences, HSE Statistics	Regular Inspection Third Party Inspection	Daily Bi-annual/ Annual	Entire facility Pressure vessels, valves, hoses, lifting equipment	Project Manager

## 10.6. TRAINING AND COMPETENCE

Plant Manager shall define, assess and ensure the competency of its employees and sub-contractors based on the qualification, experience, training, technical expertise, managerial / supervisory skills and various soft skills required to perform in a manner that meets the requirements of HSE management system.

### 10.6.1. HSE Training Programme

SEWA identifies training needs and provides necessary training as follows

- Awareness with respect to HSE policy and procedures.
- Emergency preparedness and response requirements specific to site.
- The training shall be imparted taking into account the ability, literacy levels, the language comprehension and risk levels of the personnel to be trained.

The following training will be given to personnel working in the facility.

- Personal Protective Equipment
- Basic Fire Fighting Skills
- Fire Warden/Fire Watcher Training
- Basic First-Aid Course
- Emergency response team roles and responsibilities.
- Safe handling chemicals/hazardous materials/flammables
- Regular emergency evacuations, drills and exercises by in-house.
- Permit to Work system
- Electrical safety
- Housekeeping and waste management
- Spill response and management

## 10.7. COMMUNICATION

The requirements of environmental and social management plan will be effectively communicated to all personnel by induction training, tool box talk, awareness programme and instructions to ensure the effective implementation of environmental and social management plan.

### 10.7.1. Induction Training

All site personnel must undergo initial induction training before they commence work at the facility. A typical site induction training session should include as a minimum the following subjects:-

- a. HSE responsibilities for themselves and co-workers
- b. The correct Use of PPE.
- c. Dress Code
- d. Welfare facilities
- e. Medical facilities (First Aid, medical facility etc.)
- f. Restricted areas, barriers signs
- g. Fire prevention and fire-fighting appliances
- h. Emergency response procedures, evacuation & assembly, alarms etc.,
- i. Designated smoking areas
- j. Reporting of accidents, incidents and unsafe practices

### **10.7.2. Tool Box Training**

Tool Box Training meetings will be conducted at least once a week in which supervisor and their work group will discuss about HSE procedures, safety precautions and to promote individual HSE awareness.

### **10.7.3. Refresher HSE Training**

All employees, after a specific period and/or as designated by the HSE manager or as project conditions change or new HSE Procedures are introduced shall receive a refresher HSE Course so as to maintain their HSE awareness at the highest level possible. This course is to be held once every year or more depending on the HSE Performance.

## **10.8. AUDIT AND INSPECTION**

HSE Manager performs inspections in the workplace for notifying that there are unsafe or unhealthy conditions or working practices, and unsatisfactory arrangements for welfare at work. General workplace inspection will be carryout on weekly basis. The weekly inspection report will be submitted to Plant Manager for review.

Some activities require regular inspection before work starts which will be identified through Job Safety Analysis (JSA)/risk register. Based on the JSA/risk register, check list will be prepared for routine inspection.

**HSE Audit** will be conducted annually to report and evaluate the performance of environmental and social management system and assessment of compliance monitoring.

## 11. CONCLUSION

Based on findings of Environmental and Social Impact Assessment (ESIA) study, proposed project will have certain level of marginal impacts on the local environment, certain individual risks to onsite population and minor impact on society. With effective implementation of recommended environment and social management plan, the proposed project will have minor residual effects on local environment and society. The effectiveness of ESMP and effects of residual impacts will be regularly monitored by suggested environmental monitoring plan to sustain the environment, health and safety of society. **Sharjah Electricity and Water Authority (SEWA)** and Consortium of EPC Contractor have committed to implement ESMP effectively. Thus implementing the proposed project has low significance of adverse impact on environment and society.

## 12. REFERENCES

- Abdul Azis, P.K., Ibrahim Al-Tisan, Mohammed Al-Daili, Troy N. Green, Dalvi, A. G. I. and Javeed, M. A. 1998. Ecological Evaluation Of The Depth Profile Of The Near Shore Waters Of The Al-Jubail Desalination And Power Plants . P. K. Abdul Azis, SWCC R&D Center Al Jubail.
- Alsharhan, A.S. and Kendall, C.G.St.C. 2003. Holocene coastal carbonates and evaporites of the southern Arabian Gulf and their ancient analogues. Earth-Science Reviews, v. 61, p. 191-243
- Brook, M. and Dawoud, M.A., 2005, Coastal water resources management in the United Arab Emirates. In: Proceedings of integrated coastal zone management in the United Arab Emirates Conference held on 5-8 June, 2005
- Canter, L. W., Environmental Impact Assessment, McGraw-Hill, New York, 1996
- Davis, M. L. & Cornwell, D. A., "Introduction to Environmental Engineering", 2nd Edition, McGraw-Hill, Inc., Singapore, 1991.
- Dorgham, M.M. and Muftah, A., 1986. Plankton studies in the Arabian Gulf. I. Preliminary list of Phytoplankton Species in Qatari Waters Arab Gulf J. Scient. Res., 4(2): 421-436.
- Dorgham, M.M., Muftah, A. and El-Deeb. 1987. Plankton Studies in the Arabian Gulf, II. Autumn Phytoplankton in the Northwestern Area. Ibid, Agric. Biol. Sci., B5(2): 215-235.
- Dubai Municipality – Technical Guidelines
- Engledow, H.R. and Bolton, J.J. 1994. Seaweed alpha-diversity within the lower eulittoral zone in Namibia: The effects of wave action, sand inundation, mussels and limpets. Botanica Mar., 37: 267-276.
- Environment Protection & Development Authority, RAK-EPDA standard report format
- Environmental Standards and Allowable Limits of Pollutants on Land, Water, and Air Environment, Dubai Municipality, May 2003
- Federal Law No 24 of 1999, for the Protection and Development of the Environment, UAE

- GHD Meraas Development, June 2017, Dubai Harbour Environmental Impact Assessment
- Government.ae, Topography and Ecosystems, <https://government.ae/en/information-and-services/environment-and-energy/topography-and-ecosystems>
- Hogan, T.W., 2015. Impingement and entrainment at SWRO desalination facility intakes, chapter 4, in: Missimer, T.M., Jones, .B and Maliva, R.G., (Eds.), Intakes and Outfalls for Seawater Reverse-osmosis Desalination Facilities: Innovations and Environmental Impacts, Springer International Publishing, Switzerland, 2015, pp. 57–78.
- [https://en.wikipedia.org/wiki/United\\_Arab\\_Emirates](https://en.wikipedia.org/wiki/United_Arab_Emirates)
- Iglesias, J.I.P., Urrutia, M.B., Navarro, E., Alvarez-Jorna, P., Larretxea, X., Bougrier, S. and Heral, M. 1996. Variability of feeding processes in the cockle *Cerastoderma edule* (L.) in response to changes in seston concentration and composition. *J. Exp. Mar. Biol. Ecol.*, 197: 121–143.
- Ingham, R.A., Mansour, L., Qadan, T., Al Hindi, M.H. and Attawneh, O., 2009. RO pretreatment design and performance under challenging conditions in the Arabian Gulf, IDA World Congress—Atlantis, the Palm—Dubai, UAE, 2009, pp. 7–12.
- Kader Gaid, 2011. A Large Review of the Pre Treatment, Expanding Issues in Desalination, Prof. Robert Y. Ning (Ed.), ISBN: 978-953-307-624-9, InTech, Available from: <http://www.intechopen.com/books/expandingissues-in-desalination/a-large-review-of-the-pre-treatment>
- Karim, F.M. and Fawzi, N.M., 2007. Flora of the United Arab Emirates. Vol. 1. United Arab Emirates University, Al Ain, UAE.
- Kohler, K.E. and Gill, S., 2006. Coral Point Count with Excel extensions (CPCe): A Visual Basic program for the determination of coral and substrate coverage using random point count methodology. *Computer & Geosciences*, 32(9):1259-1269
- Makuriaw, A. and Teffera, B., 2013. IAIA13 Conference Proceedings – Impact Assessment the Next Generation, 33rd Annual Meeting of the International Association for Impact Assessment (13-17 May 2013), Canada.

- Meteorology and Environmental Protection Administration (MEPA), 1992. Arabian Gulf, Report 5, Meteorology and Environment Protection Admin. In Saudi Arabia for IUCN, Switzerland.
- Ministerial Decree No.12 of 2006/Protection of air from Pollution, UAE
- Ministerial Order No. 32 of 1982/ Issued by the Ministry of Labour specifies the Determination of Preventive Methods and Measures for the Protection of workers from the risks of work, UAE
- Murad, A.A., 2010. An Overview of Conventional and Non-Conventional Water Resources in Arid Region: Assessment and Constrains of the United Arab Emirates (UAE). J. Water Resource and Protection, 2: 181-190.
- Narimisa, M. R., and Ahmed Basri, N. E., A case study for environmental impact assessment of oil refinery in Iran with emphasis of Environmental and Social Action Plan (ESAP), 2011 2nd International Conference on Environmental Science and Technology, IPCBEE vol.6, Singapore, 2011
- Nations Encyclopedia, United Arab Emirates-Topography, <https://www.nationsencyclopedia.com/Asia-and-Oceania/United-Arab-Emirates-TOPOGRAPHY.html>
- NFPA 1600 - Standard on Disaster/ Emergency Management and Business Continuity Programs, Massachusetts, 2007
- Occupational Safety & Health Administration (OSHA), 29 CFR 1910
- Pielou, E. C., 1966. The measurement of diversity in different types of biological collections. J. Theor. Biol., 13: 131-144.
- Preparation of environmental statements for planning projects that require environmental assessment – a good practice guide, Department of the Environment, UK, 1995
- Raymont, J.E. 1964. Plankton and Productivity of the Ocean. Wheaton and co. Exeter, Great Britain.
- Sheppard, C.R.C. 1993. Physical-environment of the Gulf relevant to marine pollution an overview. Mar. Pollut. Bull. 27: 3–8.
- Technical Guidance Document for Environmental Impact Assessment (EIA), Environment Agency–Abu Dhabi, April 2010



- Tourenq, C. and Launay, F., 2008. Challenges facing biodiversity in the United Arab Emirates. *Management of Environmental Quality An International Journal*, 19(3):283-304.
- U. S. Environmental Protection Agency-Compilation of Air Pollutant Emission Factors (AP 42 - Fifth Edition), 2009. Published by Office of Air Quality Planning and Standards, Office of Air and Radiation, North Carolina.
- United Arab Emirates Yearbook 2000 - 2010, National Media Council, Abu Dhabi, United Arab Emirates
- Waste Statistics of Abu Dhabi Emirate, 2013, Statistics Centre of Abu Dhabi Emirate.
- WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide - Global update 2005 - Summary of risk assessment, World Health Organization.
- Workplace Health and Safety Queensland, Risk Management Code of Practice 2007, Supplement 1- Hazard Identification, Supplement 2- Risk Assessment, and Supplement 3- Control, monitor, implement and review, Queensland, 2007.
- World Health Organization – Guidelines for Community Noise Document References MNB-1Q DOC2 [Editors: Birgitta Berglund, Thomas Lindval and Dietrich H Schwela], Outcome of WHO Expert Task Force Meeting held in London – UK, April 1999.
- Zein, S.R. and Abdulrahman, S.A. 2003. Water resources in the UAE. In: *Water Resources Perspectives: Evaluation, Management and Policy*. Edited by A.S. Alsharhan and W.W. Wood. Published by Elsevier Science, Amsterdam, The Netherlands, p. 245-264.
- Zoutendyk, P. and Duvenage, I.R. 1989. Composition and biological implications of a nepheloid layer over the inner Agulhas Bank near Mossel Bay, South Africa. *Trans. Roy. Soc. S. Afr.*, 47: 187-197.

## 13. ANNEXURES

### ANNEXURE 1 – WRITTEN AUTHORIZATION FROM PROJECT OWNER/DEVELOPER

### Written Authorization from Project Owner/ EPCC



الموقرة

سعادة/ هنا سيف السويدي  
رئيس هيئة البيئة والمحميات الطبيعية بالشارقة

السلام عليكم ورحمة الله وبركاته ،،،،

**الموضوع: الأعمال الأولية الخاصة بمشروع تطوير وتوسعة محطة الية لتوليد الطاقة**

تهديكم هيئة كهرباء ومياه الشارقة أطيب تحياتها وخالص تمنياتها لسعادتكم بدوام والتوفيق والسداد ، ونعرب لكم عن عميق شكرنا وتقديرنا لجهودكم وتعاونكم الدائم معنا في إطار الروابط والعلاقات الاستراتيجية وبعد ،

بالإشارة إلى الموضوع أعلاه ، نود إحاطة سعادتكم علماً بأن هيئة كهرباء ومياه الشارقة كلفت السادة/ إئتلاف شركتي ميتسوبيشي هيتاشي باور سيستمز والسويدي باور (اس ايه ني) للقيام بأعمال تطوير وتوسعة محطة الية لتوليد الطاقة بنظام الدورة المركبة بسعة ( 1100 ) ميغاواط.

وبناءً عليه فإننا نرغب في أن يقوم الإئتلاف المذكور بالقيام ببعض الأعمال الأولية والدراسات الخاصة بالمشروع والتي تشمل ما يلي :

- الدراسات البيئية و الإجتماعية و الضوضاء
- الدراسات البحرية والساحلية
- دراسات الحفر وجودة التربة
- الدراسات الجيوفيزيائية
- المسوحات الأرضية

  
1. 7 2018



ونظراً لأهمية المشروع وحيويته لإمارة الشارقة وإرتباطه بجدول زمني محدد، يرجى التكرم من سعادتكم بتقديم الدعم اللازم للسادة/ إئتلاف شركتي ميتسوبيشي هيتاشي باور سيستمز والسويدي باور (اس ايه ئي) فيما يخص هذا المشروع الحيوي.

ولمزيد من الاستفسار والايضاح يرجى التواصل مع المهندس/علي عباس ، عبر البريد الإلكتروني  
ali.yousif@sewa.gov.ae

وتفضلوا بقبول فائق التحية والاحترام

الدكتور المهندس /راشد الليم  
رئيس هيئة كهرباء ومياه الشارقة



التاريخ: 01 يونيو 2018

السيد / رئيس هيئة البيئة و المحميات الطبيعية بالشارقة

السلام عليكم و رحمة الله و بركاته ،،،،

الموضوع : الأعمال الأولية الخاصة بمشروع تطوير و توسعة محطة الية لتوليد الطاقة

تهديكم شركة السويدي باور أطيب التحيات و تتمنى لكم دوام التقدم والنجاح.

إيماءا إلي خطاب السيد / رئيس هيئة كهرباء و مياه الشارقة لسيادتكم المرفق. و بالإشارة إلي الموضوع أعلاه و علما بأن هيئة كهرباء و مياه الشارقة قد كلفت السادة إنتلاف شركتي ميتسوبيشي هيتاشي باور سيستمز و السويدي باور (اس ايه ني) للقيام بأعمال تطوير و توسعة محطة الية لتوليد الطاقة بنظام الدورة المركبة.

نحيط علم سيادتكم ان الإنتلاف قد أسند إلى السادة / الحلول البيئية للإستشارات البيئية (ص.ب. 68595، إمارة الشارقة، الإمارات العربية المتحدة) القيام بأعمال الدراسة البيئية و المجتمعية للمشروع.

و نظرا لأهمية المشروع و حيويته لإمارة الشارقة و إرتباطه بجدول زمني محدد. يرجى التكرم من سعادتكم بتقديم الدعم اللازم فيما يخص هذا المشروع الحيوي.

و تفضلوا بقبول فائق التحية و الإحترام

مهندس / رامي إمام

مدير المشروع




1. 7. 2018

---

## ANNEXURE 2 – EPAA's TERMS OF REFERENCE

# TERMS OF REFERENCE DOCUMENT

**RE: TERMS OF REFERENCE (TOR) REPORT FOR ENVIRONMENTAL AND SOCIAL  
IMPACT ASSESSMENT (ESIA) STUDY: PROPOSED LAYYAH COMBINED CYCLE  
THERMAL POWER PROJECT OF SHARJAH ELECTRICITY AND WATER AUTHORITY  
(SEWA) LAYYAH POWER STATION, SHARJAH - UAE**

Environment & Protected Areas Authority Sharjah United Arab Emirates Sharjah Desert Park Intersection 9 (E88)	Author: Department: Telephone: Email: Date:	John Pereira EPAA +971 52 7208397 john.pereira@epaa.shj.ae 01-08-2017	
---	---	---	---

**KEY COMMENTS:**

Comment	Page No.	Document Section	Quote	Commentary
1	8	<b>1.Introduction</b>	<i>“It is still undergoing expansion as the demand increasing demand of water and electricity in the emirate of Sharjah”</i>	The introductory section of the document contains numerous grammatical errors, it is suggested that greater emphasis is placed on proofreading the document prior to release.
2	26		<i>“Such screening is based on the environmental and social categorization process of the International Finance Corporation (IFC) and it will be categorized as A, B and C.”</i>	No clarity is provided as to what category this project falls in.
3	49	<b>3.6 Waste Streams/3.6.3. Liquid waste</b>	<i>“The generated domestic wastewater (sewage) will be collected in underground collection tank and it will</i>	Greater clarity needs to be provided on this process, what treatment process will be implemented. What “checks and balances” will be implemented to ensure appropriate water quality when disposed of?

		<b>generation and management.</b>	<i>be treated in Sewage Treatment Plant (STP). The treated sewage will be disposed to sea (Arabian Gulf)."</i>	
4	49	<b>3.6 Waste Streams/3.6.3. Liquid waste generation and management.</b>	<i>"The industrial wastewater to be generated from the proposed will be neutralized and neutralized wastewater will be discharged to sea through outfall channel."</i>	Greater detail needs to be placed on the quality of this industrial discharge, will any contaminants or chemicals be present, what will the temperature & salinity levels be. Could this have an impact, needs serious addressing in the EIA.
5	53	<b>4.1.1. Environmental sensitivity of the study area</b>	<i>Sensitive receptors are the specially protected resources and those vulnerable people in a given area at the receiving end of the discharges, emissions and pollutions from a project or activity.</i>	<p>Various sensitive receptors are excluded in this report, the impact of the project on these receptors need to be reviewed:</p> <ul style="list-style-type: none"> <li>➤ No less than 5 commercially operating hotels and resorts along the Al Khan Beach Area. Golden Beach Resort is within 500m of the proposed construction site. <a href="http://www.mhgroupsharjah.com/GBM/en/hotel.html">http://www.mhgroupsharjah.com/GBM/en/hotel.html</a></li> <li>➤ Al Khaleidia Suburb</li> <li>➤ Al Khan Primary School (Within 2km)</li> <li>➤ Arabian Gulf School (Within 2 km)</li> <li>➤ 2 x Nurseries (Within 2 km)</li> </ul> <p>These stakeholders need to be considered when assessing the impacts of the projects. 30 + months of construction e.g. noise, dust and vibration could seriously impact the economic viability of hotels and resorts. Also reduced water quality could seriously impact the experience of resort visitors.</p> <p>See figure 1.</p>
6	Pg 54 - 61	<b>4.3 Climate and Meteorology 4.4 Geology and Soil Quality 4.5 Ground Water</b>		This entire section is almost entirely dominated by generic National or Regional scale information and carries little relevance to the local project environment. Greater emphasis must be placed on the local environment surrounding the site, e.g. site geology, soil quality, marine environment etc. Most of this information must be site specific.



		<b>4.6 Air Environment</b> <b>4.8 Marine Environment</b> <b>4.9 Waste Management</b> <b>4.10 Socio-Economic Profile</b>		The socio-economic profile of the surrounding environment and communities needs to be described, Emirate scale descriptions are too vague.
7	57	<b>4.4 Geology and Soil Quality</b>  <b>4.8 Marine Environment</b>	<p><i>“According to the study conducted by Alsharhan and Kendall (2003), coast between”</i></p> <p><i>Circulation in the Gulf is in an anti-clockwise motion, driven primarily by density gradients, creating a reverse estuarine flow similar to the circulation of the Mediterranean Sea (Reynolds, 1993).</i></p> <p><i>Figure 9 - Arabian Gulf bathymetry depth contours in m (Source: Elshorbagy et al., 2006)</i></p>	The references referred to on the left have not been cited in the document. Poor citation exists throughout the document. At all times where external resources have been utilized the source must be cited.
8	55	<b>4.3.2 Humidity</b>	<p><i>Perusal on data from National Center of Meteorology and Seismology (NCMS) during 2013-2017 for Sharjah International Airport, it indicates that lowest minimum absolute relative humidity by month (Min., - Lowest monthly minimum absolute relative humidity observed in a specific month) during 2013 – 2017 was 4% during October, 2014. While, highest</i></p>	This paragraph is confusing and hard to follow; careful revision of sentence structures is required. Similar confusing paragraphs exist through the document and will require revision.

			<p><i>maximum absolute relative humidity by month (Max., - Highest monthly maximum absolute relative humidity observed in a specific month) was 99% during the months of January to April, 2013 and March, 2016.</i></p> <p><i>The lowest mean of minimum monthly relative humidity (Mean Min., - Mean of daily minimum relative humidity observed during a specific month during 2013 – 2017 was 15% during May, 2015, While, highest mean of maximum monthly relative humidity (Mean Max., -Highest monthly maximum relative humidity observed in a specific month) was 89% during February, 2013.</i></p>	
9	57	<b>4.7 Noise Environment</b>	<p><i>“There are no significant sources of noise by the proposed project.”</i></p>	<p>The proposed project site is situated in an industrial zone, numerous sources of noise are present. The construction of the project will result in significant noise pollution. This will have an impact on the Adjacent Hotels and Resorts situated within 1km of the proposed project site. This statement is therefore misleading and not accurate.</p>
10	61	<b>4.10.2. Traffic and Transportation</b>	<p><i>“The project site is well connected by road network. The level of service of that road is moderate. The project site is well accessible by air and sea route.”</i></p>	<p>On what analysis is the “level of service” determined as moderate? Sharjah is prone to severe congestion at peak hours how will the project impact or contribute to further congestion.</p> <p>A major shortcoming of the current road network is that all access for construction and service vehicles are forced through high to medium density urban and residential areas, the road network is ill-suited for construction machinery. 30+ Months of construction will have a negative impact on local congestion, noise and air pollution this needs to be evaluated.</p>
11	63	<b>4.11 Gap Analysis</b>		<p>This section places minimal emphasis on the impacts of the project on the adjacent urban and hospitality environments this needs to be addressed.</p>

				The discharge of industrial wastewater and its associated impacts need to be included. Special focus is required on Chemical and Salinity impacts.
12	66	<b>Table 16 – Summary of Environmental Aspects and probable impacts during construction and operation.</b>		<p>The Impacted receptors need to be carefully revised. As an example construction noise, dust and vibrations could impact adjacent resorts and residential areas.</p> <p>The discharge of dewatered water into the ocean’s impact will determine entirely on the level of contamination at the site, which could drastically increase the impact on the local environment and adjacent hospitality stakeholders. Not only the project site will be impacted.</p>

Final Commentary:

The EPAA requires that the following be included in the EIA:

The EIA report should give details on the:

- ◆ Impacts to the marine environment from accidental discharges of hazardous materials
- ◆ Detail design, specification and layout of surface drains for storm water disposal indicating its final exit
- ◆ Impacts on sediment transport and consequences on the coastal environment.

The EIA must contain the following:

- ◆ Prediction of the ecological impacts of the proposed development
- ◆ Direct losses of habitats, flora and fauna, natural features (*Feeding grounds, shelter, breeding sites and areas used during seasonal migration may be lost*), including habitat fragmentation
- ◆ Negative effects on the health of biota including plants, animals and fish
- ◆ Threat to rare and endangered species
- ◆ Reduction in species diversity or disruption of food webs

- ◆ Determining the significance of the ecological impacts. Factors include the timing of the impact, duration and frequency of the impact, timescale within which the impact is being investigated, spatial scale of an evaluation, the nature conservation value of a species or habitat
- ◆ Disturbance of aquatic organisms and aquatic habitats
- ◆ Hydrological disturbances – changes in the quality and quantity of surface and groundwater flows  
Changes in the physico-chemical environment

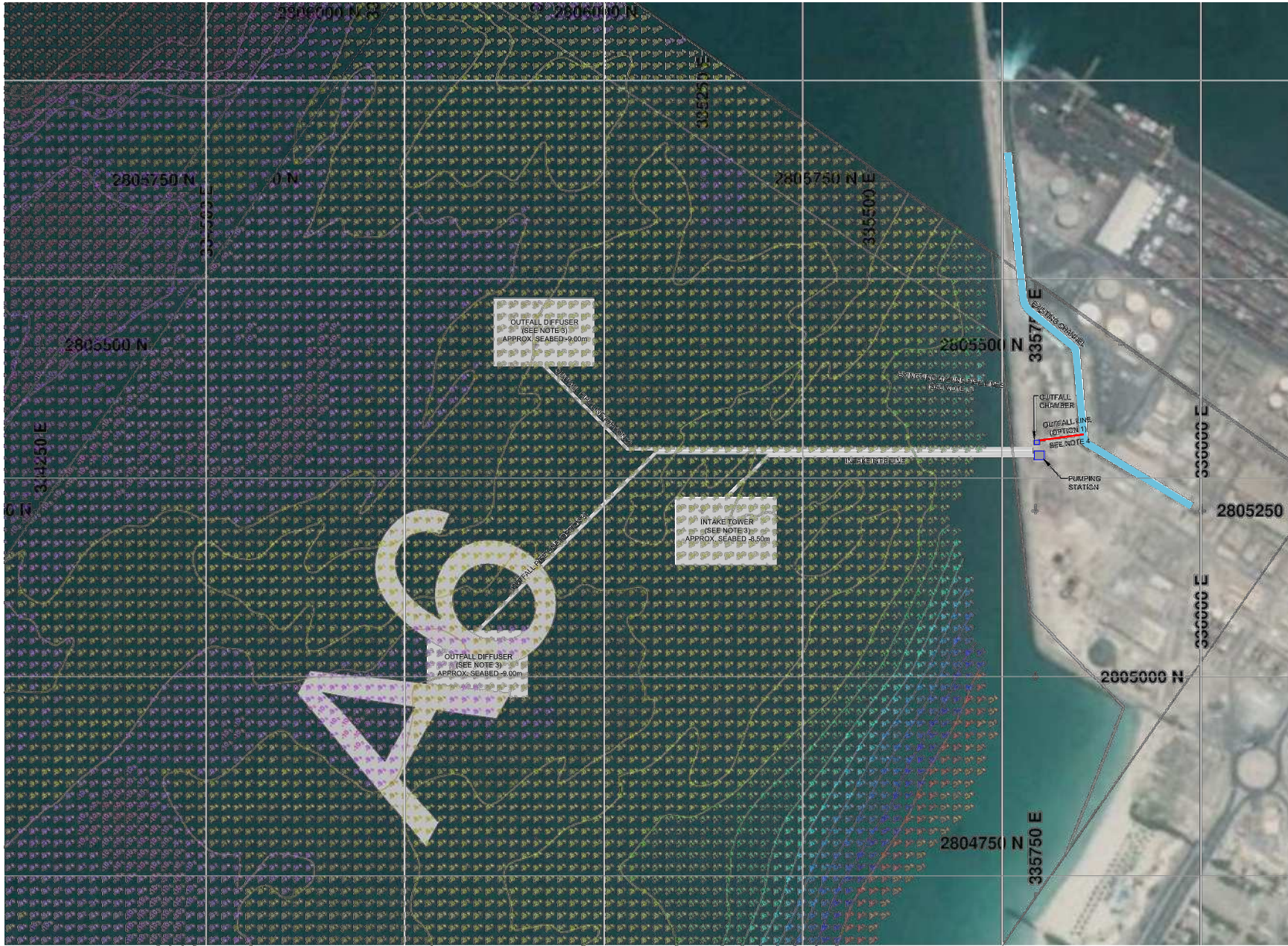


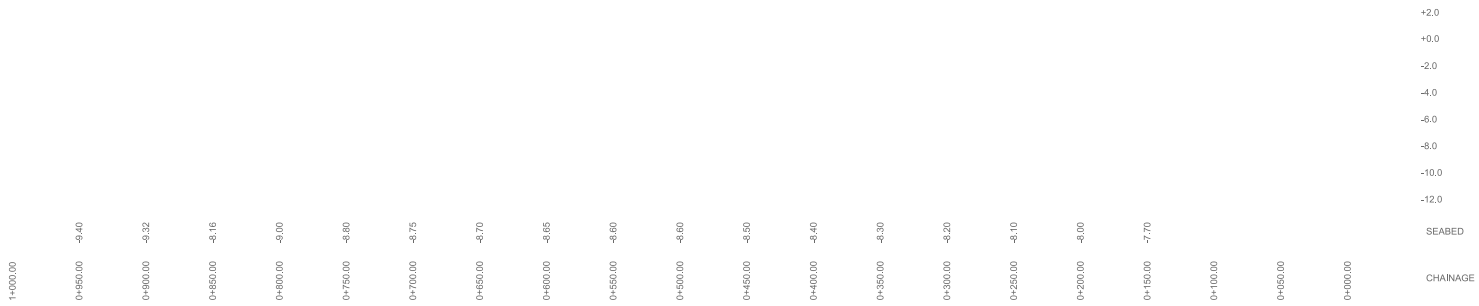
*Figure 1 Any impacts on the marine environment could lead to detrimental consequences for adjacent stakeholders, below is a persistent Algal Bloom Experienced along the Al Khan Beaches adjacent to the project site, special emphasis needs to be placed on inspecting marine water quality impacts of the proposed project.*

---

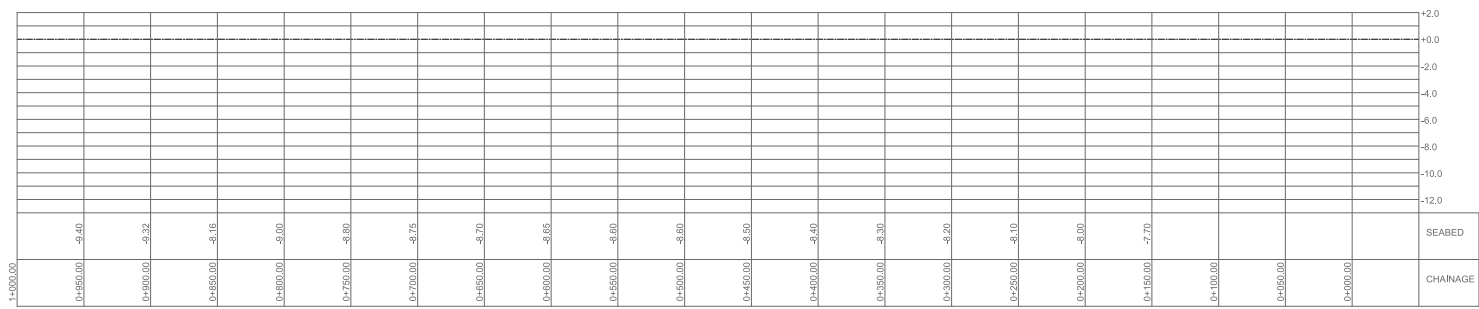
## **ANNEXURE 3 – LAYOUT SHOWING TENTATION LOCATIONS OF INTAKE AND OUTFALL DISCHARGE**

**Layout showing tentative locations of intake and outfall  
discharge**





INTAKE PIPELINE PROFILE



OUTFALL PIPELINE PROFILE

DN  
1xDN  
DN

A

B

2xB

B

C

A

DN

D

B

### INTAKE HEAD TYPICAL LAYOUT

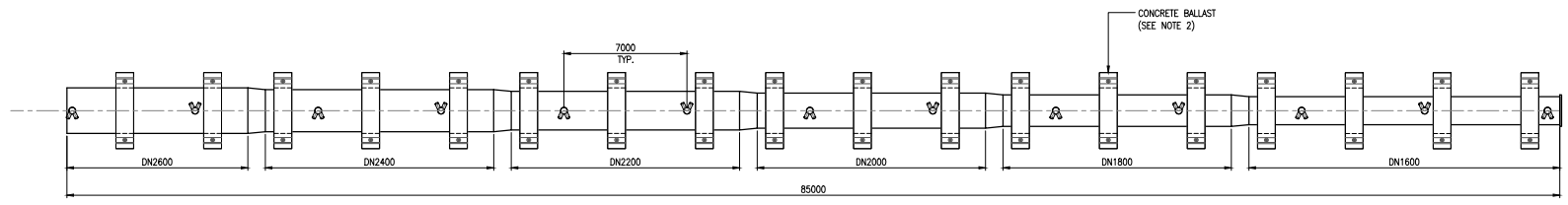
### INTAKE HEAD SECTIONAL DETAIL

(SCALE N.T.S)

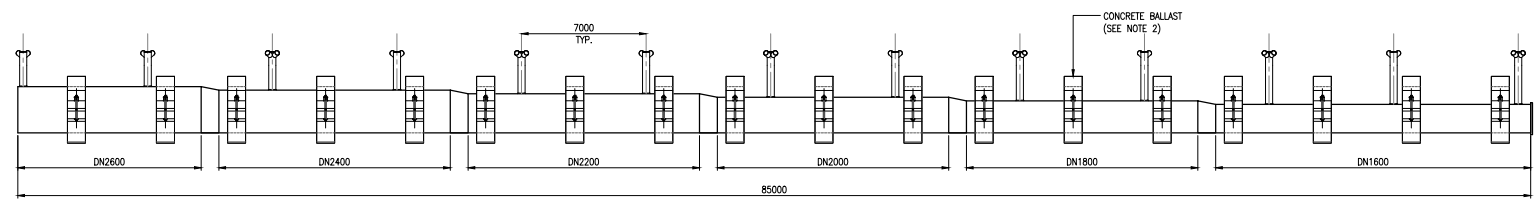
### INTAKE HEAD TABLE

LOCATION	A (m)	B (m)	C (m)	D (m)	DN (mm)
----------	-------	-------	-------	-------	---------





DIFFUSER LAYOUT



DIFFUSER ELEVATION

## ANNEXURE 4 – SITE PHOTOS

