ADNOC GAS

ADNOC RUWAIS LNG PROJECT

OPERATIONAL ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (OESMP) FOR THE LNG PLANT IN RUWAIS, ABU DHABI

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ABBREVIATIONS

AAQ	Ambient Air Quality
AC	Accidentally Contaminated
ADACH	Abu Dhabi Authority for Culture and Heritage
ADNOC	Abu Dhabi National Oil Company
ADTCA	Abu Dhabi Tourism and Culture Authority
AGL	Above Ground Level
AIS	Automatic Identification Systems
APCI	Air Products and Chemicals, Inc
API	American Petroleum Institute
AQMS	Air Quality Monitoring System
ASME	American Society of Mechanical Engineers
BAP	Biodiversity Action Plan
BAT	Best Available Technologies
BMP	Biodiversity Management Plan
BOD	Biological Oxygen Demand
BOG	Boil-Off Gas
CAP	Corrective Action Plans
CBD	Convention on Biological Diversity
CC	Continuously Contaminated
CCRA	Climate Change Risk Assessment
CD	Closed Drains
CEMS	Continuous Emission Monitoring Systems
CEO	Chief Executive Officer
CFM	Community Feedback Mechanism
CH4	Methane
CICPA	Critical Infrastructure and Coastal Protection Authority
CITES	Convention on International Trade in Endangered Species
CMS	Convention on Migratory Species
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
COLREG	International Regulations for Preventing Collisions at Sea
CR	Clean Water System or Storm Water Run-off
CSR	Corporate Social Responsibility
CWM	Center for Waste Management
DCT	Department of Culture and Tourism
DDV	Drop-down Video

DMT	Department of Municipalities and Transport
EAD	Environmental Agency of Abu Dhabi
EDG	Emergency Diesel Generator
EHS	Environmental, Health, and Safety
EHSMS	Environmental, Health, and Safety Management System
EIA	Environmental Impact Assessment
ELARD	Earth Link and Advanced Resources Development
ENVID	Environmental Impact Identification
EOH	Environmental and Occupational Health
EP	Equator Principle
EPC	Engineering, Procurement and Construction
ERP	Emergency Response Plan
ERT	Emergency Response Team
ESD/EDP	Emergency Shutdown / Emergency Depressurization
ESEP	External Stakeholder Engagement Plan
ESIA	Environmental and Social Impact Assessment
ESMA	Emirates Authority for Standardization and Metrology
ESMS	Environmental and Social Management System
FEED	Front End Engineering Development
FFG	Flame Front Generator
FGRS	Flare Gas Recovery System
FRP	Facility Response Plan
FW	Fire Water
GAN	Gaseous Nitrogen
GC	Group Company
GC CHSE	GC Corporate Health, Safety, and Environment
GC GSA	GC General Services and Administration
GCC	Gulf Cooperation Council
GHG	Greenhouse Gas
GHSEF	Group Health Safety and Environment Function
GPS	Global Positioning System
GRI	Global Reporting Initiative
HHP	High High Pressure
HHR	Heavy Hydrocarbon Removal
HP	High Pressure
HSE	Health, Safety, and Environment
HSEIA	Health, Safety, Environmental Impact Assessment
HSEMS	Health, Safety, and Environment Management System

HVAC	Heating, Ventilation, and Air Conditioning
IAPP	International Air Pollution Prevention
IFC	International Finance Corporation
ILO	International Labor Organization
IMDG	International Maritime Dangerous Goods
IMO	International Maritime Organization
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organization for Standardization
IUCN	International Union for Conservation of Nature
KO	Knock Out
KPI	Key Performance Indicator
LDAR	Leak Detection and Repair
LED	Light-Emitting Diode
LIN	Liquid Nitrogen
LMXD	Littoral Mixed Deposit
LNG	Liquefied Natural Gas
LP	Low Pressure
MARPOL	Marine Pollution
MCHE	Main Cryogenic Exchanger
MEPC	Marine Environmental Protection Committee
MES	Monaco Engineering Solutions
MMO	Marine Mammal Observer
MOCCAE	Ministry of Climate Change and Environment
MOU	Memorandums of Understanding
MP	Medium Pressure
MPA	Marine Protected Area
MR	Mixed Refrigerant
MSDS	Material Safety Data Sheet
NFPA	National Fire Protection Association
NO2	Nitrogen Dioxide
NOC	No Objection Certificate
NRU	Nitrogen Rejection Unit
O3	Ozone
O&G	Oil and Gas
OESMP	Operations Environmental and Social Management Plan
OH SME	Occupational Health Subject Matter Expert
OHID	Occupational Health Identification
OHS	Occupational Health and Safety

OSHAD SF	Abu Dhabi Occupational Safety and Health System Framework
PM	Particulate Matter
PPE	Personal Protective Equipment
QCC	Quality and Conformity Council
RCP	Representative Concentration Pathway
RIC	Ruwais Industrial Complex
RLNG	Ruwais Liquefied Natural Gas
ROPME	Regional Organization for the Protection of the Marine Environment
RRW	Ruwais Refinery West
SAR	Search and Rescue
SDS	Safety Data Sheet
SEP	Stakeholder Engagement Plan
SHA	Seismic Hazard Assessment
SIA	Social Impact Assessment
SO2	Sulfur Dioxide
SOLAS	Safety of Life at Sea
SOPs	Standard Operating Procedures
SRM	Social Risk Management
SS	Sanitary Sewer
STCW	Standards of Training, Certification, and Watchkeeping for Seafarers
STP	Sewage Treatment Plant
TBC	To be Confirmed
TPH	Total Petroleum Hydrocarbons
TSS	Total Suspended Solids
UAE	United Arab Emirates
UNCLOS	United Nations Convention on the Law of the Sea
UNEP APELL	United Nations Environment Programme - Awareness and Preparedness for Emergencies at Local Level
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
VOC	Volatile Organic Compounds
VP	Vice President
VTMS	Vessel Traffic Management System
WEEE	Waste from Electrical and Electronic Equipment
WHO	World Health Organization
WPS	Wage Protection System

1. INTRODUCTION

1.1 Project Background

The Abu Dhabi National Oil Company (ADNOC) Ruwais Liquefied Natural Gas (RLNG) Front End Engineering Development (FEED) Project will develop a two train, near net-zero electrically driven LNG facility, targeting international markets. The project is located adjacent to the Ruwais Refinery West, United Arab Emirates (UAE), comprising approximately 2 million square meters within the Ruwais Industrial Area. The feed gas for the project will be supplied from the Habshan gas processing plant, via a new sales gas pipeline. The pipeline is not part of the scope of the project and even though it is classified as an Associated Facility, environmental and social risks associated with the pipeline are covered by a different contractor.

Monaco Engineering Solutions (MES) (hereinafter referred to as the "CONSULTANT") has been invited by ADNOC Gas (hereinafter referred to as "COMPANY") to perform FEED Phase Health, Safety, Environmental Impact Assessment (HSEIA) Study for the ADNOC Ruwais LNG FEED Project (hereinafter referred to as the "PROJECT"), which is a revalidation of the HSEIA conducted during the FEED phase for the Fujairah LNG project. The Environmental and Social scope has been contracted to Earth Link and Advanced Resources Development (ELARD). MES and ELARD are jointly referred to as CONSULTANT. ELARD is a registered environmental consultant with the Environmental Agency of Abu Dhabi (EAD) and with ADNOC.

This project is located in an ADNOC concession area and does not cross any protected area; accordingly, ADNOC is the delegated competent environmental authority for environmental permitting.

1.2 Purpose of the OESMP

1.2.1 Purpose

The Operational Environmental and Social Management Plan (OESMP) is a project specific plan developed for the Operator and its contractors to ensure appropriate environmental and social management practices are followed during the operational phase of the Project as well as define the environmental and social performance expectations. The OESMP process aims at covering all aspects of planned operations by the Contractor as well as by its contractors. The main objectives of the OESMP are to:

- Mitigate potential adverse impacts during operation of the project.
- Achieve compliance with environmental and social permit and legal requirements, EIA mitigation, management, and monitoring requirements, endeavor Equator Principles IV, and Best Available Techniques.
- Ensure compliance of contractors and suppliers with the same requirements.
- Ensure adherence of the supply chain to sustainability and of the ADNOC Code of ethics principles.
- Secure necessary human and financial resources with upper management support.

It should be noted that this is a FEED-stage OESMP that still requires finalization by the Operator following detailed design and prior to operation (or Financial Close in case of International Lender Financing). It also requires integration of additional studies and surveys that are not yet completed such as a marine ecological survey and associated Biodiversity Management Plan (restoration plan) for the operation of the jetty.

1.2.2 Scope

The overall RLNG project comprises the installation of two (2) Liquefied Natural Gas (LNG) Trains (together with inlet gas treating facilities), two (2) LNG Tanks and an LNG Loading jetty with two (2) berths together with support utilities and infrastructure buildings. Construction of the second LNG train may be carried out during commissioning/ operation of the first LNG train.

The scope of this OESMP consists of the operation of both LNG trains, irrespective of the construction schedule for each train; however, operating one train while constructing the other implies an overlap between the CESMP and OESMP. This will require coordination and potentially integration of certain plans, particularly the security management plan and emergency response plan given that different stakeholders may be occupying the same project site. Integration of the CESMP and OESMP is outside the scope of this OESMP and will be conducted during the EPC stage of the project prior to construction as relevant.

Other upstream and downstream facilities, as listed below, are being assessed by other contractors and are also outside the scope of this OESMP:

- Upstream (Habshan) gas processing facility and associated gas pipeline.
- Feed Gas supply from the Habshan pipeline tie-in point (manual pipeline end valve) to the RLNG Plant.
- Electric power interfaces upstream to the tie-in to the local TRANSCO 400 kV grid network.
- LNG Carriers.
- LNG Bunkering Vessels.
- Miscellaneous other marine support vessels for LNG loading activities.

Referring to ADNOC Standard for EIA development [Ref 4], an OESMP must be prepared prior to start of operations and must provide the necessary information for the operator to effectively control any adverse environmental and social impacts identified during the EIA and Social Impact Assessment (SIA) for the operational phase. Hence, this OESMP is prepared while referring to the FEED Phase ENVID Report [Ref 28] and according to the template provided in Appendix 4 of ADNOC Standard for EIA development [Ref 4]. The scope of this OESMP is to provide control and mitigation measures for the RLNG Project operational phase that includes early commissioning as well as operational activities.

1.2.3 Structure of the OESMP

The OESMP aligns with and integrates key documents to ensure effective management of environmental and social risks during operations. It translates the mitigation measures from the EIA and SIA into actionable steps. Additionally, it references Standard Operating Procedures (SOPs), HSE manuals, and project-specific plans to guide day-to-day operations. The OESMP also ensures compliance with regulatory requirements and permits, while maintaining

alignment with the Environmental and Social Management System (ESMS) and Stakeholder Engagement Plan (SEP) to promote consistent stakeholder engagement and risk management throughout the operations phase.

The structure of the OESMP Report is as follows:

- Section 1 Introduction
- Section 2 Project Description
- Section 3 Environmental and Social Policy
- Section 4 Environmental and Social Management
- Section 5 Environmental Management Plans
- Section 6 Social Management Plans
- Section 7 Occupational Health & Safety Management Plans
- Section 8 Emergency Response Plans
- Section 9 Conclusion
- References

2. PROJECT DESCRIPTION

2.1 Project Location

The RLNG plant is located on the coast within the Ruwais Industrial Complex (RIC), adjacent to the Ruwais Refinery West (RRW), covering approximately 2 million square meters. It is bordered by industrial plots to the west and south, with the Persian Gulf to the north and east. The feed gas for the project will come from the Habshan gas processing plant via a new 364 km sales gas pipeline. The overall project location is shown in Figure 2-1, while the proposed development area is depicted in Figure 2-2.

As indicated above, the Ruwais LNG Project is located in an ADNOC concession area, which also hosts other industries. There are also several sensitive areas in the surrounding area as indicated below around the project site:

- North:
    - Gulf (sea)
    - Marawah Marine Protected Area (MPA) (nearest protected marine area): 10.0-15.0 km northeast
- East:
    - TAKREER Carbon Black & Delayed Coker Project: 2.0 km east
    - Al Houbara Protected Area (protected terrestrial area) : 16.0 km southeast
- South:
    - Ruwais Refinery West: 0.7 km south
    - Al Dhanna city (nearest residential area): 5.0 km south
    - Barqa Al Suqoor Protected Area (nearest protected terrestrial area): 9.8 km south
- West:
    - Shuweihat Power Complex: 7.0 km west
    - Dhafra Beach Hotel: 2.0 km northwest
    - Sir Bani Yas Island: 13.0-15.0 km northwest

Figure 2-1. Project Location

Figure 2-2. Project Site

2.2 Project Operations Overview

This section is based on the Project Basis of Design (Doc No. 359665-0000-070-BD-9999-001) [Ref 43] and describes the operational processes and activities of the LNG plant, including LNG processing, storage, loading, and shipping as well as utilities and support systems during the operations phase of the RLNG project. Those are summarized below.

2.2.1 Gas Inlet Facilities

The purpose of the common inlet facilities is to filter, meter and regulate the pressure of the pipeline gas prior to the LNG Trains. Inlet filters are to be designed for handling "black powder" with 99.9% removal of particles of 2 microns. Knock Out (KO) of any potential free liquids is only required if the Heavy Hydrocarbon Removal (HHR) is installed. If installed the HHR will treat the Feed Gas to the required specification to suit the downstream LNG Liquefaction. Inlet gas compression will be installed with the HHR to maintain the feed gas pressure to liquefaction at 72 barg. The design flowrate for the inlet gas compression and HHR facilities shall be 1,575 MMscfd including margin.

2.2.2 Liquefaction and Refrigeration

The purpose of the Liquefaction Unit is to liquefy the natural gas such that it can be stored and shipped in LNG Carriers at atmospheric pressure. The C3MR liquefaction process based on APCI liquefaction technology has been selected with the refrigerant compressors being driven by electric motors.

The treated Feed gas is mixed with recycled BOG gas and supplied to the trains at 72 barg where it is cooled by the High High Pressure (HHP), High Pressure (HP). Medium Pressure (MP) and Low Pressure (LP) Propane Chillers prior to entering the Main Cryogenic Exchanger (MCHE) where LNG liquefaction as well as subcooling takes place via heat exchange with the Mixed Refrigerant.

The compressed Mixed Refrigerant (MR) is a mixture of nitrogen, methane, ethylene, and propane and this is cooled against air and partially condensed by heat exchange with the LP, MP, HP & HHP Propane before passing as vapor and liquid coolants to the MCHE where it liquefies the LNG.

Raw refrigerant storage for propane and ethylene are provided in the utilities area and facilities are provided in the LNG Train to transfer the propane refrigerant back to storage to minimize propane losses.

2.2.3 Nitrogen Rejection Unit (NRU)

The purpose of the Nitrogen Rejection Unit (NRU) is to meet the LNG product nitrogen specification.

LNG exiting the MCHE is routed to a 'Cold Box' containing a Nitrogen Rejection Column and other exchangers. A 'Cold Box' side stream is sent to an LNG Hydraulic turbine to achieve further cooling and returned to the Nitrogen Rejection column.

The 'Cold Box' on-specification LNG is produced and pumped to the LNG 'run-down' circuit and the LNG Storage Tanks.

The NRU reject nitrogen-rich streams shall meet a maximum methane content specification of 0.01% by volume (100 ppmv) and are primarily recovered and used as a source of nitrogen for the plant, either as Gaseous Nitrogen (GAN)

or Liquid Nitrogen (LIN). Any excess nitrogen to the plant demand is vented to atmosphere as GAN at a safe location for personnel.

The system shall be designed for cold restart in the event of a train trip to ensure minimum production loss. NRU gas flaring shall be minimized during the unit restart.

LNG rundown from the production trains will be stored in two full containment LNG Storage Tanks. The LNG Storage and BOG Compression unit is closely aligned with the LNG Loading Facilities.

2.2.4 Utilities

2.2.4.1 Power

Electric power will be provided from the TRANSCO 400 kV supply grid via overhead cables and pylons.

Emergency Diesel Generators (EDG), as listed below, will be provided for the required load to run all equipment on the essential board in the event of loss of main power as well as the black start requirements:

- One EDG per LNG Train (to serve each unit).
- One EDG to serve the Utility Area and Central Control Building.
- One EDG to serve the Administration Area.
- One EDG to serve the Boil-Off Gas (BOG) Compression.
- One EDG to serve the Jetty LNG Loading

2.2.4.2 Fuel Gas System

The purpose of the LP Fuel Gas System is to reliably provide fuel gas to flare pilots, secondary flare purge, condensate loading thermal oxidizer and blanket gas.

Fuel Gas to users is available at 5 barg and 35ºC with a design pressure of 10 barg and design temperatures of 4 – 87ºC with a minimum superheat of +15ºC.

2.2.4.3 Diesel Fuel System

Diesel fuel is required intermittently for the operation of engine-driven plant equipment such as fire pumps, emergency generators and emergency Instrument Air Compressor. These will in normal operation have intermittent usage for periodic equipment testing and the diesel ‘day tanks’ will be replenished using a diesel road tanker.

2.2.4.4 Nitrogen System

The nitrogen system is required to supply Gaseous Nitrogen (GAN) for LNG Train MR make-up, inert purging of lines and equipment, compressor seals, blanketing of equipment, LNG Loading arms, flare purging and at utility stations. The prime source of nitrogen is GAN from the LNG NRU units which also supply Liquid Nitrogen (LIN) to the nitrogen storage and vaporization unit.

2.2.4.5 Water System

It is to be assumed that Utility Water is to be supplied from the established tie-in point. The system consists of the following:

- Utility Water Storage tank,
- Distribution Pumps
- Distribution system

The function of the Utility Water System is to supply water at 4.5 barg with a design pressure of 10 barg to the following users:

- Potable Water System
- Fire Water System
- Utility stations

The Utility Water Storage Tank shall have a 24-hour capacity.

2.2.4.6 Fire Water System

The Fire Water shall be provided to hydrants, monitors, water sprays, Hi-expansion foam, hose reels and sprinkler systems in the event of a fire on site.

The jetty firefighting systems and ring main shall be connected to the main plant firewater ring main ensuring a dual feed along the trestle to the jetty ring main.

The Fire/ Fresh Water Tank(s) working volume will be sized to give 6 hours supply to the maximum fire-fighting demand.

Two Jockey Pumps are required to provide fire water ring main circulation and maintain fire water ring main pressure when a hydrant is operated.

Two Fire Water Pumps are required to meet the maximum fire-fighting demand with one unit having a diesel engine driver supplying the firewater distribution system at 11.5 barg with a design pressure of 16 barg.

A fire station will be provided within the LNG Plant which will also have support from the adjacent refinery (ADNOC Refining GUP).

2.2.4.7 Drainage and Wastewater System

Effluent drainage systems shall be designed to safely convey effluents to suitable segregation, holding, treatment, sampling and disposal facilities. The drainage systems shall be capable of handling the maximum expected flow of firewater, wash water, accidental spills and sanitary waste from the facility.

Seven types of effluent systems are envisaged i.e., Clean Run-Off (CR), Accidentally Contaminated (AC), Continuously Contaminated (CC), Sanitary Sewer (SS), Closed Drains (CD), Chemical Effluent and LNG Spillage as per the Reference Project.

Clean Run-Off System

It should be noted that the 'CR' Drains system is also referenced as 'CWS' (Clean Water System) in the COMPANY specifications and standards.

Clean rainwater or washdown draining to the Clean Run-Off (CR) System drain. This is applicable exclusively to areas where surface rainwater cannot be contaminated by hydrocarbons or chemicals.

Surface run-off (rainwater, firewater) from non-curbed paved areas, unpaved areas and roads is considered CR and will flow through ditches, swales, and culverts to the Outfall Pumping Basin.

Areas where LNG and other 'cold liquid hydrocarbons (i.e., liquid propane, ethylene and cold mixed refrigerant liquid) where, upon rupture, significant hydrocarbon liquid pooling is possible, will be collected in impounding basins where they will weather off. In normal operation, surface run off from the impounding areas is considered CR and will be directly discharged to the respective outfall pumping basin. LNG spills shall not be allowed to enter any closed drainage network to avoid vapor entrapment

Accidentally Contaminated System

It should be noted that the 'AC' Drains system is also referenced as 'AOC' in the COMPANY specifications and standards.

Effluents from areas where spills or leakages of hydrocarbons or chemicals may be anticipated but not expected. This system collects storm water / fire water run-off from paved equipment areas divided into AC catchment areas. These effluent streams normally meet the required water discharge specifications but on occasion may be contaminated.

The AC drains system is to be sized for firewater and wash water runoff.

Each AC drains catchment area will be routed to a 'Stormceptor' (interceptor/ separator) type device where the free oil is separated to meet the marine water discharge specification and are then passed to a 'First Flush Basin' where the water quality is inspected for contamination before forwarding to the Outfall Pumping Basin.

Wash-down water from vehicle wash areas associated with road tankers or vacuum truck loading/ unloading areas shall drain to the AC systems.

AC drains in remote areas of the plant (e.g., LNG Jetty) may have localized collection points for emptying via a vacuum truck and transfer to the main site facilities for treatment.

Continuously Contaminated System

As per the Reference Project, there are no Continuously Contaminated (CC) effluents from LNG Plant process equipment.

It should be noted that the 'CC' Drains system is also referenced as 'COC' in the Company specifications and standards.

Domestic Sanitary Sewer System

Domestic sewage is to drain to the Sanitary Sewer (SS) system and mainly includes waste streams from toilets, showers, sinks, kitchens, and canteen facilities. This is routed to the Sewage Treatment Plant (STP) for treatment. The treated sewage water from the STP will be used primarily as irrigation water. This shall include a piped distribution on plot to the landscaped / building area, with a truck loading connection point. The truck loading facility will be provided for distribution of irrigation water around the facility or to export offsite. Excess irrigation water may be discharged to sea. The STPs shall be designed to operate with minimal operator intervention and maximum automatic control, with sparing to allow for online maintenance.

No hydrocarbons shall be allowed to enter the sanitary sewer.

Sewage from the buildings remote to the STP shall be pumped to the Sewage Treatment Plant (STP). Full automation solutions shall be applied such that minimal operation intervention is required.

The STP is to be designed for a maximum instantaneous flow of 7 m^3/h to meet the most stringent of the irrigation water and discharge to marine specifications as defined in Appendix 4 of Pollution Prevention and Control Standard HSE-EN-ST02 [Ref. 4].

The system is to include buffer storage for the produced water sized for 3 days of normal production plus 24 hours of maximum instantaneous production.

Monitoring to be included for the treated water flow, temperature, pH, dissolved oxygen, COD, turbidity, ammonia, and free chlorine, with dosing controllers for maintaining a constant pH, where required. Discharge to marine environment will have dedicated monitoring systems.

2.2.4.8 BOG System

Boil-Off Gas (BOG) from the storage and marine loading area will be compressed and sent to the Inlet Gas system. The BOG compressors are sized for the maximum vapor generated during ship loading.

The BOG system, including vapor arm and ship vapor return line, allows for simultaneous loading of an LNG carrier up to 216,000m^3 together with an LNG Bunkering Vessel.

2.2.4.9 Flare System

A Flare System shall be provided for the reliable and safe disposal of hydrocarbon vapor and liquid streams that result from upsets and emergencies.

The flare systems are also capable of handling hydrocarbon streams that result from operating conditions such as start-up, shutdown, venting, draining, gas purging, heating, and cooling of equipment and/or piping.

There will be 2 flare systems as follows:

- Dry (HP) Flare – Enclosed Ground Flare
- BOG (Low Low Pressure (LLP)) Flare – Enclosed Ground Flare

The dry gas flare may have the provision to incorporate 'burner runs' for a separate Wet Gas flare system which handles relief gas from the Inlet Gas Compression and HHR facilities (if provided in the future).

Flare headers shall be provided with continuous nitrogen gas purges to prevent the infiltration of air into the system. Fuel gas will be used as a back-up flare purge gas.

Each flare will have a dedicated ignition system and back-up pilot gas supply.

The flares shall be designed to API 521, API 537 and project specifications.

The general philosophy is to operate with pilot burners continuously lit and no routine flaring during normal process operating conditions, including purge and blanket gases. In addition:

- High energy ignition system shall be available in case of loss of pilot flame to ignite from remote/control room by operations.
- A Flame Front Generator (FFG) shall be provided as a backup ignition.

2.2.4.10 LNG Plant Marine Facilities

The LNG Jetty shall have 2 berths each with the capability of handling either an LNG carrier or an LNG Bunkering Vessel. The LNG Jetty is also to cater for miscellaneous vessels such as Tugs, Line Boats, Pilot Boats etc. The range of LNG Carriers capacity for the marine installation design is up to 216,000 m3 for membrane storage vessels and 125,000 to 177,000 m3 for those with spherical storage.

2.3 Exclusion Zones And Safety Zones

The RLNG Project is situated in an ADNOC concession area where only industrial activities occur. The nearest protected sensitive environmental feature is the Marawah Marine Protected Area (MPA), a 4,255 km2 UNESCO designated 'Marine Biosphere Reserve'. The MPA comprises a range of unique marine and coastal habitats including sand flats, salt marshes, mangroves, seagrass beds, oyster reefs/beds, and coral reefs. The MPA is located approximately 10 - 15 km north-east of Ruwais Industrial Complex (RIC) and no impact is anticipated due to Project activities. In addition, a seagrass habitat is located approximately 18 km northeast of the RLNG site development [Ref. 29]. Impacts related to Marine Ecology are further explored in Section 5.9. The jetty will be constructed within a marine buffer allocated for the project including a canal for marine vessels transporting LNG.

There are no archaeological and cultural sites in the near vicinity of the Project Area and no associated impacts are expected. The nearest archaeological and cultural sites identified are listed below:

- Fossil sites within RIC (potentially containing fossils from the Late Miocene Period).
- An archaeological site in the RIC, located 1 km south from the current shoreline.

Notwithstanding, ADNOC Gas should seek NOC from Department of Culture and Tourism (DCT) during EPC stage.

2.4 Support Infrastructure

This section, which describes the additional infrastructure and facilities required to support construction activities, will be developed during the EPC stage prior to construction start.

2.4.1 Access and Transportation

Details any new or existing roads that will be used for access to the project site.

2.4.2 Maintenance Facilities

Details any maintenance facilities that will be used for the project operations.

2.4.3 Operational Offices and Control Rooms

Details any operational offices and control rooms that will be used for the project operations.

2.5 Accommodation Facilities

Based on currently available information, no accommodation camps are planned; facility staff are expected to live in nearby residential areas.

3. ENVIRONMENTAL AND SOCIAL POLICY

3.1 Purpose and Scope

This Environmental and Social Policy is designed to guide all operation activities under the Ruwais LNG Project, ensuring that those are conducted responsibly and transparently. This policy applies to all project activities, contractors, and stakeholders, aiming to prevent adverse impacts, manage risks, and enhance the positive contributions of the project to the local environment and community.

3.2 Regulatory and Standards Compliance

The Ruwais LNG Project will comply with all relevant UAE federal and emirate-specific environmental, health, and safety (EHS) regulations, including guidelines issued by the UAE Ministry of Climate Change and Environment (MOCCAE). In addition, the project will endeavor to meet international best practices, including:

- International Finance Corporation (IFC) Performance Standards for managing social and environmental risks and impacts.
- Equator Principles for responsible project financing.
- ISO 14001 for environmental management and ISO 45001 for occupational health and safety.

These standards set the framework for a comprehensive and systematic approach to risk management in line with global expectations.

3.3 Environmental and Social Commitments

3.3.1 Environmental Management

To minimize environmental impacts during the operations phase, the project will implement specific protocols aligned with industry best practices:

- Waste Management: Implement waste segregation, reduction, and disposal protocols to minimize landfill use and promote recycling.
- Spill Prevention and Control: Develop a spill prevention and response plan to avoid contaminating local soil and water resources.
- Air Quality, Illumination, and Noise Control: Regularly monitor emissions, illumination, and noise levels, implementing mitigation measures to ensure compliance with international commitments and national standards, and to minimize impact on local communities and ecosystems.
- Marine and Biodiversity Protection: Conduct surveysand monitor marine environments to protect local biodiversity and habitats.

3.3.2 Social Management

The project is committed to respecting and benefiting the local communities impacted by plant operations. Social management strategies include:

- Community Engagement: Transparent communication with local communities, government bodies, and industry partners.
- Grievance Mechanism: Implement an accessible grievance redress mechanism to address community concerns promptly, fairly, and transparently.
- Cultural Sensitivity and Respect: Conduct all operations with respect for local customs and values, working collaboratively with stakeholders to enhance positive social outcomes.

3.3.3 Worker Welfare

Recognizing the importance of worker health, safety, and welfare, the project will:

- Labor and Working Conditions: Ensure fair employment practices and protection of worker rights in line with local labor laws and ILO conventions.
- Occupational Health and Safety (OHS): Adhere to ISO 45001 standards and UAE EHS regulations, with regular training, safety protocols, and audits to prevent accidents and occupational hazards.
- Worker Accommodations: Ensure that all worker accommodations will endeavor to implement IFC worker welfare guidelines, providing safe, clean, and comfortable living conditions.
- Health and Well-being: Provide access to mental and physical health support, fair treatment, and protection from discrimination.

3.4 Adaptive Management and Monitoring

To maintain a dynamic and responsive approach, the project will conduct continuous environmental and social monitoring throughout operations. Adaptive management strategies will be used to respond to changing conditions and unforeseen challenges:

- Regular Assessments: Conduct scheduled environmental and social assessments to track impacts, identify areas for improvement, and adjust management measures as needed.
- Reporting and Transparency: Report monitoring outcomes to regulatory bodies and stakeholders to maintain transparency and demonstrate accountability.

3.5 Roles and Accountability

The project assigns clear roles and responsibilities to ensure that environmental and social commitments are met including:

- Environmental Manager: Responsible for overseeing environmental compliance, monitoring, and reporting.
- Social/ Interface Manager: Oversees social impact management, community engagement, and grievance redress.
- HSE (Health, Safety, and Environment) Manager and Team: Ensures Contractor develop and implements safety protocols, conduct training, and ensure continuous improvement in worker welfare and compliance with ADNOC and UAE safety standards.

3.6 Stakeholder Collaboration

The Ruwais LNG Project is dedicated to promoting collaborative partnerships with all stakeholders. By prioritizing transparent communication, ongoing dialogue, and community involvement, the project aims to build mutual trust and ensure that all project activities align with community values and contribute positively to the region.

4. ENVIRONMENTAL AND SOCIAL MANAGEMENT

4.1 Regulatory Framework And Applicable Standards

4.1.1 National and Local Legislation

4.1.1.1 Environmental

Environmental Framework Policies relating to the Project consist of laws, international conventions, and Management Action Plans. The Ministry of Climate Change and Environment (MOCCAE), formerly the Ministry of Environment and Water, is the principal environmental institution within the UAE. The MOCCAE develops environmental laws that are implemented and enforced as a minimum level of environmental due diligence by the various member Emirates.

The main law governing environmental protection in the UAE is the Federal Law No. 24 of 1999 for the "Protection and Development of the Environment", with which all companies/ establishment operating in the UAE have to comply with.

The main objective of this Law is to promote the protection and conservation of the environment across the UAE through:

- Protection and conservation of the quality and natural balance of the environment.
- Control of all forms of pollution and avoidance of any immediate or long-term harmful effects resulting from industrial, economic or agricultural development.
- Development of natural resources and conservation of biological diversity.
- Protection of society, human health and health of other living creatures.
- Protection of human health and the health of other living creatures from environmentally harmful activities.
- Compliance with international and regional conventions ratified or approved by the UAE regarding environmental protection and control of pollution.
- ADNOC and its operating companies, by virtue of Article 94 of Federal Law No. 24 of 1999, have been given the self-regulatory status for O&G Sector, with regard to the following:
    - Issuance of environmental permit or approvals for projects.
    - Implementation and submission of environmental monitoring reports.
    - Inspection (sampling) to verify compliance of liquid waste discharges.
    - Handling and treatment of hazardous wastes.

Therefore, the Company should obtain approval or secure environmental permits from the ADNOC for its activities and not from the EAD, the competent authority for Abu Dhabi Emirate for non-O&G Sector. Activities and operations located outside the ADNOC concession areas or within or near protected areas requires EAD approval, which is not the case of this project.

Irrespective of ADNOC or EAD requirements, the Company is not exempted from the following provisions of Federal Law No. 24:

- Ensuring that emission of air pollutants from its operation and other activities do not exceed the acceptable permissible limits.
- Prohibition on discharging untreated substances, wastes or liquids which may directly or indirectly cause pollution to the water environment.
- Prohibition on damaging or disturbing the natural properties or polluting the soil in any way that may affect its productivity.
- Prohibition on damaging flora, which can cause desertification or deformation of natural environment.

In addition to the Federal Law No. 24 of 1999 for the Protection and Development of the Environment, the Local Law No. 8 of 1978 Conservation of Petroleum Resources set out the high-level expectations of environmental protection from operating entities. Local Law No. 8 (Article 3) requires entities to "take all necessary measures to prevent damage or hazard, as a result of its operations, to the life or health of individuals, properties, natural resources, cemeteries, or archaeological, religious or tourist places. Article 56 of this law compels entities to take necessary precautions to prevent pollution of the air, underground and surface waters, territorial waters, and waters of continental shelf, shores and all islands within the territorial waters and the continental shelf.

4.1.1.2 Social

In terms of Health and Safety, the Federal Law No. 8 of 1980 concerning Regulation of Working Relations is a comprehensive law that regulates all aspects of labor relations between employers and employees. Federal Law No. 8 of 1980 has been amended by the following laws: Federal Law No. 8 of 2007, Federal Law No. 14 of 1999, Federal Law No. 12 of 1986, Federal Law No. 15 of 1985 and Federal Law No. 24 of 1981. Other Health & Safety related legislations are listed below:

- Ministerial Order No. 32 of 1982 Specifying Preventive Methods and Measures for Protecting Workers against Work Hazards.
- Federal Law No. 27 of 1981 Concerning Prevention from Communicable Diseases and its UAE Cabinet Decision No. 28 of 2010 on the Medical Examination System of the Persons coming to the UAE for Work or Residence.
- Federal Law No. 27 of 1981 Concerning Prevention from Communicable Diseases and its UAE Cabinet Resolution No. 7 of 2008 on the Medical Examination System of the Persons coming to the UAE for Work or Residence.
- Ministerial Resolution No. 443 of 2010 concerning the Working Hours during Summer.
- Ministerial Decision No. 37/2 of 1982 on the Medical Care which the Employer is Obliged to Provide to his Workers.
- Cabinet Resolution No. 13 of 2009 Approving the General Standards Manual of the Labor Collective Accommodation and Attached Services.
- Federal Law No. 3 Concerning Civil Defense and its amendments.

- Federal Law No. 1 of 1992.
- Federal Law No. 1 of 1995.
- Ministerial Resolution No. 154 of 1991 Concerning the Provisions of Fire Prevention in Public and Private Premises.
- Federal Law No. 21 of 2005 Concerning Traffic Law.
- Abu Dhabi Emirate Law No. 23 of 2005 and the Executive Regulations Regarding the Health Insurance Scheme for the Emirate of Abu Dhabi.
- Law No. 1 of 2006 concerning Civil Service and its Executive Order (issued in October 2007) relating to the civil service Law.
- Industrial Safety and Health Regulations - Part 3: Occupational Health and Environmental Control (Emirates Standardization and Metrology Authority).

Table 4-1 and Table 4-2 present lists of key legislation within the UAE legislative framework that are relevant to the project, covering areas such as environmental protection, solid waste and wastewater management, and social risk management, respectively.

Table 4-1. Main Laws Related to Environmental Protection in UAE

Year	Law/ Decree	Relevant Provisions	Relevance to the Project
2018	Federal Law No. 12	Integrated Waste Management.	--
2009	Federal Law No. 6	Peaceful Uses of Nuclear Energy.	Addresses the control of the use of Radioactive sources and protection against its hazards.
2009	Federal Law No. 7	Environmental affairs of UAE in general.	--
2008	Local Law No. 28	Establishment of Center for Waste Management (CWM).	• Established CWM to control and coordinate waste management activities throughout the Abu Dhabi Emirate with following objectives: • Establish systems to deal with all aspects of waste management to avoid or minimise pollution and health risks. • To be the focal point for coordinating all waste management practices within the Emirate. • To establish an electronic market for all types of recoverable wastes to facilitate trade and re-use. • To work with construction and industry sectors to establish specifications for re-use of secondary materials arising from waste treatment processes.
2005	Local Law No. 17	Establishment of the Abu Dhabi Authority for Culture and Heritage (ADACH), now Abu Dhabi Tourism and Culture Authority (ADTCA)	--

Year	Law/ Decree	Relevant Provisions	Relevance to the Project
2006	Council of Ministers' Decision No. 12	Regulation on Protection of Air from Pollution	Sets the requirements and limits for emissions from industries and all associated equipment and processes. Also sets the acceptable ambient limits for air and noise quality.
2005	Local Law No. 21	Waste Management in Abu Dhabi Emirate	Sets the requirements for handling all types of waste by parties generating waste and / or operating in the field of collection, transport, and storage, recycling processing and disposal of wastes.
2003	Ministerial Decree No. 50	Basic Regulating Rules for Ionizing Radiation Protection.	Sets the framework for protection against ionizing radiation.
2002	Federal Law No. 1	Regarding Organization and Monitoring the Use of Radiation and Protection	Define requirements for handling/ use of radiation sources.
2002	Federal Law No. 11	Regulation and Control of International Trade in Endangered Species of Wild Flora and Fauna.	--
2002	Regulation for Handling Hazardous Material, Hazardous work and Medical waste		Handling and management of hazardous materials, activities and medical wastes.
2001	Council of Ministers' Decision No. 37	Regulation concerning Environmental Impact Assessment of Projects	--
2001	Council of Ministers' Decision No. 37	Regulation on Handling Hazardous Materials, Hazardous Wastes and Medical Wastes.	Sets the requirements for import, transport, handling, and storage of hazardous substances as well as for generation of hazardous wastes and their management and disposal (Articles 5-14).

Year	Law/ Decree	Relevant Provisions	Relevance to the Project
2001	Council of Ministers' Decision No. 37	Regulation on Protection of Marine Environment.	Sets laws and regulations for marine transportation, as well as oil/gas platforms activities to protect the marine environment in terms of discharge-prohibited materials, and limits of allowed discharges.
2001	Council of Ministers Decree No. 23	Protection of ports, shore, and maritime territory from oil pollution incidents.	--
2000	The Water Quality Regulations		Provide water quality standards.
1999	Federal Law No. 24 and its Executive Orders	Protection and Development of the Environment.	This law aims at the protection and conservation of the quality and natural balance of the environment. Requirements applicable to the Project operations include: • Pollution from land sources (Articles 35-38) • Protection of drinking water and underground water (Article 39-41) • Soil protection (Article 42-47) • Air pollution (Article 48-57) • Handling of hazardous substances and wastes and medical wastes (Article 58-62) • Liability and compensation for Environmental damages (Article 71-90).

Year	Law/ Decree	Relevant Provisions	Relevance to the Project
1999	Federal Law No. 23	Exploitation, Protection and Development of Living Aquatic Resources in UAE	Key regulations pursuant to Article 62: • The Trade Effluent Control Regulations June 2010 • The Recycled Water and Bio-solids Regulations June 2010 • The Water Supply Regulations • Fuel Storage Tank Regulations 2009.
1998	Local Law No. 2, as amended	Regulation of the Water and Electricity Sector in the Emirate of Abu Dhabi	Key regulations pursuant to Article 62: • The Trade Effluent Control Regulations June 2010 • The Recycled Water and Bio-solids Regulations June 2010 • The Water Supply Regulations • Fuel Storage Tank Regulations 2009.
1993	Federal Law No. 19	Concerning the Delimitation of Maritime Zones in UAE.	--
1978	Abu Dhabi Emirate Law No.8	Conservation of Petroleum Resources	--

Table 4-2. Main Laws Related to Social Protection in UAE

Year	Law/ Decree	Relevant Provisions	Relevance to the Project
2021	Federal Decree-Law No. 33	Employment Relationship	This law regulates the relationship between the employer and the employees and aims at positive engagements to avoid/minimise work disruptions caused by protests or worker dissatisfaction.
2021	Federal Decree-Law No. 47	Unified General Rules of Labor in the United Arab Emirates	This law has come into force as of February 2, 2022. The law repeals the Federal Law No.8 of 1980 (UAE Labor Code). The law sets and unifies the general rules of labor in the UAE. The law adopts the principles of equality and non-discrimination at the workplace and draws up general employment conditions in the UAE.
2006	Federal Law No. 29	Rights of People of Determination as amended	This law states the right of people with disabilities for social welfare, education, work, and other services.
2012	Federal Decree No. 73	State's accession to the Convention against torture and other cruel, inhuman, or degrading treatment or punishment of 1984	This decree ratifies the Convention against torture and other cruel, inhuman, or degrading treatment or punishment, especially by those in higher positions and high societal status.
2006	Federal Law No. 51	Combating Human Trafficking Crime as amended	This law provides the legal framework for handling human trafficking cases.
2006	Council of Ministers' Decision No. 12	Regulation on Protection of Air from Pollution	Sets the requirements and limits for emissions from industries and all associated equipment and processes. Also sets the acceptable ambient limits for air and noise quality which generate a nuisance to social receptors.

Year	Law/ Decree	Relevant Provisions	Relevance to the Project
2005	Federal Law No. 21	Traffic Law	Reflects the relevant provisions involving the use of road vehicles on the public road network.
2004	Decree No. 38	State's accession to the Convention on the Elimination of all Forms of Discrimination Against Women	This decree ratifies the Convention on the Elimination of all Forms of Discrimination Against Women including the workplace.
1999	Federal Law No. 24	Protection and Development of the Environment	This law aims at the protection and conservation of the quality and natural balance of the environment. Requirements applicable to the Project operations include: • Pollution from land sources (Articles 35-38) • Protection of drinking water and underground water (Article 39-41) • Soil protection (Article 42-47) • Air pollution (Article 48-57) • Handling of hazardous substances and wastes and medical wastes (Article 58-62) • Liability and compensation for Environmental damages (Article 71-90).
1985	Federal Law No. 5	UAE Civil Code as amended	This law draws up the civil rights of nationals and foreigners in the UAE. Key clauses relevant to the Project are: • Ownership of assets and other in-kind rights are governed by the local legislation (Article 18) • State-specific regulations govern contacts and agreements between different parties (Articles 19 and 20))

Year	Law/ Decree	Relevant Provisions	Relevance to the Project
			• The law of the UAE applies to all people, including those who are stateless and those who hold multiple nationalities (Article 24) • Different kind of rights and means to prove the person's right (Articles 107-112) • Framework for the sale of vacant space and lands (Articles 580 and 581).

4.1.2 ADNOC Standards and Guidelines

ADNOC serves as the regulatory authority for Health, Safety, and Environment (HSE) and Social Protection in the Oil and Gas (O&G) sector in Abu Dhabi, managing compliance within its concession areas. ADNOC has established a series of standards covering various HSE and social aspects relevant to the industry. These standards fulfill the requirements of Article 94 of Federal Law No. 24, forming the framework for ADNOC's self-regulatory system, in which ADNOC acts as both a regulator and operator.

For environmental compliance, ADNOC standards outline mandatory requirements that all ADNOC group companies must follow, detailing procedures for HSE management across operations.

In terms of social protection, ADNOC's Social Risk Management (SRM) Standard provides guidelines for identifying, assessing, and mitigating social impacts. This includes procedures for impact assessments, social engagement plans, and mitigation measures that all ADNOC group companies and contractors must implement.

Relevant ADNOC environmental and social standards for this OESMP are listed in Table 4-3.

Together, these standards ensure that ADNOC's activities align with both environmental protection and social responsibility within its operational areas.

Table 4-3. ADNOC Standards Relevant to the OESMP Study

ADNOC Standards	Title
HSE-RM-ST01	HSE Risk Management System
HSE-RM-ST02	HSE Impact Assessment (HSEIA)
HSE-RM-ST03	HAZID ENVID OHID
HSE-EN-ST01	Environment Impact Assessment
HSE-EN-ST02	Pollution Prevention and Control
HSE-EN-ST03	Energy Management System
HSE-EN-ST04	Waste Management
HSE-EN-ST05	Environmental Performance Monitoring
HSE-EN-ST06	Biodiversity Assessment
HSE-EN-ST07	Air Dispersion Modelling Techniques
HSE-GA-ST02	HSEMS Standard
HSE-GA-ST04	ADNOC incident Notification, Investigation & Reporting Standard

ADNOC Standards	Title
HSE-GA-ST06	Project HSE Plan and Standard
HSE-GA-ST07	HSE Design Philosophy
HSE-GA-ST08	HSE Performance Monitoring and Reporting
HSE-GA-ST09	HSE Audit and Assurance
HSE-GA-ST10	Social Risk Management
EOH-GID-010	BAT in GHG Management of Projects
HSE-CE-ST02	Oil Spill Response
HSE-OA-ST08	Hazardous Substances
HSE-OH-ST08	Physical Health Hazard Standard
HSE-OH-ST09	Chemical Hazards Standard
HSE-OH-ST10	Biological Hazards Standard
HSE-OH-ST12	Indoor Air Quality Standard
HSE-OS-ST24	Marine Operations Safety
HSE-OS-ST27	Hazards Communication Standard

4.1.3 International Standards and Best Practices

Refer to the 'Regulatory Framework and Standards' subsection under Section 5 ENVIRONMENTAL MANAGEMENT PLANS, for a list of specific international conventions applicable to each environmental category.

The following list includes some key international conventions and best practices for environmental and social management:

- IFC Performance Standards (2006):
- ISO 14001 (Environmental Management) (first published in 1996, revised in 2015):
- ISO 45001 (Occupational Health and Safety) (published in 2018):
- United Nations Framework Convention on Climate Change (UNFCCC) (1992):
- Convention on Biological Diversity (CBD) (1992):
- International Labor Organization (ILO) Conventions (various dates, notably the Declaration on Fundamental Principles and Rights at Work in 1998):

- Stockholm Convention on Persistent Organic Pollutants (POPs) (2001):
- Minamata Convention on Mercury (2013):
- United Nations Sustainable Development Goals (SDGs) (adopted in 2015):
- World Bank Environmental and Social Framework (2017):

4.1.4 Environmental Permits and Licenses

A list of all relevant environmental permits and licenses required for operations shall be provided during the EPC stage prior to operation.

4.2 Environmental And Social Aspects And Impacts

4.2.1 Environmental Impact Assessment Summary of Impacts

Several pertinent environmental and social aspects/impacts during operation were identified as possibly significant and assessed in the EIA and SIA (planned to be revised during EPC Stage). These include:

- **Environmental Aspects**
    - Air Quality and Emissions:
        - Planned Emissions: "No continuous flaring" philosophy adopted, with primary emissions from emergency-only flares (Dry HP and BOG LP) and EDGs.
        - Unplanned Emissions: Emergency emissions/ERPG ; no AAQ limits apply.
        - GHG Emissions: Direct emissions of ~72,000 tCO2e/year, predominantly from flaring, venting, fugitive emissionsand generators; requires annual monitoring and periodic management action review.
    - Marine Ecology and Water Quality:
        - Presence of sensitive habitats, including mangroves, seagrass, and diverse marine species.
        - Design measures (e.g., "Stormceptor" systems) prevent contaminated runoffs from affecting the marine environment.
        - Effluent discharge from the sewage treatment plant to comply with ADNOC and statutory standards; study required during EPC.
        - Vessel traffic impacts minimized through speed limits and marine species observers.
    - Soil and Groundwater: Baseline studies indicate no contamination; double-walled day tanks and drip trays prevent spill-related impacts.
    - Waste Management:

- Dedicated hazardous waste storage, compliant with ADNOC guidelines for waste segregation, treatment, and disposal.
- Opportunities for waste avoidance, reduction, and recycling identified in the Waste Management Plan.

- Noise and Vibrations:
  - Noise levels during normal and emergency operations comply with regulatory standards at sensitive receptors.
  - Specific machinery requiring noise mitigation identified; quieter equipment recommended for high-contributing sources.
- Illumination: Potential concerns regarding illumination effects from ground flares; illumination study results to be included in the revised EIA.
- Resource Use:
  - Potable water sourced from public utilities; electricity from the grid.
  - Minimal ecological resource use due to location on reclaimed land with low terrestrial ecological significance.

- **Social Aspects**
  - Community Health and Safety:
    - Cumulative impacts on air and noise levels are negligible at nearby sensitive receptors (e.g., hospitals, schools).
    - Illumination from flares may raise community concerns; further studies are underway.
  - Livelihood Impacts: No anticipated impacts on land-based or fishing livelihoods, as public access to the project site is restricted and fishing activities are prohibited along the coastline. Regular patrols by the Coastguard mitigate potential disruptions.
  - Traffic: Operational phase involves ~200 personnel; existing transport infrastructure deemed sufficient.
  - Employment and Economic Contributions: Stable employment opportunities for operational workforce.
  - Stakeholder Engagement:
    - Social Impact Assessment (SIA) and Baseline Survey (SBS) to be revised during EPC to reflect updated project details.
    - External Stakeholder Engagement Plan (ESEP) to continue to be implemented and updated during operations as required.

4.2.2 Environmental Impact Assessment Summary of Mitigation and Monitoring Recommendations

The following key mitigation and recommendations were identified:

- Annual GHG monitoring and five-year management action reviews to optimize emissions reduction.
- Biodiversity Action Plan in line with ADNOC standards to include habitat restoration based on EPC phase assessments.
- Implementation of a robust waste management plan and enforcement of ADNOC standards for hazardous material handling.
- Conduct stakeholder engagement activities as part of the Social Impact Assessment (SIA) process. Raise awareness of ADNOC's Community Feedback Mechanism during all engagements to enable stakeholders to voice concerns or request additional project-related information.
- Employment and Community Development: Operations Social Management Plan to address workforce and community dynamics during respective phases.

4.2.3 Environmental and Social Aspects and Impacts Register

The COMPANY and EPC Contractor shall ensure all operational-phase actions and studies identified in the EIA, ENVID, and Action Plan are completed in accordance with ADNOC standards (e.g., HSE-RM-ST01 – HSE Risk Management). A consolidated list of environmental and social aspects and impacts shall be developed and maintained, prioritizing risk significance based on ADNOC standards.

Risk assessments will be conducted by qualified personnel (e.g., EHS specialists and social experts) and periodically revisited to incorporate:

- Operational changes, including new or modified activities.
- Abnormal conditions and emergency scenarios.

Documented information shall include:

- Identified environmental and social aspects and impacts.
- Criteria for determining significant impacts.
- Mitigation and management measures implemented.

At present (November 2024), based on the ENVID Study and EIA Action Plan, the operational environmental and social aspects and impacts are presented in Table 4-4.

Table 4-4. RLNG Environmental and Social Aspects and Impacts during Operations

Aspect	Potential Impact	Mitigation / Management Measures	Responsibility	Timeline
Air Quality				
Air Emissions from Flares	Contribution to localized air pollution during emergency scenarios	Implement "No continuous flaring" philosophy; optimize operations to reduce emergency flaring; monitor emissions regularly.	Environmental Specialist	Operations Phase
Fugitive Hydrocarbon Emissions	Impact on air quality from venting and leaks	Regular leak detection and repair (LDAR) program; monitor vented emissions and use activated carbon adsorption where feasible.	Environmental Specialist	Operations Phase
Noise and Vibrations				
Noise from Ground Flare Operations	Potential disturbance to nearby communities	Update noise study with vendor data; monitor and maintain compliance with ADNOC limits.	Environmental Manager	EPC and Operations Phase
Occupational Noise Exposure	Health risks to workers	Provide hearing protection and post warning signage for high-noise equipment; monitor and enforce PPE use.	HSE Manager	Operations Phase
Marine Ecology				
Effluent Discharge	Contamination risks to marine habitats	Ensure sewage and process effluents meet ADNOC and statutory limits; monitor effluent discharge quality.	Environmental Specialist	Operations Phase

Vessel Traffic	Risk to marine megafauna and sensitive habitats	Implement vessel speed limits and Arabian Marine Species Observers for vessel operations.	Environmental Specialist	Operations Phase
Waste Management				
Hazardous Waste	Environmental risks from improper disposal	Implement a Waste Management Plan; provide dedicated hazardous waste laydown areas; ensure ADNOC-compliant disposal methods.	Environmental Manager	Operations Phase
Illumination				
Artificial Lighting	Disturbance to marine and terrestrial fauna	Conduct groundflare illumination study; use directional lighting to minimize impacts on sensitive habitats.	Environmental Manager	EPC and Operations Phase
Community Health and Safety				
Traffic from Operational Activities	Increased risk of road accidents	Develop Traffic Management Plan; train drivers on safe driving; enforce speed limits near populated areas.	HSE Manager	Operations Phase
Public Safety	Risks from facility operation near populated areas	Conduct regular safety drills; ensure secure fencing and signage for high-risk zones.	HSE Manager	Operations Phase
Cultural and Social Aspects				
Community Engagement	Potential lack of transparency in communication with stakeholders	Implement and update External Stakeholder Engagement Plan; maintain a community feedback mechanism.	Social Manager	Operations Phase

Employment Opportunities	Workforce satisfaction and retention	Provide ongoing training and adhere to ADNOC worker welfare standards.	Social Manager	Operations Phase

4.3 ENVIRONMENTAL AND SOCIAL OBJECTIVES AND TARGETS

The EHS and Social Objectives and Targets relate to the identified Environmental and Social aspects, which were determined to have significant EHS and Social impacts. The following objectives and targets are specified at present and shall be updated following the update of Environmental and Social Aspects and Impacts:

4.3.1 General Compliance Objectives and Targets

- Objective: Ensure full compliance with ADNOC's EHSMS, UAE federal laws, Abu Dhabi regulatory standards, and endeavor implementation of the Equator Principles IV during operations.
- Target:

Conduct semiannual audits and annual inspections to ensure compliance with ADNOC and regulatory requirements.

Achieve 100% adherence to ADNOC's operational environmental and social performance criteria.

4.3.2 Environmental Objectives and Targets

- Air Quality and Emissions
  - Objective: Minimize air pollution and GHG emissions during operations.
  - Targets:
    - Maintain compliance with ADNOC and UAE air quality standards, ensuring negligible air pollution impacts on sensitive receptors.
- Noise and Vibrations
  - Objective: Minimize operational noise impacts on workers, communities, and marine species.
  - Targets:
    - Maintain e compliance with ADNOC noise limits.
- Marine Ecology
  - Objective: Protect marine habitats and biodiversity during operations.
- Waste Management
  - Objective: Optimize waste management practices to minimize environmental impacts.
  - Targets:
    - Follow-up waste hierarchy rate with priority to waste avoidance, reduction and recycling
    - Maintain compliance with ADNOC guidelines for hazardous waste segregation, storage, and disposal.
- Resource Use

- Objective: Efficiently use resources during operations.
- Targets:
  - Source 100% of clean energy from the grid and potable water from public utilities.
  - Evaluate and implement feasible measures for water reuse at the plant.

- Illumination
  - Objective: Mitigate impacts of artificial lighting on communities and biodiversity.
  - Targets:
    - Complete an illumination study for ground flares and implement directional lighting by the end of the EPC stage.
    - Reduce light spillover impacts using shielding and improved lighting design.

4.3.3 Health and Safety Objectives and Targets

- Occupational Health and Safety
  - Objective: Implement safe working conditions for the operational workforce.
  - Targets:
    - Conduct monthly safety inspections and quarterly training sessions for workers.
    - Achieve zero occupational incidents related to hazardous materials or equipment.
- Community Health and Safety
  - Objective: Protect local communities from operational risks.
  - Targets:
    - Conduct annual air and noise monitoring at nearby communities, ensuring compliance with UAE and ADNOC standards.
    - Maintain zero recordable incidents affecting public safety.

4.3.4 Social Objectives and Targets

- Stakeholder Engagement
  - Objective: Maintain transparent and effective communication with stakeholders.
  - Targets:
    - Ensure 100% of grievances received through ADNOC's Community Feedback Mechanism are addressed
- Livelihood and Community Well-being

- Objective: Mitigate potential impacts on local livelihoods and enhance community well-being.

- Employment and Labor Conditions
  - Objective: Promote fair labor practices and workforce development, and endeavor compliance with international labor standards.
  - Targets:
    - As per IFC PS 2 requirements, the project should maintain :
    - Fair wages, benefits, and working hours.
    - Freedom of association and non-discrimination.
    - Preventing child and forced labor.
    - Provision of safe and healthy working conditions, including adequate accommodations for workers, particularly for migrant laborers.
    - Conduct annual audits to verify compliance across contractors and subcontractors.
    - Adherence to ADNOC and UAE Labor Standards: migrant workers are employed under UAE labor laws and ADNOC Worker Welfare standards, covering fair contracts, overtime compensation, and paid leave.
    - Workforce Development:
    - Provide training and professional development opportunities to the workforce annually, focusing on safety-critical and operational roles.
    - Provide training aligned with IFC PS2 objectives, such as enhancing workers' rights awareness, safety, and employability.
    - Worker Grievance Mechanisms: Establish and maintain a transparent grievance redressal mechanism that addresses 100% of grievances within 30 days.

4.4 IMPLEMENTATION

4.4.1 Management Organizational Structure

This section outlines the key responsibilities of the principal organizational stakeholders involved in managing and implementing environmental, social, and compliance standards during the operational phase of the LNG project in Ruwais, Abu Dhabi. The stakeholders include Project Owner, Contractors and Suppliers.

1. Environment Agency – Abu Dhabi (EAD)

The Environment Agency - Abu Dhabi (EAD) has no direct role in this project given that the project is within an ADNOC concession area and does not cross protected areas. However, this would not be the case for the dredging activities.

2. Project Owner and Operator: ADNOC

As the project owner and operator, ADNOC holds ultimate responsibility for ensuring that the LNG plant operates in compliance with both local and international environmental and social standards. Key responsibilities include:

- **Overall Operational Accountability**: ADNOC is responsible for the environmental and social performance of the LNG plant during operations, ensuring compliance with the OESMP, UAE environmental regulations, ADNOC's internal standards, and Equator Principles IV.
- **Implementation of OESMP**: ADNOC is directly responsible for implementing the Operational Environmental and Social Management Plan (OESMP), integrating environmental and social considerations into daily operations.
- **Regulatory Compliance**: ADNOC must obtain and maintain all necessary environmental permits and licenses required for the operation of the LNG plant. This includes regular reporting to the EAD and adherence to any operational conditions stipulated by regulatory authorities.
- **Resource Provision**: Ensure that sufficient resources (financial, technical, and human) are allocated to effectively implement environmental and social measures, monitoring programs, and compliance activities as per the OESMP and EP IV requirements.
- **Stakeholder Engagement**: Continue engagement with all stakeholders, including local communities, regulatory authorities, and international lenders, maintaining transparency and addressing any concerns related to the project's environmental and social impacts during operations.
- **Monitoring and Reporting**: Conduct regular monitoring of environmental and social performance, including compliance audits, performance assessments, and reporting of key compliance indicators to internal management, regulatory authorities, and international lenders.

3. Contractors and Suppliers

During operations, ADNOC may engage contractors and suppliers for various operational activities, maintenance, and support services. Contractors and suppliers play a critical role in ensuring that operational activities comply with the OESMP and environmental and social standards. Their key responsibilities include:

- **Compliance with OESMP**: Ensure full compliance with the OESMP, including environmental protection measures, waste management protocols, labor rights, and health and safety standards.
- **EHS&S Focal Points**: Appoint Environmental, Health, Safety, and Social (EHS&S) focal points to coordinate with ADNOC's operational HSE and social management teams, ensuring all contracted activities align with operational standards.
- **Training and Capacity Building**: Participate in training programs provided by ADNOC on environmental and social compliance, ensuring that all contractor and supplier personnel understand their roles and responsibilities in maintaining environmental and social performance.

- **Incident Reporting**: Immediately report any environmental or social incidents (e.g., spills, safety incidents, labor disputes) to ADNOC and ensure that corrective actions are implemented as required.
- **Grievance Mechanism**: Ensure that all workers, including contractor and supplier personnel, have access to an effective grievance mechanism to raise concerns related to labor rights, working conditions, and social welfare.

4.4.2 Roles and Responsibilities

To implement the environmental management measures during operations, an appropriate organizational framework is established, where key EHS&S designations and roles and responsibilities are as follows:

1. General Manager (Operations) in RLNG site

The General Manager holds overall accountability for OESMP compliance and the successful execution of the Environmental, Health, Safety & Social (EHS&S) aspects during the operational phase. The key responsibilities include:

- **Approval of OESMP and Relevant Management Plans**: Review and approve the Operational Environmental and Social Management Plan (OESMP), ensuring it aligns with ADNOC's internal standards, and UAE environmental regulations.
- **Oversight of OESMP Implementation**: Ensure that the OESMP is effectively implemented across all operational activities, maintaining compliance with environmental and social standards.
- **Provision of Resources**: Allocate necessary resources to ensure effective management of environmental and social aspects, including human resources, equipment, and financial support.
- **Compliance Enforcement**: Regularly review operational performance against OESMP requirements and ADNOC's standards, ensuring compliance and addressing any deviations.
- **Stakeholder Engagement**: Interface with regulatory authorities and local communities on issues related to environmental and social performance during operations.
- **Emergency Response**: Approve emergency response procedures and oversee the adequacy of emergency preparedness for operational incidents.
- **Incident Review**: Ensure participation in incident investigations when required, ensuring corrective actions are effectively implemented.

2. Operations (RLNG) HSE Manager

The Operations HSE Manager reports to the General Manager and is responsible for managing the implementation and ongoing monitoring of OESMP compliance, covering environmental, social, health, and safety matters during operations. Responsibilities include:

- **Development of HSE Management Systems**: Maintain and continuously improve systems and procedures related to health, safety, environment, and emergency response tailored to operational activities.

- **Risk Management**: Ensure that environmental and social risk assessments are conducted for operational activities and integrated into the OESMP.
- **KPIs Monitoring**: Oversee the monitoring of safety, environmental, and social performance indicators (KPIs), taking corrective action as necessary to meet targets and continuous improvement goals.
- **Incident Reporting and Analysis**: Ensure that all incidents, near misses, and unsafe acts/conditions during operations are reported, investigated, and analyzed to prevent recurrence.
- **Regulatory Compliance**: Liaise with regulatory authorities to ensure compliance with environmental and social regulations during operations, including permit renewals and reporting obligations.
- **Training Oversight**: Oversee training programs to ensure operational personnel are competent in managing environmental and safety risks.

3. Health, Safety, and Environment (HSE) Team

The HSE Team supports the Operations HSE Manager in ensuring compliance with ADNOC's safety standards, UAE regulations, and best practices during operations. The team plays a key role in implementing HSE protocols on the ground. Key responsibilities include:

- **Operational HSE Compliance Monitoring**: Conduct regular inspections and monitoring to ensure all operational activities comply with OESMP safety protocols and ADNOC standards, immediately addressing any deviations.
- **Safety Audits and High-Risk Activity Oversight**: Perform regular audits focused on high-risk operational activities, such as process safety, equipment maintenance, and emergency preparedness, reporting findings to the Operations HSE Manager.
- **Incident Reporting and Preliminary Investigation**: Record and report health and safety incidents, near misses, and unsafe conditions, conducting preliminary investigations and collaborating with the Operations HSE Manager on root cause analysis.
- **Emergency Preparedness and Response Support**: Assist in implementing emergency response plans, conducting drills, and providing immediate support during emergency situations to ensure swift, effective action.
- **Worker Health and Safety Training**: Deliver safety briefings and refresher training sessions, particularly on operational hazards, PPE use, and safe operating procedures.
- **Record-Keeping and Documentation**: Maintain accurate records of all inspections, audits, incidents, and training sessions, ensuring documentation aligns with ADNOC and OESMP requirements.

4. **Environmental Manager (can be shared with HSE manager in case HSE manager has a strong environmental background)**

The Environmental Manager is responsible for overseeing all environmental aspects of the operation, ensuring compliance with UAE environmental regulations, ADNOC standards, and international best practices. This role involves strategic planning, monitoring, and continuous improvement to minimize environmental impacts during operations. Key responsibilities include:

- **Environmental Compliance Management**: Ensure that all operational activities comply with UAE environmental regulations, ADNOC guidelines, and endeavor international standards, including maintaining necessary permits and submitting required reports.
- **Environmental Risk Assessment and Mitigation**: Conduct environmental risk assessments for operational activities and develop mitigation strategies for key environmental risks, such as emissions, effluent discharges, waste management, and energy efficiency.
- **Environmental Monitoring and Reporting**: Oversee the regular monitoring of key environmental parameters, including air emissions, wastewater quality, waste generation, energy consumption, and resource use. Analyze trends and prepare regular environmental performance reports for internal management and regulatory authorities.
- **Waste and Resource Management**: Implement waste management protocols aligned with ADNOC and local regulations, including waste minimization, recycling, and proper disposal. Promote efficient use of natural resources, reducing consumption and emissions.
- **Incident Investigation and Corrective Action**: Lead investigations into environmental incidents, determine root causes, and implement corrective actions to prevent recurrence.
- **Sustainability Initiatives**: Promote sustainable operational practices, including energy efficiency measures, greenhouse gas emissions reduction, and continuous improvement in environmental performance.
- **Stakeholder Engagement and Communication**: Act as the main point of contact for environmental matters, liaising with regulatory authorities, local communities, and other stakeholders to ensure transparent communication about environmental performance and initiatives.
- **Training and Awareness Programs**: Develop and deliver environmental training sessions for operational staff and contractors to increase awareness of environmental responsibilities and promote a culture of environmental stewardship.

5. **Environmental Engineers / Specialists (can be part of the HSE team)**

Environmental Engineers / Specialists support the Environmental Manager by focusing on the technical and field-level implementation of environmental measures during operations. Their responsibilities involve direct monitoring, compliance checks, and operational support to ensure adherence to the OESMP. Key responsibilities include:

- **Field Environmental Monitoring**: Conduct regular field monitoring of environmental parameters, including emissions, effluents, noise levels, waste management, and resource use. Report any deviations from established thresholds to the Environmental Manager for action.
- **Environmental Risk Identification and Mitigation**: Assist in identifying potential environmental risks specific to operational activities, implementing mitigation measures as outlined in the OESMP.
- **Waste Management Coordination**: Oversee daily waste management activities, ensuring that waste segregation, handling, and disposal comply with ADNOC and Abu Dhabi regulations.
- **Regulatory Compliance Checks**: Conduct on-site compliance inspections to ensure that operational activities align with ADNOC's environmental guidelines, UAE laws, and project-specific environmental requirements.
- **Incident Response and Documentation**: Respond promptly to environmental incidents, supporting root cause analysis and preparing initial documentation.
- **Reporting and Data Collection**: Collect and compile data from monitoring activities to prepare environmental performance reports, submitting findings to the Environmental Manager.

6. Social Manager

The Social Manager focuses on managing the social aspects of the operation, ensuring compliance with international standards, particularly related to labor rights, worker welfare, community engagement, and social impacts of operational activities. Responsibilities include:

- **Community Engagement**: Manage stakeholder engagement processes, ensuring that grievances from the community are addressed in line with the OESMP and endeavoring the principles of EP IV requirements.
- **Worker Welfare**: Monitor working conditions, ensure compliance with international labor standards and UAE labor laws, and promote worker health and wellbeing.
- **Social Impact Management**: Identify and manage social risks associated with operational activities, such as potential impacts on local communities, traffic, and noise.
- **Training and Capacity Building**: Oversee training programs aimed at enhancing workers' skills and improving long-term employability.
- **Grievance Mechanism**: Manage and ensure the effectiveness of grievance mechanisms for workers and local communities, ensuring timely resolution of issues.
- **Supply Chain Social Compliance**: Ensure that all suppliers and contractors comply with Equator Principles IV and international labor standards. Conduct regular audits of the supply chain to assess adherence to social performance standards, including worker welfare.

- **Labor and Welfare Monitoring**: Oversee contractors' and suppliers' labor conditions, including recruitment, wages, and worker accommodations, ensuring compliance with ADNOC standards, UAE labor laws, and Equator Principles IV.
- **Reporting and Auditing**: Ensure that social compliance audits and performance assessments are conducted regularly and include all supply chain partners. Report any non-compliance or social-related incidents to the RLNG General Manager and Operations HSE Manager and ensure corrective actions are implemented.

7. Procurement Manager

This role ensures that suppliers and contractors meet ADNOC standards, UAE legislation related to both environmental protection and social responsibility. Responsibilities include:

- **Supply Chain Compliance Oversight**: Ensure that all suppliers and contractors are evaluated for compliance with environmental, social, and labor standards as per ADNOC, UAE before being contracted.
- **Contractual Enforcement**: Ensure that contracts with suppliers and contractors include clear terms for compliance with ADNOC's environmental and social policies, including consequences for non-compliance and expectations for corrective action plans.

8. Security Manager

The Security Manager ensures that all operational activities and the LNG plant facilities are secure from unauthorized access or any other security risks. The role involves:

- **Security Risk Assessments**: Conduct risk assessments to identify potential security threats during operations.
- **Coordination with Local Authorities**: Maintain liaison with local law enforcement agencies for security support, as required.
- **Access Control**: Manage access control to operational areas, ensuring security measures are aligned with OESMP standards.

9. Contractors and Suppliers EHS&S Focal Points

Each contractor or supplier is required to appoint EHS&S Focal Points for coordination with RLNG's operational EHS&S team. These focal points ensure contractors' and suppliers' compliance with ADNOC standards and UAE laws. Responsibilities include:

- **Implementation of OESMP Requirements**: Ensure all contracted activities are aligned with the OESMP, particularly in environmental, social, and health & safety areas.
- **Regular Reporting**: Submit regular compliance reports to the Operations HSE Manager and participate in audits, as required.
- **Training and Capacity Building**: Ensure contractor and supplier staff receive adequate training on EHS&S issues.

10. All Employees and Workers

All operational personnel, including those from contractors and suppliers, are responsible for adhering to the OESMP and contributing to a safe and compliant work environment:

- **Participating in EHS&S Initiatives**: Actively engage in safety meetings, environmental initiatives, and risk assessments.
- **Incident Reporting**: Report any incidents, unsafe acts, or near misses to their supervisors.
- **Following Procedures**: Ensure strict adherence to safety protocols, environmental procedures, and personal protective equipment (PPE) use.

4.4.3 Communication

Effective communication during the operational phase of the LNG Project is essential to ensure compliance with environmental, social, and health & safety standards. The following outlines the communication protocols to be followed, aligning with ADNOC's communication procedures.. These protocols also reference communication within the Stakeholder Engagement Plan (SEP) and the Emergency Response Plan (ERP).

1. Internal Communication

- **Clear Communication Channels**: All operational personnel, including contractors and suppliers, must be aware of and follow established communication channels for reporting environmental and social issues. The Operations HSE Manager and Social Manager are responsible for ensuring efficient communication, particularly for critical issues like environmental incidents, grievances, and safety concerns.
- **Environmental and Social Briefings**: Regular environmental and social briefings must be conducted by ADNOC's operational EHS&S teams to ensure that all key personnel, contractors, and workers are informed about environmental risks, social responsibilities, and mitigation measures outlined in the OESMP.
- **Operational Meetings**: Regular meetings between RLNG management, contractors, and relevant environmental and social personnel must be held. These meetings will serve as a forum for discussing:
  - Environmental performance updates.
  - Incidents, near misses, and non-compliance events.
  - Grievance management and worker welfare issues.
  - Corrective actions implemented and lessons learned.
- **Incident and Non-Compliance Reporting**: All environmental and social incidents, near misses, and non-compliance events must be reported immediately to RLNG's management and documented using established procedures. The Operations HSE and Social teams will investigate and address incidents.
- **Stakeholder Engagement Plan (SEP)**: Communication with internal and external stakeholders regarding environmental and social matters will align with the Stakeholder Engagement Plan (SEP). The SEP outlines

procedures for engaging with affected communities, local authorities, and other stakeholders, ensuring that concerns and inputs are incorporated into operational decisions.

2. External Communication

- **Stakeholder Engagement and Grievance Mechanism**
  - Coordination with External Stakeholders: The Social Manager will oversee day-to-day grievance management and will be responsible for receiving and addressing grievances from external stakeholders and workers.
  - Public and Worker Grievance Mechanism: Grievance/ Feedback Mechanism will be maintained to allow external stakeholders (including local communities) and workers to submit concerns or complaints. The grievance mechanism will:
    - Be accessible and transparent for all stakeholders.
    - Ensure timely responses and resolution of grievances.
    - Be documented, ensuring that all complaints are logged, investigated, and addressed.
  - Grievance Management Responsibilities:
    - The Social Manager will manage the grievance process for both external stakeholders and workers.
    - The EHS&S team will be responsible for logging and reporting all grievances to the RLNG management, including actions taken to resolve them.
    - All grievances must be included in the project's regular performance reports submitted to internal management and, if applicable, to international lenders.
- **Environmental Complaints and Incident Communication**
  - Public Environmental Complaints: RLNG's management will oversee the resolution of public environmental complaints, such as those related to air quality, noise, waste management, or operational impacts. The Environmental Manager and EHS&S teams must support the resolution by providing data and reports necessary to address complaints effectively.
  - Environmental Incident Reporting to Authorities: In the event of significant environmental incidents, ADNOC will coordinate with the Environment Agency - Abu Dhabi (EAD) and other relevant authorities to ensure that proper notification and response protocols are followed.

3. Regular Reporting and Communication Protocols

- **Environmental and Social Performance Reporting**
  - Regular Environmental Reports: The Environmental Manager and Social Manager will prepare and submit regular environmental and social performance reports to ADNOC management and regulatory authorities as required. These reports will include:

- Environmental performance data (emissions, effluent discharges, waste management, energy consumption, etc.).
- Social performance data (worker welfare, grievances received and resolved, stakeholder engagement activities).
- Corrective actions taken to address non-compliance or grievances.

  - KPI Monitoring and Reporting: The EHS&S team must monitor and report key performance indicators (KPIs) related to environmental and social performance, aligning with ADNOC's standards and EP IV requirements.
  - Lenders reporting requirements (EP IV): If international lenders are involved, RLNG will endeavor to comply with all reporting obligations under Equator Principles IV, providing necessary updates, including risk management, mitigation measures, and stakeholder engagement activities.

- **Meetings and Stakeholder Updates**

  - Regular Internal Progress Meetings: Regular internal meetings between RLNG management and operational teams will focus on identifying and resolving any environmental and social issues that arise during operations.
  - Periodic External Reporting and Meetings: Regular reports on environmental and social performance will be submitted to international lenders, where applicable. ADNOC will coordinate these reports and meetings to ensure external stakeholders are informed of operational progress and challenges.
  - Ad Hoc Meetings and Reporting: In addition to scheduled meetings, ad hoc meetings or reports should be conducted as needed to address specific incidents or compliance issues.

4. Emergency Communication

Emergency Communication is detailed in the Emergency Response Plan (ERP) and briefly described below:

- **Emergency Communication within the ERP**: Communication protocols for emergencies will be managed as part of the Emergency Response Plan (ERP). This plan includes all emergency communication protocols required to notify ADNOC management, local authorities, emergency services, and stakeholders in the event of environmental or social emergencies.
- **Immediate Incident Reporting**: All emergency incidents, including environmental, safety, or social emergencies (e.g., spills, worker accidents, fires), must be reported immediately to ADNOC management. The response will follow the procedures laid out in the ERP, ensuring a coordinated effort to mitigate and manage the emergency.
- **Coordination with Local Authorities**: In the event of a major emergency, ADNOC will coordinate with local authorities (including the Environment Agency - Abu Dhabi and emergency services) to manage the response.

5. Stakeholder Engagement Plan (SEP)

Communication with external stakeholders, including local communities and regulators, will adhere to the guidelines provided in the Stakeholder Engagement Plan (SEP). The SEP outlines:

- **Procedures for Engaging with Stakeholders**: Including ongoing consultation processes to ensure transparency and responsiveness to community and regulatory needs.
- **Mechanisms for Receiving and Addressing Concerns**: Through an accessible and effective grievance mechanism.

4.4.4 Training and Awareness

Success of the Operational Environmental and Social Management Plan (OESMP) for the LNG project in Ruwais relies on ensuring that all personnel, including operational staff, contractors, and official visitors, are fully trained and aware of their environmental, social, health, safety, and security responsibilities. This section outlines the training programs required during the operational phase, designed in compliance with ADNOC's policies and endeavors the Equator Principles IV (EP IV).

1. Training Programs Overview

Training programs will be developed and implemented prior to the commencement of operations and will be periodically updated throughout the operational phase. The training will be designed to:

- Ensure personnel understand their environmental, social, health, safety, and security responsibilities.
- Instill awareness of ADNOC's code of conduct, social and environmental policies, and cultural sensitivity in dealing with local communities.
- Promote understanding of the Stakeholder Engagement Plan (SEP) and emergency response plans.

Key Training Areas:

- **Environmental Responsibilities:** Training on potential environmental impacts of operational activities, as outlined in the OESMP.
- **Health, Safety, and Security (HSS) Awareness:** Training on key health, safety, and security protocols to ensure a safe operational site, including safe work practices, process safety, and site security measures.
- **Social and Cultural Sensitivity:** Training on local cultural norms and expectations, ensuring respectful interaction with local communities.
- **Code of Conduct:** Training on ADNOC's code of conduct, including guidelines on ethical behavior, respect for human rights, and compliance with UAE labor laws.
- **Stakeholder Engagement and Communication:** Training on the Stakeholder Engagement Plan (SEP), including procedures for addressing stakeholder concerns and grievances.

- **Emergency Response and Preparedness:** Training on the Emergency Response Plan (ERP), focusing on emergency communication procedures, spill responses, and incident management protocols.

2. Training Delivery and Frequency

- **Induction Procedures:** Before any personnel commence work during operations, they will undergo a comprehensive induction program covering the project's key environmental and social requirements and their specific responsibilities.
- **Regular Training Sessions including Safety Meetings and Toolbox Talks:** Regular meetings to reinforce environmental and social awareness and discuss specific operational hazards and mitigation measures.
- **Specialized Training for Key Roles:**
  - Operational Staff: In-depth training tailored to specific operational roles, including process safety management, environmental monitoring, and emergency response.
  - Emergency Response Team Training: Specialized training on the ERP, including incident management, emergency communication, and coordination with external emergency services.

3. Training Responsibilities and Documentation

- **Training Program Development and Coordination**: The Operations HSE Manager and Social Manager will be responsible for developing, implementing, and updating the training programs throughout the operational phase.
- **Competence Assurance**: The EHS&S team must ensure that all personnel are competent in carrying out their duties concerning environmental and social compliance.
- **Training Records**:
  - Documentation: All training sessions, inductions, and safety meetings will be fully documented, including attendance records, training materials, and certificates of competence.
  - Tracking Compliance: A training log will be maintained, detailing all personnel who have completed the required training and induction programs.

4. Continuous Improvement

The training program will be reviewed regularly to ensure it remains relevant and effective. Feedback from workers, contractors, and stakeholders will be incorporated into future training sessions.

4.4.5 Transparency and Public Disclosure

Transparency is essential for maintaining trust with stakeholders during operations. This section outlines how ADNOC will regularly disclose relevant environmental and social information to stakeholders in a transparent and accessible manner, ensuring compliance with ADNOC's policies.

1. Objectives of Public Disclosure

- **Build Trust and Accountability**: Keep stakeholders informed about the project's environmental and social impacts during operations.
- **Promote Engagement**: Facilitate ongoing dialogue with affected stakeholders by providing accurate, up-to-date information.

2. Types of Information to be Disclosed

The project will regularly disclose the following types of information:

- **Environmental and Social Information**: Summaries of KPIs related to emissions, discharges, waste management, resource use, worker welfare, and community engagement as applicable and relevant to stakeholders concerns.
- **Incident Reports and Corrective Actions**: Disclosure of significant environmental or social incidents and the corrective actions taken.
- **Operational Updates**: Information on operational changes or activities that may affect stakeholders.
- **Grievance Mechanism Summary**: Updates on the grievance mechanism and how grievances have been resolved.

3. Disclosure Formats

Information will be made accessible to all stakeholders, including vulnerable and directly affected groups, through the following formats:

- **Public Meetings**: Public meetings as required to provide updates on operational performance and address stakeholder concerns.
- **Online Platforms**: Disclosure of key documents and updates on ADNOC's website.
- **Printed Materials**: Distribution of printed materials to local communities and stakeholders.
- **Community Notice Boards**: Updates posted in areas accessible to local stakeholders.

4. Frequency of Disclosure

- **Regular Updates**: Environmental and social performance reports will be disclosed regularly as per ADNOC and lenders reporting obligations.
- **Ad Hoc Disclosure**: Significant incidents or operational changes affecting stakeholders will be disclosed promptly.

4.4.6 Documentation, Control, Review, and Updates

This section establishes procedures for managing, reviewing, and updating all documents related to the OESMP during operations, ensuring documents are properly created, reviewed, approved, distributed, and maintained.

1. Objectives

- **Consistency and Control**: Ensure that all documents are accurate, consistently managed, and accessible.
- **Live Document Management**: Keep the OESMP and associated documents up-to-date and adaptable.
- **Compliance and Continuous Improvement**: Maintain compliance with ADNOC's policies and endeavor EP IV standards.

2. Document Creation, Approval, and Control

- **Creation and Version Control**: All documents will include version control, author details, date, and revision history.
- **Approval Process**: Documents must be reviewed and approved by the Operations HSE Manager and Social Manager.
- **Controlled Distribution**: Approved documents will be distributed to relevant personnel, with distribution tracked.
- **Access to Documentation**: Personnel will have access to the OESMP and related documents through controlled systems.
- **Document Maintenance and Storage**: Secure storage of documents, with outdated versions marked as superseded.

3. Document Review and Updates

- **Regular Review Cycle**: The OESMP and associated documents will be reviewed regularly.
- **Ad Hoc Updates**: Updates will be made in response to significant changes or feedback.
- **Stakeholder Involvement**: Updates will consider stakeholder input and be communicated appropriately.

4. Roles and Responsibilities

- **Operations HSE and Social Managers**: Responsible for coordinating document control and OESMP reviews.
- **ADNOC Oversight**: ADNOC's management will oversee the process, ensuring alignment with standards.

5. Updating and Distributing the OESMP

- **Procedure for Updates**: Updates will follow established procedures, with changes documented.
- **Version Control**: Each updated version will be uniquely identified.
- **Communicating Updates to Stakeholders**: Significant updates will be communicated via established channels.

6. Monitoring, Reporting, and Adaptive Management

- **Monitoring and Feedback Integration**: Results from monitoring activities will inform OESMP updates.

- **Adaptive Management**: The OESMP will adapt to changing operational conditions.

7. Document Control and Audit Trail

- **Audit Trail:** A full audit trail will be maintained for all revisions.
- **Record Keeping:** Document control activities will be documented.

4.4.7 Management of Contractors and Suppliers

Effective management of contractors and suppliers is essential to ensure that all environmental, social, health, safety, and security (EHS&S) requirements of the OESMP are met during operations.

1. Objectives

- **Ensure Compliance**: Ensure that contractors and suppliers adhere to EHS&S requirements.
- **Risk Management**: Minimize risks by ensuring contractors and suppliers understand and implement mitigation measures.
- **Promote Accountability**: Establish clear roles and accountability mechanisms.

2. Contractor and Supplier Selection and Pre-Qualification

Before engaging contractors and suppliers, a thorough pre-qualification process will be implemented to ensure they have the capability and commitment to comply with the project's OESMP and other EHS&S requirements.

- **Pre-Qualification Criteria**: Contractors and suppliers will be evaluated based on their ability to comply with EHS&S standards.
- **Environmental and Social Risk Screening**: Assess potential contractors and suppliers for environmental and social risks.
- **Contractual Requirements**: Contracts will include clauses requiring compliance with the OESMP and consequences for non-compliance.

3. Onboarding and Induction

Before beginning work on-site, all contractors and suppliers must undergo a comprehensive onboarding process to ensure they fully understand the project's OESMP and their environmental and social responsibilities.

- **Induction Program**: Contractors and suppliers will undergo a comprehensive induction covering OESMP requirements.
- **Training Programs**: Participation in training programs on key environmental and social issues.

4. Contractor and Supplier Monitoring and Reporting

Regular monitoring and reporting are critical to ensuring contractor and supplier compliance with the OESMP and project standards. This section outlines the processes for ongoing contractor and supplier performance evaluation.

- **Site Audits and Inspections**: Regular audits and inspections to ensure compliance.

- **Key Performance Indicators (KPIs)**: Contractors and suppliers will report on EHS&S performance KPIs.
- **Regular Reporting**: Submission of regular compliance reports to ADNOC.

5. Non-Compliance and Corrective Actions

In cases where contractors and suppliers fail to meet the OESMP requirements or contractual obligations, corrective action will be taken to address non-compliance.

- **Non-Compliance Identification**: Non-compliance will be documented and assessed.
- **Corrective Action Plans (CAPs)**: Contractors and suppliers will develop CAPs to address non-compliance.
- **Monitoring Corrective Actions**: Implementation of CAPs will be monitored.
- **Contract Termination**: Persistent non-compliance may result in contract termination.

6. Grievance Mechanism for Contractor Workers

As part of the project's commitment to worker welfare, contractors must ensure that their workers have access to the project's Grievance Mechanism. This mechanism allows workers to raise concerns related to labor conditions, health and safety, or social issues.

- **Worker Access to Grievance Mechanism**: Ensuring workers can raise concerns.
- **Grievance Tracking and Resolution**: Grievances will be tracked and resolved according to procedures.

7. Continuous Improvement and Capacity Building

The project will support the continuous improvement of contractor and supplier performance through capacity-building initiatives and ongoing engagement.

- **Capacity Building Programs**: Providing support to improve EHS&S practices.
- **Performance Reviews**: Regular reviews to evaluate compliance and provide feedback.

4.4.8 Emergency Preparedness and Response

This section outlines plans and procedures for emergency preparedness and response during operations.

1. Objectives

- **Minimize Impacts**: Manage potential emergencies to minimize environmental and social impacts.
- **Risk-Specific Preparedness**: Develop tailored procedures for identified risks.
- **Rapid Response and Recovery**: Establish clear procedures for swift response and recovery.

2. Risk Assessment and Emergency Scenarios

- **Identified Risks**: Emergency scenarios include process safety incidents, spills, emissions exceedances, fires, explosions, and social incidents.

3. Emergency Response Plan (ERP) Structure

The Emergency Response Plan (ERP) for the LNG project (see Section 8) will address both environmental and social emergencies through clear, structured response procedures:

- **Roles and Responsibilities**: Clear definition of roles in emergency situations.
- **Emergency Communication Protocols**: Procedures for notifying internal and external stakeholders.

4. Response Procedures for Key Emergency Scenarios

Based on the identified risks, the ERP will include detailed response procedures for the following scenarios:

- **Process Safety Incidents**: Procedures for managing operational hazards.
- **Spill Response**: Containment and cleanup procedures for spills.
- **Fire and Explosion Response**: Evacuation and containment measures.
- **Environmental Exceedances**: Response to emissions or discharges exceeding limits.
- **Social Incidents**: Procedures for managing social emergencies impacting communities.

5. Training and Drills

- **Induction and Onboarding Training:** All workers, including contractors and suppliers, will receive emergency preparedness training during their induction. This includes specific training on the ERP, incident response, and emergency evacuation procedures.
- **Quarterly Mini Drills:** Focused, brief drills held quarterly to test specific elements of the Emergency Response Plan (ERP), such as minor spills or small-scale road incidents. These drills ensure personnel, contractors, and suppliers are familiar with key procedures and can identify any immediate gaps in response readiness.
- **Semi-Annual Regular Drills:** Comprehensive drills conducted twice a year to simulate larger, high-risk scenarios, like significant spills and major traffic accidents. These exercises evaluate the full ERP, coordination among teams, and overall readiness, identifying areas for improvement in emergency response.
- **Specialized Training**: Providing specialized training for emergency response teams.

6. Post-Incident Review and Continuous Improvement

After each emergency, a post-incident review will be conducted to assess the response effectiveness and identify areas for improvement.

- **Incident Investigation**: Detailed investigations will follow each emergency, focusing on identifying root causes, evaluating the response, and determining corrective actions.
- **Corrective Action Plans (CAPs)**: CAPs will be developed and implemented to address the root causes of each emergency and prevent recurrence. Lessons learned will be incorporated into future updates of the ERP.

- **Feedback Integration**: Feedback from post-incident reviews and emergency drills will be used to continuously improve the ERP. Monitoring results and stakeholder feedback will also inform updates to ensure the plan remains effective.

7. Emergency Resources and Equipment

- **Emergency Equipment**: Ensuring availability and readiness of equipment.
- **Medical Facilities**: Providing on-site medical support.
- **Communication Systems**: Maintaining effective communication systems.

4.5 CHECKING AND CORRECTIVE ACTION

The effectiveness of the Operational Environmental and Social Management Plan (OESMP) depends on robust mechanisms for monitoring performance, addressing incidents, and ensuring continuous compliance with environmental, social, health, and safety standards. This section outlines the processes for measuring performance, managing incidents and nonconformances, conducting audits, and maintaining comprehensive records during the operational phase of the LNG plant in Ruwais.

4.5.1 Performance Measurement and Monitoring

ADNOC will regularly measure and monitor the environmental and social performance of the LNG plant to ensure compliance with the OESMP objectives, targets, and regulatory requirements. This section details the methods, indicators, and responsibilities for monitoring and measuring performance during operations.

- **Key Performance Indicators (KPIs):** ADNOC will establish and track KPIs based on the environmental and social impacts identified during the operational Environmental Impact Assessment (EIA) and Social Impact Assessment (SIA). These KPIs will focus on critical areas such as:
    - Environmental Monitoring
        - Air Emissions: Regular monitoring of emissions from combustion sources (e.g., NOx, SOx, CO_2) to ensure compliance with emission limits.
        - Noise Levels: Monitoring ambient and operational noise to ensure compliance with noise regulations.
        - Marine ecology: Monitoring and control of marine vessels to protect marine ecology.
        - Waste Management: Monitoring waste generation, segregation, recycling rates, and disposal methods.
        - Effluent Discharges: Regular testing of wastewater quality to meet discharge standards.
        - Energy Consumption and Efficiency: Tracking energy usage and efficiency measures implemented.
        - Resource Use: Monitoring water consumption and implementing water conservation measures.
    - Social Monitoring
        - Stakeholder engagement: Maintain transparent and effective communication with stakeholders.
        - Worker Welfare: Monitoring health and safety performance, including occupational illness rates, lost-time injuries, and worker satisfaction surveys.

- Community Health and Safety: Tracking any incidents impacting local communities, such as traffic accidents involving operational vehicles.
- Grievance Mechanism Effectiveness: Recording the number and nature of grievances received from workers and communities, and the resolution time.

- **Monitoring Methods:** Various methods will be employed to collect performance data, including:
  - Simplified Predictive Emissions Monitoring Systems for flares Sampling and Laboratory Analysis: Regular collection of samples for effluent discharges, waste characterization, and ambient environmental parameters.
  - Inspections and Audits: Routine inspections of operational activities and facilities to ensure compliance with environmental and social policies.
  - Surveys and Feedback Mechanisms: Conducting worker and community surveys to gather feedback on social performance and identify areas for improvement.
  - Incident Reporting Systems: Utilizing standardized reporting tools for any environmental or social incidents.
- **Frequency:**
  - Continuous Monitoring: For critical parameters like air emissions
  - Daily/Weekly Inspections: For waste management practices and safety checks.
  - Monthly/biannual Monitoring: For parameters like noise levels, resource consumption, and social performance indicators.
  - Annual Reviews: Comprehensive assessments of overall environmental and social performance.

4.5.2 Incidents, Accidents, Nonconformance, and Corrective and Preventive Action

This section outlines procedures for managing incidents, accidents, and nonconformances during operations, ensuring they are promptly reported, investigated, and addressed. Corrective and preventive actions will be implemented to prevent recurrence and promote continuous improvement.

All incidents are Notified, recorded, investigated and reported as per the latest ADNOC incident notification, investigation, and Reporting standard.

- **Incident Reporting:** All environmental, health, safety, and social incidents, accidents, or nonconformances must be reported immediately to the Operations HSE Manager. This includes:
  - Environmental Incidents: Spills, unplanned emissions, effluent discharge exceedances, and other environmental breaches.
  - Health and Safety Incidents: Worker injuries, process safety incidents, equipment failures, and near-misses.

- Social Incidents: Community complaints, disruptions caused by operations, or issues related to worker welfare.

- **Investigation Procedures:** Every incident or nonconformance will be thoroughly investigated by the Operations HSE Manager and relevant specialists. The investigation will:
  - Identify Root Causes**:** Determine underlying factors contributing to the incident.
  - Assess Impact**:** Evaluate the potential or actual impact on environmental, social, or health and safety performance.
  - Develop Corrective Actions**:** Recommend immediate steps to mitigate impacts and prevent recurrence.
  - Implement Preventive Measures: Identify long-term strategies to address systemic issues.
- **Corrective and Preventive Actions (CAPAs)**: Following each investigation, a Corrective and Preventive Action Plan will be developed, detailing:
  - Corrective Actions: Immediate steps to address and rectify the nonconformance or incident.
  - Preventive Actions: Measures to prevent similar incidents in the future, such as process changes, additional training, or equipment upgrades.
  - Responsibilities and Timelines**:** Assignment of tasks to specific individuals or teams, with clear deadlines.
  - Effectiveness Monitoring**:** Follow-up to verify the implementation and effectiveness of CAPAs.

4.5.3 Audit and Inspection

Regular audits and inspections are essential to verify compliance with the OESMP, evaluate performance, and identify areas for improvement. This section details the processes for conducting audits and inspections during operations.

- **Audit Scope and Frequency:**
  - Internal Audits:
    - Frequency: Conducted regularly by internal audit team or Operations HSE personnel.
    - Scope: Assess compliance with the OESMP, focusing on critical areas such as emissions control, waste management, process safety, and social performance.
    - Methodology: Use standardized checklists and audit protocols aligned with international standards (e.g., ISO 14001, ISO 45001).
  - External Audits:
    - Regulatory Audits: May be conducted by the Environment Agency - Abu Dhabi (EAD) or other regulatory bodies to ensure compliance with environmental permits and regulations.

- Third-Party Audits: Independent audits by external consultants to provide an objective assessment of environmental and social performance.

- **Site Inspections:**
  - Routine Inspections: Daily or weekly inspections by operational staff to monitor compliance with standard operating procedures and safety protocols.
  - Special Inspections: Targeted inspections following incidents, complaints, or identified risks.
- **Corrective Measures from Audits:**
  - Non-Compliance Identification: Document any findings of non-compliance or areas needing improvement.
  - Action Plans: Develop and implement action plans to address audit findings, with assigned responsibilities and deadlines.
  - Follow-Up: Conduct follow-up audits or inspections to verify that corrective actions have been effectively implemented.

4.5.4 Performance Reporting

Transparent reporting mechanisms are crucial for accountability and continuous improvement. This section outlines internal and external reporting procedures during the operational phase.

- **Internal Reporting**
  - Monthly Performance Reports:
    - Prepared By: Environmental Manager and Social Manager.
    - Contents: Detailed data on KPIs, incidents, audit findings, corrective actions, and progress on environmental and social initiatives.
    - Distributed To: General Manager (Operations) and relevant operational teams.
  - Quarterly Reports:
    - Purpose: Provide a higher-level overview of performance trends, significant achievements, and strategic issues.
    - Audience: ADNOC senior management and, if applicable, the Board of Directors.
- **External Reporting**
  - Regulatory Reporting:
    - To Authority (ADNOC): Submission of periodic environmental compliance reports, emissions inventories, waste management summaries, and any required notifications of incidents.

- Frequency: As specified in environmental permits and regulatory requirements (e.g., biannually, annually).

- Public Disclosure:
  - Transparency Initiatives: Sharing summaries of environmental and social performance with stakeholders and the public as outlined in the Transparency and Public Disclosure section.
  - Grievance Mechanism Updates: Reporting on the number and resolution of grievances.

- **Incident Reporting**
  - Immediate Notification: Serious incidents or regulatory breaches must be reported promptly to regulatory authorities and other stakeholders as required.
  - Follow-Up Reports: Detailed incident reports outlining investigation findings and corrective actions.

4.5.5 Record Control

Maintaining comprehensive records is essential for demonstrating compliance and supporting continuous improvement. This section describes the procedures for record-keeping during operations.

- **Document Types**
  - Monitoring Data: Emissions, effluent discharges, waste records, resource consumption.
  - Incident Reports: Documentation of environmental incidents and responses.
  - Permits and Licenses: Copies of all environmental permits, approvals, and correspondence with authorities.
  - Social Records:
    - Grievance Logs: Records of grievances received from workers and communities, including resolution steps.
    - Training Records: Documentation of training sessions, attendance, and competency assessments.
    - Community Engagement Activities: Records of meetings, consultations, and communication with stakeholders.
  - Health and Safety Records:
    - Incident and Accident Reports: Details of all health and safety incidents, investigations, and corrective actions.
    - Audit and Inspection Reports: Findings from HSE audits and inspections.

- **Record Maintenance**
    - Accessibility and Security:
        - Secure Storage: Both digital and physical records will be securely stored to prevent unauthorized access or loss.
        - Access Control: Only authorized personnel will have access to sensitive records.
    - Legibility and Traceability: Documentation Standards: Ensure all records are clear, accurate, and easily traceable to relevant activities or incidents.
    - Retention Period:
        - Compliance with Policies: Records will be retained according to ADNOC's record retention policies and UAE legal requirements.
        - Archiving: After the operational life of the plant or as required, records will be archived appropriately.
- **Record Review and Updating**
    - Regular Updates: Ensure records are kept up-to-date and reflect current operations and compliance status.
    - Auditing of Records: Periodic reviews to verify the completeness and accuracy of records.

4.6 MANAGEMENT REVIEW

Management Review is a critical component of the OESMP, ensuring that environmental, social, health, and safety management processes remain effective, relevant, and aligned with the LNG plant's operational needs, regulatory requirements, and stakeholder expectations. This section outlines the procedures for conducting management reviews, evaluating performance, and implementing improvements.

4.6.1 Objectives of the Management Review

The primary objectives of the Management Review during operations are to:

- **Evaluate Performance:** Assess the plant's environmental and social performance against established objectives, targets, and KPIs.
- **Ensure Continuous Improvement:** Identify opportunities for improvement based on audit findings, incident reports, and changing operational conditions.
- **Maintain Compliance:** Ensure ongoing compliance with ADNOC standards, UAE regulations, and endeavor Equator Principles IV (EP IV), adapting to any new regulatory changes or industry best practices.
- **Respond to Stakeholder Concerns:** Address feedback from internal and external stakeholders, incorporating necessary adjustments into the OESMP.

4.6.2 Inputs for the Management Review

The Management Review will consider various inputs to provide a comprehensive evaluation:

- **Audit Results**
  - Internal and External Audits: Findings from operational audits, including compliance with the OESMP, legal requirements, and international standards.
  - Non-Conformance Reports: Analysis of non-compliances and effectiveness of corrective actions.
- **Performance Against Objectives and Targets**
  - KPI Analysis: Review of environmental and social KPIs, identifying trends, achievements, and areas needing improvement.
  - Resource Consumption and Efficiency: Assessment of energy and water usage, and effectiveness of conservation measures.
- **Review of Procedures and Policies**
  - Operational Procedures: Evaluation of the effectiveness of current procedures in achieving desired outcomes.
  - Policy Alignment: Ensuring that environmental and social policies remain aligned with ADNOC's strategic objectives and regulatory requirements.

- **Incident and Non-Conformance Reports**
  - Incident Analysis: Detailed review of incidents, accidents, and near-misses, focusing on root causes and systemic issues.
  - Corrective Action Effectiveness: Evaluation of implemented CAPAs and their success in preventing recurrence.
- **Stakeholder Feedback**
  - Grievances and Complaints: Summary of grievances received from workers, contractors, and communities, and how they were addressed.
  - Community Engagement Feedback: Insights from stakeholder consultations and engagement activities.
- **Regulatory and Compliance Updates**
  - Legal Changes: Any updates to UAE environmental, social, or labor laws that may impact operations.
- **Changes in Operational Conditions**
  - Operational Modifications: Assessments of how changes in operations, technology upgrades, or capacity expansions affect the OESMP.
  - Risk Assessments: Updates to environmental and social risk profiles.

4.6.3 Review Process and Frequency

- **Frequency of Management Reviews**
  - Annual Reviews: A comprehensive Management Review will be conducted annually to assess overall performance and strategic alignment.
  - Interim Reviews: Additional reviews may be conducted semi-annually or as needed in response to significant incidents, regulatory changes, or operational modifications.
- **Participants**
  - General Manager (Operations)
  - Operations HSE Manager
  - Environmental Manager
  - Social Manager
  - Procurement Manager
  - Security Manager
  - Representatives from ADNOC's Senior Management
- **Review Meetings**

- Preparation: Relevant managers will prepare reports summarizing performance, incidents, audit findings, and stakeholder feedback.
- Discussion: The meeting will involve a thorough discussion of inputs, identification of issues, and deliberation on necessary actions.
- Documentation: Minutes of the meeting will be recorded, capturing decisions, action items, responsibilities, and timelines.

4.6.4 Outcomes of the Management Review

The Management Review aims to produce actionable outcomes that enhance environmental and social performance:

- **OESMP Updates**
  - Revisions to Plans: Update the OESMP to reflect changes in operations, regulations, or stakeholder expectations.
  - Procedure Enhancements: Modify operational procedures to improve effectiveness and compliance.
- **Improvement Initiatives**
  - Action Plans: Develop specific initiatives to address identified weaknesses or opportunities, such as energy efficiency projects or community development programs.
  - Resource Allocation: Ensure necessary resources are provided to implement improvements.
- **Policy Adjustments**
  - Policy Amendments: Update policies to align with new strategic directions or regulatory requirements.
- **Objectives and Targets Revision**
  - KPI Adjustment: Set new or revised KPIs and targets that are realistic and reflect continuous improvement goals.
- **Training and Awareness**
  - Enhanced Training Programs: Implement additional training where gaps in knowledge or competence are identified.
- **Stakeholder Engagement Enhancement**
  - Improved Communication: Strengthen engagement strategies with stakeholders based on feedback.

4.6.5 Communication of Review Outcomes

- **Internal Communication**
  - Dissemination of Decisions: Communicate the outcomes of the Management Review to all relevant personnel, ensuring that they understand changes to the OESMP, new responsibilities, and expectations.

- Implementation Guidance: Provide clear instructions and support for implementing approved changes.

- **External Communication**
  - Regulatory Authorities: If changes impact compliance obligations, notify ADNOC and other relevant authorities as required.
  - Stakeholders and Communities: Share relevant updates with stakeholders, especially if changes affect them directly.

- **Documentation**
  - Record Keeping: Maintain comprehensive records of the Management Review, including minutes, reports, and action plans.
  - Accessibility: Ensure documentation is accessible to authorized personnel and auditors.

5. ENVIRONMENTAL MANAGEMENT PLANS

5.1 AIR QUALITY MANAGEMENT PLAN

5.1.1 Objectives

The main objectives of the Air Quality Management Plan during the operations phase of the LNG Project in Ruwais, Abu Dhabi are to:

- Prevent or Mitigate Adverse Effects on Air Quality: Implement measures to minimize air emissions and dust generation to protect human health and the environment.
- Ensure Compliance: Adhere to all relevant UAE laws, Abu Dhabi regulations, ADNOC standards, and international best practices related to air quality management.
- Promote Environmental Responsibility: Foster a culture of environmental stewardship among all project personnel through training and awareness.

5.1.2 Regulatory Framework and Standards

The Air Quality Management Plan aligns with the following regulatory frameworks, standards, conventions, and guidelines relevant to air quality management:

ADNOC Standards

- EOH-GID-010: Best Available Techniques (BAT) in Greenhouse Gas (GHG) Management of Projects
- HSE-GA-ST02: HSE Management System Standard
- HSE-GA-ST04: Incident Notification, Investigation, and Reporting
- HSE-GA-ST06: Project HSE Plan and Standard
- HSE-GA-ST07: HSE Design Philosophy
- HSE-GA-ST08: HSE Performance Monitoring and Reporting
- HSE-GA-ST09: HSE Audit and Assurance
- HSE-EN-ST02: Pollution Prevention and Control
- HSE-EN-ST05: Environmental Performance Monitoring
- HSE-EN-ST07: Air Dispersion Modelling Techniques
- HSE-OH-ST08: Physical Health Hazard Standard
- HSE-OH-ST09: Chemical Hazards Standard
- HSE-OH-ST10: Biological Hazards Standard
- HSE-OH-ST12: Indoor Air Quality Standard

UAE Laws and Regulations

- Federal Law No. 24 of 1999: Protection and Development of the Environment
- Federal Cabinet Resolution No. 12 of 2006: Concerning Protection of Air from Pollution
- Council of Ministers' Decision No. 37 of 2001: Regulation concerning Environmental Impact Assessment of Projects
- Emirates Authority for Standardization and Metrology (ESMA) Standards: EMS 477 (Air Quality Standards)
- Ministerial Resolutions Issued by the Ministry of Climate Change and Environment (MOCCAE)
- Environment Agency Abu Dhabi (EAD) Noise and Vibration Guidelines

International Conventions and Protocols

- United Nations Framework Convention on Climate Change (UNFCCC), 1992
- Kyoto Protocol of the UNFCCC, 1997
- Paris Agreement under UNFCCC, 2015

International Best Practices

- ISO 14001: Environmental Management Systems
- Implementation of Best Available Techniques (BAT)
- Community Communication Programs:
    - Engagement with Nearby Communities: Maintaining open communication channels to address air quality concerns.
    - Complaint Mechanisms: Establishing platforms for community feedback to ensure swift resolution of issues.

5.1.3 Baseline Conditions

5.1.3.1 General Climatic Conditions

- Climate Classification: The Ruwais area exhibits a desert climate characterized by hot summers and mild winters.
- Seasonal Variations:
    - Summer Season: Extends from June to September, with temperatures reaching up to 51.2°C.
    - Winter Season: From December to March, with temperatures dropping to as low as 6.0°C.
    - Transitional Months: April to May and October to November.
- Humidity: Relative humidity is relatively high throughout the year, ranging from 42% to 72%.
- Rainfall: Minimal annual rainfall, typically ranging from 0 mm to 10.1 mm.

5.1.3.2 Meteorological Data

- Temperature and Humidity: Data from the Al Ruwais weather station (2011-2022) indicate significant temperature variations and consistently high humidity levels.
- Wind Patterns:
    - Dominant Wind Direction: Predominantly from the northwest, influencing pollutant dispersion patterns.
    - Wind Speed: Average wind speeds vary, with higher speeds potentially increasing dust dispersion.

5.1.3.3 Ambient Air Quality Conditions

- Monitoring Stations (Figure 5-1):
    - ADNOC Ruwais Air Quality Monitoring System (AQMS): Located approximately 5 km southeast of the project site.
    - Environment Agency Abu Dhabi (EAD) AQMS: Situated about 9 km west of the project boundary.
- Key Pollutants Monitored:
    - Sulfur Dioxide (SO_2)
    - Nitrogen Dioxide (NO_2)
    - Particulate Matter (PM_{10} and $PM_{2.5}$)
    - Ozone (O_3)
    - Carbon Monoxide (CO)
- Ambient Air Quality Data Summary (Table 5-1):
    - SO_2 and NO_2: Generally, within UAE ambient air quality standards, with average concentrations well below the limits.
    - PM_{10}: Occasional exceedances of the daily average standards, likely due to natural dust events and construction activities in the region.
    - O_3 and CO: Concentrations typically within acceptable ranges.

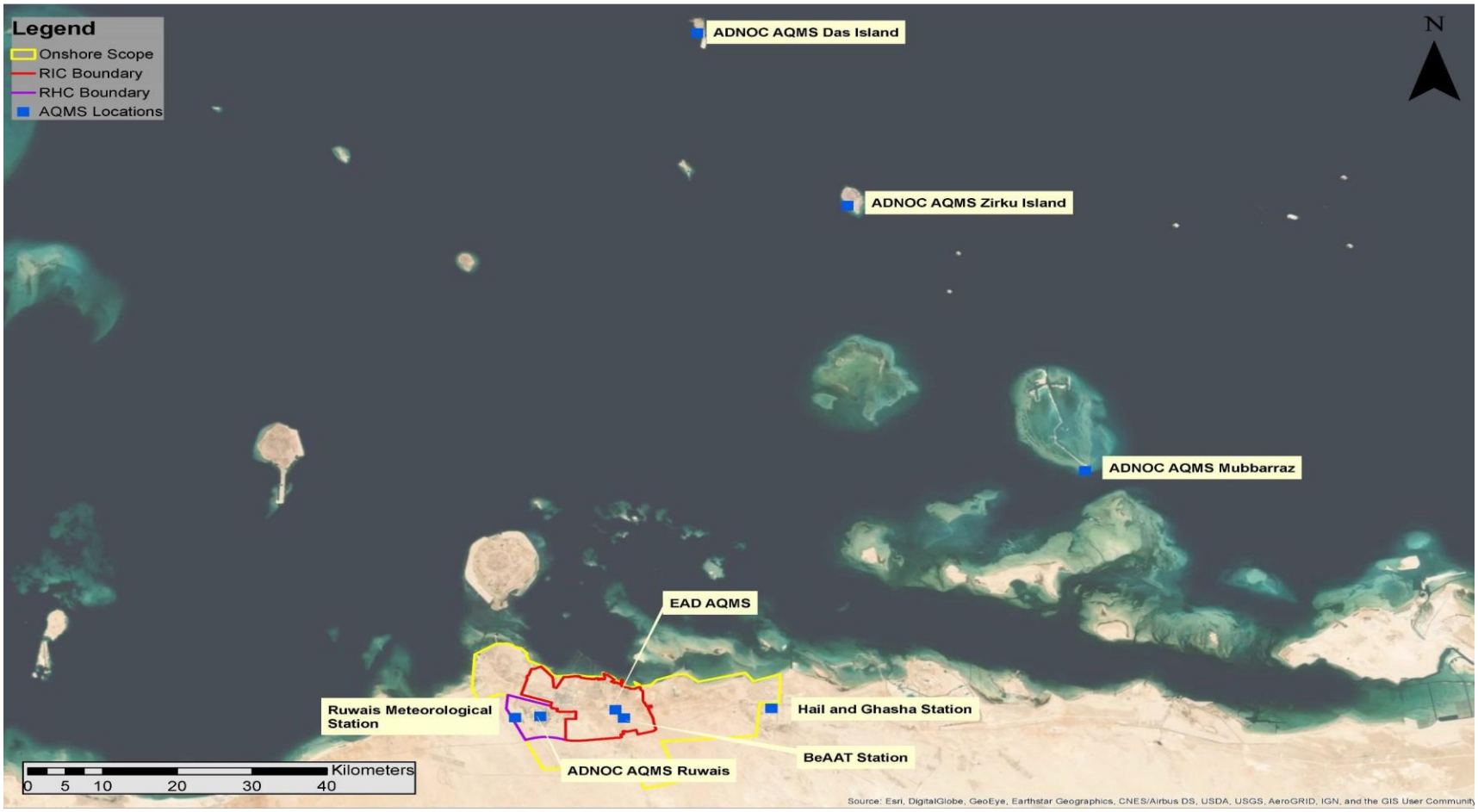

Figure 5-1. AAQ Monitoring Stations

Table 5-1. EAD Ruwais AQMS Results (2015 – 2019)

Year	Parameter	CO (mg/Nm^3)		NO^2 (µg/m^3)		SO$_2$ (µg/m^3)		PM (µg/m^3)
	Averaging Period	*1 Hour*	*8 Hour*	*1 Hour*	*24 Hour*	*1 Hour*	*24 Hour*	*24 Hour*
	Ambient Standards	*30*	*10*	*400*	*150*	*350*	*150*	*150*
2015	Maximum	8.90	8.34	194.04	84.71	**476.38**	91.14	**2,215.26**
	Minimum	0.01	0.05	1.50	3.27	0.20	1.16	26.97
	Average	0.79	0.79	25.77	25.77	15.63	15.67	143.90
2016	Maximum	2.86	2.27	164.86	74.84	278.75	91.67	**895.16**
	Minimum	0.00	0.12	0.11	6.42	0.43	2.66	24.09
	Average	0.85	0.85	24.84	24.85	20.16	20.19	124.98
2017	Maximum	5.87	5.87	137.04	76.74	339.93	82.64	**1,124.59**
	Minimum	0.01	0.07	1.22	5.68	1.32	2.42	22.10
	Average	1.00	1.00	21.74	21.85	19.07	19.17	110.45
2018	Maximum	1.56	1.38	124.45	52.87	**737.71**	99.77	**992.69**
	Minimum	0.02	0.03	2.74	7.76	1.00	3.47	9.50
	Average	0.36	0.36	22.36	22.37	20.91	20.96	116.63
2019	Maximum	5.43	1.87	152.93	61.11	163.29	47.13	**503.72**

Year	Parameter	CO (mg/Nm^3)		NO^2 (µg/m^3)		SO$_2$ (µg/m^3)		PM (µg/m^3)
	Averaging Period	*1 Hour*	*8 Hour*	*1 Hour*	*24 Hour*	*1 Hour*	*24 Hour*	*24 Hour*
	Ambient Standards	*30*	*10*	*400*	*150*	*350*	*150*	*150*
	Minimum	0.01	0.01	1.45	7.05	0.75	2.27	17.10
	Average	0.83	0.81	21.84	21.80	16.37	16.35	102.33
Key: Exceedance in bold								
Source: Regulations for the Protection of Air from Pollution (Ministerial Decree No. 12 of 2006). ADNOC Standard for Pollution Prevention and Control (HSE-EN-ST-02.)								

5.1.4 Potential Impacts

5.1.4.1 Emission Sources

During the operations phase of the LNG facility in Ruwais, Abu Dhabi, potential sources of air emissions that may impact ambient air quality include:

- **Engine Exhaust Emissions (*Combustion Emissions*)**: Emissions from diesel-powered vehicle movement and equipment (operation of EDG, FW pumps) (CO, NO_X, SO_2, PM, CO_2 as well as CH_4 & N_2O as applicable)
- **Flare Emissions**: Combustion of hydrocarbons during emergency scenarios for safe disposal of hydrocarbon vapor and liquid streams that result from upsets and emergencies.
- **Fugitive Emissions**: Volatile organic compounds (VOCs) released from piping connectors, valves, seals, flanges etc.
- **Vent emissions**: Nitrogen and less than 100ppmv of hydrocarbon emissions venting to the atmosphere, via cold vents in case the compressor is not working. In addition, venting from LNG storage tank relief valves (hydrocarbon), as an unplanned event, may deteriorate the local air quality.
- **Gas Leaks**: Identified as unplanned events, they could occur from LNG storage tanks or from the refrigerant systems such as propane/ Mixed Refrigerant (MR) (compressors, coolers, accumulators, piping, etc.)

5.1.4.2 Sensitive Receptors

During the operations phase, the primary sensitive receptors for air quality impacts are the on-site workers and the adjacent marine environment. Given the expected operation activities, combustion sources, flaring activities, and fugitive emissions are the main air quality concerns that may affect these receptors.

Key sensitive receptors and their characteristics are as follows:

- On-Site Workers: Workers present within the project boundary are at the highest risk of exposure to combustion sources, flaring activities, and fugitive emissions generated during operation activities. Ensuring air quality controls, proper PPE, and routine health checks for these personnel is essential.
- Adjacent Marine Environment: Operation activities close to the shoreline could affect the nearby sea through thermal pollution, nutrient enrichment, and potential toxic accumulation, especially seagrass beds. Light pollution from flaring activities can disrupt the natural light cycles of marine organisms is assessed in Section 5.5. Monitoring emissions and implementing emission control measures near the shoreline will help minimize potential impacts on marine water quality and marine life.
- Nearby Communities identified in the Air Dispersion Modelling study [Ref 31] are the same for both air-sensitive and noise-sensitive receptors. However, these are considered low-risk receptors due to their distance from the site. The identified receptors are listed below with their names/IDs, descriptions, and distances from the project area (in km), respectively:
    - NML01 – NMC Ruwais Hospital – 4.9 km

- NML04 – Dhafra Beach Hotel – 2.0 km
- NML06 – Ruwais School – 5.1 km
- NML07- Ruwais Palace – 5.0 km
- NML10 – ADNOC Beach Club – Ruwais -2.4 km
- NML14 – RIC Boundary - 3.0 km

Figure 5-2 displays the air sensitive receptor to RLNG project.

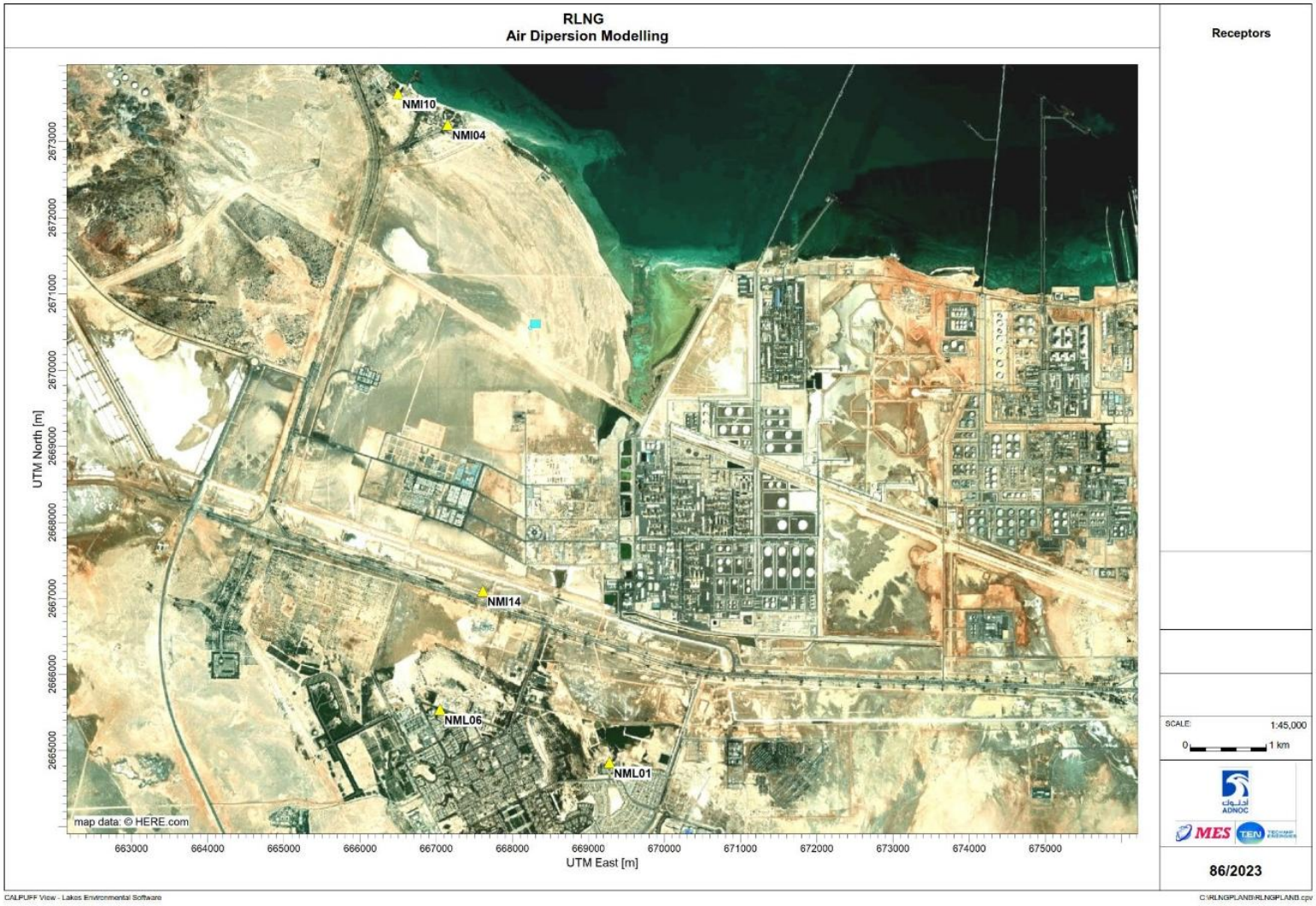

Figure 5-2. Air Sensitive Receptors

5.1.4.3 Commissioning Phase Impact Assessment

Assess and quantify potential significant air quality impacts during commissioning if the plant is not connected to the grid and diesel generators are used; this assessment should be conducted during the EPC phase.

5.1.4.4 Operation Phase Impact Assessment

Given that the primary receptors during the operations phase are the onsite workers and the adjacent marine environment, pertinent impacts are described below:

- **Engine Exhaust Emissions**
  - Description: Emissions from vehicle movement and equipment which may contribute to local air pollution.
  - Impact: Potential health effects on workers due to inhalation of pollutants; minor contribution to local air quality degradation.
  - Significance: Assessed as Low, considering the open environment and emission dispersion.
- **Flare Emissions**
  - Description: Combustion of hydrocarbons during emergency scenarios may contribute to local air pollution.
  - Impact: Potential health effects on workers due to inhalation of pollutants; contribution to local air quality degradation.
  - Significance: Assessed as High to Medium, considering the open environment, emission dispersion, and occurrence during emergency scenarios.
- **Fugitive Emissions and Gas Leaks**
  - Description: Unintended release of gases, including volatile organic compounds (VOCs) from piping connectors, valves, seals, and flanges, as well as potential leaks from LNG storage tanks or refrigerant systems.
  - Impact:
    - Environmental: Localized deterioration of air quality and potential contributions to climate change.
    - Health and Safety: Exposure of workers to harmful vapors and potential hazards near leak points.
  - Significance: Assessed as Low, as impacts are localized, temporary, and mitigated through effective design, monitoring, and response measures.
- **Vent Emissions**
  - Description:

- Release of nitrogen via cold vents in case the compressor is not working.
- Venting from LNG storage tank relief valves (hydrocarbon), as an unplanned event, may deteriorate the local air quality.

- Impact: Deterioration of air quality and climate change impacts.
- Significance: Assessed as Medium with sufficient height provided for the vent.

5.1.5 Mitigation Measures

To minimize air quality impacts during operations, the following mitigation measures will be implemented:

- **Engine Exhaust Emissions**
  - Use well-maintained equipment and vehicles to ensure efficient combustion.
  - Implement a preventative maintenance schedule for all machinery.
  - Utilize low-sulfur diesel fuel in compliance with UAE regulations.
  - Turn off engines when not in use to reduce idling emissions.
  - Preferentially use newer equipment meeting higher emission standards.
  - Require all vessels (as applicable) to have a MARPOL/ IMO/ IAPP certificate, energy efficiency plan (specifically MARPOL Annex VI, which addresses maritime air pollution preventions).
  - Limited Use of EDGs: Restrict the use of Emergency Diesel Generators (EDGs) to emergency situations and essential support functions.
  - Use of low-emission technologies.
  - Implementation of Best Available Techniques (BAT).
- **Flare Emissions**
  - Flaring minimization strategies.
  - No Continuous Flaring: Implement a "No continuous flaring" philosophy; design and operate the plant.
  - Emergency Flaring Only: Use flares (Dry Gas Flare and BOG Flare) solely during emergency scenarios.
  - Follow Flaring Philosophy.
  - Flare located upwind from receptors.
  - Flare design specifications as per ADNOC requirements:
    - Smokeless (Ringelmann 1) flaring capacity.
    - Destruction efficiency 98%.
    - Implementation of BAT.

- **Fugitive Emissions and Gas Leaks**
  - Design and Engineering Controls
    - Leak Source Optimization:
      - Adopt piping design philosophies to minimize leak potential.
      - Incorporate materials and designs aligned with ADNOC standards, including corrosion allowances, external coating/painting, and ambient environment considerations.
      - Design to meet ASME standards and ensure fugitive emissions tightness as per BS EN ISO 15848.
    - Containment Measures:
      - Install full containment tanks and spill containment basins.
      - Include cryogenic spill protection systems in design.
      - Equip containment basins with high-expansion foam systems for spill response.
    - Fire and Gas Safety Systems:
      - Integrate flammable gas and fire detection systems.
      - Ensure passive and active fire protection in accordance with ADNOC's fire protection philosophy.
      - Implement an Emergency Shut Down (ESD) and Emergency Depressurization (EDP) system.
  - Operational Monitoring and Maintenance
    - Leak Detection and Repair (LDAR) Program:
      - Conduct regular monitoring using advanced technologies such as infrared cameras to detect and repair leaks.
      - Establish preventive and corrective maintenance schedules targeting high-risk components.
    - Asset Integrity Management:
      - Develop and implement an Asset Integrity Management System (AIMS) to ensure continuous assessment and management of equipment.
      - Include comprehensive inspections to detect early signs of leaks or failures.
    - Preventive Measures:

- Conduct routine maintenance and inspections aligned with a structured Facility Response Plan (FRP).
- Utilize best available technologies (BAT) to minimize fugitive emissions and enhance system reliability.

- Emergency Preparedness - Facility Response Plan (FRP):
  - Establish clear procedures for addressing gas leaks and fugitive emissions incidents.
  - Conduct regular emergency drills to ensure readiness in handling containment and spill scenarios.

- **Vent Emissions**

Design specification in line with ADNOC standards and requirements - American National Standards Institute (ANSI).

- Vent at safe height.
- Follow Venting Philosophy.
- No continuous venting.

5.1.6 Monitoring

To ensure the effectiveness of mitigation measures and compliance with relevant standards, the monitoring activities in Table 5-2 will be conducted.

Table 5-2. Air Quality Monitoring Plan During Operations Phase

Aspect	Parameter(s)	Frequency	KPI(s)
Engine Exhaust Emissions	- Emission levels of CO, NO_x, SO_2, PM, CO_2 from equipment and vehicles - Visual inspections of emissions	- Quarterly monitoring - Daily visual inspections	- Percentage of equipment undergoing regular maintenance - Number of instances of unnecessary idling per week
Flare Emissions	- CO, NOx, as NO_2, SO_2, CH4 and PM_{10}. concentrations	- Monitoring during emergency scenario - Daily inspections - All flare flows are continuous monitored through ultrasonic flow meters - SPEMS are installed to estimate emission on continuous basis	- Volume of gas flared during emergency events in m^3 - Number of emergency flaring events per year

Fugitive Emissions and methane Leaks	- VOC/methane concentrations near storage, handling areas, and refrigerant systems. - Inspections for leaks and spills..	- Daily inspections - Annual per LDAR Plan/OGMP 2.0 reporting	- Number of leak detection As per LDAR survey - Volume of methane leaked. - Percentage of personnel trained in leak detection and prevention.
Vent Emissions	- Nitrogen and hydrocarbon/methane concentration from cold vents	- Annual monitoring/estimation as per OGMP surveys - Daily inspections	- Number of nitrogen and hydrocarbon venting events per week - Volume of nitrogen and hydrocarbon released via cold vents
Gas Leaks	- VOC concentrations and refrigerants (i.e., nitrogen) from LNG storage tanks or from the refrigerant systems	- Monthly monitoring - Daily inspections	- Leak detection frequency - Volume of gas leaked

Monitoring Details

- Engine Exhaust Emissions
    - Methodology: Use portable emission analyzers to measure exhaust emissions from equipment. Visual inspections for excessive smoke.
- Flare Emissions
    - Methodology: Install flare flow monitoring at an appropriate location in the flare line, ideally upstream of the flare stack, during emergency scenarios to measure the volume of gases routed to the flare
    - Standards: Ensure compliance with UAE ambient air quality standards.
- Fugitive Emissions and Gas Leaks
    - Methodology:
        - Monitor methane/VOC concentrations using portable detection equipment in storage, handling, and refrigerant areas.
        - Conduct Leak Detection and Repairs (LDAR) Program on annual or as per the ADNOC schedule.
        - Conduct visual inspections for potential leaks or spills in LNG storage tanks, piping, valves, and refrigerant systems.

- Utilize advanced technologies such as infrared cameras or sniffers for precise detection of hydrocarbon leaks.
- Quantify the methane leak as part of OGMP 2.0 reporting

- Standards:
  - Compliance with ADNOC standards for fugitive emissions and gas leaks.

- Adhere to international best practices and UAE environmental regulations for hydrocarbon and VOC management.
- OGMP 2.0

- Vent Emissions
  - Methodology: Monitor nitrogen and hydrocarbon levels using appropriate detection equipment near fuel storage areas as part of OGMP 2.0 reporting
  - Standards: Follow ADNOC standards and international best practices for nitrogen and hydrocarbon emissions

5.1.7 Reporting

All monitoring results will be documented and reported. Mitigation plan shall be carried out as per LDAR program.

5.1.8 Responsibilities

The HSE Manager will oversee the implementation of the Air Quality Management Plan, ensure compliance with mitigation measures, and coordinate monitoring activities.

5.1.9 Training and Awareness

Conduct regular training sessions for workers on:

- The importance of air quality management.
- Proper operation and maintenance of equipment to reduce emissions.
- Safe handling and storage of fuels and chemicals.
- Conduct scenario-based training on emergency response, including the proper protocols for initiating, monitoring, and shutting down emergency flaring.
- Conditions under which flaring is activated.
- Differentiate between planned and venting events, emphasizing the importance of minimizing uncontrolled emissions.
- Educate on the correct operation and inspection of pressure relief valves.
- Introduce workers to the LDAR program, detailing methods for identifying leaks.

- Provide practical training on using leak detection equipment and interpreting results to identify leak points in real time.

5.1.10 Review and Update

The Air Quality Management Plan will be reviewed biannually or when significant changes in operation activities occur to ensure its effectiveness and relevance.

5.2 GHG MANAGEMENT PLAN

5.2.1 Objectives

The main objectives of the Greenhouse Gas (GHG) Management Plan during the operation phase of the LNG Project in Ruwais, Abu Dhabi are to:

- Reduce GHG Emissions: Implement strategies to minimize GHG emissions associated with operation activities.
- Ensure Compliance: Adhere to relevant regulatory requirements and standards for GHG emissions.
- Improve energy efficiency.

5.2.2 Regulatory Framework

The GHG Management Plan aligns with the following regulatory frameworks, standards, and guidelines relevant to GHG emissions during operations:

ADNOC Standards

- HSE-GA-ST02: HSE Management System Standard
- HSE-GA-ST06: Project HSE Plan and Standard
- HSE-EN-ST03: Energy Management System
- HSE-EN-ST05: Environmental Performance Monitoring
- EOH-GID-010: Best Available Techniques (BAT) in GHG Management of Projects

UAE Laws and Regulations

- Federal Law No. 24 of 1999: Protection and Development of the Environment
- National Climate Change Plan 2017-2050
- UAE Net Zero by 2050 Strategic Initiative
- Council of Ministers' Decision No. 12 of 2006: Regulation on Protection of Air from Pollution

International Conventions and Protocols

- United Nations Framework Convention on Climate Change (UNFCCC), 1992
- Kyoto Protocol, 1997
- Paris Agreement under UNFCCC, 2015
- Intergovernmental Panel on Climate Change (IPCC) Guidelines for National GHG Inventories

5.2.3 Potential Impacts

5.2.3.1 Impact Sources

During the operations phase, GHG emissions are primarily associated with:

- Flare Emissions: Flaring of hydrocarbons during emergency scenarios.
- Fugitive Emissions: Release of methane/VOCs from piping connectors, valves, seals, flanges etc.
- Fuel Combustion: Use of diesel-powered equipment and vehicles.
- Electricity Consumption: Use of electricity generated onsite by diesel generators.
- Venting Emissions: Compressor Seals as venting emissions of nitrogen and hydrocarbons

A GHG estimation methodology based on the GHG assessment conducted with guidance on monitoring and corrective actions is provided in Appendix A: GHG Emissions Estimation and Management of this GHG Management Plan.

5.2.3.2 Impact Assessment

- Potential Impacts:
    - Contribution to Climate Change: GHG emissions contribute to global warming and climate change.
    - Regulatory Non-Compliance: Exceeding emission limits can lead to regulatory penalties and reputational damage.
    - Environmental Impact: GHG emissions can indirectly affect local ecosystems, including the adjacent sea.
- Significance:

Given the limited probability of emergency scenario occurrence during operations phase, as well as the implementation of the Management Actions to further reduce GHG emissions, the GHG emissions are not significant with proper and effective management. The impact is assessed as Low.

5.2.4 Mitigation

To reduce GHG emissions during operations, the following mitigation measures, some of which are associated with the design phase, will be implemented to achieve mitigation during operations:

- Flare Emissions:
    - Reduce Flaring:
        - Develop and implement Plant Standard Operating Procedures (SOPs) to minimize operational tripping and reduce flaring.
        - Monitor and report continuously the flare gas flow through ultrasonic flow meters

- Optimize Flare Combustion Efficiency:
  - Maintain High Combustion Efficiency: Ensure the flare achieves near-complete combustion to minimize the release of unburned hydrocarbons like methane (CH_4), which is a potent GHG.
  - Enhance Pilot Burner Performance: Ensure the pilot burner provides consistent ignition during emergencies.
- Improve Emergency Scenario System Design and Control:
  - Pressure Management and Blowdown Optimization: Design systems to control pressure spikes more effectively, reducing the frequency and volume of flaring, as well as optimize blowdown rates during emergencies to limit the volume of gas sent to the flare.
  - Install dry gas seals.
- Prevent Emergency Scenarios That Trigger Flaring:
  - Proactive Maintenance and Leak Prevention: Regularly inspect and maintain equipment to prevent leaks or process upsets that may lead to emergency flaring.

- Fugitive Emissions:
  - Leak Detection and Repair (LDAR) programs:
    - Regular leak monitoring.
    - Proactive leak repair.
  - Enhanced equipment design:
    - Install low-leak components.
  - Pipe and flange improvements:
    - Regular inspection and maintenance.
  - Gas recovery and utilization:
    - Install vapor recovery units: Recover fugitive emissions from storage tanks, loading areas, and pipelines and redirect them to the gas processing system or for on-site use.
- Vent Emissions:
  - Replace wet seals with dry gas seals.
  - Install vapor recovery systems.
  - Optimize compressor operations.
  - Conduct regular maintenance and inspections.

- Adopt BAT.

5.2.5 Monitoring

A comprehensive monitoring plan will be implemented to track GHG emissions and the effectiveness of mitigation measures as show in Table 5-3.

Table 5-3. GHG Emissions Monitoring Plan During Operations Phase

Aspect	Parameter(s)	Frequency	KPI(s)
Flare Emissions	- CO_2, CH_4, and CO_2-eq and N2O	Continuous	- Total GHG emissions per month - Number of emergency flaring events per year
Fugitive Emissions	- CH_4 and N_2O	Annual/as per ADNOC LDAR Plan	- Number of leak detection As per LDAR survey - Volume of methane leaked. - Percentage of personnel trained in leak detection and prevention
Fuel Consumption	- Volume of diesel fuel consumed by equipment and vehicles	Monthly recording	- Total fuel consumption per month Fuel consumption per unit of work (e.g., liters per hour)
Electricity Generation	- Hours of operation of diesel generators - Amount of electricity generated	Monthly recording	- Total generator runtime per month - Efficiency of generators (kWh per liter of diesel)
Equipment Efficiency	- Maintenance records - Equipment performance data	Biannual reviews	- Percentage of equipment maintained on schedule - Average fuel efficiency improvements
Vent Emissions	- Nitrogen and hydrocarbon concentration from compressors	- Monthly monitoring - Daily inspections	- Number of nitrogen and hydrocarbon venting events per week - Volume of nitrogen released via cold vents
GHG Emissions Inventory	- Total GHG emissions calculated from fuel and electricity use	Biannual reporting	- Total GHG emissions per quarter - GHG emissions per unit of operation activities

Monitoring Details:

- Methodology: Use standard emission factors from recognized sources (e.g., IPCC Guidelines) to calculate GHG emissions based on fuel consumption data.
- Data Collection: Collect accurate data on fuel usage, electricity generation, and material consumption.
- Verification: Regular audits to verify data accuracy and compliance with monitoring protocols.

5.2.6 Reporting

GHG emission reports will be prepared biannually and submitted to project management and relevant authorities as required.

5.2.7 Responsibilities

The facility Environmental Manager will oversee the GHG Management Plan, ensuring implementation of mitigation measures and monitoring activities.

5.2.8 Training and Awareness

- Training Programs: Conduct training sessions for staff on:
    - Efficient operation of equipment.
    - Fuel-saving practices.
    - Importance of GHG emission reduction.
- Awareness Materials: Distribute informational materials (posters, bulletins) highlighting GHG reduction strategies.

5.2.9 Review and Update

- Periodic Review: The GHG Management Plan will be reviewed biannually or when significant changes occur in operation activities.
- Continuous Improvement: Adjust mitigation measures and targets based on monitoring results and advancements in technology or best practices.

APPENDICES

Appendix A: GHG Emissions Estimation and Management

I. GHG EMISSIONS INVENTORY

An estimation of GHG emissions during the operation phase is essential to establish a baseline and identify key emission sources for effective management.

Major Sources of GHG Emissions:

1. Flaring

- Description: Flaring occurs during operational upsets, maintenance, and emergencies, involving the combustion of excess hydrocarbons.
- Sources:
  - Ground Flares.
  - BOG (Boil-Off Gas) Flare.
- Estimation Method:
  - Calculate the volume of gas flared annually.
  - Apply appropriate emission factors for CO_2, CH_4, and N_2O based on combustion efficiency.

2. Venting

- Description: Venting involves the direct release of gases into the atmosphere without combustion.
- Sources:
  - Compressor Seals.
  - Double Block and Bleed Valves (DBBV).
- Estimation Method:
  - Use equipment-specific emission factors.
  - Calculate emissions based on the number of components and operational hours.

3. Emergency Diesel Generators (EDGs)

- Description: EDGs provide backup power during outages or emergencies.
- Estimation Method:
  - Calculate fuel consumption based on generator runtime and load.
  - Apply emission factors for diesel combustion.

4. **Firewater Pumps**
    - Description: Used for firefighting, powered by diesel engines.
    - Estimation Method:
        - Similar to EDGs, calculate fuel consumption and apply emission factors.
5. **Fugitive Emissions**
    - Description: Unintentional leaks from equipment components.
    - Sources:
        - Valves.
        - Flanges.
    - Estimation Method:
        - Use standard emission factors per component type.
        - Account for the number of each component.

Example GHG Emission Calculations:

1. **Flaring Emissions**
    - Annual Flaring Hours: 23 hours.
        - Zero Production: 9 hours.
        - F&G Trip Events: 6 events × 1 hour = 6 hours.
        - Warm Start-Up: 8 hours every 6 years (annualized to 1.33 hours/year).
    - Total CO_2e Emissions from Flaring: 50,660 tonnes/year (as provided).
    - Calculation Method:
        - Total Emissions = Volume of Gas Flared × Emission Factor.
2. **Venting Emissions**
    - Components:
        - Compressor Seals.
        - DBBV.
    - Total CO_2e Emissions from Venting: 22,505 tonnes/year.
    - Calculation Method:

- Total Emissions = Number of Components × Emission Factor per Component.

3. **Emergency Diesel Generators**
    - Number of EDGs: 6.
    - Assumed Runtime: X hours/year (to be defined based on maintenance schedule).
    - Fuel Consumption: Calculated based on generator specifications.
    - Emission Factor for Diesel Combustion: 2.68 kg CO_2/liter.
    - Total CO_2e Emissions from EDGs: 237 tonnes/year.
    - Calculation Method:
        - Total Emissions = Fuel Consumption × Emission Factor.
4. **Firewater Pumps**
    - Number of Pumps: 2.
    - Total CO_2e Emissions: 10 tonnes/year.
    - Calculation Method:
        - Similar to EDGs, based on fuel consumption and emission factors.
5. **Fugitive Emissions**
    - Components:
        - Valves: 435 units.
        - Flanges: 1,424 units.
    - Total CO_2e Emissions from Fugitive Sources: 261 tonnes/year.
    - Calculation Method:
        - Total Emissions = ∑ (Number of Components × Emission Factor per Component).

Total Estimated GHG Emissions:

- **Total Direct Emissions (Scope 1):** 73,643 tonnes CO_2e/year.
- **Total Indirect Emissions (Scope 2):** 0 tonnes CO_2e/year (using clean energy).
- **Overall Total Emissions:** 73,643 tonnes CO_2e/year.

II. Monitoring Progress

- **Emissions Tracking:**
    - Regular Updates: Maintain a GHG emissions inventory updated quarterly.

- Data Collection: Record operational data such as flaring volumes, venting occurrences, fuel consumption, and maintenance activities.

- **Performance Indicators:**
  - Flaring Metrics:
    - Volume of Gas Flared (m^3/year).
    - Number of Flaring Events.
  - Venting Metrics:
    - Number of Venting Incidents.
    - Emissions from Compressor Seals and DBBV (tonnes CO_2e/year).
  - Fuel Consumption Metrics:
    - Diesel Consumption for EDGs (liters/year).
    - Diesel Consumption for Firewater Pumps (liters/year).
  - Fugitive Emissions Metrics:
    - Leak Detection and Repair (LDAR) Program Results.
    - Number of Components Inspected vs. Leaks Found.

III. Corrective Actions

If Targets Are Not Met:

- **Review Operational Practices:**
  - Analyze flaring and venting procedures.
  - Assess equipment performance and maintenance schedules.
- **Implement Mitigation Strategies:**
  - Flaring: Introduce advanced flare management systems.
  - Venting: Upgrade to mechanical seals or dry gas seals in compressors.
  - Energy Efficiency: Incorporate variable speed drives and energy-efficient technologies.
- **Maintenance and Repairs:**
  - Increase frequency of equipment inspections.
  - Promptly repair identified leaks and faulty equipment.
- **Training and Awareness:**
  - Conduct training sessions for operational staff on GHG reduction practices.

- Encourage employee involvement in identifying emission reduction opportunities.

IV. Stakeholder Engagement

- **Communication**
  - Internal Stakeholders: Regularly update employees and contractors on GHG management goals and progress.
  - External Stakeholders: Provide reports to regulatory authorities and engage with the community regarding environmental performance.
- **Collaboration**
  - Suppliers and Contractors:
    - Work with partners to source low-emission equipment and materials.
    - Encourage adoption of best practices across the supply chain.
  - Research and Development: Participate in industry initiatives to develop new technologies for emission reductions.

V. Compliance and Audit

- **Regulatory Compliance**
  - Adherence to Standards:
    - Ensure all operations comply with local, national, and international GHG regulations.
    - Meet reporting requirements as per ADNOC standards and IFC guidelines.
  - Reporting:
    - Submit annual GHG emissions reports to authorities.
    - Disclose emissions data transparently to stakeholders.
- **Audits**
  - Internal Audits:
    - Conduct annual internal audits to assess compliance and performance.
    - Identify areas for improvement and update the GHG Management Plan accordingly.
  - External Audits:
    - Engage third-party auditors to verify GHG emissions data and management practices.

VI. Notes

- **GHG Intensity Benchmarking:**
    - The project's carbon intensity is 0.01 tonnes CO_2e per tonne of LNG produced, which is significantly better than industry averages.
    - Continuous improvement will aim to maintain and enhance this performance.
- **Regulatory Context:**
    - The project falls below the 100,000 tonnes CO_2e threshold but exceeds 25,000 tonnes CO_2e, necessitating a standalone GHG emission assessment and management plan as per ADNOC and international standards, which was conducted during the FEED stage.

5.3 CLIMATE RISK MANAGEMENT PLAN

5.3.1 Objectives

The main objectives of the Climate Risk Management Plan during the operations phase of the LNG Project in Ruwais, Abu Dhabi are to:

- Identify and Manage Climate Risks: Recognize potential climate-related risks during operations phase and implement measures to mitigate them.
- Ensure Resilience and Sustainability: Incorporate adaptation strategies into project operations to enhance resilience against climate change impacts.
- Comply with Regulations: Adhere to all relevant UAE laws, Abu Dhabi regulations, ADNOC standards, and international best practices related to climate risk management.

5.3.2 Climate Risks

The Climate Risk Management Plan aligns with the following regulatory frameworks, standards, conventions, and guidelines:

ADNOC Standards

- HSE-GA-ST02: HSE Management System Standard
- HSE-GA-ST07: HSE Design Philosophy
- HSE-EN-ST02: Pollution Prevention and Control
- HSE-EN-ST05: Environmental Performance Monitoring
- HSE-GA-ST09: HSE Audit and Assurance

UAE Laws and Regulations

- Federal Law No. 24 of 1999: Protection and Development of the Environment
- Abu Dhabi Climate Change Strategy 2021-2025: A strategic plan for mitigating and adapting to climate change impacts

International Standards and Guidelines

- Intergovernmental Panel on Climate Change (IPCC) Reports: Providing scientific assessments on climate change
- International Finance Corporation (IFC) Performance Standards:
    - Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts
    - ISO 14090: Adaptation to Climate Change—Principles, Requirements, and Guidelines

- ISO 14001: Environmental Management Systems

International Best Practices

- Equator Principles (EP IV Guidance Note on CCRA, May 2023): A risk management framework for determining, assessing, and managing environmental and social risk.
- World Bank Group's Climate Change Action Plan.

5.3.3 Climate Risks to the Project

Infrastructure design adjustments.

Operational modifications to cope with climate variability.

Refer to Design and Operation Phase Adaptation Actions from CCRA below that shall be accounted for.

5.3.3.1 Overview

As per the Climate Change Risk Assessment (CCRA) report [Ref 33], a climate change risk assessment was performed for the Ruwais RLNG facility using the Equator Principles/World Bank screening tool and methodology. The assessment considered SSP2-4.5 and SSP5-8.5 scenarios up to 2030, 2050, and 2100, focusing on:

- Temperature
- Humidity
- Precipitation
- Sea Level Rise
- Dust Storms
- Sand Encroachment
- Wind and Storms
- Cyclones
-

5.3.3.2 Identified Risks

The risks identified are categorized under the following three main areas while the key risks are detailed further below:

1. Risks to Asset Integrity/Infrastructure Damage
2. Risks Related to Resource Availability, Resilience, Productivity Loss
3. Risks Related to People's Health and Related Consequences to the Facility

Key Risks:

a. Vulnerability to Sand Movement (Physical Risk)

- Assessment Findings
    - Roads in the project area are at moderate risk of sand encroachment due to sandy topsoil textures (Figure 5.3).
    - Roads near existing facilities in the southern and southeastern areas have low to medium probability of sand blockage
- Implications
    - Potential for road blockages affecting transportation and access
    - Increased maintenance requirements for roads and infrastructure

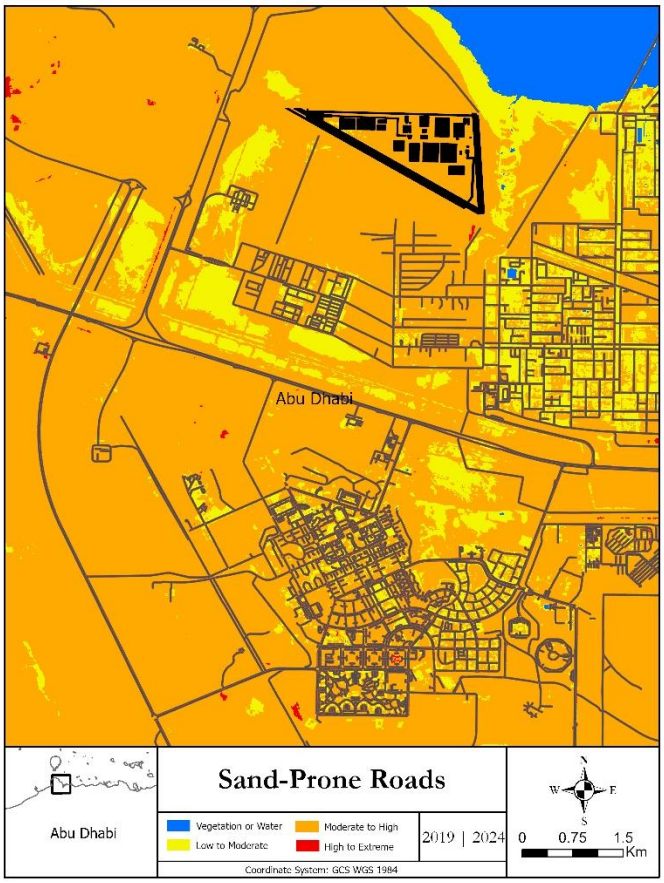

Figure 5-3. Vulnerability of roads toward sand encroachment (Aug 2019 till Aug 2024 – Mean)

b. Vulnerability to Sand Movement (Physical Risk)

- Average Performance Loss Projection (Figure 5-4)
    - Methodology

- For each 1°C rise in maximum air temperature from 29°C to 46°C, a decrease in performance by 0.6% is expected
- Projections made under SP2-4.5 and SP5-8.5 scenarios

SP2-4.5 Findings

- Average annual performance loss from 2025 to 2060 is approximately 5.69%.
- Highest losses (>6%) expected in certain years due to higher temperatures.
- Trend shows increasing performance loss over time

SP5-8.5 Findings

- Average annual performance loss is about 5.77%, slightly higher than SP2-4.5.
- More pronounced increase in performance loss due to higher temperature rise

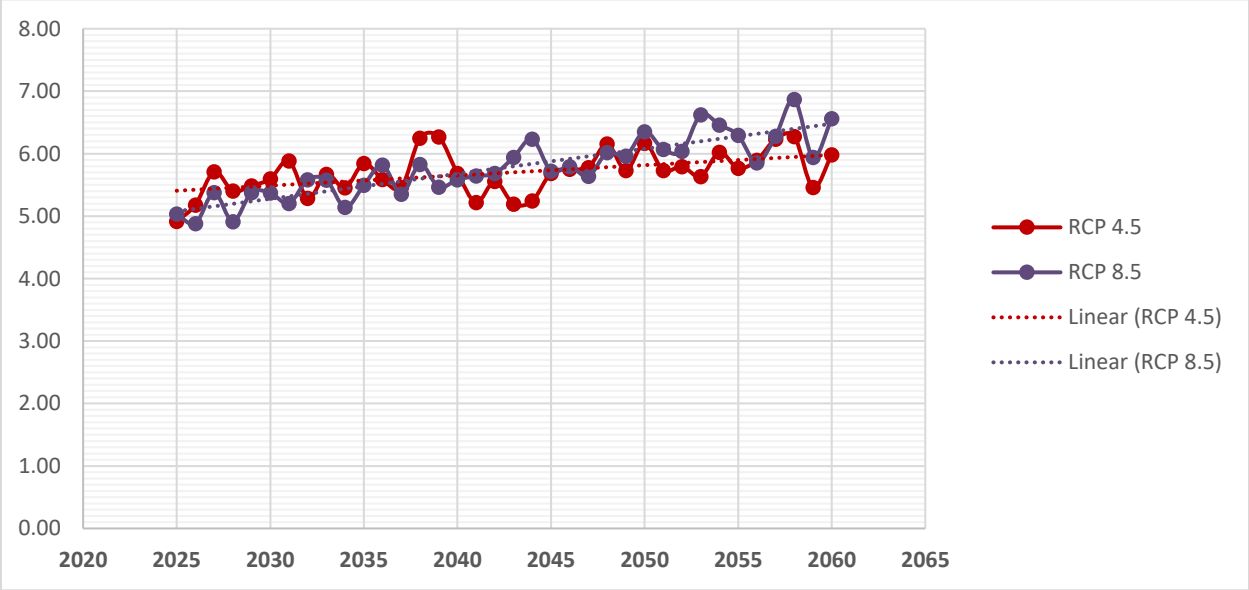

Figure 5-4. Average Performance Loss during Summer Season under SP2- 4.5 and SP5-8.5

Human Risk Level

Risk Assessment Based on Maximum Air Temperature is shown in Table 5-4.

Table 5-4. Risk Assessment Based on Maximum Air Temperature (Source: Technical Guidelines for Management of Heat Stress at Work, Government of Dubai (2010)

Maximum Air Temperature Range	Human Risk Level	Control Approach
Up to 34°C	Low Risk (Caution)	Basic heat safety and planning
35°C to 39°C	Moderate Risk	Implement planned controls and create awareness
40°C to 45°C	High Risk	Additional controls with increased awareness
46°C and above	Very High Risk	Enhanced controls with enhanced awareness

- SP2-4.5 Findings (Figure 5-5)
  - Occurrences of temperatures reaching 46°C are rare.
  - High-risk levels (40°C to 45°C) are significant across most years.
  - Moderate risk levels (35°C to 39°C) are prevalent, indicating increased exposure for workers.
- SP5- 8.5 Findings (Figure 5-6)
  - Instances of temperatures reaching 46°C occur more frequently.
  - High-risk levels are notably prevalent, with a peak of 89 days in 2058.
  - Greater overall risk to worker health due to higher temperatures.
- Implications
  - Increased risk of heat-related illnesses among workers.
  - Potential for reduced productivity and operational disruptions.
  - Need for enhanced heat stress management measures.

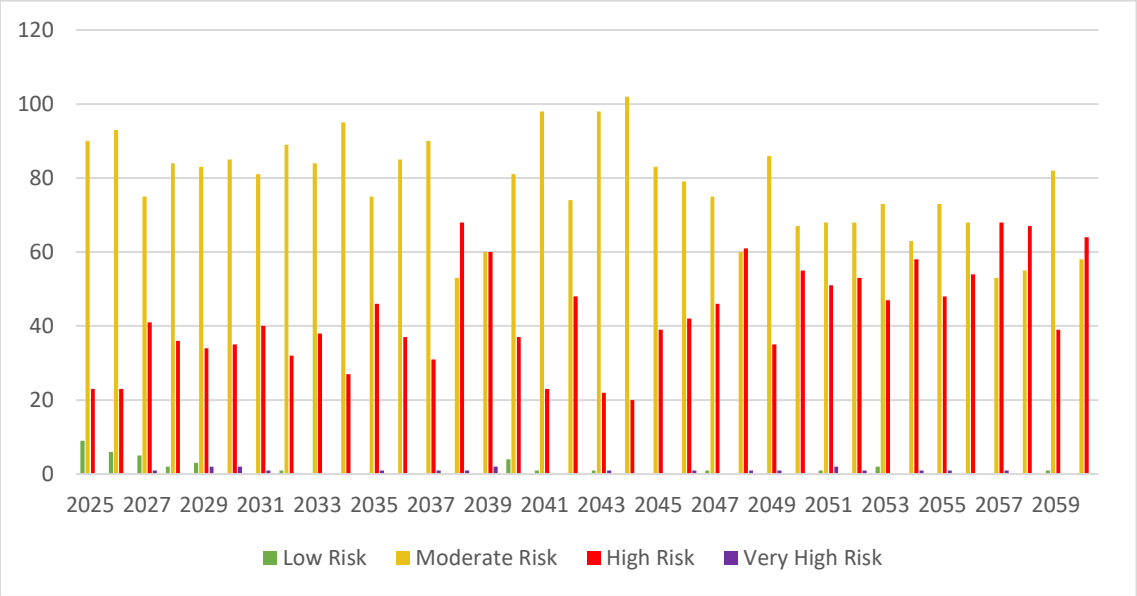

Figure 5-5. Human Risk Level Projection under SP2- 4.5 from 2025 to 2060

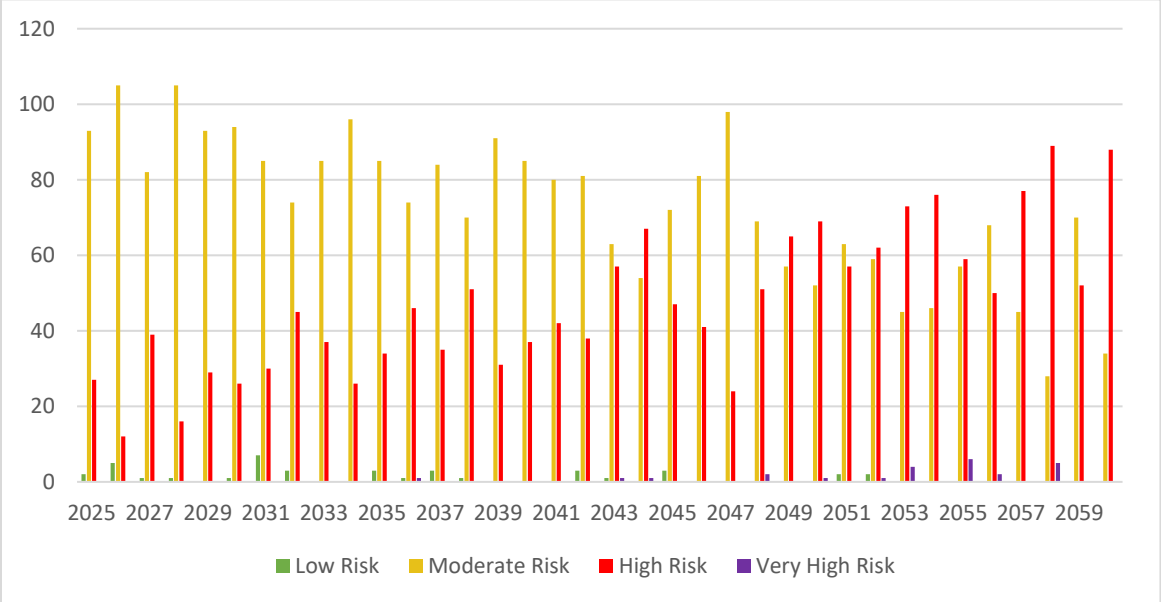

Figure 5-6. Human Risk Level Projection under SP5-8.5 from 2025 to 2060

5.3.4 Risk Assessment

5.3.4.1 Methodology

- Sensitivity of project components to identified hazards was assessed using a structured risk assessment methodology.

- A stakeholder workshop was conducted with the ADNOC design team to validate mitigation and adaptation measures and assess adaptive capacity.
- The risk assessment considered existing controls and adaptation measures already integrated into the design and operational procedures.

5.3.4.2 Results

The overall risk is Low for all relevant climate-related hazards when considering existing and planned mitigation and adaptation measures which are shown in Table 5-5.

Table 5-5. Summary Table of the Overall Risk per Hazard

Hazard	Risk
Temperature	Low
Sea Level Rise	Low
Heavy Winds	Low
Soil Erosion	Low
Cyclones	Low

5.3.5 Adaptation Measures

To enhance resilience against identified climate risks, specific adaptation measures have been developed for both the design (EPC Contractor to incorporate in Design prior to construction) and operations phases. These measures (Table 5-6. Design Phase Adaptation Actions and Table 5-7) are aimed at mitigating potential impacts on infrastructure, operations, and personnel.

Table 5-6. Design Phase Adaptation Actions

Action No.	Adaption Aspect	Action Name	Action Description	Responsible Entity	KPIs
1	Temperature Control	Install Advanced Temperature Control Systems and Insulation	- Incorporate advanced HVAC units, automated temperature sensors, thermal insulation materials, and heat-resistant materials into facility design for plant facilities and power supply systems. - Ensure designs comply with temperature limits.	ADNOC / EPC Contractor	- Reduction in temperature fluctuations inside plant facilities. - Decrease in energy consumption of HVAC systems. - Temperature stability within operational limits.
2	Heat Stress Management	Implement Heat Stress Management Measures for Workers	- Design facilities to include shade areas or shelters. - Plan the placement of drinking water stations. - Specify PPE designed to minimize heat stress. - Develop a heat stress management plan.	ADNOC / EPC Contractor	- Availability of shade areas and water stations in design. - Specification of PPE in procurement plans.
3	Sea-Level Rise and Flooding Protection	Elevate Critical Infrastructure and Install Flood Barriers	- Design and elevate storage tanks, processing equipment, power supply equipment, and marine facilities to at least 5 meters Abu Dhabi Datum (as planned). - Design barriers, berms, or sea walls around these facilities to prevent flooding.	ADNOC / EPC Contractor	- Compliance with elevation specifications in design. - Inclusion of flood protection measures in design documents.
4	Corrosion Protection and Material Durability	Apply Protective Measures to Pipelines	- Specify high-quality anti-corrosion coatings and cathodic protection systems for pipelines in design. - Select heat-resistant materials and insulation for pipelines exposed to temperature extremes.	ADNOC / EPC Contractor	- Percentage of pipelines designed with anti-corrosion measures. - Percentage of pipelines specified with heat-resistant materials.
5	Pipeline Design and Maintenance	Incorporate Flexible Joints and Supports in Pipelines	- Incorporate flexible joints and supports in pipeline design to accommodate ground movement. - Plan for ground movement assessments.	ADNOC / EPC Contractor	- Percentage of pipelines designed with flexible joints. - Inclusion of ground movement assessments in project plans.
6	Pipeline Design and Maintenance	Establish Routine Inspection and Maintenance Program	- Develop an inspection and maintenance schedule for pipelines during the operation phase. - Set up maintenance documentation requirements.	ADNOC / EPC Contractor	- Availability of maintenance schedules and documentation templates.
7	Facility Design for Extreme Weather	Design Facilities to Withstand Extreme Weather Events	- Incorporate reinforced structures and use impact-resistant, durable materials in facility design. - Use storm-resistant designs for power supply systems and backup power sources. - Plan for regular reviews and updates of design practices.	ADNOC / EPC Contractor	- Percentage of facilities designed for extreme weather resilience. - Compliance with design standards.
8	Emergency Response Planning and Monitoring	Develop Emergency Response Plans and Monitoring Systems	- Develop emergency response plans, including contingency plans for access and supply chain flexibility. - Design and integrate advanced weather monitoring systems into the facility.	ADNOC / EPC Contractor	- Availability of emergency response plans. - Integration of monitoring systems in design.

9	Power Supply System Resilience	Enhance Resilience of Power Supply Systems	- Design cooling systems and select heat-resistant materials for power supply systems. - Elevate power supply equipment and design flood defenses. - Incorporate storm-resistant designs for power systems and backups.	ADNOC / EPC Contractor	- Compliance with temperature and elevation specifications in power system design. - Inclusion of backup power sources in design.
10	Roads and Access Routes	Enhance Resilience of Roads and Access Routes	- Design roads and access routes with erosion control measures and durable construction materials. - Develop contingency plans for maintaining access during adverse weather conditions.	ADNOC / EPC Contractor	- Percentage of roads designed with durable materials. - Availability of access contingency plans.
11	Supply Chain Management	Develop Flexible Supply Chain Strategies	- Identify alternative supply routes and suppliers during planning. - Establish agreements with backup suppliers and transportation services.	ADNOC / EPC Contractor	- Number of alternative routes and suppliers identified. - Number of backup agreements in place.
12	Support Infrastructure Resilience	Enhance Resilience of Support Infrastructure	- Plan to reinforce critical access points with weather-resistant materials. - Include structural reinforcements for bridges, culverts, and vulnerable structures in the design.	ADNOC / EPC Contractor	- Percentage of infrastructure designed with reinforcements. - Compliance with resilience standards in design.

Table 5-7. Operations Phase (OESMP) Adaptation Actions

Action No.	Adaption Aspect	Action Name	Action Description	Responsible Entity	KPIs	Timeframe
1	Temperature Control	Install Advanced Temperature Control Systems and Insulation	- Regularly monitor operational temperatures in facilities and power systems. - Perform routine maintenance and upgrades of HVAC systems and insulation. - Ensure temperature stability within operational limits.	ADNOC	- Temperature stability within operational limits. - Reduction in HVAC energy consumption. - Number of heat-related issues reported.	- Daily monitoring - Monthly reviews
2	Heat Stress Management	Implement Heat Stress Management Measures for Workers	- Implement the heat stress management plan. - Maintain work-rest schedules. - Ensure availability and maintenance of shade areas, water stations, and PPE. - Conduct regular training sessions on heat stress prevention.	ADNOC	- Worker adherence rates. - Number of heat-related incidents. - Percentage of workers trained. - Effectiveness of training sessions.	- Daily checks - Monthly training
3	Sea-Level Rise and Flooding Protection	Elevate Critical Infrastructure and Install Flood Barriers	- Conduct daily monitoring for flooding risks. - Perform monthly inspections and maintenance of elevated structures and barriers. - Update flood risk assessments as needed.	ADNOC	- Number of flood-related incidents. - Maintenance activities completed on schedule. - Effectiveness of flood protection measures.	- Daily monitoring - Monthly maintenance
4	Corrosion Protection and Material Durability	Apply Protective Measures to Pipelines	- Monitor pipelines daily for system malfunctions. - Conduct monthly inspections and maintenance of anti-corrosion systems. - Replace or repair protective measures as needed.	ADNOC	- Pipeline integrity statistics. - Number of inspections conducted. - Issues identified and resolved promptly.	- Daily monitoring - Monthly maintenance
5	Pipeline Design and Maintenance	Incorporate Flexible Joints and Supports in Pipelines	- Perform daily inspections of pipelines for signs of stress or damage. Conduct monthly ground movement assessments. - Maintain records of inspections and findings.	ADNOC	- Pipeline failure rates due to ground movement. - Number of ground movement assessments conducted. - Timely maintenance actions taken.	- Daily inspections - Monthly assessments
6	Pipeline Design and Maintenance	Establish Routine Inspection and Maintenance Program	- Follow the established inspection and maintenance schedule for pipelines. - Document inspection results, maintenance activities, and corrective actions taken. - Review and update the maintenance program annually for effectiveness.	ADNOC	- Number of inspections completed. - Average time to address issues identified. - Availability and accuracy of documentation.	- Daily and monthly inspections - Yearly reviews

7	Facility Design for Extreme Weather	Design Facilities to Withstand Extreme Weather Events	- Conduct yearly reviews of facility resilience to extreme weather. - Upgrade materials and structures as needed based on new standards or findings. - Monitor for signs of wear or damage due to extreme weather events.	ADNOC	- Compliance with updated design standards. - Number of upgrades implemented. - Number of interruptions during storms.	- Yearly reviews - Upgrades as needed
8	Emergency Response Planning and Monitoring	Develop Emergency Response Plans and Monitoring Systems	- Monitor weather conditions daily using advanced systems. - Conduct monthly training and drills on emergency response procedures. Review and update emergency response plans annually or after significant events.	ADNOC	- Response times during emergencies. - Effectiveness of emergency plans. - Number of training sessions conducted. - Staff readiness levels.	- Daily monitoring - Monthly training - Yearly evaluations
9	Power Supply System Resilience	Enhance Resilience of Power Supply Systems	- Perform daily checks on power systems and backups. - Conduct monthly monitoring and maintenance of cooling systems and flood defenses. - Assess the system yearly for upgrades and compliance with new standards.	ADNOC	- Power system reliability metrics. - Efficacy of backup systems. - Number of inspections completed. - Compliance with operational limits.	- Daily checks - Monthly maintenance - Yearly assessments
10	Roads and Access Routes	Enhance Resilience of Roads and Access Routes	- Monitor road conditions daily for erosion or damage. - Perform monthly maintenance as needed. - Review contingency access plans regularly and update as necessary.	ADNOC	- Road accessibility rates. - Maintenance frequency and effectiveness. - Availability and updates of contingency plans.	- Daily monitoring - Monthly maintenance - Plan reviews
11	Supply Chain Management	Develop Flexible Supply Chain Strategies	- Monitor weather conditions daily that could affect the supply chain. - Update the supply chain strategy monthly with any new risks or alternative options. - Assess supply chain flexibility yearly and make adjustments as needed.	ADNOC	- Frequency of supply chain disruptions. - Effectiveness of alternative routes and suppliers. - Number of adjustments made to the strategy.	- Daily monitoring - Monthly updates - Yearly assessments
12	Support Infrastructure Resilience	Enhance Resilience of Support Infrastructure	- Conduct daily checks of support infrastructure for signs of wear or damage. - Perform maintenance as needed. - Assess and upgrade infrastructure yearly based on new risks or standards.	ADNOC	- Infrastructure failure rates. - Maintenance activities completed on schedule. - Percentage of infrastructure upgraded as needed.	- Daily checks - Maintenance as needed - Yearly assessments

5.3.6 Monitoring

To ensure the effectiveness of adaptation measures and compliance with relevant standards, the following monitoring activities will be conducted:

- Climate Event Monitoring
    - Temperature and Heat Stress
        - Monitor ambient temperature and humidity levels.
        - Record instances of heat stress incidents among workers.
    - Sea-Level Rise and Flooding
        - Monitor sea levels and weather forecasts for extreme events.
        - Inspect flood protection measures regularly.
- Infrastructure Monitoring
    - Structural Integrity
        - Regular inspections of facilities, pipelines, and protective structures.
        - Assess for signs of corrosion, wear, or damage.
    - Roads and Access Routes
        - Monitor for sand encroachment and erosion.
        - Maintain access routes in safe condition.
- Health and Safety Monitoring
    - Worker Health Surveillance
        - Record and analyze health data related to heat stress and other climate-related risks.
        - Implement corrective actions as necessary.
- Supply Chain Monitoring
    - Logistics Assessments: Monitor supply chain performance and adjust contingency plans as needed.
- Performance Indicators Tracking
    - KPIs as per Adaptation Actions: Regularly assess progress against KPIs outlined in the adaptation tables (Table 5-6. Design Phase Adaptation Actions and Table 5-7).

5.3.7 Reporting

- Monthly Reports: Summarize monitoring data, incidents, and actions taken.

- Incident Reports: Immediate reporting of any significant climate-related incidents.
- Annual Reviews: Assess overall performance of adaptation measures and update plans as necessary.

5.3.8 Responsibilities

- Facility Manager:
    - Responsible for integrating adaptation measures into design and operations.
    - Ensure compliance with specifications and standards.
    - Overall responsibility for implementing the Climate Risk Management Plan.
    - Ensure adequate resources are allocated for adaptation measures.
- HSE Manager:
    - Oversee monitoring activities and compliance with environmental and safety standards.
    - Coordinate with EPC Contractor on adaptation measures.
- Environmental Manager:
    - Monitor environmental conditions and effectiveness of adaptation measures.
    - Report on climate-related performance indicators.
- Operations Teams:
    - Implement adaptation actions during Operations.
    - Report any issues or deviations promptly.
- Stakeholder Engagement Officer:
    - Manage communication with stakeholders regarding adaptation measures.
    - Collect and address feedback from the community and other stakeholders.

5.3.9 Training and Awareness

- Provide training and awareness programs for staff on climate risks and adaptation strategies.
- Encourage innovation and proactive approaches to climate resilience.

5.3.10 Communication

Effective communication is essential for conveying mitigation and adaptation efforts to stakeholders based on the following:

- Stakeholder Engagement Activities
    - Regular meetings with community members, local authorities, and other stakeholders.

- Workshops and informational sessions on specific adaptation topics.

- Information Dissemination
    - Public information campaigns, including articles, infographics, and videos.
    - Updates on project websites and social media platforms.
- Feedback Mechanisms
    - Online surveys and feedback forms.
    - Suggestion boxes and community hotlines.

5.3.11 Review and Update

- Regularly review the Climate Risk Management Plan to incorporate new data, technologies, and best practices.
- Update adaptation measures based on monitoring results and stakeholder feedback.

5.4 NOISE AND VIBRATION MANAGEMENT PLAN

5.4.1 Objectives

The main objectives of the Noise and Vibration Management Plan during the operations phase of the LNG Project in Ruwais, Abu Dhabi are to:

- Minimize Noise and Vibration Impacts: Reduce noise and vibration levels to protect the health and well-being of workers and minimize impacts on the adjacent marine environment.
- Ensure Compliance: Adhere to relevant regulatory requirements and standards for noise and vibration levels during operations activities.

5.4.2 Regulatory Framework and Standards

The Noise and Vibration Management Plan aligns with the following regulatory frameworks, standards, and guidelines relevant to noise and vibration during operations:

ADNOC Standards

- HSE-GA-ST02: HSE Management System Standard
- HSE-GA-ST06: Project HSE Plan and Standard
- HSE-EN-ST02: Pollution Prevention and Control
- HSE-EN-ST05: Environmental Performance Monitoring
- HSE-OH-ST08: Physical Health Hazard Standard

UAE Laws and Regulations

- Council of Ministers' Decision No. 32 of 1982This law is concerned with the protection of Health and Safety of workers
- Federal Law No. 24 and its Executive Orders of 1999 Protection and Development of the Environment
- Council of Ministers' Decision No. 12 of 2006Regulation on Protection of Air from Pollution - Allowable limits for Noise levels (EAD Noise and Vibration Standards)

International Conventions and Protocols

- International Maritime Organization (IMO), MARPOL Convention, 1973/1978
- Barcelona Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean, 1976
- Convention on Migratory Species (CMS), 1979
- Convention on Biological Diversity (CBD), 1992

WHO Guidelines

- WHO Environmental Noise Guidelines, 2018
- International Best Practices
- ISO 14001 – Environmental Management Systems
- Implement BAT
- Community Communication Programs:
    - Engaging with nearby communities and providing real-time updates on noise and vibration helps maintain good relations and ensure transparency.
    - Complaint Mechanisms: Establishing platforms for community feedback regarding noise and vibration issues encourages swift resolution of concerns.

5.4.3 Baseline Conditions

The project site is located in an industrial area, and there are existing high noise sources in this area associated with industrial activities such as construction, operation of large-scale industries, vehicle movement from adjacent highway as well as vessels movement etc. The operation of the proposed Project will also contribute to noise levels in the industrial area.

A noise survey was undertaken by Arcadis at Ruwais and the surrounding area from 20th to 22nd September 2020 at 15 representative SR locations within the iRAMP area during the daytime (7.00 am - 8.00 pm) and night-time (8.00 pm - 7.00 am) periods using a type 1 sound level meter. Recordings were taken for 15-minute intervals at each monitoring location. Each location was monitored for equivalent continuous sound pressure level (LAeq).

In summary, the daytime noise levels were in compliance with the Federal noise standards at 12 locations, whereas the night-time noise levels were in compliance with the Federal limits at nine locations. The observed exceedances were recorded due to the following noise sources:

- Road traffic:
    - Occasional road traffic on the internal roads.
    - Road traffic on the E11 highway.
- The Ruwais Market, which included movement of residents and vehicles as well as humming and buzzing noise from the generator and lighting at the area.

Noise Modelling Study

A noise modeling study conducted during the ESIA stage revealed the following:

- For the normal operations scenario, predicted noise levels during daytime and night-time at 1.5m AGL were found to be within the permissible limit at the plot boundary. The cumulative noise levels exceeding the ambient noise limits; however, noise levels of the sensitive receptors are from other sources (mostly from

traffic) and the Plant's noise levels will have no perceivable effect on these receivers. According to the calculations, the Plant causes +0.0-0.4 dB increase on these receptors.

- HSE noise levels during daytime and night-time at 1.5m AGL were found to be within the permissible limit. For the machines that emit noise levels close to or just higher than 85 dB(A) hearing protection signs are to be placed on machines.
- For the emergency scenario, environmental noise levels during daytime and night-time at 1.5m AGL were found to be within permissible limits at the plot boundary. Further, no health impacts are expected from the noise levels at the receptors. Hence, no mitigation is recommended for the emergency scenario.
- HSE noise levels for emergency operation during daytime and night-time at 1.5m AGL were found to be exceeding the workplace limit at ground level Ground Flares and BOG Flare. For the machines that emit noise levels close to or just higher than 85 dB(A) at 1 m buffer area as listed in the EIA report [Ref 30]., hearing protection signs are to be placed.
- It was recommended that this study be updated during EPC with vendor data.
- It was also suggested to procure quieter noise equipment for specific high contributing sources.

5.4.4 Potential Impacts

5.4.4.1 Noise Sources

During the operations phase, potential sources of noise and vibration include:

- Onshore Activities:
    - Operation of process machinery (compressors, substation, pumps, air coolers, HVAC etc.)
    - Vents (safety relief valves)
    - Ground flare
    - Operation of diesel generators (EDGs)
- Offshore Activities:
    - Movement of vessels and barges

5.4.4.2 Sensitive Receptors

Although the project site is in an industrial area with existing high noise levels, the primary sensitive receptors during operations are:

- Onsite Workers: Exposure to high noise levels can affect workers' health and safety.
- Marine Fauna: Underwater noise can impact marine species in the adjacent sea, including fish, marine mammals, and turtles.

The nearest community sensitive receptor is the Dhafra Beach Hotel, located approximately 2 km away from the project site. Given this distance and the industrial setting, noise and vibration impacts on this receptor are expected to be negligible.

5.4.4.3 Impact Assessment

- Onshore Noise and Vibration
    - Potential Impacts:
        - Health risks to workers due to prolonged exposure to high noise levels, potentially causing hearing loss or stress.
        - Nuisance and disturbance to workers, affecting productivity and well-being.
        - Structural vibrations affecting sensitive equipment or temporary structures on site.
    - Significance:
        - The impact on workers is assessed as Medium, requiring mitigation measures to protect health and safety.
        - Impact on offsite receptors is assessed as Low due to the distance and existing industrial noise levels.
- Offshore Noise and Vibration
    - Potential Impacts:
        - Underwater noise from vessel movement may disturb marine fauna, leading to behavioral changes, displacement, or physical harm.
        - Potential impact on fish stocks, affecting local fisheries.
        - Cumulative impacts when combined with existing maritime activities.
    - Significance:
        - The impact on marine fauna is assessed as Medium to High, necessitating specific mitigation measures.
        - Impact on the adjacent sea environment requires careful management.

5.4.5 Mitigation Measures

To minimize noise and vibration impacts during operations, the following mitigation measures will be implemented:

- Update Noise Study: Update the noise modelling study during the EPC phase using vendor-specific data for accuracy.
- Onshore Mitigation Measures
    - Engineering Controls:

- Use equipment fitted with noise suppressors or silencers.
- Incorporate low-noise flare tip designs.
- Maintain equipment regularly to ensure optimal performance and minimal noise emissions.
- Employ temporary noise barriers or enclosures around high-noise activities when near sensitive areas.

- Administrative Controls:
  - Schedule high-noise activities during daytime hours when possible.
  - Implement a job rotation schedule to limit workers' exposure to high noise levels.
  - Enforce mandatory use of personal protective equipment (PPE), such as earplugs or earmuffs.

- Offshore Mitigation Measures
  - Equipment Selection: Use modern, well-maintained vessels and equipment designed to minimize underwater noise emissions.
- Vibration Mitigation Measures
  - Monitoring: Regularly monitor vibration levels during high-vibration activities to ensure they remain within acceptable limits.
  - Communication: Inform all workers about potential vibration sources and safety precautions.

5.4.6 Monitoring

To ensure effective noise and vibration management and compliance with relevant standards, the monitoring activities in Table 5-8 will be conducted:

Table 5-8. Noise and Vibration Monitoring Plan During Operations Phase

Aspect	Parameter(s)	Monitoring Location	Frequency	KPI(s)
Onshore Noise Levels	- Sound pressure levels (dB(A)) - Octave band analysis	- At site boundaries - Near high-noise equipment - Worker areas - Flaring area	- Regular monitoring during peak activities	- Compliance with UAE noise standards - Number of exceedances
Worker Exposure	- Personal noise dosimetry readings	- Selected workers in high-noise areas	- Biannual assessments - Spot checks	- Percentage of workers exceeding exposure limits - PPE compliance rates

Offshore Noise Levels	- Underwater sound levels (dB re 1 µPa)	- At specified spots according to the marine traffic routes - Within specified monitoring zones offshore	- Regular during offshore activities	- Compliance with marine noise guidelines - Observations of marine fauna behavior
Vibration Levels	- Vibration velocity (mm/s) - Acceleration (m/s²) - Frequency spectra (velocity/acceleration at each frequency)	- As per OHRA recommendation	- As required during high-vibration activities	- Vibration levels within acceptable limits - Number of complaints or incidents

Monitoring Details

- Noise Monitoring Equipment:
    - Use calibrated Type 1 sound level meters for onshore noise measurements.
    - Utilize underwater hydrophones for offshore noise monitoring.
- Standards and Guidelines:
    - Ensure compliance with UAE Federal Law No. 24 of 1999 and Council of Ministers' Decision No. 12 of 2006 for noise limits.
    - Follow WHO Environmental Noise Guidelines, 2018.
- Worker Exposure Monitoring:
    - Conduct personal noise exposure assessments using dosimeters.
    - Ensure that exposure does not exceed occupational exposure limits.

5.4.7 Reporting

- Prepare annual environmental monitoring reports summarizing noise and vibration data.
- Report any exceedances of noise or vibration limits immediately to project management.
- Document any incidents involving marine fauna and actions taken.

5.4.8 Responsibilities

- Environmental Manager: Oversee the implementation of the Noise and Vibration Management Plan, ensure compliance, and coordinate monitoring activities.
- HSE Officer: Ensure that workers are provided with appropriate PPE and that safe work practices are followed.

5.4.9 Training and Awareness

- Worker Training:
    - Provide training on the hazards of noise exposure and proper use of PPE.
    - Educate workers on vibration risks and safety measures.

5.4.10 Communication

- Internal Communication: Regularly inform workers about ongoing noise and vibration management efforts.
- External Communication: While nearby communities are distant, establish a communication channel for any stakeholders to raise concerns.

5.4.11 Review and Update

- Periodic Review: Review the Noise and Vibration Management Plan when significant changes in operation activities occur.
- Continuous Improvement: Adjust mitigation measures based on monitoring results and feedback to enhance effectiveness.

5.5 ILLUMINATION MANAGEMENT PLAN

5.5.1 Objectives

The main objectives of the Illumination Management Plan during the operations phase of the LNG Project in Ruwais, Abu Dhabi are to:

- Minimize Light Pollution Impacts: Reduce light pollution from ground flares and other site illumination sources to protect the well-being of nearby communities and minimize impacts on the adjacent marine environment.
- Ensure Compliance: Adhere to relevant regulatory requirements and standards for illumination during operation activities.

5.5.2 Regulatory Framework and Standards

The Illumination Management Plan aligns with the following regulatory frameworks, standards, and guidelines relevant to noise and vibration during operations:

ADNOC Standards

- HSE-GA-ST02 HSE Management System Standard
- HSE-GA-ST04 Incident Notification, Investigation, and Reporting
- HSE-GA-ST06 Project HSE Plan and Standard
- HSE-GA-ST07 HSE Design Philosophy
- HSE-GA-ST08 HSE Performance Monitoring and Reporting
- HSE-GA-ST09 HSE Audit and Assurance
- HSE-EN-ST02 Pollution Prevention and Control
- HSE-EN-ST05 Environmental Performance Monitoring
- HSE-OH-ST08 Physical Health Hazard Standard

UAE Laws, Standards, and Strategies

- Federal Law No. 24 and its Executive Orders of 1999 Protection and Development of the Environment
- Council of Ministers' Decision No. 37 of 2001 Regulation concerning Environmental Impact Assessment of Projects
- EAD Guidelines
- Department of Municipalities and Transport (DMT) - Abu Dhabi Abu Dhabi Dark Sky Policy, 2024

Conventions and Protocols

- MARPOL (Marine Pollution) Convention, 1973/ 1978

- Convention on the Conservation of Migratory Species of Wild Animals (CMS), 1979
- Convention on Wetlands of International Importance (Ramsar Convention) especially Waterfowl Habitat, as amended, 1982/1987
- Convention on Biological Diversity (CBD) 1992

WHO Guidelines

While WHO does not have standalone guidelines on light pollution, its general recommendations on artificial light's impact on human health offer valuable insights for minimizing adverse effects in illumination management plans.

International Best Practices

- ISO 14001 – Environmental Management Systems
- International Dark-Sky Association (IDA) Guidelines
- International Finance Corporation (IFC) Performance Standards, particularly Performance Standard 6
- CIE (Commission Internationale de l'Eclairage) Standards
- Implement Best Available Technologies (BAT)

5.5.3 Potential Impacts

5.5.3.1 Illumination Sources

During the operations phase, potential illumination sources include:

- Ground flares
- Other lighting used in operational and safety procedures.

5.5.3.2 Sensitive Receptors

The RLNG Project is located within an ADNOC concession area designated solely for industrial activities. Although the project site is in an industrial area with existing artificial lighting / illumination effects, the primary sensitive receptors during operations are:

- Nearby communities: Exposure light pollution effects, including glare, sky glow, and spillover lighting can affect nearby community's wellbeing, especially during night-time, including:
    - Dhafra Beach Hotel
    - VIP Palace
    - Sir Banyas Island
- Marine Fauna: Illumination effects, primarily during night-time, can impact marine species in the adjacent sea, including fish, marine mammals, and turtles.

5.5.3.3 Impact Assessment

- Illumination effect on Nearby Communities
    - Potential Impacts:
        - Health risks to nearby communities due to mistakenly interpreting the ground flare illumination effect as a significant fire or explosion risk.
        - Complaints and concerns from nearby communities.
        - Reputational consequences for the RLNG project.
        - Cumulative impacts when combined with existing illumination sources.
    - Significance:
        - The impact on nearby communities is assessed as Medium, requiring mitigation measures to protect health and safety.
- Illumination effect on Marine Fauna
    - Potential Impacts:
        - Illumination effect may disturb marine fauna, leading to behavioral changes, displacement, or physical harm.
        - Potential impacts on foraging, breeding, and migratory patterns of species, especially those adapted to natural light cycles.
        - Cumulative impacts when combined with existing illumination sources.
    - Significance:
        - The impact on marine fauna is assessed as Medium, requiring mitigation measures to protect marine fauna.

5.5.4 Mitigation Measures

The potential mitigation measures that were initially identified either via ENVID or during scoping, in order to minimize the significant of illumination effect impacts include:

- Engineering Controls:
    - Utilize shielded or directional lighting to minimize upward and outward spill of light.
    - Implement adaptive lighting controls, such as dimmers, timers, and motion sensors, to adjust lighting levels based on necessity.
    - Implement low-impact lighting technologies, such as LED lights with warm color temperatures.
- Administrative Controls:

- Scheduling: Avoid flaring during critical periods for marine life (e.g., breeding or migration seasons.
- Install timers and motion sensors to ensure lights are only on when necessary.

- Marine Fauna Monitoring:
  - Employ Marine Mammal Observers (MMOs) to monitor for the presence of sensitive species.
  - Establish exclusion zones; minimize lighting if marine mammals are observed within the zone.
  - Conduct Illumination Study: Carry out an illumination study particularly for ground flares to assess and mitigate potential night-time illumination effects on nearby communities.
  - Stakeholder engagement: Informe and raise awareness of the nature of this illumination to manage stakeholder expectations and avoid unnecessary concerns.

5.5.5 Monitoring

To ensure effective illumination management and compliance with relevant standards, the monitoring activities in Table 5-9 will be conducted:

Table 5-9. Illumination Monitoring Plan During Operations Phase

Aspect	Parameter(s)	Monitoring Location	Frequency	KPI(s)
Illumination Effect	- Light Intensity (Illuminance) using lux meters - Brightness (Luminance) using luminance meters	- Ground flare area - Near intense artificial lighting sources	- Weekly measurements - Continuous monitoring during peak activities - During emergency scenarios	- Compliance with Abu Dhabi light pollution standards and international best practices - Number of exceedances per month
Nearby Community Exposure	- Complaints - Feedback from community engagement	- Nearby community's recipient to impacts	- Continuous monitoring during emergency scenarios - Spot checks	- Number of complaints received - Actions taken upon complaints received
Marine Fauna Observations	- Sightings of marine mammals and turtles	- Within specified monitoring zones offshore	- Continuous during emergency scenarios	- Number of marine fauna sightings during night-time

	- Behavioral changes	- Within sensitive areas	- Spot checks	- Actions taken upon sightings

Monitoring Details

- Ground Flare and Other Sources:
    - Use lux meter (lx) at various distances from light sources to measure Illuminance.
    - Utilize luminance meter to measure brightness (cd/m²).
    - Periodic updates to the illumination study, especially during phases of significant operational change
- Standards and Guidelines:
    - Ensure compliance with UAE Federal Law No. 24 of 1999 and Council of Ministers' Decision No. 12 of 2006 for Protection and Development of the Environment.
    - Follow DMT Abu Dhabi Dark Sky Policy, 2024.
- Nearby communities Exposure Monitoring:
    - Utilize the Complaint Feedback Mechanism (CFM) to address nearby community concerns.
- Review and Update Monitoring Plan:
    - The monitoring program will be periodically reviewed and updated in consultation with relevant stakeholders and experts to enhance effectiveness.

5.5.6 Reporting

- Monthly Environmental Monitoring Reports: Prepare reports summarizing illumination effect data, monitoring activities, and any incidents.
- Immediate Reporting: Report any exceedances of illuminance and luminance limits immediately to project management for corrective action.
- Incident Documentation: Document any incidents involving marine fauna and actions taken in response.

5.5.7 Responsibilities

- Environmental Manager:
    - Oversee the implementation of the Illumination Management Plan.
    - Ensure compliance with all regulatory requirements.
    - Coordinate monitoring activities and liaise with stakeholders.
- HSE Officer:

- Ensure that nearby communities are well-informed about potential illumination sources from the RLNG plant.
- Coordinate training programs for staff on light pollution mitigation.

- Operational Staff:
  - Implement best practices for minimizing light pollution during daily operations.
  - Report any deviations or incidents related to illumination.

5.5.8 Training and Awareness

- Staff Training - Conduct training sessions for operational staff on:
  - Best practices for minimizing light pollution.
  - Understanding the impact of artificial lighting on the environment and marine life.
  - Proper use of lighting equipment and controls.
- Nearby Community Awareness - Educate nearby communities on:
  - Light sources originating from the RLNG plant operations.
  - Safety measures and reasons for flaring activities.
  - How to use the Complaint Feedback Mechanism (CFM).

5.5.9 Communication

- External Communication:
  - Regularly inform nearby communities about illumination effect management efforts through meetings, newsletters, or digital platforms.
  - Establish a dedicated communication channel (e.g., hotline or email) for stakeholders to raise concerns.
- Internal Communication:
  - Maintain open communication among project teams regarding illumination management strategies and updates.

5.5.10 Review and Update

- Periodic Review: Review the Illumination Management Plan semi-annually or when significant changes in operation activities occur.
- Continuous Improvement: Adjust mitigation measures based on monitoring results and feedback to enhance effectiveness.

5.6 SOIL AND GROUNDWATER MANAGEMENT PLAN

5.6.1 Objectives

The main objectives of the Soil and Groundwater Management Plan during the operations phase of the LNG Project in Ruwais, Abu Dhabi are to:

- Prevent Contamination: Avoid soil and groundwater contamination resulting from operation activities.
- Ensure Safe Handling: Implement safe handling, storage, and disposal practices for hazardous materials and waste.
- Protect Receptors: Prevent adverse impacts on the adjacent marine environment.

5.6.2 Regulatory Framework and Standards

In the aim of environmental protection and development, the following regulatory framework, standards, conventions, and protocols, which are relevant to soil and groundwater protection are listed below:

ADNOC Standards

- HSE-GA-ST02: HSE Management System Standard
- HSE-GA-ST06: Project HSE Plan and Standard
- HSE-EN-ST02: Pollution Prevention and Control
- HSE-EN-ST04: Waste Management
- HSE-EN-ST05: Environmental Performance Monitoring
- HSE-CE-ST02: Oil Spill Response

UAE Laws and Regulations

- Federal Law No. 5 of 1981: Regulating groundwater resources
- Federal Law No. 24 and its Executive Orders of 1999: Protection and Development of the Environment
- Council of Ministers' Decision No. 37 of 2001: Regulation on Handling Hazardous Materials, Hazardous Wastes and Medical Wastes
- Local Law No. 21 of 2005: Waste Management in Abu Dhabi Emirate
- Ministerial Decree No. 20 of 2008: Establishes specific controls over the use of treated wastewater to prevent soil and groundwater contamination
- Abu Dhabi Environment, Health, and Safety Management System Framework, 2009
- Federal Law No. 12 of 2018: Integrated Waste Management:
- Federal Decree-Law No. 15 of 2020: Water Resources Management and Protection

- EAD Soil Contamination Standards, 2016

International Conventions and Protocols

- MARPOL (Marine Pollution) Convention, 1973/ 1978
- Convention on Wetlands of International Importance (Ramsar Convention) especially Waterfowl Habitat, as amended, 1982/1987
- Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal, 1989
- Protocol on the Control of Marine Trans boundary Movements and Disposal of Hazardous Wastes and Other Wastes, 1998

WHO Guidelines

While WHO does not have specific guidelines solely for soil and groundwater protection, it addresses related areas through standards on water quality, environmental health, and safe management of hazardous substances. WHO's guidelines on safe drinking water quality emphasize protecting groundwater sources, setting limits for contaminants, and recommending pollution prevention strategies.

International Best Practices

- ISO 14001 – Environmental Management Systems
- Best Available Techniques (BAT): Source control and pollution prevention

5.6.3 Baseline Conditions

Soil and Geology

The Ruwais coastal region is typified by carbonate sediments and saline sandy soils, known as "Sabkha," which have formed through the interplay of wind, evaporation, and occasional sheet flows. These processes have led to the formation of salt crusts near the surface due to capillary action from the shallow groundwater. The area's geological profile includes weak calcarenite formations such as "Miliolite Sandstone" and bioclastic limestones, which reflect the sedimentary evolution of the UAE coastline.

To establish baseline soil quality, a soil survey was conducted on September 6, 2023, during which nine samples were collected from five locations within the project development area. Analysis results (detailed in Table 5.20 of the EIA report [Ref 30]) were benchmarked against the ADNOC Pollution Prevention and Control standards [Ref 5] and the Abu Dhabi QCC's "Environmental Specification for Soil Contamination (ADS19/2017)" [Ref 38]. All results complied with these standards.

Groundwater

Groundwater in the Emirate of Abu Dhabi is limited due to low recharge rates, with high salinity and shallow levels along the coast. The project area is characterized by elevated groundwater tables near the coastline. Groundwater sampling was conducted between September 6 and 7, 2023, from three boreholes. As specific local standards for

groundwater quality were unavailable, the results were assessed against Dutch Standards (see Table 5.21 in the EIA report [Ref 30]). All samples met the referenced standards, establishing a baseline for groundwater quality.

5.6.4 Potential Impacts

5.6.4.1 Contamination Sources

During the operations phase, potential sources that may impact soil and groundwater include:

- Hazardous Material Storage and Handling: Leaks or spills from storage containers of chemicals, fuels, and hazardous substances.
- Fuel and Oil Spills: Leakage from operations equipment, vehicles, and fuel storage tanks.
- Chemical Spills: Accidental releases during handling and use of operations chemicals.
- Waste Generation and Disposal: Improper disposal of operations waste, including hazardous and non-hazardous waste.

5.6.4.2 Sensitive Receptors

The primary sensitive receptors during operations are:

- Soil and Groundwater Resources: The local soil and shallow groundwater, which could be contaminated by operational activities.
- Adjacent Marine Environment: The sea adjacent to the operations site, which could be affected by runoff or spills reaching the marine ecosystem.

5.6.4.3 Impact Assessment

- Potential Impacts:
    - Soil Contamination: Spills or leaks of hazardous materials can lead to soil contamination, affecting soil quality and potentially impacting flora and fauna.
    - Groundwater Contamination: Contaminants can infiltrate through soil to the groundwater table, leading to pollution of groundwater resources.
    - Marine Pollution: Runoff carrying contaminants can reach the adjacent sea, harming marine life and ecosystems.
- Significance:
    - Soil and Groundwater: The impact is assessed as Medium, requiring effective mitigation measures to prevent contamination.
    - Marine Environment: The impact is assessed as Medium, necessitating controls to prevent pollutants from reaching the sea.

5.6.5 Mitigation Measures

To prevent soil and groundwater contamination during operations, the following mitigation measures will be implemented:

- Hazardous Material Storage and Handling
    - Secure Storage Areas:
        - Store hazardous materials in designated, secure areas with restricted access.
        - Use impermeable surfaces and secondary containment (e.g., bunds or drip trays) capable of holding 110% of the largest container's volume.
        - Implement weather protection measures to prevent corrosion and deterioration of storage containers.
    - Proper Labeling and Segregation:
        - Clearly label all containers with contents and hazard symbols.
        - Segregate incompatible materials to prevent reactions.
    - Leak Detection and Maintenance:
        - Regularly inspect storage containers and equipment for leaks or damage.
        - Maintain a maintenance log for all equipment handling hazardous materials.
        - Install leak detection systems for large storage tanks.
- Fuel and Oil Spill Prevention
    - Equipment Maintenance:
        - Implement a preventative maintenance program for all machinery and vehicles to prevent leaks.
        - Use absorbent pads or drip trays under stationary equipment.
        - Replace worn or damaged parts promptly.
    - Refueling Procedures:
        - Conduct refueling activities in designated areas with spill containment measures.
        - Train personnel on safe refueling practices.
        - Keep spill kits readily available at refueling stations.
- Chemical Spill Prevention
    - Safe Handling Procedures:

- Provide training to personnel on the proper handling and use of chemicals.
- Use appropriate transfer equipment to minimize spills during dispensing.
- Avoid overfilling containers and monitor transfer operations.

- Spill Response Kits:
  - Position spill response kits at strategic locations, including storage areas and work sites.
  - Ensure kits contain absorbents, neutralizing agents, and protective equipment.
  - Regularly inspect and replenish spill kits.

- Waste Management Practices
  - Waste Segregation and Storage:
    - Segregate waste at the source into hazardous and non-hazardous categories.
    - Store waste in designated areas with appropriate containment.
    - Label waste containers clearly with contents and hazard information.
  - Authorized Disposal:
    - Use licensed waste contractors for the collection and disposal of waste.
    - Maintain waste transfer notes and disposal certificates.
    - Track waste generation and disposal volumes for reporting and management purposes.
  - Reduce, Reuse, Recycle (3Rs):
    - Implement waste minimization practices.
    - Encourage recycling of materials where feasible.
    - Set targets for waste reduction and monitor progress.

- General Measures
  - Emergency Response Plan:
    - Develop and implement a Spill Prevention and Response Plan.
    - Train personnel in emergency procedures and conduct regular drills.
    - Establish clear communication protocols for reporting spills.
  - Drainage Control:
    - Design site drainage to prevent contaminated runoff from reaching the sea.

- Use oil-water separators where appropriate.
- Regularly inspect and maintain drainage systems.

- Training and Awareness:
  - Conduct regular training sessions on environmental protection practices.
  - Display signage to reinforce proper procedures.
  - Include environmental responsibilities in staff inductions and job descriptions.
- Contractor Management:

- Ensure that all contractors and subcontractors comply with the Soil and Groundwater Management Plan.
- Include environmental protection clauses in contracts.

5.6.6 Monitoring

To ensure the effectiveness of mitigation measures and compliance with relevant standards, the monitoring activities in Table 5-10 will be conducted:

Table 5-10. Soil and Groundwater Monitoring Plan During Operations Phase

Aspect	Parameter(s)	Monitoring Location	Frequency	KPI(s)
Soil Quality	- Total Petroleum Hydrocarbons (TPH) - Heavy Metals (e.g., lead, mercury) - pH and Conductivity	- Areas near hazardous material storage - Spill sites (if any)	- Annual sampling - After any spill incident	- Compliance with EAD Soil Contamination Standards - Compliance with ADNOC PPC standards - Number of exceedances reported
Groundwater Quality	- pH, - Conductivity - TPH - Heavy Metals - Chemical Oxygen Demand (COD) - Nitrates and Phosphates	- Existing groundwater monitoring wells - Down-gradient of the site	- Annual sampling - After any significant spill	- Compliance with referenced groundwater standards - Number of exceedances reported
Inspection of Storage Areas	- Integrity of storage containers	- Hazardous material storage areas	- Weekly inspections	- Number of inspection findings addressed

	- Condition of secondary containment - Spill kit availability	- Fuel storage tanks		- Percentage of storage areas compliant
Waste Management	- Waste segregation practices - Waste storage conditions - Documentation of waste disposal	- Waste storage areas - Throughout the operations site	- Weekly inspections	- Percentage of waste properly segregated - Number of waste disposal records maintained
Spill Response Readiness	- Availability of spill kits - Training records - Response time to spills	- Throughout the operations site	- Monthly checks - After training sessions	- Percentage of staff trained - Number of spill incidents responded to effectively
Runoff and Drainage Control	- Visual inspection of drainage systems - Erosion control measures	- Site perimeter - Near drainage outfalls	- Weekly inspections - After heavy rain events	- Number of incidents of uncontrolled runoff - Effectiveness of erosion controls

Monitoring Details

- Sampling and Analysis:
    - Soil and groundwater samples will be collected by qualified personnel using standard methods.
    - Analysis will be conducted at accredited laboratories.
- Standards and Guidelines:
    - Soil quality results will be compared to the latest EAD Soil Contamination Standards (2016) as well as ADNOC's PPC standards.
    - Groundwater quality will be assessed against applicable international guidelines if local standards are unavailable.
- Incident Reporting:
    - Any exceedance of standards or spill incidents will be reported immediately to project management.
    - An incident investigation will be conducted to identify root causes and preventive measures.
- Data Management:

- Maintain a database of monitoring results for trend analysis.
- Use monitoring data to assess the effectiveness of mitigation measures and update the management plan as necessary.

5.6.7 Reporting

- Monthly Environmental Monitoring Reports:
  - Prepare reports summarizing soil and groundwater monitoring data, inspection findings, and any incidents.
  - Include analysis of trends and recommendations for improvements.
- Incident and Non-Compliance Reporting:
  - Report any incidents, non-compliances, and corrective actions taken to project management and regulatory bodies as required.
  - Maintain records of incident investigations and follow-up actions.
- Record Keeping:
  - Maintain records of training sessions, inspections, waste disposal documentation, and maintenance logs.
  - Ensure all documentation is easily accessible for audits and reviews.

5.6.8 Responsibilities

- Environmental Manager:
  - Oversee the implementation of the Soil and Groundwater Management Plan.
  - Ensure compliance with all regulatory requirements and company policies.
  - Coordinate monitoring activities and liaise with regulatory authorities.
- Site Supervisor:
  - Ensure that mitigation measures are implemented on-site.
  - Monitor daily operations for compliance with environmental procedures.
  - Report any incidents or non-compliances to the Environmental Manager.
- HSE Officer:
  - Conduct regular inspections and audits of environmental practices.
  - Provide training and awareness programs to personnel.
  - Respond promptly to incidents and coordinate spill response efforts.

- Operational Staff:
    - Follow all procedures related to hazardous material handling, waste management, and spill prevention.
    - Participate in training programs and report any environmental concerns.
- Contractors and Suppliers:
    - Comply with the Soil and Groundwater Management Plan.
    - Ensure their personnel are trained and aware of environmental responsibilities.
    - Report any incidents or non-compliances immediately.

5.6.9 Training and Awareness

- Training Programs - Provide training to all personnel on:
    - Hazardous Material Handling: Safe handling, storage, and transportation procedures.
    - Spill Prevention and Response: Use of spill kits, reporting procedures, and emergency actions.
    - Waste Management Practices: Proper segregation, storage, and disposal methods.
    - Environmental Awareness: Understanding the importance of protecting soil and groundwater resources.
- Awareness Materials:
    - Display signage and posters highlighting key procedures and environmental protection measures.
    - Conduct regular toolbox talks to reinforce training topics and address any concerns.
    - Distribute informational leaflets or newsletters with updates and best practices.
- Competency Assessments:
    - Evaluate personnel understanding through quizzes or practical demonstrations.
    - Provide refresher training as needed

5.6.10 Review and Update

- Periodic Review:
    - Review the Soil and Groundwater Management Plan biannually or when significant changes in operational activities occur.
    - Update the plan to reflect changes in regulations, standards, or operational procedures.
- Continuous Improvement:

- Adjust mitigation measures based on monitoring results and feedback to enhance effectiveness.
- Incorporate lessons learned from incidents or near-misses.

- Stakeholder Engagement:
  - Engage with regulatory authorities and stakeholders to receive feedback.
  - Participate in industry forums or workshops to stay informed about new technologies and methods.
- Audit and Assessment:
  - Conduct internal audits to assess compliance and identify areas for improvement.
  - Address any findings promptly and effectively.

5.7 WASTE MANAGEMENT PLAN

5.7.1 Objectives

The main objectives of the waste management plan during the operation phase of the RLNG Project are to:

- Minimize Waste Generation: Implement waste prevention, reduction, reuse, and recycling practices to reduce the volume and toxicity of waste generated.
- Ensure Proper Handling and Disposal: Safely manage waste through proper segregation, storage, transportation, and disposal to prevent environmental impacts.
- Protect Sensitive Receptors: Safeguard the health of workers, protect the adjacent marine environment, and prevent contamination during marine operations.

5.7.2 Regulatory Framework and Standards

In the aim of environmental protection and development, the following regulatory framework, standards, conventions, and protocols, which are relevant to waste management are listed below.

ADNOC Standards

- HSE-GA-ST02: HSE Management System Standard
- HSE-GA-ST06: Project HSE Plan and Standard
- HSE-EN-ST02: Pollution Prevention and Control
- HSE-EN-ST04: Waste Management
- HSE-EN-ST05: Environmental Performance Monitoring

UAE Laws and Regulations

- Ministerial Order No. 32 of 1982: Prevention Methods and Measures for Protecting Workers against Work Hazards
- Federal Law No. 24 and its Executive Orders of 1999: Protection and Development of the Environment
- Council of Ministers' Decision No. 37 of 2001: Regulation concerning Environmental Impact Assessment of Projects
- Law of 2002: Regulation on Handling Hazardous Materials, Hazardous Wastes, and Medical Wastes
- Local Law No.21 of 2005: Waste Management in Abu Dhabi Emirate
- Local Law No. 17 of 2008: Establishment of the Center for Waste Management
- Federal Law No.12 of 2018: Integrated Waste Management
- Abu Dhabi Occupational Safety and Health System Framework (OSHAD-SF) Code of Practice (CoP) 3.0.

International Conventions and Protocols

- International Convention for the Prevention of Pollution from Ships (MARPOL) 73/78, including Annexes I to VI
- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, 1989
- Protocol for the Protection of the Marine Environment against Pollution from Land-Based Sources, 1990
- Stockholm Convention on Persistent Organic Pollutants (POPs), 2001
- Paris Agreement under UNFCCC, 2015

International Best Practices

- ISO 14001 – Environmental Management Systems
- Implement Best Available Techniques (BAT)
- International Maritime Organization (IMO) Guidelines
- International Safety Guide for Oil Tankers and Terminals (ISGOTT)
- International Maritime Dangerous Goods (IMDG) Code

5.7.3 Potential Impacts

5.7.3.1 Impact Sources

During the operational phase, waste generation can lead to several potential impacts on the environment and human health if not properly managed:

- Hazardous Waste Generation:
    - Use of mercury guard beds, HHR beds, filters, pigging waste, WEEE wastes, lube oil, spent chemicals, contaminated rags, paint wastes, and empty containers of hazardous materials.
    - Waste from ship maintenance activities, such as oily rags, spent solvents, and cleaning agents.
- Non-Hazardous Waste Generation:
    - Operation and maintenance activities might generate non-hazardous waste such as concrete, wood, metals, plastics, and packaging materials.
    - Waste generated from administrative buildings, dining facilities, workshops, stores, control rooms.
- Domestic Waste:
    - Waste generated from worker accommodations and site offices, including food waste, paper, and general refuse.

- Waste generated from ships, including galley waste.

- Sewage Sludge:
  - Sewage sludge generated from the Sewage Treatment Plant (STP).
  - Sewage and wastewater from ships during port calls.
- Potential Litter and Debris:
  - Improper disposal can lead to waste dispersal by wind or water runoff.

5.7.3.2 Sensitive Receptors

- Onsite Workers: Exposure to hazardous waste can pose health risks.
- Adjacent Marine Environment: The nearby sea can be contaminated by waste runoff, spills, or improper disposal, affecting marine life and ecosystems.

5.7.3.3 Impact Assessment

- Potential Impacts
  - Soil and Water Contamination: Improper disposal or accidental spills can lead to contamination of soil and groundwater, potentially reaching the adjacent sea.
  - Health Risks to Workers and ship crew: Exposure to hazardous waste can cause health issues.
  - Marine Pollution:
    - Waste entering the sea can harm marine organisms and disrupt ecosystems.
    - Discharge of untreated ballast water and bilge water can introduce pollutants and invasive species.
  - Waste Accumulation: Unmanaged waste can lead to unsightly conditions, attract pests, and create odors.
  - Reputational Risk: Environmental incidents can harm the project's reputation and lead to regulatory penalties.
- Significance: The impact is assessed as Medium, requiring effective waste management practices to mitigate potential adverse effects.

5.7.4 Mitigation Measures

To minimize waste generation and manage waste properly during operation, the following mitigation measures will be implemented:

5.7.4.1 Waste Minimization

- Waste Prevention and Reduction

- Material Optimization: Implement inventory management to avoid overstocking.
- Efficient Operational Methods:
  - Optimize processes to reduce waste generation.
  - Use digital documentation to reduce paper waste.
- Material Substitution: Use materials that generate less waste or are recyclable.

- Reuse and Recycling
  - Segregation at Source: Separate waste streams at the point of generation.
  - Reuse of Materials: Reuse materials such as timber, pallets, and formwork where feasible.
  - Recycling Programs: Implement recycling for materials like metals, plastics, paper, and glass.

5.7.4.2 Waste Segregation and Storage

- Segregation Practices
  - Provide clearly labeled and color-coded waste containers for different waste types (hazardous, non-hazardous, recyclable, etc.).
  - Educate workers and ship crews on proper segregation through training and signage.
- Waste Storage
  - Establish a dedicated hazardous waste storage area, designed as per the requirements of HSE-EN-ST04.
  - Store waste in designated areas away from watercourses and drainage systems.
  - Use covered containers to prevent waste dispersion by wind or rain.
  - Ensure hazardous waste is stored in secure, bunded areas with secondary containment.

5.7.4.3 Waste Handling and Transportation

- Licensed Contractors
  - Use approved and licensed waste service providers/contractors for transportation and disposal.
  - Verify that waste service providers/contractors comply with regulatory requirements.
- Safe Handling Procedures
  - Train personnel on safe handling of waste, particularly hazardous waste.
  - Use appropriate equipment for handling waste to prevent spills and exposure.
  - Ensure that waste transferred from ships is handled safely and securely (if applicable).

5.7.4.4 Waste Disposal

- Compliance with Regulations
    - Dispose of waste in accordance with ADNOC standards and UAE regulations.
    - Hazardous waste will be managed through approved facilities like the BeAAT (Central Environment Protection Facilities), currently known as MAGMA facility.
    - Ensure ship-generated waste is disposed of according to MARPOL Annex V requirements (if applicable).
- Documentation
    - Maintain records of waste types, quantities, and disposal methods.
    - Keep waste transfer notes and disposal certificates.
    - For ship-generated waste, maintain records as per MARPOL requirements (if applicable).
    -

5.7.4.5 Emergency Response

- Spill Response Plan
    - Develop and implement a plan for responding to waste spills.
    - Equip the site with spill response kits appropriate for the types of waste handled.
    - Conduct regular drills and exercises involving both shore-based and ship personnel.

5.7.4.6 Training and Awareness

- Worker Education
    - Conduct regular training sessions on waste management practices.
    - Use toolbox talks, posters, and bulletins to reinforce key messages.
    -
- Community Engagement: Inform nearby communities about waste management practices and emergency response measures to address any concerns.

5.7.5 Monitoring

To ensure effective waste management and compliance with relevant standards, the monitoring activities in Table 5-11. Waste Management Monitoring Plan During Operation Phase will be conducted.

Table 5-11. Waste Management Monitoring Plan During Operation Phase

Aspect	Parameter(s)	Monitoring Location	Frequency	KPI(s)
Waste Generation	- Types and quantities of waste generated - Segregation effectiveness	- Throughout the operation site	- Monthly recording - Weekly inspections	- Total waste generated per month - Percentage of waste segregated correctly
Waste Storage	- Condition of storage areas - Labeling and signage - Container integrity	- Waste storage areas -	- Weekly inspections	- Number of non-compliances identified and corrected - Percentage of containers in good condition
Waste Disposal	- Documentation of waste transfers - Disposal methods - Contractor compliance	- Administrative offices - Disposal sites - Ship records	- Monthly audits	- All waste disposed through licensed contractors - Availability of disposal certificates
Hazardous Waste Management	- Storage conditions - Spill incidents - Training records	- Hazardous waste storage areas -	- Weekly inspections - After any incident	- Number of spill incidents Percentage of staff trained in hazardous waste handling
Recycling Efforts	- Quantities of materials recycled - Recycling facilities used	- Waste storage areas -	- Monthly recording	- Percentage of waste recycled - Reduction in waste sent to landfill
	-	-	-	-
	-	-	-	-
Worker Training and Awareness	- Training sessions conducted - Attendance records	- Training facilities	- Quarterly	- Number of workers trained - Increase in compliance rates

Monitoring Details

- Data Collection:
    - Use waste tracking forms to record types and quantities of waste.
    - Collect weighbridge tickets, manifests, and receipts from waste contractors.
- Inspections:
    - Conduct regular site inspections to check waste storage, segregation, and housekeeping practices.
    - Inspect waste containers for integrity and proper labeling.
- Audits: Perform periodic audits of waste management procedures and operator compliance.
- Reporting: Prepare monthly waste management reports summarizing data and any issues identified.

5.7.6 Reporting

To ensure transparency and accountability in waste management, regular reporting will be carried out as follows:

- Monthly Reports:
    - Summarize waste data, including waste generated, recycled, and disposed.
    - Include KPIs such as waste segregation rates, recycling percentages, and any non-compliances.
- Incident Reports:
    - Document any waste-related incidents within 24 hours, detailing responses and follow-up actions.
- Quarterly Compliance Summary:

Provide an overview of regulatory and ADNOC compliance, including trends and recommendations.

- Annual Review:
    - Conduct a year-end evaluation of waste management effectiveness, updating the plan as needed.

All reports will be made available to ADNOC and other relevant stakeholders to ensure ongoing compliance and continuous improvement in waste management practices.

5.7.7 Responsibilities

- Environmental Manager:
    - Oversee the implementation of the Waste Management Plan.
    - Ensure compliance with regulations and standards.

- Coordinate monitoring activities and reporting.

- Site Supervisor:
  - Ensure that waste management practices are implemented on-site.
  - Address any issues identified during inspections.
- HSE Officers / Environmental Specialists
  - Conduct training and awareness programs.
  - Monitor worker compliance with waste management procedures.
- All Personnel and Ship Crew:
  - Follow waste segregation and handling procedures.
  - Report any spills or incidents immediately.
- Contractors and Suppliers:
  - Comply with the Waste Management Plan.
  - Ensure that their personnel are trained and aware of waste management responsibilities.

5.7.8 Training and Awareness

- Training Programs – Provide training to all workers on:
  - Waste segregation and recycling practices.
  - Safe handling and storage of waste.
  - Emergency response procedures for spills.
  - Compliance with MARPOL and other relevant maritime regulations.
- Awareness Campaigns:
  - Display posters and signage to reinforce waste management messages.
  - Conduct regular toolbox talks focusing on waste-related topics.
  - Provide informational materials in multiple languages if necessary.
- Community Engagement:
  - Engage with local communities to inform them about waste management practices and address any concerns.

5.7.9 Review and Update

- Periodic Review: Review the Waste Management Plan biannually or when significant changes in operational activities occur.

- Continuous Improvement:
    - Update the plan based on monitoring results, audits, and feedback.
    - Implement corrective actions to address any non-compliances or inefficiencies.
    - Incorporate new technologies and best practices in waste management.
- Stakeholder Feedback:
    - Incorporate feedback from regulatory authorities, port authorities, ship operators, and local communities.
- Audit and Assessment:
    - Conduct internal audits to assess compliance and identify areas for improvement.
    - Address any findings promptly and effectively.

5.8 EFFLUENT, DRAINAGE, AND WASTEWATER MANAGEMENT PLAN

5.8.1 Objectives

The main objectives of the effluent, drainage, and wastewater management plan during the operation phase of the RLNG Project are to:

- Prevent Environmental Contamination: Avoid pollution of soil, groundwater, and the adjacent sea through proper management of effluents and wastewater.
- Ensure Proper Treatment and Disposal: Implement effective treatment and disposal practices for all effluents and wastewater generated during operation.
- Comply with Regulatory Requirements: Adhere to all relevant laws, regulations, and standards governing effluent and wastewater management.

5.8.2 Regulatory Framework and Standards

The Effluent, Drainage, and Wastewater Management Plan aligns with the following regulatory frameworks, standards, conventions, and guidelines relevant to effluent, drainage, and wastewater management during operation:

ADNOC Standards

- HSE-GA-ST02: HSE Management System Standard
- HSE-GA-ST06: Project HSE Plan and Standard
- HSE-EN-ST02: Pollution Prevention and Control
- HSE-EN-ST04: Waste Management
- HSE-EN-ST05: Environmental Performance Monitoring
- HSE-CE-ST02: Oil Spill Response
- ADNOC Codes of Practice and Guidelines for Effluent Management

UAE Laws and Regulations

- Federal Law No. 24 of 1999: Protection and Development of the Environment
- Federal Law No. 23 of 1999: Exploitation, Protection, and Development of Living Aquatic Resources in the UAE
- Federal Law No. 12 of 2018: Integrated Waste Management
- Federal Law No. 15 of 2020: Water Resources Management and Protection
- Council of Ministers' Decision No. 37 of 2001: Regulation concerning Environmental Impact Assessment of Projects
- Cabinet Resolution No. 39 of 2006: Regulations for the Disposal of Wastewater

- Abu Dhabi Waste Management Center (Tadweer) Regulations
- Abu Dhabi Environment, Health, and Safety Management System (AD EHSMS) Regulatory Framework.

Conventions and Protocols

- International Convention for the Prevention of Pollution from Ships (MARPOL) 73/78, including Annexes I, IV, and V
- International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM Convention), 2004
- United Nations Convention on the Law of the Sea (UNCLOS), 1982
- Kuwait Regional Convention for Cooperation on the Protection of the Marine Environment from Pollution (ROPME), 1978
- Protocol for the Protection of the Marine Environment against Pollution from Land-Based Sources, 1990
- International Maritime Organization (IMO) Regulations

WHO Guidelines

- Guidelines for the safe use of wastewater, excreta and greywater

International Best Practices

- ISO 14001 – Environmental Management Systems
- Implement Best Available Technologies (BAT)
- IFC Environmental, Health, and Safety Guidelines
- American Petroleum Institute (API) Standards for Wastewater Management.

5.8.3 Potential Impacts

5.8.3.1 Impact Sources

During the operation phase, potential sources of effluent, drainage, and wastewater that may impact the environment include:

- Domestic Sewage: Sewage generated from administrative buildings, staff accommodations, and other facilities.
- Process Wastewater: Wastewater generated from LNG processing operations, including condensate drainage, boiler blowdown, cooling tower blowdown, and wash water.
- Produced Water: Water extracted along with natural gas during production, which may contain hydrocarbons and other contaminants.

- Stormwater Runoff: Rainwater runoff from operational areas, which may carry pollutants such as oil, grease, and sediments.
- Chemical Spills and Leaks: Accidental releases of chemicals, fuels, lubricants, and other hazardous substances during storage, handling, or transfer operations.
- .Desalination Plant Rejects (if applicable): Concentrated brine discharges from any onsite desalination facilities.

5.8.3.2 Sensitive Receptors

The primary sensitive receptors during operation are:

- Marine Environment: The adjacent sea, including marine flora and fauna, coral reefs, seagrass beds, and fisheries.
- Soil and Groundwater: Potential contamination could affect soil quality and groundwater resources.
- Onsite Workers and Local Communities: Exposure to contaminated water can pose health risks.
- Protected Areas: Any nearby marine protected areas or conservation zones.

5.8.3.3 Impact Assessment

- Potential Impacts
    - Water Pollution: Affecting marine life and water quality.
    - Soil and Groundwater Contamination: Leading to long-term environmental degradation.
    - Health Risks: To workers and local communities.
    - Introduction of Invasive Species: Disrupting local ecosystems.
    - Regulatory Non-Compliance: Resulting in legal penalties and reputational damage.
- Significance: The impact is assessed as Medium to High, depending on the nature and scale of the contamination, requiring effective mitigation measures to prevent adverse effects.

5.8.4 Mitigation

To prevent contamination and ensure proper treatment and disposal of effluents and wastewater during operation, the following mitigation measures will be implemented.

- Effluent and Wastewater Management
    - Treatment Facilities:
        - Install appropriate wastewater treatment systems for sewage and oily wastewater, such as package sewage treatment plants (STPs) and oil-water separators.
        - Ensure treated effluent meets UAE regulatory discharge standards before release.

- Reuse and Recycling: Reuse treated wastewater for non-potable applications where feasible

- Chemical and Fuel Spill Prevention and Response
  - Spill Prevention Measures: Implement secondary containment and leak detection systems.
  - Spill Response Plan:
    - Develop a comprehensive plan covering onshore and offshore activities.
    - Equip the site with appropriate spill response equipment.
  - Training: Train personnel on spill prevention, response procedures, and proper use of spill equipment.

- Discharge Control
  - Monitoring and Compliance:
    - Regularly test effluent quality to ensure compliance with discharge limits.
    - Cease discharges that do not meet standards and take corrective actions.
  - Discharge Permits: Obtain necessary permits for any discharges to the environment, as required by regulatory authorities.

- General Measures
  - Good Housekeeping:
    - Maintain clean work areas to prevent pollutants from entering drainage systems.
    - Regularly inspect storage and handling areas for leaks and spills.
  - Awareness and Communication:
    - Conduct regular training sessions for workers on environmental protection measures.
    - Display signage to remind personnel of proper practices.

Contractor Management: Ensure contractors comply with procedures.

5.8.5 Monitoring

To ensure the effectiveness of mitigation measures and compliance with relevant standards, the monitoring activities in Table 5-12 . Effluent, Drainage, and Wastewater Monitoring Plan During Operation Phase will be conducted:

Table 5-12 . Effluent, Drainage, and Wastewater Monitoring Plan During Operation Phase

Aspect	Parameter(s)	Monitoring Location	Frequency	KPI(s)
Treated Effluent Quality	- pH, BOD_5, COD - Total Suspended Solids (TSS) - Oil and Grease - Nutrients (Ammonia, Nitrogen, Phosphorus) E. coli / Fecal Coliforms - Heavy Metals	- Outlet of sewage treatment plants - Discharge points to the sea	- Monthly sampling - After significant maintenance or incidents	- Compliance with UAE discharge standards - Number of exceedances reported
Process Wastewater Quality	- Hydrocarbons (TPH) - pH, COD, BOD_5 - Suspended Solids - Heavy Metals - Temperature	- Discharge points from treatment facilities	- Monthly sampling - Continuous monitoring	- Compliance with standards - Number of exceedances
Stormwater Runoff Quality	- Oil and Grease - Suspended Solids - pH - Visual inspections for contamination	- Stormwater discharge points - Retention ponds	- During/after rainfall - Biannual sampling	- No contamination - Compliance if discharged
Spill Incidents	- Number of spills - Volume and type of material spilled - Response time	- Throughout the operation site	- Immediately upon occurrence - Monthly summary	- Zero major spills - Prompt containment and cleanup - Staff trained in spill response
Worker Training	- Training sessions conducted - Attendance records	- Training facilities	- Quarterly	- Number of workers trained - Increased compliance observed

Inspections and Audits	- Compliance with procedures - Condition of facilities - Housekeeping standards	- Entire operation site	- Weekly inspections - Quarterly audits	- Non-compliances corrected - Improvement in audit scores

5.8.6 Responsibilities

- Environmental Manager: Oversee implementation, ensure compliance, coordinate monitoring.
- Operations Manager: Ensure operational compliance, allocate resources.
- Marine Operations Manager: Oversee vessel compliance, coordinate with ship operators.
- Site Supervisor: Implement mitigation measures, monitor operations.
- HSE Officers: Conduct inspections, provide training, respond to incidents.
- Operational Staff: Follow procedures, participate in training, report concerns.
- Contractors/Suppliers: Comply with the plan, ensure personnel are trained.

5.8.7 Reporting

- Monthly Reports: Summarize data, trends, compliance status, recommendations.
- Incident Reporting: Immediate reporting of incidents, corrective actions.
- Record Keeping: Maintain permits, results, inspections, training records.
- Annual Report: Summarize yearly activities, performance, future plans.

5.8.8 Training and Awareness

- Training Programs - Provide training to all workers on:
    - Effluent and wastewater management procedures.
    - Spill prevention and response.
    - Proper operation of treatment systems.
- Awareness Campaigns:
    - Display posters and signage to reinforce key messages.
    - Conduct regular toolbox talks focusing on environmental protection.
- Competency Assessments: Quizzes, demonstrations, refresher training.

5.8.9 Review and Update

- Periodic Review: Review the Effluent, Drainage, and Wastewater Management Plan biannually or when significant changes in operational activities occur.
- Continuous Improvement:
    - Update the plan based on monitoring results, audits, and feedback.
    - Implement corrective actions to address any non-compliances or inefficiencies.
- Stakeholder Engagement: Engage with authorities, communities, participate in industry forums.
- Audit and Assessment: Internal audits, prompt addressing of findings.

5.8.10 Communication

- External Communication:
    - Inform authorities and stakeholders.
    - Address community concerns.

Internal Communication: Share strategies, updates, results with staff.

5.9 MARINE ECOLOGY PROTECTION PLAN

5.9.1 Objectives

The main objectives of the Marine Ecology Protection Plan during the operation phase of the LNG Project in Ruwais, Abu Dhabi are to:

- Protect Marine Habitats and Biodiversity: Safeguard sensitive marine ecosystems, habitats, and species from adverse impacts associated with operational activities.
- Minimize Environmental Disturbance: Implement measures to reduce physical, chemical, and acoustic disturbances to marine life.
- Ensure Regulatory Compliance: Adhere to all relevant laws, regulations, and international conventions pertaining to marine ecology protection.
- Promote Sustainable Operations: Integrate environmental considerations into operational practices to achieve sustainable marine resource use.
- Ensure Compliance with International Standards: Ensure No Net Loss of Natural Habitats and Net Gain of Critical Habitats are achieved where applicable.

5.9.2 Regulatory Framework and Standards

The management plan aligns with the following regulatory frameworks, standards, and guidelines relevant to marine ecology protection during operation:

ADNOC Standards

- HSE-GA-ST02: HSE Management System Standard
- HSE-GA-ST06: Project HSE Plan and Standard
- HSE-EN-ST02: Pollution Prevention and Control
- HSE-EN-ST05: Environmental Performance Monitoring
- HSE-EN-ST06: Biodiversity Assessment
- HSE-CE-ST02: Oil Spill Response
- ADNOC Codes of Practice and Guidelines for Marine Operations

UAE Laws and Regulations

- Federal Law No. 24 of 1999: Protection and Development of the Environment
- Federal Law No. 23 of 1999: Exploitation, Protection, and Development of Living Aquatic Resources in the UAE
- Cabinet Decision No. 37 of 2001: Regulation on Protection of Marine Environment

- Cabinet Decision No. 23 of 2001: Protection of Ports, Shores, and Maritime Territories from Oil Pollution Incidents
- Federal Decree-Law No. 15 of 2020: Water Resources Management and Protection
- Abu Dhabi Environment, Health, and Safety Management System (AD EHSMS) Regulatory Framework
- Environment Agency - Abu Dhabi (EAD) Guidelines

Conventions and Protocols

- International Convention for the Prevention of Pollution from Ships (MARPOL) 73/78, including Annexes I to VI
- International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM Convention), 2004
- Convention on the Conservation of Migratory Species of Wild Animals (CMS), 1979
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 1973
- United Nations Convention on the Law of the Sea (UNCLOS), 1982
- Kuwait Regional Convention for Cooperation on the Protection of the Marine Environment from Pollution (ROPME), 1978
- Protocol for the Protection of the Marine Environment against Pollution from Land-Based Sources, 1990
- Convention on Biological Diversity (CBD), 1992
- Convention on Wetlands of International Importance (Ramsar Convention), 1982/1987
- Oil Pollution Preparedness, Response and Cooperation (OPRC) Convention, 1990
- International Maritime Organization (IMO) Guidelines

International Best Practices

- ISO 14001: Environmental Management Systems
- Implement Best Available Techniques (BAT)
- International Finance Corporation (IFC) Performance Standards, particularly Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources
- International Union for Conservation of Nature (IUCN) Guidelines
- Joint Nature Conservation Committee (JNCC) Guidelines for Minimizing Acoustic Disturbance to Marine Mammals

5.9.3 Baseline Conditions

A comprehensive marine baseline survey was conducted for the LNG Project by M/s Fugro between September 13th and 19th, 2023, utilizing remote sampling and investigation techniques, including drop-down video (DDV), sediment grabs, water sampling, and plankton nets [Ref 35]. The objectives of the marine baseline study were to:

- Determine Environmental and Ecological Conditions: Assess the existing marine environment, including habitats, species diversity, and water quality.
- Identify Sensitive Habitats and Species: Locate and map critical habitats such as seagrass beds, coral reefs, and areas frequented by protected species.
- Establish Baseline Data: Provide a reference point for future monitoring and impact assessment.

Key Findings:

- Habitats Identified:
    - Seagrass Beds: Patches of seagrass, including species such as Halodule uninervis and Halophila stipulacea, found approximately 18 km northeast of the project site.
    - Macroalgae: Presence of red algae and other macroalgae species.
    - Unconsolidated Bottom: Predominant habitat of sand and silt substrates.
- Marine Fauna:
    - Marine Mammals: Occurrence of species such as dugongs (Dugong dugon), which are classified as Vulnerable by the IUCN.
    - Sea Turtles: Presence of green sea turtles (Chelonia mydas) and hawksbill turtles (Eretmochelys imbricata), both of which are of conservation concern.
    - Fish Species: Diversity of reef-associated fish, including commercially important species.
- Protected Areas:
    - Marawah Marine Protected Area (MPA): Located approximately 10-15 km northeast of the project site, designated as a UNESCO Marine Biosphere Reserve.
    - Sir Bani Yas Island: An important area for migratory species and marine biodiversity.
- Water Quality:
    - Parameters such as temperature, salinity, dissolved oxygen, pH, and nutrient levels were within normal ranges for the region

5.9.4 Potential Impacts

5.9.4.1 Impact Sources

During the operation phase, potential sources of impact on marine ecology include:

- Chemical and Oil Spills: Accidental releases from vessels or O&M activities contaminating marine waters.
- Wastewater Discharges: Discharge of treated or untreated wastewater affecting water quality.
- Air Emissions: Deposition of airborne pollutants into the marine environment.

5.9.4.2 Sensitive Receptors

- Marine Habitats (Figure 5-7):
    - Seagrass Beds: Vital for marine biodiversity, serving as feeding grounds and nursery areas.
    - Coral Reefs: Important ecosystems providing habitat for numerous marine species.
    - Mangroves and Mudflats: Essential for coastal protection and biodiversity.
- Marine Fauna:
    - Endangered Species: Dugongs, sea turtles, and certain species of dolphins and whales Table 5-13. Marine Mammals Present Within UAE Waters (IUCN, 2023)).
    - Fish Stocks: Commercially important species vital for local fisheries.
- Protected Areas:
    - Marawah MPA: A UNESCO Marine Biosphere Reserve.
    - Sir Bani Yas Island: A designated area for conservation of migratory species

Table 5-13. Marine Mammals Present Within UAE Waters (IUCN, 2023)

Scientific name	Common name	IUCN status	Occurrence in UAE Arabian Gulf
Megaptera novaeangliae	Arabian Sea humpback whale	EN	Rare
Balaenoptera edeni	Bryde's whale	LC	Regular
Orcinus orca	Killer whale	DD	Rare
Pseudorca crassidens	False killer whale	NT	Rare
Sousa plumbea	Indian Ocean humpback dolphin	EN	Regular

Scientific name	Common name	IUCN status	Occurrence in UAE Arabian Gulf
Tursiops aduncus	Indo-Pacific bottlenose dolphin	NT	Regular
Stenella attenuata	Pantropical spotted dolphin	LC	Rare
Delphinus delphis tropicalis	Indo-Pacific common dolphin	LC	Regular
Stenella longirostris	Spinner dolphin	LC	Regular
Neophocaena phocaenoides	Indo-Pacific finless porpoise	VU	Rare
Dugong dugon	Dugong	VU	Regular
Reference: Nearshore Surveys Services for Ruwais LNG Project Environmental Baseline Survey (2023) EN: Endangered. LC: Least Concern. DD: Data Deficient. NT: Near Threatened. VU: Vulnerable.			

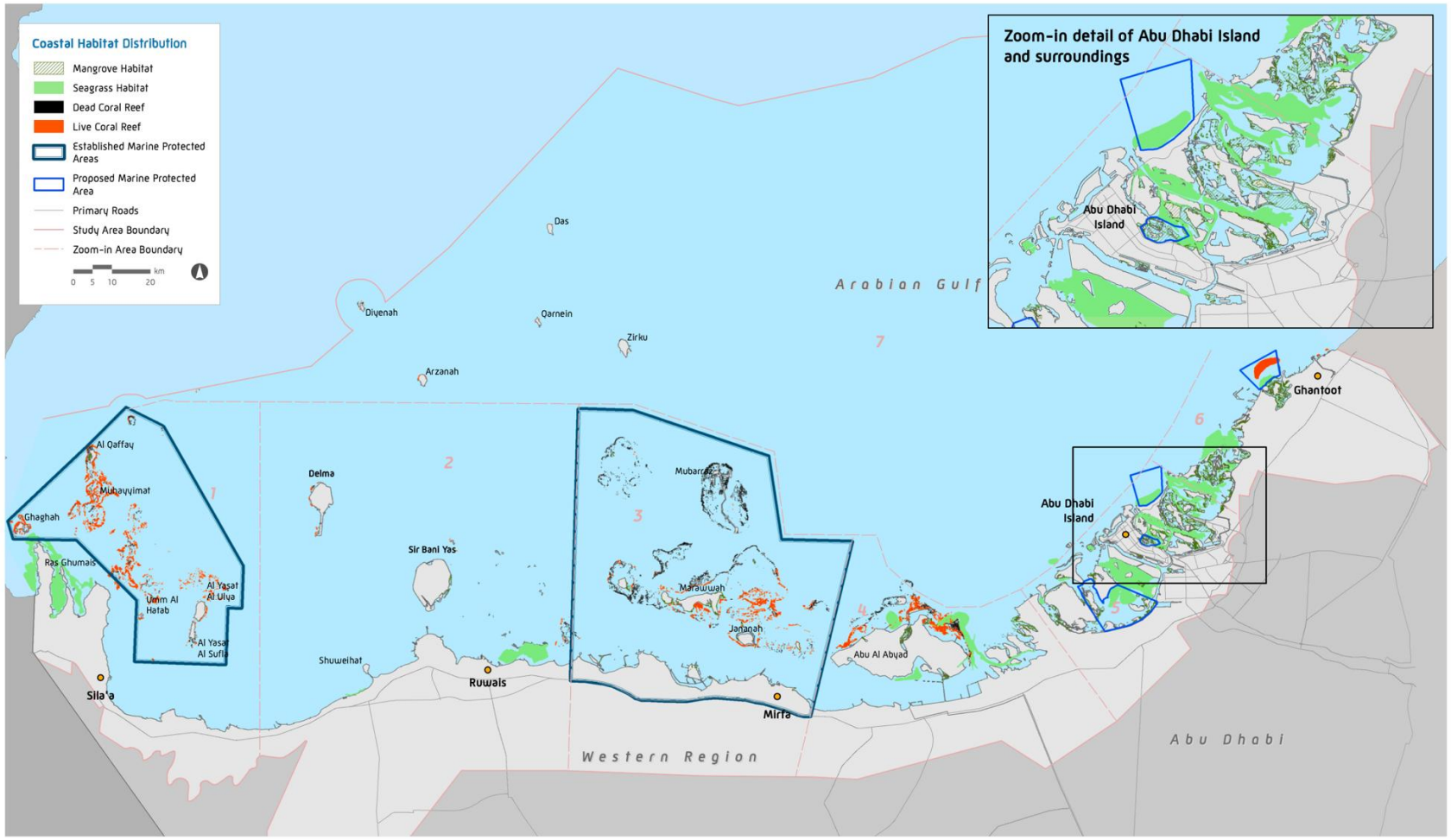

Figure 5-7. Marine Habitat Distribution

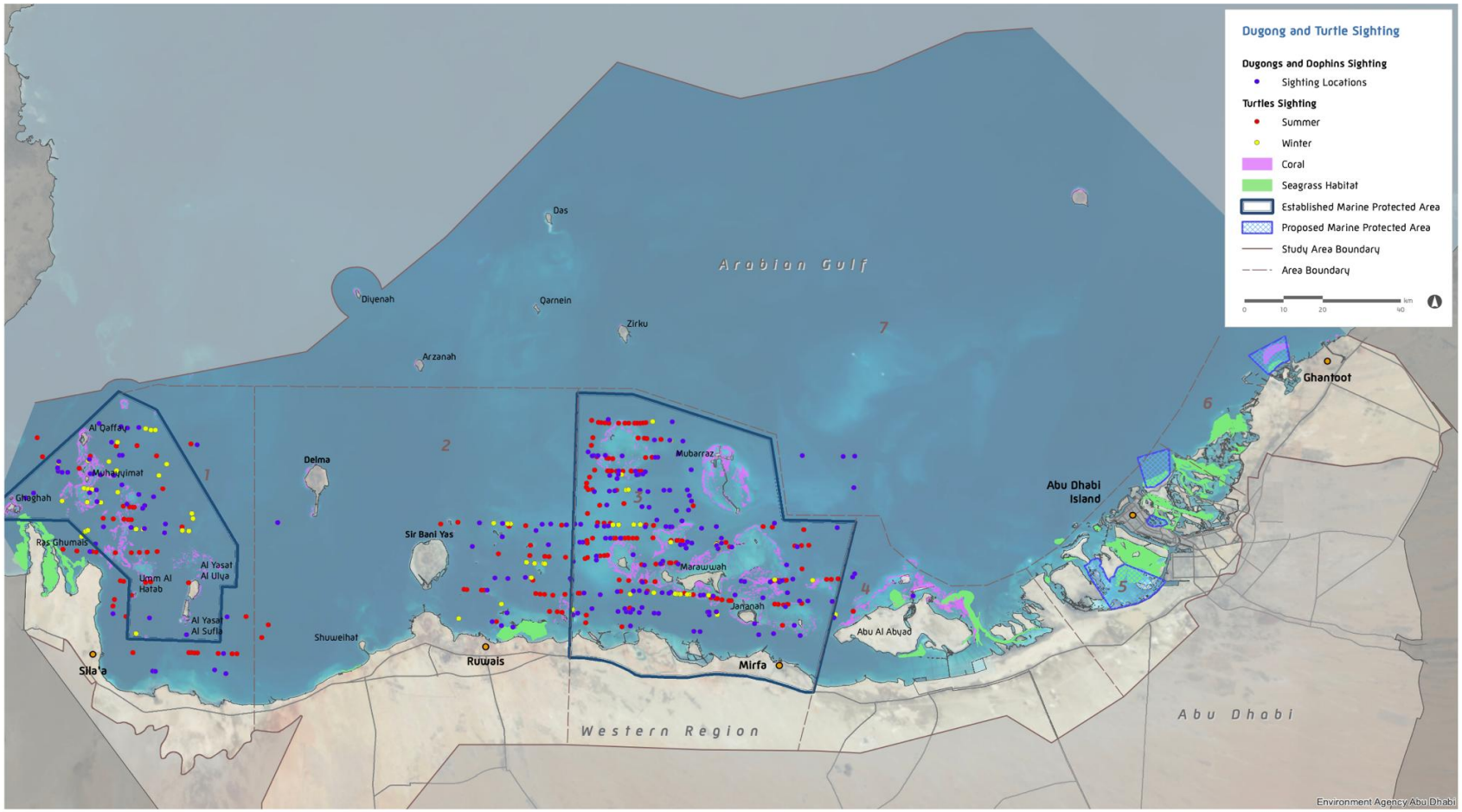

Figure 5-8. Dugongs and Turtle Sighting in Abu Dhabi

5.9.4.3 Impact Assessment

- Potential Impacts:
    - Habitat Alteration: Physical changes due to thermal discharges and potential contamination, affecting habitat suitability.
    - Water Quality Degradation: Increased turbidity, sedimentation, and potential contamination from spills.
    - Collision Risks: Increased vessel traffic leading to potential collisions with marine fauna.
    - Acoustic Disturbance: Underwater noise affecting behavior, communication, and navigation of marine mammals and fish.
    - Introduction of Invasive Species: Via ballast water discharges, potentially disrupting local ecosystems.
- Significance: Due to the presence of sensitive habitats and endangered species, impact significance is considered High and requires stringent mitigation measures.

5.9.5 Mitigation Measures

To protect marine habitats and biodiversity, the following mitigation measures will be implemented:

- Water Usage Optimization:
    - Water Conservation: Implement practices to minimize cooling water usage.
    - Alternative Cooling Methods: Consider air cooling or hybrid systems where feasible.
- Ballast Water Management in Line with International Conventions
    - Ballast Water Treatment Systems: Ensure vessels are equipped with approved ballast water management systems.
    - Ballast Water Exchange: Perform ballast water exchange in open ocean areas, away from the coast, as per regulations.
    - Record Keeping: Maintain accurate ballast water records for all vessels.
- Vessel Traffic Management
    - Navigation Measures:
        - Designated Shipping Lanes: Use established routes to avoid sensitive habitats.
        - Speed Restrictions: Implement maximum speed limits in designated areas, particularly near sensitive habitats.
    - Marine Fauna Protection:
        - Marine Mammal Observers (MMOs): Avail MMOs on vessels to monitor for marine fauna and advise on avoidance measures.

- Vessel Scheduling: Avoid as feasible vessel movements during peak periods of marine fauna activity, where possible.

- Pollution Prevention
    - Spill Prevention and Response:
        - Oil Spill Contingency Plan: Develop and implement an Oil Spill Contingency Plan in line with ADNOC standards and international guidelines.
        - Spill Response Equipment: Ensure availability of appropriate spill response equipment on-site and on vessels.
        - Training: Provide spill response training to relevant personnel.
- Biodiversity Conservation
    - Habitat Restoration and Enhancement:
        - Restoration Programs: Implement habitat restoration projects when required.
        - Artificial Reefs: Consider installation of artificial reefs to enhance local biodiversity.
    - Biodiversity Offsets:
        - Conservation Projects: Support local conservation initiatives to achieve net positive biodiversity outcomes, where possible.

5.9.6 Monitoring

To ensure the effectiveness of mitigation measures and compliance with relevant standards, the monitoring activities in Table 5-14. Marine Ecology Monitoring Plan During Operation Phase will be conducted.

Table 5-14. Marine Ecology Monitoring Plan During Operation Phase

Aspect	Parameter(s)	Monitoring Location	Frequency	KPI(s)
Water Quality	- Temperature - Turbidity - Dissolved Oxygen - pH - Salinity - Nutrients (N, P) - Hydrocarbons	- Near discharges sites - Control sites away from activities	- Monthly sampling - Continuous for critical parameters	- Compliance with water quality standards - No significant deviation from baseline
Habitat Condition	- Physical condition of habitats - Presence of sedimentation or contamination	- Sensitive habitats identified	- Biannually surveys	- No significant degradation of habitats - Successful restoration where applicable

Vessel Compliance	- Adherence to speed limits - Route deviations - Pollution incidents	- Vessel tracking systems - Port records	- Continuous monitoring - Monthly reviews	- Zero incidents of non-compliance - No collisions with marine fauna
Spill Incidents	- Number and volume of spills - Response effectiveness	- Throughout the marine operations area	- Immediately upon occurrence - Monthly summaries	- Zero major spills - Prompt and effective response
Stakeholder Engagement	- Meetings held - Issues raised and addressed	- Local communities - Conservation groups	- Quarterly meetings - As needed	- Number of engagements - Positive feedback received

Monitoring Details

- Water Quality Sampling:
    - Conducted by qualified personnel using standard methods.
    - Laboratory analysis to be performed at accredited facilities.
- Marine Fauna Monitoring:
    - MMOs to record sightings, behaviors, and any disturbances.
    - Data used to adjust activities as needed.
- Underwater Noise Monitoring:
    - Utilize hydrophones to measure ambient noise levels.
    - Data used to assess impact on marine fauna.
- Data Management:
    - Establish a database for monitoring data.
    - Regularly review data to identify trends and inform management actions.

5.9.7 Responsibilities

- Environmental Manager:
    - Oversee the implementation of the Marine Ecology Protection Plan.
    - Ensure compliance with regulations and standards.
    - Coordinate monitoring activities and reporting.
- Marine Mammal Observers (MMOs):
    - Conduct observations and record data on marine fauna.

- Advise on necessary actions to avoid impacts.

- HSE Officers:
  - Conduct inspections and audits.
  - Provide training and awareness programs.
- All Personnel:
  - Comply with environmental policies and procedures.
  - Participate in training and awareness programs.
- Contractors and Suppliers:
  - Ensure compliance with the Marine Ecology Protection Plan.
  - Train their personnel in relevant environmental procedures.

5.9.8 Reporting

- Monthly Environmental Monitoring Reports:
  - Summarize monitoring data, compliance status, and any incidents.
  - Include analysis of trends and recommendations for improvement.
- Incident Reporting:
  - Immediate reporting of any environmental incidents or non-compliances.
  - Detailed incident investigation reports with corrective actions.
- Annual Environmental Report:
  - Comprehensive overview of environmental performance over the year.
  - Assessment of the effectiveness of mitigation measures.
- Regulatory Reporting:
  - Submit required reports to regulatory authorities as per permit conditions.

5.9.9 Training and Awareness

- Training Programs:
  - Environmental Induction: Provide all personnel with an introduction to marine ecology and the importance of protection measures.
  - Specialized Training: For MMOs, vessel crews, and operation staff involved in high-risk activities.
  - Spill Response Training: For personnel involved in handling and transporting hydrocarbons.
- Awareness Campaigns:

- Informational Materials: Posters, brochures, and newsletters highlighting marine ecology topics.
- Toolbox Talks: Regular sessions focusing on specific environmental aspects.

- Community Outreach: Engage with local communities to raise awareness about marine conservation efforts.

5.9.10 Review and Update

- Periodic Review: Review the Marine Ecology Protection Plan annually or when significant changes occur in operations or regulations.
- Continuous Improvement:
  - Update the plan based on monitoring results, scientific advancements, and stakeholder feedback.
  - Implement corrective actions promptly to address any identified issues.
- Stakeholder Engagement: Incorporate feedback from regulatory authorities, NGOs, and local communities into plan revisions.
- Audit and Assessment:
  - Conduct internal and external audits to assess compliance and effectiveness.
  - Address audit findings in a timely manner.

5.9.11 Communication

- Internal Communication:
  - Regular meetings to discuss environmental performance and issues.
  - Sharing of monitoring results and best practices among staff.
- External Communication:
  - Transparent communication with stakeholders regarding environmental management.
  - Participation in industry forums and collaboration with conservation organizations.

5.10 NAVIGATIONAL RISK MANAGEMENT PLAN

5.10.1 Objectives

The main objectives of the navigational risk management plan during the operations phase of the RLNG Project are to:

- Ensure Safe Maritime Operations: Prevent navigation-related accidents and incidents during operation activities.
- Protect Marine Environment: Avoid marine pollution resulting from navigational mishaps.
- Comply with Regulations: Adhere to all relevant maritime laws, standards, and international conventions.
- Facilitate Efficient Navigation: Promote smooth and efficient maritime operations while minimizing risks to all sea users.

5.10.2 Regulatory Framework and Standards

The Navigational Risk Management Plan aligns with the following regulatory frameworks, standards, and guidelines relevant to maritime safety and environmental protection during operations:

ADNOC Standards

- HSE-GA-ST02: HSE Management System Standard
- HSE-GA-ST04: Incident Notification, Investigation, and Reporting
- HSE-GA-ST06: Project HSE Plan and Standard
- HSE-GA-ST07: HSE Design Philosophy
- HSE-GA-ST08: HSE Performance Monitoring and Reporting
- HSE-GA-ST09: HSE Audit and Assurance
- HSE-EN-ST02: Pollution Prevention and Control
- HSE-EN-ST05: Environmental Performance Monitoring
- HSE-EN-ST06: Biodiversity Assessment
- HSE-OH-ST08: Physical Health Hazard Standard
- HSE-OS-ST24: Marine Operations Safety
- ADNOC Codes of Practice and Guidelines for Marine Operations

UAE Laws and Regulations

- Federal Law No. 26 of 1981: Commercial Maritime Law
- Federal Law No. 23 of 1999: Exploitation, Protection, and Development of Living Aquatic Resources
- Federal Law No. 24 of 1999: Protection and Development of the Environment

- Council of Ministers' Decision No. 23 of 2001: Protection of Ports, Shores, and Maritime Territories from Oil Pollution Incidents
- UAE Cabinet Resolution No. 71 of 2020: Governs marine and coastal activities
- Abu Dhabi Maritime Regulations
- National Transport Authority (NTA) Guidelines

International Conventions and Protocols

- International Regulations for Preventing Collisions at Sea (COLREGs), 1972
- International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended
- International Convention for the Prevention of Pollution from Ships (MARPOL) 73/78, including Annexes I to VI
- International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers (STCW), 1978, as amended
- United Nations Convention on the Law of the Sea (UNCLOS), 1982
- Oil Pollution Preparedness, Response, and Co-operation (OPRC) Convention, 1990
- International Safety Management (ISM) Code
- International Ship and Port Facility Security (ISPS) Code

International Best Practices

- ISO 14001: Environmental Management Systems
- ISO 45001: Occupational Health and Safety Management Systems
- Implement Best Available Techniques (BAT)
- International Maritime Organization (IMO) Guidelines
- International Association of Oil & Gas Producers (IOGP) Guidelines

5.10.3 Potential Impacts

5.10.3.1 Impact Sources

During the operations phase, potential sources of navigational risk include:

- Increased Vessel Traffic: Movement of operation vessels, barges, and support ships may increase the risk of collisions.
- Restricted Navigational Areas: Establishment of exclusion zones may impact regular maritime routes.
- Environmental Conditions: Adverse weather, sea states, and visibility can increase navigational risks.
- Human Error: Inadequate training or non-compliance with navigational protocols can lead to accidents.
- Mechanical Failures: Equipment malfunctions on vessels, such as propulsion or steering failures.

5.10.3.2 Sensitive Receptors

The operations phase of the LNG Project in Ruwais involves several sensitive receptors that may be impacted by navigational risks. These include:

- Marine Ecosystems and Protected Species: Sensitive habitats near the project area include coral reefs, seagrass beds, and species like dugongs and sea turtles, which could be impacted by pollution or navigational incidents.
- Commercial Fisheries: Local fisheries operate nearby and may face disruptions from increased vessel traffic and restricted zones, potentially affecting livelihoods.
- Recreational and Tourist Areas: Occasional recreational boating and diving activities in the area may be impacted by restricted zones and need clear communication to ensure public safety.
- Existing Marine Infrastructure: Infrastructure such as jetties, buoys, and pipelines could be damaged by navigational accidents, leading to potential disruptions and repair costs.
- Commercial Shipping Routes: The project area intersects significant shipping routes; increased traffic and collision risks necessitate careful coordination to prevent operational delays and liabilities.
- Local Communities: Coastal communities potentially affected by pollution incidents or changes in marine traffic patterns.

5.10.3.3 Impact Assessment

- Potential Impacts:
    - Collisions and Groundings: Increased vessel movements can lead to accidents, causing injuries, fatalities, or environmental pollution.
    - Interference with Other Sea Users: Disruption of commercial shipping lanes, fishing activities, or recreational boating.
    - Environmental Pollution: Accidents may result in oil spills or release of hazardous materials into the marine environment.
    - Damage to Infrastructure: Navigational accidents can damage existing marine infrastructure, including jetties, buoys, and pipelines.
    - Reputational Damage: Navigational incidents can harm the project's reputation and lead to legal liabilities.
- Significance: The impact is assessed as High, necessitating stringent navigational safety measures and compliance with maritime regulations.

5.10.4 Mitigation Measures

To ensure safe maritime operations and prevent navigation-related accidents during operations phase, the following mitigation measures will be implemented:

- Navigational Planning
    - Development of a Navigational Management Plan:

- Route Planning: Define and communicate safe navigational routes for project vessels.
- Exclusion Zones: Establish and enforce maritime exclusion zones around operation areas.
- Navigational Risk Assessment: Conduct a comprehensive risk assessment to identify hazards and develop control measures. Navigational risks are already minimized due to established maritime exclusion zones and defined navigation routes for vessels as shown in Figure 5-9.

  - Coordination with Authorities:
    - Liaise with Port Authorities: Work closely with Abu Dhabi Ports and relevant maritime authorities.
    - Notification to Mariners: Issue Notices to Mariners (NTMs) regarding operation activities and exclusion zones.

- Vessel Management
  - Vessel Traffic Management System (VTMS):
    - Monitoring: Implement a VTMS to monitor vessel movements within the project area.
    - Communication: Ensure continuous communication between vessels and the project control center.
    - Traffic Separation Schemes: Establish traffic separation schemes where appropriate to organize vessel movements.
  - Vessel Standards:
    - Certification: All vessels to be certified and comply with international and UAE maritime regulations.
    - Equipment: Ensure vessels are equipped with necessary navigational aids (e.g., Automatic Identification Systems (AIS), radar, and Global Positioning System (GPS)).
    - Traffic Separation Schemes: Establish traffic separation schemes where appropriate to organize vessel movements.

- Operational Procedures
  - Navigational Procedures:
    - Compliance with COLREGs: Adhere strictly to the International Regulations for Preventing Collisions at Sea.
    - Speed Restrictions: Implement speed limits within certain areas to reduce collision risks.

- Passage Planning: Conduct thorough passage planning for all voyages, considering environmental conditions and potential hazards.

- Environmental Considerations:
  - Weather Monitoring: Monitor weather and sea conditions; suspend operations during adverse conditions.
  - Pollution Prevention: Implement measures to prevent accidental discharges (e.g., double-hulled vessels, spill kits).
- Implementation of the International Safety Management Code:
  - International Safety Management (ISM) Code: Ensure compliance with the ISM Code for safe operation and pollution prevention.
  - International Ship and Port Facility Security (ISPS) Code: Implement security measures to protect vessels and facilities.

- Personnel Competency
  - Training and Certification:
    - Qualified Crew: Ensure all vessel crew are appropriately trained and hold valid certifications (STCW compliance).
    - Safety Drills: Conduct regular drills on emergency response and navigational safety.
    - Fatigue Management: Implement measures to prevent fatigue among crew members, ensuring adequate rest periods.
  - Pilotage
    - Use of Qualified Pilots: Engage licensed marine pilots for navigating in port areas and challenging routes.
    - Pilotage Procedures: Establish clear procedures for pilot boarding, exchange of information, and pilot-master communication.
- Communication and Coordination
  - Marine Coordination Center:
    - Central Control: Establish a center to coordinate all maritime activities related to the project.
    - Stakeholder Engagement: Maintain open communication with other sea users, including fishermen and commercial shipping operators.
  - Signage and Markings:
    - Navigational Aids: Install buoys, markers, and lights to delineate operation areas and hazards.

- Visual and Auditory Warnings: Use signals to alert nearby vessels of ongoing operations.

- Emergency Preparedness
    - Emergency Response Plan:
        - Incident Management: Develop procedures for responding to navigational incidents.
        - Oil Spill Response: Equip vessels with spill response equipment and train crew in spill containment.
        - Search and Rescue Coordination - SAR Procedures: Establish protocols in coordination with national search and rescue services.
    - Drills and Exercises:
        - Regular Drills: Conduct regular emergency response drills, including man-overboard, fire, collision, and pollution response.
        - Evaluation and Improvement: Review drill performance, identify areas for improvement, and update procedures accordingly.

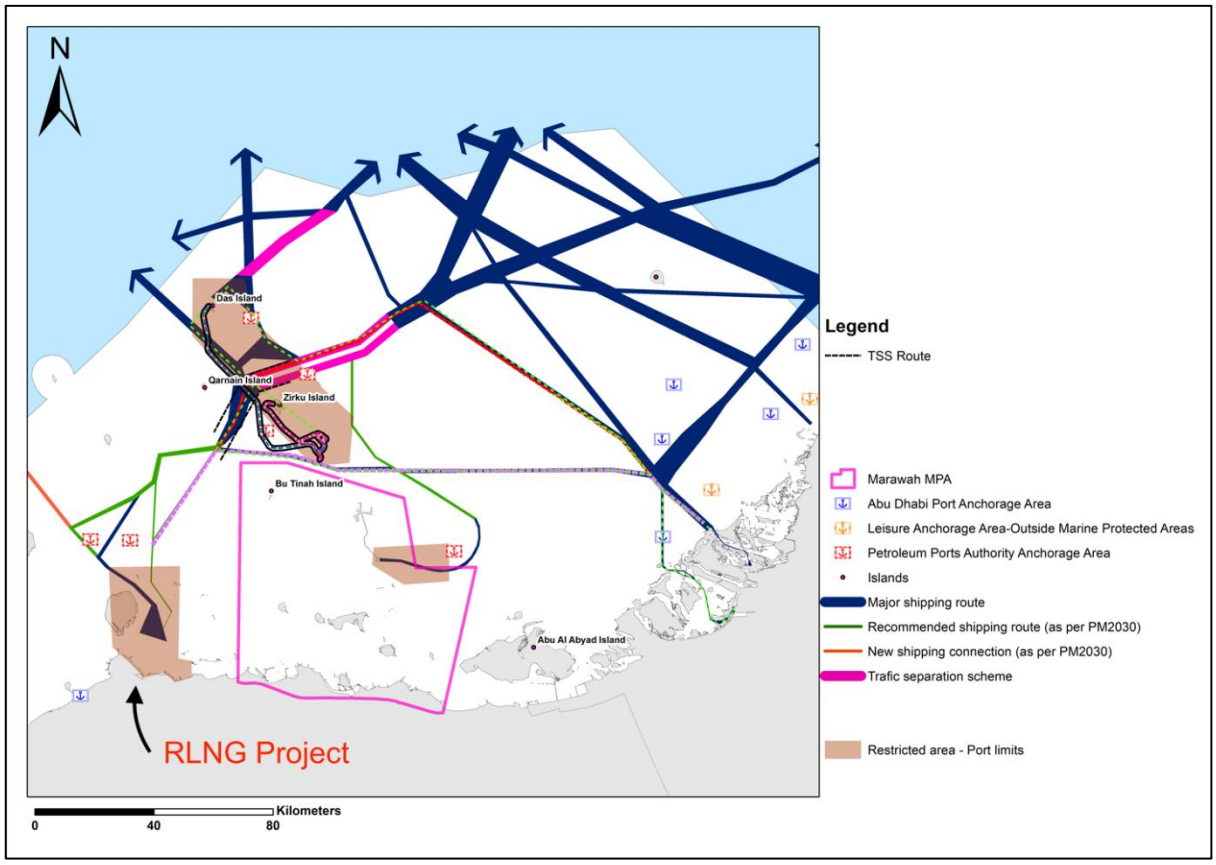

Figure 5-9. Existing Marine Transport Corridor

Source: www.admaritime.ae [Ref 42]

5.10.5 Monitoring

To ensure the effectiveness of mitigation measures and compliance with relevant standards, the monitoring activities in Table 5-15 will be conducted.

Table 5-15. Navigational Risk Monitoring Plan During Operations Phase

Aspect	Parameter(s)	Monitoring Location	Frequency	KPI(s)
Vessel Movements	- Number of vessel movements - Compliance with routes and speed limits - AIS data tracking	- Project area - Exclusion zones	- Continuous monitoring	- Zero unauthorized route deviations - Adherence to speed limits - No near-miss incidents
Navigational Incidents	- Number and type of incidents - Near-misses reported - Incident investigations	- Throughout the project area	- Immediate reporting - Monthly summaries	- Reduction in incidents over time - All incidents investigated and corrective actions taken
Communication Systems	- Functionality of communication equipment - Response times - Communication logs	- Vessels - Marine Coordination Center	- Daily checks - Random audits	- 100% functionality of equipment - Prompt communication established - No communication failures
Compliance with Regulations	- Vessel certifications - Crew qualifications - Compliance with ISM and ISPS Codes	- Vessel audits - Document reviews	- Prior to vessel deployment - Annual audits	- All vessels and crew certified - No non-compliances found - Valid certificates maintained
Environmental Monitoring	- Oil discharge levels - Waste management practices	- Vessel operations - Port facilities	- Regular inspections - Monthly reports	- Zero unauthorized discharges - Proper waste disposal records maintained - Compliance with MARPOL

	- Compliance with MARPOL regulations			
Training Records	- Training sessions conducted - Attendance records - Competency assessments	- Training facilities	- Quarterly - After new hires	- 100% of relevant personnel trained - Increased awareness observed - Positive assessment results
Stakeholder Engagement	- Meetings held - Feedback received and addressed - Complaints resolved	- Local maritime stakeholders	- Quarterly meetings - As needed	- Number of engagements - Positive feedback from stakeholders - Timely resolution of concerns

Monitoring Details

- Vessel Tracking:
    - Utilize Automatic Identification Systems (AIS) and GPS tracking to monitor vessel positions and movements in real-time.
    - Data collected will be analyzed to ensure compliance with routes and speed limits.
- Incident Reporting:
    - Implement a system for immediate reporting of any navigational incidents or near-misses.
    - Investigate all incidents to determine root causes and implement corrective actions.
- Audits and Inspections:
    - Conduct regular audits of vessels for compliance with safety and environmental standards.
    - Include inspections of navigational equipment, crew certifications, and vessel conditions.
- Communication Tests:
    - Perform routine tests of communication systems between vessels and the coordination center.
    - Maintain communication logs for review.

5.10.6 Responsibilities

- Marine Operations Manager:
    - Oversee all maritime activities and ensure compliance with the Navigational Risk Management Plan.

- Coordinate with port authorities and maritime regulators.
- Ensure resources are allocated for effective implementation of mitigation measures.

- Vessel Masters (Captains):
  - Responsible for the safe operation of their vessels and compliance with navigational procedures.
  - Ensure crew adherence to protocols and report any incidents or deviations.
- Marine Coordination Center Staff:
  - Monitor vessel movements, maintain communication, and manage real-time operational information.
  - Coordinate emergency responses and liaise with relevant authorities.
- Environmental Manager:
  - Oversee environmental compliance related to maritime operations.
  - Coordinate spill response efforts and environmental monitoring.
- HSE Officers:
  - Conduct inspections and audits of maritime operations.
  - Provide training and awareness programs to personnel.
- All Personnel:
  - Comply with navigational safety procedures, environmental policies, and reporting requirements.
  - Participate in training and drills and report any concerns or incidents.

5.10.7 Reporting

- Daily Reports: Vessel Masters to submit daily reports on operations, including voyage details, any incidents, and observations.
- Monthly Reports:
  - Compile summaries of vessel movements, incidents, compliance status, and monitoring data.
  - Include analysis of trends and recommendations for improvements.
  - Incident Reports: Immediate reporting of any accidents, near-misses, or non-compliances to project management and relevant authorities.
  - Detailed incident investigation reports to be prepared, including root cause analysis and corrective actions.
- Regulatory Reporting: Submit required reports to maritime authorities as per regulations and permit conditions

5.10.8 Training and Awareness

- Training Programs:
    - Navigational Safety Training: Provide training on COLREGs, local maritime regulations, and company procedures.
    - Emergency Response Training: Conduct drills on collision avoidance, spill response, and search and rescue operations.
    - Environmental Awareness: Educate crew on environmental protection measures and pollution prevention.
    - Security Training: Provide training on ISPS Code compliance and security procedures.
- Certification Verification:
    - Ensure all crew members have up-to-date certifications as per STCW and other relevant standards.
    - Maintain records of crew qualifications and training.
- Awareness Campaigns:
    - Display signage on vessels highlighting key safety procedures, emergency contacts, and environmental guidelines.
    - Distribute information bulletins on navigational safety topics, updates, and lessons learned.

5.10.9 Review and Update

- Periodic Review: Review the Navigational Risk Management Plan biannually or when significant changes occur in maritime operations.
- Continuous Improvement:
    - Update the plan based on monitoring results, incident investigations, and stakeholder feedback.
    - Implement corrective actions to address any identified issues.
- Stakeholder Engagement: Engage with regulatory authorities, port operators, maritime organizations, and local communities to gather feedback and share best practices.
- Audit and Assessment:
    - Conduct internal and external audits to assess compliance with the plan and effectiveness of mitigation measures.
    - Address audit findings promptly and effectively.

5.10.10 Communication

- Internal Communication:

- Maintain regular communication among project teams, vessel crews, and management regarding navigational safety.
- Share updates on procedures, incidents, and lessons learned.

- External Communication:
  - Communicate with maritime authorities, port operators, and other stakeholders regarding operational activities and navigational safety measures.
  - Provide information to local communities and sea users about potential impacts and mitigation measures.
- Community Feedback Mechanisms: Establish channels for receiving and addressing feedback, concerns, or complaints from stakeholders and the public.

5.11 HAZARDOUS MATERIALS MANAGEMENT PLAN

5.11.1 Objectives

The main objectives of the hazardous material management plan during the operations phase of the RLNG Project are to:

- Ensure Safe Handling and Storage: Implement procedures for the safe handling, storage, and use of hazardous materials to prevent accidents and incidents.
- Prevent Contamination and Accidents: Minimize the risk of environmental contamination and occupational exposure by effectively managing hazardous materials.
- Comply with Regulations: Adhere to all relevant UAE laws, Abu Dhabi regulations, ADNOC standards, and international best practices related to hazardous materials management.
- Promote a Safety Culture: Foster awareness and responsibility among all personnel regarding the risks associated with hazardous materials.
- Protect Sensitive Receptors: Safeguard the health of workers, the marine environment, local communities, and ecological systems from the adverse effects of hazardous materials.

5.11.2 Regulatory Framework and Standards

The Hazardous Materials Management Plan aligns with the following regulatory frameworks, standards, conventions, and protocols relevant to hazardous materials management during operation:

ADNOC Standards

- HSE-GA-ST02: HSE Management System Standard
- HSE-GA-ST04: Incident Notification, Investigation, and Reporting
- HSE-GA-ST06: Project HSE Plan and Standard
- HSE-GA-ST07: HSE Design Philosophy
- HSE-GA-ST08: HSE Performance Monitoring and Reporting
- HSE-GA-ST09: HSE Audit and Assurance
- HSE-EN-ST02: Pollution Prevention and Control
- HSE-EN-ST04: Waste Management
- HSE-EN-ST05: Environmental Performance Monitoring
- HSE-OA-ST08: Hazardous Substances
- HSE-OH-ST08: Physical Health Hazard Standard
- HSE-OH-ST09: Chemical Hazards Standard
- HSE-OH-ST10: Biological Hazards Standard
- HSE-OS-ST27: Hazard Communication Standard

UAE Laws and Regulations

- Federal Law No. 24 of 1999: Protection and Development of the Environment
- Federal Law No. 27 of 1981: Regulation of Industrial Waste (including hazardous substances)
- Federal Law No. 37 of 1992: Regulation of Hazardous Materials
- Council of Ministers' Decision No. 37 of 2001: Regulation concerning Environmental Impact Assessment of Projects
- UAE Cabinet Regulation for Handling Hazardous Materials, Hazardous Wastes and Medical Wastes, 2001
- Abu Dhabi Environmental Law (Law No. 21 of 2005): Governs environmental protection in Abu Dhabi, with provisions for hazardous materials
- Abu Dhabi Waste Management Center (Tadweer) Regulations, 2010
- Ministry of Climate Change and Environment (MOCCAE) Guidelines
- UAE Civil Defense Laws and Regulations
- Ministry of Human Resources and Emiratization, Occupational Safety and Health Regulations, 1980

International Conventions and Protocols

- International Maritime Dangerous Goods (IMDG) Code, 1965
- MARPOL (Marine Pollution) Convention, 1973/ 1978
- Vienna Convention for the Protection of the Ozone Layer, 1985
- Montreal Protocol on Substances that Deplete the Ozone Layer, 1987
- Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal, 1989
- ILO Convention No. 170 on Safety in the Use of Chemicals at Work, 1990
- Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, 1998
- Stockholm Convention on Persistent Organic Pollutants (POPs), 2001
- Minamata Convention on Mercury, 2013
- Strategic Approach to International Chemicals Management, 2020
- WHO Guidelines
- Air Quality Guidelines
- Emergency Response Framework
- Guidelines for Drinking-water Quality (for Chemical Contaminants in Water)

- International Chemical Safety Cards
- Occupational Health and Safety Guidelines

International Best Practices

- ISO 14001: Environmental Management Systems
- ISO 45001: Occupational Health and Safety Management Systems
- Implement Best Available Techniques (BAT)
- International Finance Corporation (IFC) General Environmental, Health, and Safety Guidelines
- American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs)
- European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR)

5.11.3 Potential Impacts

5.11.3.1 Impact Sources

During the operations phase, the use and management of hazardous materials can lead to several potential impacts on the environment and human health if not properly managed:

- Chemical Spills and Leaks: Accidental spills or leaks of hazardous chemicals such as solvents, fuels, lubricants, paints, process chemicals, and cleaning agents.
- Exposure to Hazardous Substances: Workers and contractors may be exposed to hazardous substances through inhalation, skin contact, or ingestion during handling, use, or maintenance activities.
- Hazardous Waste Generation: Improper disposal of hazardous waste, including spent chemicals, contaminated containers, and maintenance wastes, can lead to environmental contamination.
- Fire and Explosions: Improper storage and handling of flammable, reactive, or oxidizing materials can result in fires or explosions.
- Transportation Accidents: Incidents during the transportation of hazardous materials to or from the site can lead to spills and exposure risks.

5.11.3.2 Sensitive Receptors

- Onsite Workers and Contractors: Directly exposed to hazardous materials during handling, storage, use, and disposal activities.
- Adjacent Communities: Potential exposure through air emissions, water discharges, or soil contamination.
- Marine Environment: Proximity to the sea means spills or runoff could impact marine ecosystems, including sensitive habitats and species.
- Soil and Groundwater: Potential contamination from spills and leaks affecting soil quality and groundwater resources, which can have long-term environmental impacts.
- Air Quality: Volatile emissions from hazardous materials can affect ambient air quality, impacting human health and the environment.

5.11.3.3 Impact Assessment

- Potential Impacts
    - Environmental Contamination: Spills and leaks can contaminate soil, groundwater, surface water, and the marine environment, affecting ecosystems and biodiversity.
    - Health Risks to Workers and Public: Exposure can lead to acute or chronic health effects, including chemical burns, respiratory issues, skin irritation, poisoning, or long-term illnesses.
    - Fire and Explosion Hazards: Risk of injuries, fatalities, property damage, and environmental harm due to fires or explosions caused by improper handling or storage.
    - Regulatory Non-Compliance: Failure to manage hazardous materials properly can result in legal penalties, fines, project delays, and reputational damage.
    - Transportation Risks: Accidents during the transportation of hazardous materials can lead to spills and exposure risks to the public and environment.
- Significance: The impact is assessed as High, requiring stringent management and mitigation measures to prevent adverse effects.

5.11.4 Mitigation Measures

To manage hazardous materials safely during operations, the following mitigation measures will be implemented:

- Hazard Identification and Inventory
    - Comprehensive Inventory:
        - Maintain an up-to-date inventory of all hazardous materials on-site, including quantities, storage locations, and associated Material Safety Data Sheets (MSDS) or Safety Data Sheets (SDS).
        - Use a centralized database or software system for tracking hazardous materials.
    - Hazard Classification:
        - Classify materials according to internationally recognized systems, such as the Globally Harmonized System (GHS) of Classification and Labeling of Chemicals.
- Substitution and Minimization
    - Material Substitution: Use less hazardous alternatives where feasible.
    - Quantity Control: Order and store only the necessary amounts to reduce the volume of hazardous materials on-site.
- Storage and Handling Procedures
    - Storage Practices
        - Designated Storage Areas:

- Store hazardous materials in designated, secure, and appropriately constructed storage facilities, with secondary containment, ventilation, and spill control measures.
- Ensure storage areas are compliant with relevant standards (e.g., NFPA codes, ADNOC HSE standards).

– Segregation of Incompatible Materials: Store incompatible materials separately to prevent dangerous reactions, following compatibility charts.

– Labeling and Signage:

- Clearly label all containers with contents and hazard information.
- Post appropriate warning signs and emergency contact information at storage areas.

– Ventilation: Ensure adequate ventilation in storage areas to prevent accumulation of vapors and gases.

– Fire Protection: Equip storage areas with appropriate fire detection and suppression systems, such as fire extinguishers, sprinklers, and alarms.

- Handling Procedures

– Standard Operating Procedures (SOPs): Develop and implement SOPs for the safe handling, use, and disposal of hazardous materials.

– Personal Protective Equipment (PPE):

- Provide appropriate PPE to all personnel handling hazardous materials, such as gloves, goggles, respirators, and protective clothing.
- Ensure proper training on the correct use and maintenance of PPE.

– Equipment and Tools: Use appropriate equipment for handling hazardous materials, such as drum trolleys, pumps, and spill pallets..

- Transportation of Hazardous Materials
  - Licensed and Qualified Transporters

– Regulatory Compliance: Use approved and licensed carriers for the transportation of hazardous materials, compliant with UAE regulations and international standards (e.g., ADR, IMDG Code).

– Driver Competency: Ensure drivers are trained and certified in the transport of dangerous goods.

  - Safe Transportation Practices

– Packaging and Labeling:

- Use appropriate UN-approved packaging for hazardous materials.

- Label and mark packages according to regulatory requirements.
  - Documentation: Provide proper documentation, including transport permits, manifests, MSDS/SDS, and emergency contact information.
  - Route Planning: Plan transportation routes to minimize risks to the public and environment, avoiding densely populated or environmentally sensitive areas where possible.
  - Emergency Preparedness: Ensure vehicles carry spill kits and emergency response information.

- Emergency Response and Spill Management
  - Emergency Response Plan
    - Spill Prevention and Control Plan: Develop and implement a comprehensive plan for preventing and responding to spills and releases of hazardous materials.
    - Emergency Procedures: Establish clear procedures for reporting, containment, clean-up, and disposal of spills.
    - Spill Kits and Equipment: Equip all areas where hazardous materials are stored or used with appropriate spill response kits and equipment.
    - Emergency Response Team: Designate and train an emergency response team responsible for managing hazardous materials incidents.
  - Training
    - Emergency Response Training: Provide regular training and drills for personnel on emergency response procedures, including spill response, evacuation, and first aid.
    - Coordination with Authorities: Establish communication channels with local emergency services and authorities for coordinated response.

- Training and Awareness
  - Worker Education
    - Training Programs: Conduct comprehensive training for all personnel on hazardous materials management, including hazard recognition, safe handling, storage, use, disposal, and emergency procedures.
    - Refresher Training: Provide periodic refresher training to ensure knowledge is retained and updated.

- Awareness Campaigns
    - Signage and Labels: Use clear and visible signage to indicate hazardous areas, PPE requirements, and emergency procedures.

- Communication Materials: Distribute safety bulletins, posters, and newsletters to reinforce key messages.
- Toolbox Talks: Conduct regular toolbox talks focusing on specific hazardous materials topics.

- Waste Management
  - Hazardous Waste Management
    - Segregation and Storage: Segregate hazardous waste from non-hazardous waste and store it in designated, secure areas with secondary containment.
    - Labeling: Clearly label waste containers with contents and hazard information.
    - Disposal: Dispose of hazardous waste through licensed and approved waste management facilities, in compliance with UAE regulations and international conventions.
  - Record Keeping
    - Waste Tracking: Maintain records of hazardous waste generation, storage, transportation, and disposal.
    - Manifests and Certificates: Keep copies of waste transfer notes, manifests, and disposal certificates.

5.11.5 Monitoring

To ensure effective hazardous materials management and compliance with relevant standards, the monitoring activities in Table 5-16 will be conducted.

Table 5-16. Hazardous Materials Management Monitoring Plan During Operations Phase

Aspect	Parameter(s)	Monitoring Location	Frequency	KPI(s)
Hazardous Materials Inventory	- Types and quantities of hazardous materials - Inventory accuracy - MSDS/SDS availability	- Storage areas - Administrative offices	- Monthly recording - Semi-annual audits	- Up-to-date inventory - Percentage accuracy of inventory records - 100% availability of MSDS/SDS
Storage Conditions	- Condition of storage areas - Labeling and signage - Containment integrity	- Hazardous materials storage areas	- Weekly inspections	- Number of non-compliances identified and corrected

	- Ventilation and fire protection systems			- Percentage of storage areas meeting standards
Handling Practices	- Compliance with handling procedures - PPE usage - Equipment condition	- Throughout the Project's site	- Weekly inspections - Random checks	- Number of safety violations - Percentage of workers using PPE correctly - Corrective actions taken
Transportation Records	- Documentation of hazardous materials transport - Contractor compliance - Vehicle condition and driver qualifications	- Administrative offices - Transport vehicles	- Monthly audits	- All hazardous materials transported by licensed contractors - Availability of transport permits and manifests
Spill and Incident Reporting	- Number of spills/incidents - Response time and effectiveness - Incident investigations	- Entire operation site - Transportation routes	- After any incident - Monthly summaries	- Zero major incidents - Average response time - Percentage of incidents properly reported and investigated
Training and Awareness	- Training sessions conducted - Attendance records - Competency assessments	- Training facilities	- Semi-annually - After new hires	- Number of workers trained - Increase in compliance rates - Positive assessment results
Environmental Monitoring	- Signs of contamination in soil and water	- Site perimeter - Nearby water bodies	- Semi-annually	- Number of contamination events - Results within acceptable limits - Compliance with emission standards

Monitoring Details

- Data Collection:
    - Use standardized monitoring forms and checklists to record observations and data.
    - Collect documentation such as inventory records, transport manifests, MSDS/SDS, inspection reports, and training attendance sheets.
- Inspections:
    - Conduct regular site inspections to check storage conditions, labeling, signage, containment, ventilation, and fire protection systems.
    - Inspect handling practices, PPE usage, equipment condition, and spill response preparedness.
- Audits: Perform periodic audits of hazardous materials management procedures and contractor compliance.
- Environmental Monitoring:
    - Conduct soil, water, and air sampling in areas where hazardous materials are stored or used to detect any signs of contamination.
    - Analyze samples at accredited laboratories.
- Incident Reporting and Investigation:
    - Implement a system for immediate reporting of spills, leaks, and incidents.
    - Investigate all incidents to determine root causes and implement corrective actions.

5.11.6 Reporting

To ensure transparency and accountability in hazardous materials management, regular reporting will be carried out as follows:

- Monthly Reports:
    - Summarize hazardous materials data, including inventory updates, incidents, inspection findings, and KPIs.
    - Include analysis of trends, compliance status, and any corrective actions taken.
- Incident Reports:
    - Document any spills, leaks, or hazardous materials incidents within 24 hours, detailing the incident, response actions, and follow-up measures.
    - Submit incident reports to relevant authorities as required.
- Biannual Compliance Summary: Conduct a comprehensive evaluation of hazardous materials management effectiveness, identifying areas for improvement and updating the plan as needed.

- Annual Review: Conduct a year-end evaluation of hazardous materials management effectiveness, updating the plan as needed.
- Regulatory Reporting: Submit required reports to regulatory authorities in compliance with permit conditions and legal obligations.
- Record Keeping: Maintain records of inventories, MSDS/SDS, training, inspections, incidents, audits, waste disposal documentation, and permits
- Communication with Stakeholders: Share relevant information with stakeholders, including ADNOC, regulatory bodies, contractors, and local communities, as appropriate.

5.11.7 Responsibilities

- Environmental Manager:
    - Oversee the implementation of the Hazardous Materials Management Plan.
    - Ensure compliance with regulations and standards.
    - Coordinate monitoring activities and reporting.
- HSE Manager:
    - Ensure that hazardous materials management practices are implemented on-site.
    - Address any issues identified during inspections.
    - Provide guidance on HSE matters related to hazardous materials.
- Site Supervisors:
    - Enforce hazardous materials policies on-site.
    - Ensure proper handling, storage, and disposal practices are followed.
    - Conduct regular inspections and report any non-compliances.
- HSE Officers / Environmental Specialists:
    - Conduct training and awareness programs.
    - Monitor worker compliance with hazardous materials procedures.
    - Assist in incident investigations and implementation of corrective actions.
- Operational Staff and Contractors:
    - Follow hazardous materials handling, storage, and disposal procedures.
    - Use PPE as required and maintain equipment properly.
    - Report any spills, leaks, or incidents immediately.
- Emergency Response Team:
    - Respond promptly to hazardous materials incidents.

- Implement emergency procedures and coordinate with external emergency services if needed.

- Procurement and Supply Chain Management:
  - Ensure that hazardous materials are procured from approved suppliers.
  - Verify that all materials are accompanied by MSDS/SDS and proper documentation.
- Transport Contractors:
  - Comply with all regulations and standards for the transportation of hazardous materials.
  - Ensure drivers are trained and vehicles are suitable for transporting hazardous materials.

5.11.8 Training and Awareness

- Training Programs - Provide training to all workers on:
  - Hazardous materials handling and storage practices.
    - Provide comprehensive training on safe handling, storage, and use of hazardous materials.
    - Include information on hazard recognition, risk assessments, and control measures.
  - Use of PPE: rain personnel on the correct selection, use, maintenance, and limitations of PPE.
  - Emergency Response Procedures: Conduct training and drills on spill response, fire-fighting, evacuation, and first aid.
  - Transportation Safety: For drivers and transport personnel, provide training on safe transportation practices and regulatory compliance.
- Awareness Campaigns:
  - Display posters and signage to reinforce hazardous materials management messages.
  - Conduct regular toolbox talks focusing on hazardous materials topics.
  - Distribute safety bulletins, newsletters, and alerts to keep personnel informed
- Competency Assessments:
  - Evaluate personnel understanding through quizzes, observations, or practical demonstrations.
  - Provide refresher training as needed.

5.11.9 Review and Update

- Periodic Review: Review the Hazardous Materials Management Plan biannually or when significant changes in operation activities occur.
- Continuous Improvement:

- Update the plan based on monitoring results, audits, and feedback.
- Implement corrective actions to address any non-compliances or inefficiencies

- Stakeholder Engagement: Engage with regulatory authorities, ADNOC, contractors, and local communities to gather feedback and share best practices.
- Audit and Assessment:
  - Conduct internal and external audits to assess compliance with the plan and effectiveness of mitigation measures.
  - Address audit findings promptly and effectively.

5.11.10 Communication

- Internal Communication:
  - Maintain regular communication among project teams, HSE personnel, and management regarding hazardous materials management.
  - Share updates on procedures, incidents, lessons learned, and best practices.
- External Communication:
  - Communicate with regulatory authorities and ADNOC regarding compliance, reporting, and any incidents involving hazardous materials.
  - Provide information to contractors and suppliers about hazardous materials requirements and expectations.
- Community Engagement:
  - Inform local communities about hazardous materials management practices and emergency response measures.
  - Establish channels for receiving and addressing community feedback or concerns.

5.12 RESOURCE USE OPTIMIZATION PLAN

5.12.1 Objectives

The main objectives of the Resource Use Optimization Plan during the operations phase of the LNG Project in Ruwais, Abu Dhabi are to:

- Enhance resource efficiency: Set measures to optimize resource use in operations, including water and energy usage.
- Reduce environmental impact: Implement mitigation measures to minimize waste and emissions related to resource consumption.
- Comply with Regulations: Adhere to all relevant UAE laws, Abu Dhabi regulations, ADNOC standards, and international best practices related to resource protection and consumption.
- Promote Sustainable Practices: Foster a culture of sustainability among all personnel, encouraging responsible use of resources and continuous improvement.
- Support Corporate Sustainability Goals: Align resource optimization efforts with ADNOC's sustainability framework and national strategies, contributing to broader environmental objectives.

5.12.2 Regulatory Framework and Standards

ADNOC Standards

- HSE-GA-ST07 HSE Design Philosophy
- HSE-GA-ST08 HSE Performance Monitoring and Reporting
- HSE-GA-ST09 HSE Audit and Assurance
- HSE-EN-ST02 Pollution Prevention and Control
- HSE-EN-ST03 Energy Management System
- HSE-EN-ST05 Environmental Performance Monitoring
- ADNOC Value Improving Practice: Energy optimization guidelines

UAE Laws, Standards, and Strategies

- Federal Law No. 24 of 1999: Protection and Development of the Environment
- Federal Law No. 23 of 1999: Exploitation, Protection, and Development of Living Aquatic Resources
- Federal Law No. 15 of 1972: Conservation of Petroleum Resources
- Abu Dhabi Emirate Law No. 8 of 1978: Conservation of Petroleum Resources
- Federal Law No. 15 of 2020: Water Resources Management and Protection
- Cabinet Decision No. 37 of 2001: Regulation concerning Environmental Impact Assessment of Projects
- Abu Dhabi Water Strategy 2021-2030
- UAE Energy Strategy 2050

- Environment Agency - Abu Dhabi (EAD) Regulatory Standards
- Abu Dhabi Environment, Health, and Safety Management System (AD EHSMS) Regulatory Framework

Conventions and Protocols

- Convention on Wetlands of International Importance (Ramsar Convention) especially Waterfowl Habitat, as amended, 1982/1987
- Montreal Protocol on Substances that Deplete the Ozone Layer, 1987
- Convention on Biological Diversity (CBD) 1992
- United Nations Framework Convention on Climate Change (UNFCCC), 1992
- Kyoto Protocol of the UNFCCC, 1997
- International Renewable Energy Agency (IRENA) Statute, 2009
- Paris Agreement under UNFCCC, 2015

International Best Practices

- ISO 14001 – Environmental Management Systems
- ISO 50001 - Energy Management System
- International Finance Corporation (IFC) Performance Standards, particularly Performance Standard 3: Resource Efficiency and Pollution Prevention
- World Bank Environmental, Health, and Safety (EHS) Guidelines
- Global Reporting Initiative (GRI) Standards on Water and Energy
- Implement Best Available Technologies (BAT)

5.12.3 Potential Impacts

5.12.3.1 Resources Consumed

During the operation phase, the following resources are primarily consumed by the RLNG plant in Ruwais:

- Water Resources:
    - Potable Water: Consumption for domestic use, sanitation, and drinking.
    - Process Water: Water used in LNG processing, cooling systems, and equipment cleaning.
    - Utility Water: Water for firefighting systems, irrigation, and other utility uses.
- Energy Resources:
    - Electricity: Consumption for operation of plant equipment, lighting, HVAC systems, and office facilities.
    - Fuels:
        - Natural Gas: Used as fuel for LNG processing and potentially for power generation.

- Diesel Fuel: Used for backup generators, vehicles, machinery, and equipment.

- Materials and Consumables:
    - Industrial Gases: Such as nitrogen and oxygen used in processing.
    - Chemicals: Used in water treatment, cleaning, and maintenance activities.
    - Raw Materials: Any additional materials required for operation.

5.12.3.2 Impact Assessment

- Potential Impacts:
    - Water Resources:
        - Resource Depletion: Over-extraction of groundwater or excessive use of desalinated water can strain local water resources.
        - Impact on Marine Environment: Increased reliance on desalination can lead to elevated brine discharge, affecting marine ecosystems.
        - Wastewater Generation: Increased water use leads to higher volumes of wastewater, which if not properly treated, can contaminate the marine environment.
        - Energy Consumption: High water use increases energy demand for pumping and treatment, contributing to emissions.
    - Energy Resources:
        - Greenhouse Gas (GHG) Emissions: Combustion of fossil fuels (natural gas, diesel) releases CO_2 and other GHGs, contributing to climate change.
        - Air Pollution: Emissions of NOx, SOx, particulate matter, and volatile organic compounds (VOCs) can degrade air quality.
        - Resource Depletion: Consumption of non-renewable energy sources depletes finite resources.
        - Noise Pollution: Operation of generators and machinery can generate noise affecting workers and nearby fauna.
    - Materials and Consumables:
        - Waste Generation: Inefficient use leads to increased waste requiring disposal.
        - Environmental Contamination: Improper handling and disposal of chemicals can lead to soil and water contamination.
- Significance: Impact significance for the above is considered Medium to High without mitigation due to the scale of operations and potential cumulative impacts.

5.12.4 Mitigation

To minimize and optimize resource consumption impacts during operations, the following mitigation measures will be implemented:

5.12.4.1 Water Resource Optimization

- Water Conservation Measures
    - Water Recycling and Reuse: Install wastewater treatment systems to recycle process water for reuse in cooling, irrigation, or other non-potable applications.
    - Efficient Fixtures and Equipment: Use low-flow faucets, toilets, and showers in facilities.
    - Implement water-efficient technologies in processing equipment.
    - Leak Detection and Repair Program: Regularly inspect and maintain water pipelines and equipment to prevent leaks.
    - Process Optimization: Optimize processes to reduce water consumption per unit of production.
    - Rainwater Harvesting (if applicable): Collect and use rainwater for suitable applications.
- Alternative Water Sources
    - Use of Treated Sewage Effluent (TSE): Utilize TSE for irrigation or other appropriate uses.
    - Brackish Water Use: Consider using brackish water where potable quality is not required.
- Awareness and Training
    - Employee Engagement: Encourage staff to conserve water through awareness campaigns and training.

5.12.4.2 Energy Resource Optimization

- Energy Efficiency Measures
    - Efficient Equipment: Use energy-efficient motors, pumps, lighting (e.g., LED), and HVAC systems.
    - Energy Management System (EnMS): Implement an EnMS in line with ADNOC Standards to monitor, control, and optimize energy consumption.
    - Variable Frequency Drives (VFDs): Install VFDs on motors and pumps to adjust energy usage based on demand.
    - Preventive Maintenance: Regular maintenance of equipment to ensure optimal performance and efficiency.
- Optimization of Operations
    - Load Management: Schedule high-energy-consuming operations during off-peak periods if possible.

- Automation and Control Systems: Implement advanced control systems to optimize processes and reduce energy wastage.

5.12.4.3 Materials and Consumables Optimization

- Efficient Use of Materials
  - Inventory Management: Implement just-in-time inventory to reduce overstocking and waste.
  - Material Substitution: Use environmentally friendly or recycled materials where possible.
  - Process Optimization: Optimize processes to reduce material waste and improve yield.
- Waste Reduction
  - Reduce, Reuse, Recycle: Implement waste segregation and recycling programs.
  - Supplier Engagement: Work with suppliers to provide materials with less packaging or in bulk to reduce waste.

5.12.4.4 Emission and Discharge Minimization

- Emission Control Technologies
  - Regular Monitoring: Monitor emissions to ensure compliance with standards and identify areas for improvement.
- Wastewater Treatment
  - Advanced Treatment Systems: Use efficient wastewater treatment technologies to minimize pollutants in effluent.
  - Water Quality Monitoring: Regularly test effluent to ensure compliance with discharge standards.

5.12.5 Monitoring

To ensure the effectiveness of mitigation measures and compliance with relevant standards, the monitoring activities in Table 5-17 will be conducted.

Table 5-17. Resource Optimization Monitoring Plan During Operations Phase

Aspect	Parameter(s)	Monitoring Location	Frequency	KPI(s)
Water Usage	- Total water consumption (m^3/month) - Water consumption per unit of production (m^3/ton LNG)	- Water intake points - Process areas - Utilities and facilities	- Monthly monitoring - Continuous metering	- Total water consumption (%) compared to baseline - Percentage of water recycled/reused - Leak reduction (%)

	- Volume of water recycled and reused (m³/month)			
Energy Consumption	- Total energy consumption (kWh/month) - Energy consumption per unit of production (kWh/ton LNG) - Renewable energy generated (kWh/month)	- Power generation units - Major energy-consuming equipment	- Monthly monitoring - Continuous metering	- Total energy consumption (%) - Energy efficiency improvements (%)
Fuel Usage	- Volume of diesel and natural gas consumed (liters or m³/month) - Fuel consumption per unit of operation (liters/hour)	- Fuel storage areas - Equipment and vehicles	- Monthly monitoring - Fuel logs	- Fuel consumption (%) - Emissions per unit of fuel consumed (kg CO_2/liter or m³)
Material Usage	- Quantity of materials and chemicals used (kg or liters/month) - Waste generated (kg/month) - Waste recycled (%)	- Storage areas - Process areas	- Monthly monitoring	- Material consumption (%) - Waste reduction (%) - Waste recycling rate (%)
Equipment Efficiency	- Equipment runtime vs. idle time - Energy consumption per equipment (kWh/unit)	- Equipment operation areas - Control rooms	- Biannual assessments - Continuous for key equipment	- Reduction in idle time (%) - Improvement in equipment efficiency (%)
Leak Detection	- Number of leaks detected and repaired - Volume of resource losses (m³ or liters/month)	- Pipelines - Storage tanks - Equipment	- Monthly inspections - After maintenance activities	- Reduction in leaks over time - Response time to repair leaks

Employee Training	- Number of training sessions conducted - Attendance records - Competency assessments	- Training facilities	- Biannual - After new hires	- Percentage of employees trained - Improvement in awareness and practices
Awareness Campaigns	- Number of campaigns conducted - Employee engagement levels - Feedback received	- Throughout the facility	- Semi-annually	- Employee participation rate (%) - Positive feedback and suggestions implemented

Monitoring Details

- Water Usage Monitoring
    - Install water meters at all significant consumption points.
    - Use data logging systems to record and analyze water use patterns.
- Energy Consumption Monitoring
    - Install energy meters on major equipment and processes.
    - Implement energy management software for real-time monitoring.
- Fuel Usage Monitoring
    - Keep detailed logs of fuel deliveries and consumption by equipment and vehicles.
    - Use telemetry systems for tracking fuel usage in real-time.
- Emissions Monitoring
    - Conduct fugitive emissions monitoring.
- Material Usage Monitoring
    - Maintain inventory records of materials and chemicals.
    - Track waste generation and disposal records.
- Equipment Efficiency Monitoring
    - Use equipment logs and control systems to monitor operating hours and performance.
    - Analyze data to identify inefficiencies.
- Leak Detection
    - Implement Leak Detection and Repair (LDAR) programs.
    - Use sensors and alarms for early detection.

- Employee Training and Awareness:
    - Maintain records of training sessions and attendance.
    - Assess competency through tests or practical demonstrations.

5.12.6 Reporting

To ensure transparency and accountability in resource optimization management, regular reporting will be carried out as follows:

- Monthly Reports
    - Summarize resource consumption data, monitoring results, KPIs, and any corrective actions taken.
    - Include comparisons with baseline data and targets.
- Biannual Compliance Reports
    - Provide an overview of compliance with regulatory requirements, ADNOC standards, and internal policies.
    - Highlight trends, achievements, and areas for improvement.
- Annual Sustainability Report (through ADNOC)
    - Compile comprehensive data on resource use, efficiency measures implemented, environmental performance, and contributions to sustainability goals.
    - Share successes, challenges, and future plans.
- Incident Reports: Document any significant incidents, spills, or non-compliances within 24 hours, detailing responses and follow-up actions.
- Stakeholder Communication
    - Share relevant information with ADNOC, regulatory authorities, and other stakeholders as required.
    - Engage in dialogues on sustainability performance and initiatives.

5.12.7 Responsibilities

- Environmental Manager
    - Oversee the implementation of the Resource Optimization Plan.
    - Ensure compliance with regulations and standards.
    - Coordinate monitoring activities and reporting.
- HSE Manager
    - Ensure that resource optimization practices are implemented on-site.
    - Address any issues identified during inspections.

- Provide guidance on HSE matters related to resource use.

- Operations Manager
  - Integrate resource optimization measures into operational processes.
  - Allocate resources and support for implementing efficiency projects.
- Site Supervisors
  - Enforce resource optimization policies on-site.
  - Ensure proper handling, storage, and disposal practices are followed.
  - Conduct regular inspections and report any non-compliances.
- Maintenance Manager
  - Oversee preventive maintenance programs to ensure equipment efficiency.
  - Identify opportunities for upgrades or replacements with more efficient technologies.
- HSE Officers / Environmental Specialists
  - Conduct training and awareness programs.
  - Monitor worker compliance with resource optimization procedures.
  - Assist in data collection and analysis.
- All Personnel
  - Follow resource optimization procedures and best practices.
  - Participate in training and awareness programs.
  - Report any issues, inefficiencies, or suggestions for improvement.

5.12.8 Training and Awareness

- Training Programs
  - Resource Conservation Practices:
    - Provide training on efficient use of water, energy, and materials.
    - Include information on the environmental and economic benefits of resource optimization.
  - Operational Efficiency: Train operators on optimal operation of equipment to minimize resource use.
  - Use of PPE: Ensure personnel are trained in the correct use of PPE, especially when handling materials that require it.
  - Emergency Response Procedures: Conduct training on response to spills, leaks, or other incidents that may impact resource use.
- Awareness Campaigns

- Posters and Signage: Display messages promoting resource conservation throughout the facility.
- Competitions and Incentives: Organize challenges or reward programs to encourage employee participation.
- Regular Communications: Use newsletters, emails, or meetings to share tips, updates, and success stories.

- Employee Engagement:
  - Suggestion Programs: Encourage employees to propose ideas for improving resource efficiency.
  - Feedback Mechanisms: Provide channels for employees to provide feedback on resource optimization initiatives.

5.12.9 Review and Update

- Periodic Review: Review the Resource Optimization Plan biannually or when significant changes in operation activities occur.
- Continuous Improvement:
  - Update the plan based on monitoring results, audits, and feedback.
  - Implement corrective actions to address any non-compliances or inefficiencies.
- Benchmarking: Compare performance against industry best practices and standards to identify improvement opportunities.
- Stakeholder Engagement: Engage with ADNOC, regulatory authorities, industry peers, and external experts to stay informed of new developments and share experiences.

5.12.10 Communication

- Internal Communication:
  - Maintain regular communication among project teams, HSE personnel, and management regarding resource optimization.
  - Share updates on initiatives, performance, challenges, and lessons learned.
- External Communication:
  - Communicate with regulatory authorities and ADNOC regarding compliance, reporting, and resource management initiatives.
  - Participate in industry forums or networks focused on sustainability and resource efficiency.
- Community Engagement:
  - Inform local communities about resource optimization efforts and environmental performance.
  - Establish channels for receiving and addressing community feedback or concerns.

6. SOCIAL MANAGEMENT PLANS

6.1 LABOR AND WORKING CONDITIONS MANAGEMENT PLAN

6.1.1 Objectives

The main objectives of the Labor and Working Conditions Management Plan during the operation phase of the LNG Project in Ruwais, Abu Dhabi are to:

- Ensure Fair Employment Practices: Comply with UAE labor laws and international labor standards to provide equitable employment conditions.
- Protect Worker Rights: Uphold all workers are treated with dignity and respect.
- Promote Worker Welfare and Wellbeing: Provide safe and healthy working and living conditions, including adequate accommodation and amenities.
- Implement Effective Grievance Mechanisms: Establish accessible channels for workers to raise concerns without fear of retaliation.
- Promote Supply Chain Compliance: Extend labor and working condition standards to contractors and suppliers.
- Promote a Positive Work Environment: Encourage a culture of open communication, professional development, and continuous improvement.

6.1.2 Regulatory Framework and Standards

The management plan aligns with the following regulatory frameworks, standards, and guidelines relevant to labor and working conditions:

UAE Laws and Regulations

- Federal Law No. 8 of 1980: Regulation of Labor Relations
- Federal Decree-Law No. 33 of 2021: Regulation of Labor Relations
- Ministerial Resolution No. 44 of 2022: Concerning Occupational Health and Safety and Labor Accommodation
- Federal Law No. 6 of 1973: Concerning Entry and Residence of Foreigners
- UAE Cabinet Decision No. 15 of 2017: Service Fees and Administrative Fines in the Ministry of Human Resources and Emiratisation
- Personal Data Protection Law, 2021

ADNOC Standards

- HSE-GA-ST02: HSE Management System Standard
- HSE-GA-ST04: Incident Notification, Investigation, and Reporting
- HSE-GA-ST06: Project HSE Plan and Standard

- HSE-GA-ST08: HSE Performance Monitoring and Reporting
- HSE-GA-ST09: HSE Audit and Assurance
- HSE-OH-ST01: Occupational Health and Safety Management
- HSE-OH-ST07: Contractor Welfare Management Standard
- HSE-OH-ST08: Physical Health Hazards Standard
- HSE-OH-ST09: Chemical Hazards Standard
- HSE-OH-ST10: Biological Hazards Standard

International Standards and Guidelines

- International Labour Organization (ILO) Conventions:
    - ILO Convention No. 95: Protection of Wages, 1949
    - ILO Convention No. 97: Migration for Employment, 1949
    - ILO Convention No. 138: Minimum Age Convention, 1973
    - ILO Convention No. 182: Worst Forms of Child Labour Convention, 1999
    - ILO Convention No. 155: Occupational Safety and Health Convention, 1981
    - ILO Convention No. 143: Migrant Workers (Supplementary Provisions) Convention, 1975
- IFC Performance Standards:
    - Performance Standard 2: Labor and Working Conditions
    - Performance Standard 4: Community Health, Safety, and Security

UN Global Compact (10 principles) **International Best Practices**

- ISO 45001: Occupational Health and Safety Management Systems
- ISO 26000: Guidance on Social Responsibility
- SA8000: Social Accountability Standard
- OECD Guidelines for Multinational Enterprises
- UN Global Compact Principles.

6.1.3 Potential Impacts

6.1.3.1 Impact Sources

Potential impacts related to labor and working conditions during the operation phase include:

- Non-Compliance with Labor Laws: Risks of violating UAE labor laws and international standards, leading to legal consequences and reputational damage.
- Worker Rights Violations: Issues such as discrimination and inadequate grievance mechanisms.

- Occupational Health and Safety Risks: Exposure to physical, chemical, or ergonomic hazards due to inadequate safety measures or training.
- Inadequate Working Conditions: Poor workplace environment affecting worker morale, productivity, and well-being.
- Inadequate Accommodation: Substandard living conditions in worker camps, affecting health and morale.
- Supply Chain Risks: Contractors or suppliers not adhering to labor standards, leading to indirect violations.
- Lack of Professional Development: Limited opportunities for training and career advancement affecting skilled workers and staff retention

6.1.3.2 Sensitive Receptors

- Workers: Directly affected by employment practices, working conditions, and accommodation standards.
- Local Communities: May be impacted by worker behavior, competition for resources, and social dynamics.
- Regulatory Bodies: Concerned with compliance to labor laws and standards.
- Company Reputation: Stakeholders and the public perception of the company based on labor practices.

6.1.3.3 Impact Assessment

- Potential Impacts:
    - Health and Safety Risks: Increased risk of accidents and occupational illnesses due to inadequate safety measures.
    - Legal and Financial Consequences: Non-compliance can lead to fines, legal action, and project delays.
    - Reputational Damage: Inadequate labor practices can harm the company's image and stakeholder relations.
    - Worker Morale and Productivity: Sub-standard working conditions can lead to low morale, high turnover, and reduced productivity.
    - Discrimination and Inequality: Practices that discriminate against certain groups can lead to social tensions and legal challenges.
    - Supply Chain Non-Compliance: Violations by contractors or suppliers can indirectly impact the company.
- Significance: The impact is assessed as High due to the potential for serious legal, financial, and reputational consequences, thus necessitating comprehensive management and mitigation measures.

6.1.4 Mitigation Measures

To address the potential impacts, the following mitigation measures will be implemented:

- Compliance with Labor Laws

- Legal Adherence:
  - all employment practices should comply with UAE labor laws.
  - Regularly update policies to reflect any changes in legislation.
- Audit and Verification:
  - Conduct regular audits to verify compliance.
  - Implement corrective actions for any non-compliance identified.

- Fair Recruitment and Hiring:
  - Transparent Processes
    - Use fair, transparent, and merit-based recruitment procedures.
    - Prohibit discrimination based on race, gender, nationality, religion, or any other characteristic.
  - No Recruitment Fees: Ensure no recruitment fees are charged to workers.
  - Age Verification:
    - Verify age documentation to prevent child labor.
    - Maintain records of employee ages.

- Terms of Employment
  - Employment Contracts:
    - Provide clear contracts in a language understood by the worker.
    - Outline terms including job role, wages, working hours, and benefits.
  - Fair Compensation and Benefits:
    - Ensure wages meet or exceed legal minimums and industry standards.
    - Provide timely payment of wages.
    - Offer benefits such as health insurance, leave entitlements, and end-of-service gratuities as per legal requirements.
  - Working Hours and Overtime:
    - Limit working hours according to legal requirements.
    - Compensate overtime appropriately as per UAE labor laws.
  - Privacy and Data Protection:
    - Comply with the UAE Personal Data Protection Law.
    - Protect employee personal information and maintain confidentiality.

- Occupational Health and Safety

- Safety Management Systems: Implement safety management systems in line with ISO 45001 and ADNOC HSE standards.
- Risk Assessments: Conduct regular risk assessments to identify and mitigate workplace hazards.
- Provision of PPE: Provide appropriate Personal Protective Equipment (PPE) to all workers at no cost.
- Health and Safety Training: Conduct regular training on safety procedures, emergency response, and safe work practices.
- Health Surveillance: Implement health monitoring programs, including medical check-ups and occupational health services.

- Worker Accommodation and Welfare
  - Accommodation Standards:
    - Ensure living facilities meet or exceed ADNOC and UAE standards.
    - Provide adequate space, sanitation, and amenities.
  - Welfare Facilities:
    - Offer access to recreational facilities and services.
    - Provide nutritious meals and clean drinking water.
  - Transportation:
    - Provide safe transportation between accommodation and work sites.
    - Ensure vehicles are well-maintained and drivers are trained.
- Grievance Mechanisms
  - Accessible Channels:
    - Establish confidential and accessible grievance mechanisms.
    - Encourage workers to voice concerns without fear.
  - Timely Resolution:
    - Address grievances promptly and fairly.
    - Keep records of grievances and resolutions.
- Worker Code of Conduct
  - Behavioral Guidelines: Develop and enforce a comprehensive Code of Conduct outlining expectations on behavior, ethics, and compliance.
  - Anti-Discrimination and Harassment: Prohibit any form of discrimination, harassment, or bullying in the workplace.
  - Awareness and Enforcement:

- Ensure all employees are aware of the Code of Conduct.
- Implement disciplinary procedures for violations, ensuring consistent application.

- Professional Development and Training
    - Training Programs:
        - Provide opportunities for skills development, training, and career advancement.
        - Encourage continuous learning and professional growth.

Performance Management: Implement fair and transparent performance evaluation processes.

- Supply Chain Management
    - Contractual Obligations:
        - Include labor standards clauses in supplier and contractor agreements.
        - Require adherence to ADNOC's Supplier and Partner Code of Ethics.
    - Monitoring:
        - Conduct regular audits of suppliers' labor practices.
        - Enforce corrective actions for non-compliance.
- Security Personnel Conduct
    - Training and Conduct: train security personnel on conflict resolution and appropriate use of force.
    - Screening and Background Checks: Conduct thorough background checks on security staff.
    - Oversight: Monitor security operations to prevent any form of abuse or inhumane treatment.

6.1.5 Monitoring

To ensure the effectiveness of mitigation measures and compliance with relevant standards, the monitoring activities in Table 6-1. Labor and Working Conditions Monitoring Plan During Operation Phase will be conducted.

Given that the labor force during operation consists mostly of skilled workers, engineers, and white-collar staff, the potential for certain risks may be reduced; however, vigilance is still required.

Table 6-1. Labor and Working Conditions Monitoring Plan During Operation Phase

Aspect	Parameter(s)	Monitoring Location	Frequency	KPI(s)
Employment Practices	- Valid employment contracts - Wage payments through WPS - Recruitment compliance - Verification of age documents - Compliance with working hours and overtime	- HR records - Payroll records - Worker interviews	- Quarterly audits - Monthly payroll checks	- 100% of workers with valid contracts - Zero recruitment fees charged - Timely wage payments - Zero incidents of child labor - Compliance with legal working hours
Worker Rights Compliance	- Non-discrimination policies in place - Reports of discrimination or harassment - Grievance mechanism usage and effectiveness - Privacy and data protection compliance	- HR records - Grievance logs - Employee surveys	- Monthly monitoring - Immediate reporting of issues	- Zero incidents of discrimination - Grievances resolved within target time - High awareness and trust in grievance mechanisms - Compliance with data protection laws
Occupational Health and Safety	- Incident and accident rates - PPE availability and usage - Safety training completion - Health surveillance records - Ergonomic assessments	- Worksites - OHS records - Training records	- Monthly reporting - Immediate incident reporting	- Reduction in incident rates - 100% PPE provision and proper usage - 100% of workers trained - Low rates of work-related health issues
Worker Welfare and Accommodation	- Accommodation conditions and facilities - Hygiene and sanitation standards - Facility maintenance - Worker satisfaction levels	- Worker accommodations - Welfare facilities	- Monthly inspections - Spot checks	- Compliance with accommodation standards - High worker satisfaction ratings - Prompt resolution of maintenance issues
Grievance Mechanisms	- Number of grievances received and resolved - Types of issues raised - Awareness levels among workers - Retaliation incidents	- Grievance records - Worker surveys	- Monthly reporting - Ongoing monitoring	- Grievances resolved promptly and fairly - Zero retaliation cases - Increased use of grievance mechanisms as a sign of trust
Training and Development	- Training sessions conducted - Attendance records - Employee development plans - Performance evaluation completion	- Training facilities - HR records	- Quarterly - As required	- 100% of required trainings completed - Employee satisfaction with training programs - Regular performance evaluations conducted
Supply Chain Compliance	- Supplier and contractor audits - Compliance with labor standards - Corrective actions implemented	- Supplier sites - Procurement records	- Annual audits - As needed	- High compliance rates among suppliers - Timely implementation of corrective actions - Zero incidents of labor violations in supply chain
Security Practices	- Training records for security staff - Incidents involving security personnel	- Security logs - Training records	- Monthly reporting - Immediate incident reporting	- Zero incidents of abuse by security staff - 100% of security personnel trained - Positive feedback on security practices
Professional Development	- Number of employees receiving promotions or advancements - Participation in training programs - Employee turnover rates	- HR records - Training records	- Quarterly monitoring	- Increased retention of skilled staff - Positive employee feedback on career development opportunities

Anti-Bribery and Corruption Compliance	- Training on anti-corruption policies - Whistleblower reports - Financial audits	- Financial records - HR records	- Annual audits - As needed	- Zero incidents of bribery or corruption - Effective whistleblower mechanisms - Compliance with financial controls

Monitoring Details

- Data Collection:
    - Use standardized forms to record monitoring data.
    - Maintain records of audits, inspections, training, and incidents.
- Inspections and Audits:
    - Conduct regular inspections of worksites, accommodations, and supplier sites.
    - Use checklists aligned with UAE regulations and international standards.
- Worker Feedback:
    - Collect feedback through surveys, interviews, and grievance mechanisms.
    - Encourage open communication and anonymity where necessary.
- Reporting:
    - Prepare monthly reports summarizing monitoring data, KPIs, and actions taken.
    - Share relevant information with management and stakeholders.

6.1.6 Responsibilities

- Project Manager:
    - Overall responsibility for implementing the Labor and Working Conditions Management Plan.
    - Ensure adequate resources are allocated for mitigation measures.
- Human Resources Manager:
    - Oversee recruitment practices, worker welfare, and compliance with labor laws.
    - Manage training programs and the Code of Conduct.
- Health and Safety Manager:
    - Ensure health and safety standards are met within worker accommodations and worksites.
    - Coordinate emergency preparedness and response efforts.
- Operations Manager:
    - Integrate labor and working condition considerations into operational planning and execution.
    - Ensure supervisors and team leaders enforce policies and procedures.
- Supply Chain Manager:
    - Ensure suppliers comply with labor standards.
    - Manage supplier audits and follow-up actions.
- Accommodation Manager:
    - Ensure worker accommodations and welfare facilities meet required standards.
    - Address maintenance issues and worker concerns promptly.
- Legal and Compliance Manager:
    - Monitor changes in labor laws and regulations.
    - Provide guidance on compliance and legal obligations.
- Security Manager:
    - Oversee security personnel training and conduct.
    - Ensure compliance with company policies and lenders requirements.
- All Personnel:
    - Comply with company policies and procedures.
    - Participate in training programs.

- Report any concerns, incidents, or violations promptly.

6.1.7 Reporting

- Monthly Reports:
  - Summarize monitoring activities, findings, and KPIs.
  - Highlight any incidents, grievances, or non-compliance issues.
- Incident Reports:
  - Immediate reporting of any significant incidents or breaches of policies.
  - Include details of the incident, actions taken, and preventive measures.
- Annual Reviews:
  - Assess overall performance against objectives.
  - Identify trends, achievements, challenges, and areas for improvement.
  - Update management plans and set new goals.
- Stakeholder Updates:
  - Provide regular updates to management, regulatory bodies, and other stakeholders.
  - Ensure transparency and accountability.

6.1.8 Training and Awareness

- Worker Induction Programs:
  - Provide comprehensive induction training covering:
    - Company policies, code of conduct, and ethics.
    - Employment terms, rights, and responsibilities.
    - Health and safety procedures and emergency response.
    - Grievance mechanisms and reporting channels.
    - Anti-discrimination, harassment, and diversity.
    - Data protection and confidentiality.
  - Ensure training is in languages understood by workers.
- Ongoing Training:
  - Conduct refresher courses and toolbox talks to reinforce key messages.
  - Provide specialized training for supervisors, managers, and security personnel.

- Professional Development: Offer training programs to enhance technical skills, leadership, and personal development
- Communication Materials:
    - Display posters, notices, and visual aids in common areas.
    - Use multiple formats to accommodate different literacy levels.
    - Include information on grievance mechanisms, and worker welfare.
- Employee Engagement:
    - Encourage participation in safety committees, focus groups, and feedback sessions.
    - Recognize and reward contributions to improving labor conditions and safety.

6.1.9 Review and Update

- Periodic Review:
    - Review the Labor and Working Conditions Management Plan biannually or when significant changes occur.
    - Incorporate feedback from audits, worker input, and incident investigations.
- Continuous Improvement:
    - Update the plan based on monitoring results and lessons learned.
    - Implement corrective actions to address any issues or gaps identified.
- Stakeholder Engagement:
    - Engage with employees, contractors, regulatory authorities, and other stakeholders to gather feedback and share best practices.
    - Stay informed of industry developments and emerging trends in labor management.
- Documentation: Maintain up-to-date records of all revisions, approvals, and communications related to the management plan.

6.2 COMMUNITY HEALTH AND SAFETY MANAGEMENT PLAN

6.2.1 Objectives

The main objectives of the community health and safety management plan during the operation phase of the RLNG Project are to:

- Protect Community Health and Safety: Safeguard local communities from operation-related risks and hazards.
- Minimize Negative Impacts: Reduce adverse effects on the well-being and quality of life of local residents.
- Enhance Positive Outcomes: Promote beneficial community engagement and support local health initiatives.
- Ensure Regulatory Compliance: Adhere to all relevant laws, regulations, and international standards related to community health and safety.
- Promote Transparent Communication: Maintain open and transparent communication with local communities and stakeholders to build trust and address concerns promptly.

6.2.2 Regulatory Framework and Standards

The Community Health and Safety Management Plan aligns with the following regulatory frameworks, standards, and guidelines relevant to community health and safety during operation:

ADNOC Standards

- HSE-GA-ST02: HSE Management System Standard
- HSE-GA-ST04: Incident Notification, Investigation, and Reporting
- HSE-GA-ST06: Project HSE Plan and Standard
- HSE-GA-ST08: HSE Performance Monitoring and Reporting
- HSE-GA-ST09: HSE Audit and Assurance
- HSE-OH-ST08: Physical Health Hazards Standard
- HSE-OH-ST10: Biological Hazards Standard
- HSE-OS-ST05: Traffic Safety

UAE Laws and Regulations

- Federal Law No. 24 of 1999: Protection and Development of the Environment
- Federal Law No. 6 of 1973: Concerning the Entry and Residence of Foreigners
- Ministerial Order No. 32 of 1982: Prevention Methods and Measures for Protecting Workers against Work Hazards
- Federal Law No. 8 of 1980: Regulation of Labor Relations

- Federal Law No. 12 of 2018: Integrated Waste Management
- Federal Decree-Law No. 33 of 2021: Regulation of Labor Relations
- Local Law No. 21 of 2005: Waste Management in Abu Dhabi Emirate

International Standards and Guidelines

- International Finance Corporation (IFC) Performance Standards
    - Performance Standard 4: Community Health, Safety, and Security
    - Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts
- World Health Organization (WHO) Guidelines
    - Occupational and Environmental Health Standards
    - Guidelines for Community Noise
    - Air Quality Guidelines
    - Drinking Water Quality Guidelines
- ISO Standards
    - ISO 45001: Occupational Health and Safety Management Systems
    - ISO 39001: Road Traffic Safety Management Systems
    - ISO 14001: Environmental Management Systems

International Best Practices

- Best Available Techniques (BAT)
- World Bank Environmental, Health, and Safety (EHS) Guidelines

6.2.3 Potential Impacts

6.2.3.1 Impact Sources

During the operation phase, potential sources of impacts to community health and safety include:

- Increased Traffic and Road Safety Risks
    - Additional Vehicles: Increased number of vehicles transporting personnel, materials, and equipment on public roads.
    - Traffic Congestion: Potential for congestion on local roads, especially during peak hours.
    - Road Accidents: Elevated risk of traffic accidents involving project vehicles, pedestrians, and other road users.

- Public Health Risks
    - Air Emissions: Potential emissions of pollutants from operational activities affecting air quality.
    - Noise Pollution: Increased noise levels from operational equipment and vehicle movements impacting nearby communities.
    - Waste Management: Improper disposal or handling of waste leading to environmental contamination.
    - Accidental Releases: Risk of accidental spills or leaks of hazardous materials affecting soil, water, and public health.
- Emergency Situations
    - Fire or Explosion Risks: Operational incidents that could pose safety risks to nearby communities.
    - Natural Disasters: Events such as floods or storms exacerbated by project activities.
- Security Risks
    - Unauthorized Access: Potential for community members to access hazardous areas.
    - Conflict with Local Communities: Issues arising from miscommunication or disputes.

6.2.3.2 Sensitive Receptors

- Local Communities:
    - Residents living near transportation routes and operations sites.
    - Vulnerable groups such as children, the elderly, and individuals with pre-existing health conditions.
- Public Infrastructure and Services: Local roads, bridges, and public utilities that may be impacted by increased usage.
- Educational and Healthcare Facilities: Schools, hospitals, and clinics located near operational activities.
- Ecologically Sensitive Areas: Protected areas, natural habitats, and marine environments adjacent to project operations.

6.2.3.3 Impact Assessment

- Potential Impacts:
    - Traffic Accidents:
        - Increased risk of road traffic incidents due to additional project-related vehicles.
        - Potential injuries or fatalities involving community members.

- Air and Noise Pollution:
  - Deterioration of air quality impacting respiratory health.
  - Elevated noise levels causing stress and sleep disturbances.
- Public Health Risks:
  - Exposure to hazardous substances due to accidental releases.
  - Spread of communicable diseases if workforce interactions are not properly managed.
- Strain on Infrastructure: Damage or accelerated wear to roads and public utilities due to increased usage.
- Community Anxiety and Stress: Concerns over safety, environmental impacts, and changes to the local way of life.

- Significance: The overall impact is assessed as Medium, requiring effective mitigation measures to protect community health and safety.

6.2.4 Mitigation Measures

To protect community health and safety and minimize negative impacts during operation, the following mitigation measures will be implemented:

6.2.4.1 Traffic Management

- Traffic Impact Assessment:
  - Conduct a Detailed Assessment: Evaluate potential traffic congestion and risks associated with transportation of personnel.
  - Identify High-Risk Areas: Focus on routes passing through residential areas or near schools and hospitals.
- Traffic Management Plan:
  - Develop and Implement Strategies: Create a comprehensive Traffic Management Plan (TMP) outlining measures to control and reduce traffic risks.
  - Vehicle Scheduling: Plan deliveries and workforce transportation during off-peak hours to minimize congestion.
  - Designated Routes: Use designated transport routes agreed upon with local authorities to avoid sensitive areas.
- Road Safety Measures:
  - Driver Training:

- Ensure all drivers receive training on defensive driving, road safety, and local traffic laws.
- Provide refresher courses periodically.

- Vehicle Maintenance:
  - Maintain vehicles in good condition through regular inspections and servicing.
  - Equip vehicles with safety features such as seat belts, speed limiters, and tracking devices.
- Speed Limits and Restrictions: Enforce speed restrictions for project vehicles, especially in residential areas and near sensitive receptors.
- Signage and Signals:
  - Install warning signs, speed limit signs, and traffic signals where necessary.
  - Use flagmen or traffic marshals in high-risk areas.
- Monitoring and Enforcement:
  - Monitor driver behavior through GPS tracking and spot checks.
  - Implement disciplinary actions for violations of traffic policies.

6.2.4.2 Environmental Management

- Air Quality Control
  - Emission Controls:
    - Use low-emission vehicles and equipment.
    - Implement measures to reduce emissions from operations, such as regular maintenance and use of cleaner fuels.
  - Dust Suppression: Implement dust control measures, such as water spraying on unpaved roads.
- Noise Management
  - Noise Control Measures:
    - Use equipment with noise reduction features.
    - Schedule noisy activities during daytime hours.
    - Install noise barriers where appropriate.
- Waste Management
  - Proper Disposal:

- Implement waste management procedures in compliance with regulations.
- Prevent illegal dumping and ensure safe handling of hazardous waste.

- Waste Minimization: Reduce waste generation through efficient operational practices.

- Accidental Spill Prevention and Response
  - Develop and implement spill prevention measures.
  - Equip sites with spill kits and train personnel in spill response.

6.2.4.3 Emergency Preparedness and Response

- Develop and Implement Emergency Response Plan (ERP)
  - Include procedures for responding to incidents that may impact the community.
  - Coordinate with local emergency services and authorities.
- Community Awareness: Inform local communities about emergency procedures and how to respond.
- Regular Drills: Conduct joint emergency drills involving local authorities and community representatives.

6.2.4.4 Community Engagement and Communication

- Stakeholder Engagement Plan
  - Regular Communication:
    - Maintain open lines of communication with local communities and stakeholders.
    - Assign a Community Liaison Officer (CLO) to manage interactions.
  - Information Dissemination:
    - Provide timely updates on operational activities, schedules, and potential impacts.
    - Use multiple channels such as meetings, newsletters, and social media.
- Grievance Mechanism
  - Accessible Channels:
    - Establish mechanisms for community members to raise concerns or complaints.
    - Provide multiple avenues such as hotlines, suggestion boxes, and email.
  - Timely Response:
    - Ensure grievances are acknowledged and addressed promptly and effectively.
    - Maintain records of grievances and resolutions.

6.2.4.5 Site Security and Access Control

- Prevent Unauthorized Access:
    - Security Measures:
        - Implement security measures to secure operation sites and prevent public entry.
        - Use fencing, surveillance systems, and controlled access points.
    - Signage: Display clear warning signs around hazardous areas in multiple languages.
- Community Safety Awareness:
    - Conduct awareness campaigns to inform the community about potential hazards.
    - Provide guidance on safe behaviors near operational sites.

6.2.4.6 Health Promotion Initiatives

- Support Local Health Programs:
    - Collaboration with Health Authorities: Partner with local health authorities to support public health initiatives.
    - Health Education: Provide information on topics such as disease prevention, hygiene, and nutrition.

Disease Prevention Measures:

- Implement measures, in coordination with competent authorities, to prevent the spread of diseases between workers and the community.

6.2.5 Monitoring

To ensure the effectiveness of mitigation measures and compliance with relevant standards, the monitoring activities in Table 6-2. Community Health and Safety Monitoring Plan During Operation Phase will be conducted.

Table 6-2. Community Health and Safety Monitoring Plan During Operation Phase

Aspect	Parameter(s)	Monitoring Location	Frequency	KPI(s)
Traffic and Road Safety	- Number of project vehicles on public roads - Traffic incidents involving project vehicles - Compliance with traffic management plan and speed limits - Driver training records	- Along designated transport routes - Near sensitive receptors	- Daily monitoring - Monthly reporting	- Zero major traffic accidents - Reduction in traffic complaints - 100% of drivers trained - Compliance with vehicle scheduling and speed limits
Community Complaints	- Number of grievances received - Types of issues raised - Resolution time - Satisfaction with resolution	- Community relations office - Grievance mechanism records	- Monthly summaries - Ongoing monitoring	- Grievances addressed within target time - Reduction in repeat issues - High satisfaction levels with grievance resolution
Environmental Parameters	- Air quality measurements (e.g., PM_{10}, $PM_{2.5}$, NOx) - Noise levels at sensitive receptors - Waste management compliance - Spill incidents	- Perimeter of operational sites - Nearby communities - Waste disposal areas	- Quarterly monitoring - Continuous for critical parameters	- Compliance with environmental standards - Reduction in emissions and noise levels - Zero illegal waste disposal - Prompt response to spills
Emergency Preparedness	- Emergency drills conducted - Response times - Staff and community training records - Incident response effectiveness	- Operation site - Surrounding communities	- Biannual drills - After any incident	- Effective emergency response - 100% relevant staff trained - Community awareness of emergency procedures

Site Security	- Incidents of unauthorized access - Condition of fencing and signage - Security personnel conduct	- Site perimeter - Access points	- Weekly inspections - Immediate reporting of incidents	- Zero security breaches - All signage and barriers in place - Compliance with security protocols
Community Health Indicators	- Incidence of communicable diseases - Health complaints related to operations - Participation in health programs	- Local healthcare facilities - Community surveys	- Semi-annual monitoring	- No increase in disease incidence due to operations - Positive community feedback on health initiatives
Stakeholder Engagement	- Number of engagement activities conducted - Community attendance and participation - Feedback received and addressed	- Local communities - Meeting records	- Monthly engagement activities	- Regular communication maintained - High levels of community participation - Positive relationships with stakeholders

Monitoring Details

- Traffic Monitoring
    - Vehicle Logs:
        - Record the number and types of vehicles entering and leaving the site daily.
        - Use GPS tracking to monitor routes and speed compliance.
    - Incident Reporting:
        - Document any traffic accidents or near-misses involving project vehicles.
        - Investigate incidents to identify causes and implement corrective actions.
- Environmental Monitoring
    - Air Quality and Noise Monitoring: Conduct measurements at specified locations and compare results with UAE standards and WHO guidelines.
    - Waste Management Audits: Inspect waste storage, handling, and disposal practices regularly.
- Community Feedback
    - Engagement Activities: Hold regular meetings with community representatives and stakeholders.
    - Grievance Analysis:
        - Review grievances to identify trends and systemic issues.
        - Implement measures to prevent recurrence.
- Emergency Preparedness
    - Evaluate the effectiveness of emergency response plans through regular drills.
    - Involve local emergency services and community members where appropriate.
- Health Indicators
    - Collaborate with local health authorities to monitor health trends.
    - Provide support in case of outbreaks or health emergencies.

6.2.6 Responsibilities

- Project Manager
    - Overall responsibility for implementing the Community Health and Safety Management Plan.
    - Ensure adequate resources are allocated for mitigation measures and monitoring activities.
- Health and Safety Manager

- Oversee implementation of health and safety measures related to community impacts.
- Coordinate monitoring activities, incident investigations, and emergency preparedness.

- Environmental Manager
  - Ensure environmental mitigation measures are in place for air quality, noise, waste management, and spill prevention.
  - Liaise with regulatory authorities and ensure compliance with environmental standards.
- Community Liaison Officer (CLO)
  - Serve as the primary liaison between the project and local communities.
  - Manage the grievance mechanism and community engagement activities.
  - Coordinate stakeholder engagement and communication strategies.
- Traffic Coordinator
  - Implement the Traffic Management Plan.
  - Monitor vehicle movements, driver compliance, and road safety measures.
  - Coordinate with drivers, logistics personnel, and local authorities.
- Security Manager
  - Ensure site security measures are effective and comply with regulations.
  - Oversee security personnel conduct and training.
  - Prevent unauthorized access and address any security incidents.
- Emergency Response Team
  - Prepare for and respond to emergencies that may impact the community.
  - Coordinate with local emergency services and authorities.
- All Personnel
  - Comply with community health and safety policies and procedures.
  - Participate in training and awareness programs.
  - Report any incidents, hazards, or concerns promptly.

6.2.7 Reporting

- Monthly Reports
  - Summarize monitoring data, incidents, grievances, community engagement activities, and actions taken.

- Include KPIs, trends, and analysis of effectiveness.

- Incident Reports
  - Immediate reporting of any significant incidents affecting community health and safety.
  - Provide detailed accounts, investigation findings, and corrective actions implemented.
- Stakeholder Updates
  - Provide regular updates to local authorities, community leaders, and other stakeholders on project activities and mitigation efforts.
  - Use various communication channels to ensure transparency.
- Regulatory Reporting
  - Submit required reports to regulatory authorities in compliance with legal obligations.
  - Ensure timely and accurate reporting of environmental and safety data.

6.2.8 Training and Awareness

- Worker Training
  - Health and Safety Induction:
    - Provide all workers with induction training covering community health and safety responsibilities.
    - Include topics such as traffic safety, environmental protection, emergency response, and code of conduct.
  - Ongoing Training:
    - Conduct regular training sessions on specific topics relevant to their roles.
    - Provide refresher courses and updates on policies and procedures.
- Community Awareness
  - Information Sessions:
    - Organize sessions to inform communities about project activities and safety measures.
    - Engage with community leaders to facilitate communication.
  - Educational Materials:
    - Distribute leaflets, brochures, or posters to raise awareness about health and safety topics.
    - Use local languages and culturally appropriate messaging.

- Driver Training
    - Defensive Driving Courses: Ensure all drivers complete approved training programs.
    - Awareness of Local Conditions: Train drivers on local traffic laws and cultural considerations.
    - Regular Assessments: Evaluate driver performance and provide feedback or additional training as needed.
- Emergency Preparedness Training:
    - Staff Training: Train relevant staff on emergency response procedures, roles, and responsibilities.
    - Community Involvement: Include community representatives in drills and training where appropriate.

6.2.9 Review and Update

- Periodic Review
    - Biannual Reviews:
        - Assess the effectiveness of the Community Health and Safety Management Plan.
        - Review monitoring data, incident reports, grievances, and feedback.
    - Annual Evaluation:
        - Conduct a comprehensive evaluation of the plan's performance over the year.
        - Identify successes, challenges, and areas for improvement.
- Adjustments and Adaptive Management
    - Make necessary adjustments based on monitoring results, community feedback, changes in project activities, or new regulations.
    - Update mitigation measures, procedures, and responsibilities accordingly.
- Continuous Improvement
    - Lessons Learned:
        - Incorporate lessons from incidents, near-misses, and stakeholder feedback into the plan.
        - Share best practices within the organization and with contractors.
    - Stakeholder Input:
        - Engage with community members, local authorities, and other stakeholders to gather input on the plan's effectiveness.

- Consider suggestions to enhance community health and safety.

- Documentation
    - Record Keeping: Maintain detailed records of all reviews, updates, communications, and decisions related to the management plan.
    - Version Control: Implement a version control system to track changes and ensure that all personnel have access to the latest version.

6.3 STAKEHOLDER ENGAGEMENT PLAN

To ensure continuous engagement with communities, regulatory bodies, and other key stakeholders during operation, a standalone stakeholder engagement plan was prepared. The main components of this plan are outlined below.

6.3.1 Objectives

The main objectives of the stakeholder management plan during the operation phase of the RLNG Project are to:

- Describe the regulatory, Client and requirements for consultation and disclosure.
- Identify stakeholders so that they are provided with timely and accurate information associated with the Project.
- Describe the future plan of activities and timetable for sharing information and consulting with stakeholders.
- Describe the internal resources and individual responsibilities assigned to implement engagement activities.
- Describe how the effectiveness of the SEP will be monitored and how lessons learned will be recorded, with the aim of improving stakeholder engagement activities during the lifecycle of the Project.
- Provide accurate and timely information to stakeholders in a culturally appropriate manner.

6.3.2 Regulatory Framework and Standards

ADNOC's requirements for stakeholder engagement are outlined in the Social Risk Management Standard [Ref 27], Section 5.2. A summary of the requirements from this standard are presented below:

- ADNOC shall conduct a broad, inclusive and continuous stakeholder engagement process with all potentially impacted stakeholders.
- ADNOC shall deploy community liaison personnel to maintain an open and continuous two-way communication channel within the community.
- Engagement materials and processes should be culturally appropriate, adopting local languages and customs.
- Grievances must be taken seriously, recorded, and investigated until resolved as soon as it is possible to do so.
- Ensuring that short term business interests are not allowed to jeopardise the broader social licence to operate.

During the operation stage, ADNOC should:

- Conduct pre-production stakeholder engagements and establish mechanism for regular dialogue.
- Execute the social risk management plan including CSR activities as applicable
- Operate the Community Feedback Mechanism
- Maintain active stakeholder engagement during production

- Ensure continuity by means of setting up a community advisory committee or equivalent vehicle.

6.3.3 Stakeholder Identification and Analysis

A list of priority stakeholders is presented in Table 6-3. Priority Stakeholders for Engagement.

Table 6-3. Priority Stakeholders for Engagement

Stakeholder Category	Justification for inclusion
Al Dafrah/ADNOC Beach Club/Sir Banyas island	Can be affected during operation by: - Visual impacts from groundflare illumination
VIP Palace/representatives	Can be affected during operation by: - Visual impacts from groundflare illumination
Fishermen community	Can be affected during operation by: - Increased navigation with induced noise and disturbance to fish communities

The following types of vulnerable people could be impacted from the Project:

- Residents in the neighboring community of Al Dhanna city, including those working in the VIP palaces, that could be potentially impacted by the generation of noise, visual change, and negative perceptions of health impacts from flaring. This includes elderly people, people with pre-existing medical conditions, and the disabled visiting the tourism establishments.

6.3.4 Engagement Program, Information Disclosure, and Implementation Schedule

An integrated Engagement Action Plan for the operation stage is presented in Table 6-4. Stakeholder Engagement Activities to be Undertaken During Operations .

Table 6-4. Stakeholder Engagement Activities to be Undertaken During Operations

Stakeholders	Engagement and Information Disclosure Approach
Neighbouring communities: Qurayyah and Affected Communities impacted from the movements of workers and use of worker camps	
Al Dafrah/ADNOC Beach Club/Sir Banyas island.	Ad Hoc meeting meeting to discuss: • The outcome of environmental and social monitoring activities (air, noise, vessel traffic, etc.). • Any other concerns raised.

Stakeholders	Engagement and Information Disclosure Approach
	Disclosure tools:, the ADNOC Community Feedback Mechanism Leaflet
VIP Palace/representatives	A regular information sharing about status of the project and operations activities **Disclosure tools**: Project Information Poster, the RLNG Community Feedback Mechanism Leaflet
Fishers/Abu Dhabi Fisherman Association	An annual meeting to discuss: • The outcome of environmental and social monitoring activities (air, noise, vessel traffic, etc.). • Any other concerns raised. **Disclosure tools**:, Project Information Poster, the RLNG Community Feedback Mechanism Leaflet
Interested parties	
Al Dhannah Hospital	Annual coordination meeting
Al Dhannah educational establishments	Annual coordination meeting
Interested parties + Authorities	
Regulator EAD, DCT, Abu Dhabi Maritime, Abu Dhabi Ports, DMT, others	A series of ad hoc l meetings to discuss: • The outcome of environmental and social monitoring activities (air, noise, local employment, training, etc.). • Any other concerns raised. **Disclosure tools**: The Annual Environmental and Social Performance Report, Project Information Poster, the ADNOC Community Feedback Mechanism Leaflet

6.3.5 Roles, Responsibilities, and Resources

ADNOC Group accountabilities and responsibilities for Social Risk Management are held by three functions and the following personnel.

ADNOC GROUP HSE FUNCTION

- Performs regulatory review and approval of Social Risk Management (SRM) Dossier, which include Social Impact Assessments and External Stakeholder Engagement Plans.

ADNOC GROUP COMMUNICATIONS & CSR FUNCTION

- Supports and advises ADNOC Group HSE Function in the area of communications and stakeholder engagement.
- Provides assistance to the Directorates and Group Companies where clarification is required on communication and stakeholder engagement aspects of the Social Risk Management Standard [Ref 27].
- Provides training to Directorate and Group Company personnel on communication and stakeholder engagement topics that benefit from a corporate approach.
- Provides expert advice on all aspects of social risk management to the Directorates and Group Companies.
- Advises the Directorates and Group Companies on all formal external communications to ensure consistency of messaging and reputation management; and reviews and approves all external communication messages and materials.
- Coordinates CSR activities.
- Liaises with Group Services & Administration to align on corporate messaging and on application of stakeholder engagement methods and tools, and to ensure continuous learning from SRM implementation experiences [Ref 27].

ADNOC GROUP SERVICES & ADMINISTRATION FUNCTION

- Supports and advises ADNOC Group HSE Function with delivery of its regulatory accountabilities in the area of stakeholder engagement.
- Reviews stakeholder engagement plans before they are finalized, approved and distributed.
- Coordinates all community engagement activities executed by Group Directorates, Group Companies, Joint Ventures and Partners and their contractors in the UAE.
- Coordinates alignment of community engagement activities with engagement of local and national government and entities.
- Liaises with Group Communications and CSR to align on corporate messaging and on application of stakeholder engagement methods and tools, and to ensure continuous learning from SRM implementation experiences.

GROUP COMPANY - CEO of ADNOC Group Company

- The CEO of ADNOC Group Company is accountable for social risk management related to all business activities of Group Company.

HEAD OF GC CORPORATE HSE

- Ensures that competent and independent subject matter experts are involved in the development of the SIA and associated studies. GC CHSE shall review and technically approve the independent third-party consultants including the Curriculum Vitaes of the lead technical personnel associated with the SIA process.
- Review and technically approve SIA and associated studies during any stage of the project lifecycle (including the combined phase or modification projects).
- Review all technical content, clarifications and deviations on the requirements of SIA and associated studies and provide necessary approval.

VP OF GC COMMUNICATIONS & CSR OR EQUIVALENT

The VP of ADNOC Group Company Communications & CSR (GC Comms) is the technical approver and custodian of the External Stakeholder Engagement Plan and related studies of the SRM Dossier.

This includes identification, assessment and engagement of communities and other stakeholders, communications, and management of reputation.

The VP of GC Comms shall:

- Ensure that competent and independent subject matter experts are involved in the development of the External Stakeholder Engagement Plans and related studies. The VP of GC Comms shall review and technically approve the independent third-party consultants including the Curriculum Vitaes of the associated lead technical personnel;
- Review and technically approve stakeholder engagement reports and related studies during any stage of the project lifecycle (including the combined phase or modification projects);
- Review all technical content, clarifications and deviations on the requirements of External Stakeholder Engagement Plans and related studies and provide necessary approval;
- Liaise with ADNOC Group Communications and CSR Function for Regulatory Approval of the
- External Stakeholder Engagement Plan by timely submissions and follow up; and
- Be the custodian (single point repository) of all the stakeholder engagement components of the SRM Dossier developed for various projects and operations in GC.

The VP of GC Comms is accountable for the Communication and CSR contribution to SRM and shall:

- Represent Communications & CSR on the GC Social Risk Management Team
- Ensure the consistency of the community engagement approach and external messaging related to SRM.

HEAD OF GC GENERAL SERVICES AND ADMINISTRATION OR EQUIVALENT

The Head of GC General Services and Administration (GC GSA) is accountable for community and other stakeholder engagement. The Head of GC GSA shall:

- Represent GSA on the Social Risk Management Team
- Ensure execution of community engagement in support of business activities.
- Ensure close alignment of community engagement activities with engagement of government entities.
- Implement and manage the Community Feedback Mechanism and analyse and report community (stakeholder) feedback received on a regular basis.
- Ensure participation of and contribution from security subject matter experts as required

PROJECT MANAGER

The Project Manager is responsible for social risk management including stakeholder engagement during the project stages. The Project Manager is the owner of the SRM Dossier during the project stages and responsible for handover of the SRM Dossier to the operations phase. The Project Manager shall ensure that:

- An SRM Operational Team is formed as early as possible in the project lifecycle and tasked with the management of social risks and delivery of SRM requirements. The Project Manager or his/her delegate will chair this team.
- SRM activities and reports are prepared in line with the requirements of all applicable ADNOC Standards;
- The independent third-party consultants, lead engineers and subject matter experts involved in the development of SRM studies and reports are pre-qualified within ADNOC, and that the proposed team is technically reviewed and approved by GC CHSE to ensure the competency of the personnel involved in the project work;

HEAD OF OPERATIONS

The Head of Operations is responsible for social risk management including stakeholder engagement during the operations stage. The Head of Operations is the owner of the respective Operations SRM Reports and SRM Dossier and is responsible for handover of the SRM Dossier to the decommissioning phase.

The Head of Operations shall ensure that:

- An SRM Operational Team is formed or maintained and tasked with the management of social risks and delivery of SRM requirements. The Operations Manager or his/her delegate will chair this team.
- The 'Statement of Fitness' is signed demonstrating that facilities shall be operated and maintained to ensure HSE and integrity.

SRM Operational Team

The SRM Operational Team shall:

- Organise and attend stakeholder engagement activities;
- Monitor the effectiveness of the ESEP using the indicators (refer to Section 6.3.7);

- Approve the use of all information materials prior to their external release;
- Implement the ADNOC Community Feedback mechanism.

6.3.6 Community Feedback Mechanism

The purpose of the ADNOC Community Feedback Mechanism (CFM) is to manage communities and other stakeholders' grievances and other feedback generated during the lifecycle of the Project. The mechanism is already established and will be implemented by the SRM Team. Details of the mechanism will be included in the information tools used.

Stakeholder feedback obtained from the mechanism shall be used to improve the environmental and social performance of the Project over time. Details of all grievances raised shall be summarised in future versions of the ESEP.

The CFM is described in detail in Appendix 12 of the SRM standard and is not repeated in this document.

The CFM will be publicized to the identified stakeholders and simplified copies and CFM leaflets will be made available at the tourist facilities near the RLNG site and made available to the VIP representative.

RLNG project shall develop its own community Feedback Mechanism procedure.

6.3.7 Monitoring

The following performance monitoring indicators will be used during implementation of the ESEP to check progress and improve the overall effectiveness of the engagement programme over time:

- An up-to-date checklist of Project stakeholders – The stakeholder checklist is up to date and reflects the current stage of the Project lifecycle.
- Engagement activities completed – The register of stakeholder meetings reflects a target of 90% planned engaged as being completed.
- Disclosure documents – the disclosure documents are accurate and reflect the current life cycle stage of the Project.
- Capital spend on conducting engagements – the capital spent is aligned with the budget included in the latest version of the ESEP.

Periodically during the Project, Monitoring Compliance and Audit Reports shall be prepared by the SRM Operational Team to check that the content of the ESEP is being correctly implemented.

6.3.8 Reporting and Record Keeping

The following reports will be generated from implementation of the ESEP:

- Stakeholder engagement meeting records.
- Attendance records.

- Social Incidents Reports (see below).
- Reports that reflect the level of capital spend on implementation of the ESEP.
- Any others as necessary.

Incident Reports:

A Social Incident is defined as an unplanned event induced by external stakeholders that interrupts business activities or impacts ADNOC's reputation. Every stakeholder engagement activity shall be used as an opportunity to raise awareness of the ADNOC Community Feedback Mechanism so that concerns raised by stakeholders can be recorded, investigated, and resolved in the shortest time possible. Details of all Social Incident Reports shall be appended to future versions of the ESEP, should any incidents arise during the lifecycle of the Project.

Monitoring Compliance and Audit Reports:

Periodically during the Project, Monitoring Compliance and Audit Reports shall be prepared by the SRM Operational Team to check that the content of the ESEP is being correctly implemented.

Procedures to Review Inspections and Steps to Address Non-Compliance:

A Corrective Action Tracking Register shall be implemented by the SRM Operational Team to record and track until completion, all non-compliances identified from the compliance and audit reports.

6.3.9 Appendices

Complaint Action Form:

PART 1. CONTACT AND REGISTRATION DETAILS			Detail	Copy to Log
1	New or Existing Feedback or Complaint?	If new, allocated new feedback or complaint registration # (based on Complaint Log)		yes
		If update to existing feedback or complaint, enter existing registration #		
2	Date Received	DD/MM/YYYY		yes
3	Location	Community / Stakeholder name/general area		yes
4	Feedback Provider or Complainant	Feedback Provider or Complainant's name		yes
		Address		
		Phone #		
		Male/Female		
		Underage?		
		Vulnerable group?		
5	Received through	Suggestion box/phone/ letter / email etc.		
6	Received by	DD/MM/YYYY		
	Reported to (COMPANY function)	DD/MM/YYYY		
PART 2. COMPLAINT			**Detail**	**Copy to Log**
7	Anonymous or Confidential?	yes/no		
8	Stakeholder Category	Employee/community member/police/other state security forces/government official/NGO/supplier/media/journalist/other (specify)		yes

PART 1. CONTACT AND REGISTRATION DETAILS			Detail	Copy to Log
9	Geographic Scope	Local/provincial/regional/national/international		
10	Severity	Notable/minor/serious/major/catastrophic		yes
11	Type of Feedback/Complaint	Process/Layout/Interface/Specification/Compliance		yes
12	Feedback or Complaint Description	Detailed description		yes
PART 3. RESPONSE/CORRECTIVE ACTION			**Detail**	**Copy to Log**
13	Immediate Action Description			
	Action by	Name Company Representative		
14	In Need of Further Investigation?	yes/no		
15	Investigation Description			
16	Investigation Led by	Name Company Representative		
17	Representatives Involved	Name Company & External Representatives		
18	Deadline for Completing Investigation	DD/MM/YYYY		
19	Outcome of Investigation	Factually incorrect/reference to other mechanism/further action required		
20	Description of Further Action Required	Detailed description		
21	Action Completed	DD/MM/YYYY		
22	Approved by	Name (Company Representative)		

PART 1. CONTACT AND REGISTRATION DETAILS			Detail	Copy to Log
23	Complaint Notified Through	Phone/letter/in person/notice board/in a meeting/other (specify)		
24	Complaint Notified On	DD/MM/YYYY		
25	Response to Feedback/Complaint	Anonymous/no feedback/accepts action/rejects action/other (specify)		
26	Feedback or Complaints appeal	yes/no		
PART 3.1. ONLY COMPLETE IN CASE OF APPEAL			**Detail**	**Copy to Log**
27	Description of Appeal			
28	Appeal Panel Participants	Name of participants		
29	Deadline for Appeal	DD/MM/YYYY		
30	Outcome of Appeal			
31	Complaint Notified Through	Phone/letter/in person/notice board/in a meeting/other (specify)		
32	Complaint Notified On	DD/MM/YYYY		
33	Response from Complainant	Anonymous/no feedback/accepts action/rejects action/other (specify)		
PART 4. CLOSURE			**Detail**	**Copy to Log**
34	Feedback or Complaint Closed	yes/no		yes
35	Name of Feedback Provider or Complainant (if no anonymous)	Signature & Date		
	Company Function	Signature & Date		

PART 1. CONTACT AND REGISTRATION DETAILS			Detail	Copy to Log
	Company Function	Signature & Date		
	Company Function	Signature & Date		
	Any 3rd party involved	Signature & Date		

Feedback or Complaints Log:

1	Registration	
2	Date of Feedback or Complaint Received (DD/MM/YYYY)	
3	Location (community/general)	
4	Stakeholder category (community member, NGO, employee etc.)	
5	Severity (notable/minor/serious/major/catastrophic)	
6	Type of Feedback or Complaint	
7	Feedback or Complaint description	
8	Response / Corrective Action Description	
9	Feedback or Complaint Status (open/closed)	
10	Other notes	

Form may be digitized to fit into website or mobile application.

Feedback or Complaints Status Tracking Register:

Dashboard status as of	
Average Response Time	
Target Resolution Timeframe (days)	
%Satisfied with Process	
% Satisfied with Outcome	

Dashboard status as of	
Response Target (Days)	
Average Duration to Response	
Average Duration to Closure	

Status Report	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Open cases at beginning of month												
New cases this Month												
Cases closed this Month												
Open cases at end of month												
Average time between receipt and closing out of feedback or complaints												

% of closed cases that were closed on time												
% of feedback or complainants that were satisfied with the process												
% of feedback or complainants that were satisfied with the outcome												

6.4 SECURITY MANAGEMENT PLAN

6.4.1 Objectives

The main objectives of the security management plan during the operation phase of the RLNG Project are to:

- Ensure Safe and Secure Operations: Provide mitigation measures for the safe and secure management of site activities during operation.
- Protect Personnel and Assets: Safeguard all personnel, equipment, materials, and facilities from security threats.
- Comply with Regulations: Adhere to all relevant security laws, regulations, and ADNOC standards.
- Facilitate Effective Communication: Ensure that security policies and procedures for day-to-day site activities are communicated to all operators and personnel working on site.
- Coordinate with Authorities: Maintain close collaboration with relevant security authorities, including CICPA and ADNOC Security, to ensure integrated security management.

6.4.2 Regulatory Framework and Standards

The Security Management Plan aligns with the following regulatory frameworks, standards, and guidelines relevant to security management during operation:

UAE Laws and Regulations

- Federal Law No. 6 of 1973: Concerning Entry and Residence of Foreigners
- Federal Law No. 8 of 1980: Regulation of Labor Relations
- Federal Law No. 24 of 1999: Protection and Development of the Environment
- Federal Decree-Law No. 17 of 2019: Concerning Weapons, Ammunition, Explosives, Military Equipment, and Hazardous Materials
- Cabinet Decision No. 24 of 2017: On Security of Ports, Borders, and Free Zones
- Federal Law No. 5 of 2014: On Combating Cybercrimes
- Abu Dhabi Law No. 14 of 2017: Concerning the Establishment of the Critical Infrastructure and Coastal Protection Authority (CICPA)

ADNOC Standards

- HSE-GA-ST02: HSE Management System Standard
- HSE-GA-ST04: Incident Notification, Investigation, and Reporting
- HSE-GA-ST06: Project HSE Plan and Standard
- HSE-GA-ST08: HSE Performance Monitoring and Reporting

- HSE-GA-ST09: HSE Audit and Assurance
- HSE-OS-ST24: Security Management

International Standards and Guidelines

- ISO 28000: Specification for Security Management Systems for the Supply Chain
- ISO 27001: Information Security Management Systems
- IFC Performance Standard 4: Community Health, Safety, and Security
- International Ship and Port Facility Security (ISPS) Code (if applicable)

6.4.3 Security Roles

6.4.3.1 Critical Infrastructure and Coastal Protection Authority (CICPA) Authority and ADNOC Security

CICPA Authority and ADNOC Security are responsible for the perimeter of the existing facilities of the Ruwais Industrial City including fencing, access control, surveillance, manned guarding and direction of the emergency planning and response systems. All requirements of the CICPA or any other authority having jurisdiction with respect to access to restricted areas shall be complied with. CICPA and ADNOC Security are responsible for:

- Perimeter Security: Securing the perimeter of the existing facilities in Ruwais Industrial City, including fencing and surveillance.
- Access Control: Managing access to the site through gates and checkpoints.
- Surveillance: Monitoring the perimeter and access points via surveillance systems.
- Security Control Room: Manning the control room and coordinating incident response.
- Manned Guarding: Providing security personnel for access control, patrolling, and emergency response.
- Security Compliance and Inspections
    - Conducting security audits and inspections to ensure compliance with CICPA regulations and ADNOC security standards.
    - Providing guidance and directives on security matters to the facility management.

Key Responsibilities:

- Ensure all personnel accessing the site have the appropriate CICPA Security pass/access card.
- Process and approve access requests submitted by operators.
- Enforce compliance with all CICPA and ADNOC security requirements.
- Collaborate with facility security personnel to address security concerns.

6.4.3.2 Facility Security Management

The facility's Security Management team is responsible for implementing on-site security measures within the operational areas, including:

- Security Management System
    - Developing and maintaining a Security Management System (SMS) in line with ISO 28000 and ADNOC standards.
    - Integrating security measures into daily operations and facility management practices.
- Access Control within Operational Areas
    - Controlling entry and exit of personnel, contractors, visitors, and vehicles within the facility.
    - Issuing internal access badges and maintaining access control logs.
- Physical Security Measures
    - Implementing additional fencing, barriers, and signage within the facility as required.
    - Ensuring critical assets and sensitive areas are adequately secured.
- Security Personnel
    - Employing qualified security staff or engaging a licensed Private Security Company (PSC) approved by the relevant authorities.
    - Ensuring all security personnel are trained and certified according to UAE regulations and ADNOC requirements.
- Incident Management
    - Monitoring for security incidents, breaches, or suspicious activities.
    - Reporting incidents promptly to CICPA and ADNOC Security as required.
    - Conducting internal investigations and implementing corrective actions.
- Coordination with External Entities
    - Liaising with CICPA, ADNOC Security, local law enforcement, and emergency services.
    - Participating in joint security exercises and drills.

Key Responsibilities:

- Develop and implement a Facility Security Plan reviewed and approved by ADNOC Security and CICPA.
- Ensure all security measures comply with UAE laws, ADNOC standards, and international best practices.
- Maintain accurate records of security activities, incidents, and access control.

- Foster a security-aware culture among all personnel through training and communication.

6.4.4 Security Measures

The Security Management Plan includes comprehensive measures to mitigate security risks and protect the facility, personnel, and assets.

6.4.4.1 Access Control

- Perimeter Security
    - Maintain secure fencing around the facility perimeter with controlled access points.
    - Install intrusion detection systems and surveillance cameras along the perimeter.
- Entry and Exit Procedures
    - Implement strict access control protocols at all entry and exit points.
    - Verify identification of all personnel, contractors, and visitors entering the facility.
    - Utilize electronic access control systems with card readers or biometric verification.
- Vehicle Control
    - Inspect all vehicles entering the facility for compliance and security risks.
    - Designate parking areas for staff, contractors, and visitors away from critical infrastructure.
- Visitor Management
    - Require all visitors to be pre-approved and accompanied by authorized personnel.
    - Provide visitor badges and ensure they attend a safety and security briefing prior to entry.

6.4.4.2 Physical Security Measures

- Surveillance Systems
    - Deploy CCTV cameras with real-time monitoring in key areas, including entrances, exits, and critical infrastructure.
    - Ensure surveillance systems are operational 24/7 and recordings are securely stored.
- Lighting
    - Install adequate lighting around the facility perimeter and access points to deter unauthorized access.
- Barriers and Bollards:
    - Use barriers to control vehicle movement and prevent unauthorized vehicular access to sensitive areas.

- Signage
    - Display clear signage indicating restricted areas, security measures, and emergency contact information.
    - Use multilingual signs as appropriate.

6.4.4.3 Information Security

- Data Protection
    - Implement measures to protect sensitive information, including cybersecurity protocols and access controls.
    - Comply with UAE Federal Law No. 5 of 2014 on Combating Cybercrimes and relevant data protection regulations.
- Confidentiality Agreements: Require personnel and contractors to sign confidentiality agreements regarding sensitive information.
- Controlled Use of Communication Devices: Enforce policies on the use of mobile phones, cameras, and recording devices within the facility.

6.4.4.4 Emergency Response and Incident Management

- Emergency Procedures
    - Develop and maintain emergency response plans for security incidents, including intrusion, theft, sabotage, and terrorism.
    - Coordinate with CICPA and local emergency services.
- Incident Reporting
    - Establish protocols for immediate reporting of security incidents to relevant authorities.
    - Maintain incident logs and conduct investigations to determine root causes.
- Regular Drills and Exercises
    - Conduct security drills to test the effectiveness of emergency response plans.
    - Involve security personnel, facility staff, and external agencies as appropriate.

6.4.4.5 Coordination with Authorities

- Compliance with CICPA Requirements
    - Adhere to all directives issued by CICPA regarding security measures and procedures.
    - Facilitate inspections and audits conducted by CICPA officials.
- Information Sharing

- Share relevant security information with CICPA and ADNOC Security to enhance situational awareness.
- Participate in security briefings and coordination meetings.

6.4.5 Monitoring

To ensure the effectiveness of security measures and compliance with relevant standards, the monitoring activities in Table 6-5. Security Monitoring Plan During Operation Phase will be conducted.

Table 6-5. Security Monitoring Plan During Operation Phase

Aspect	Parameter(s)	Monitoring Location	Frequency	KPI(s)
Access Control	- Number of unauthorized access attempts - Compliance with badge/pass requirements - Functionality of access control systems - Audit of access logs	- Site entry and exit points - Security Control Room	- Continuous monitoring - Daily checks	- Zero unauthorized entries - 100% personnel with valid passes - Access control systems operational - No critical findings in access audits
Security Incidents	- Number and type of security incidents - Response times - Incident investigation outcomes - Implementation of corrective actions	- Throughout the facility	- Immediate reporting - Monthly summaries	- Reduction in incidents over time - All incidents investigated and closed - Lessons learned implemented - Timely response to incidents
Surveillance Systems	- Functionality of CCTV and surveillance equipment - Coverage of critical areas - Recording and storage of surveillance footage	- Security Control Room - Facility perimeter	- Daily equipment checks - Monthly system audits	- 100% operational surveillance systems - No blind spots in critical areas - Secure storage of recordings as per policy

Visitor Management	- Visitor logs maintained accurately - Compliance with visitor procedures - Number of visitors attending safety and security orientation	- Security offices - Reception areas	- Daily monitoring - Monthly reviews	- Accurate visitor records - 100% visitors oriented and accompanied - No violations of visitor protocols
Equipment and Material Control	- Records of materials and equipment entering and exiting the site - Compliance with material pass procedures - Inventory audits	- Security checkpoints - Storage areas	- Continuous monitoring - Quarterly audits	- Accurate and complete records - No loss or theft of materials - Compliance with procedures - Inventory discrepancies resolved promptly
Security Personnel Performance	- Training and certification records - Adherence to post orders - Professional conduct and appearance	- Security posts - Control rooms	- Monthly performance evaluations - Regular training updates	- 100% security staff trained and certified - Positive performance evaluations - No reports of misconduct
Coordination with Authorities	- Joint security meetings held - Compliance with directives from CICPA and ADNOC Security - Effectiveness of information sharing and communication	- Facility security offices - CICPA coordination meetings	- Weekly meetings - As required	- Effective collaboration - Timely implementation of directives - Clear communication channels maintained - Compliance with all regulatory requirements

Monitoring Details

- Access Control Monitoring
    - Electronic Logs
        - Regularly review access control system logs to detect any anomalies or unauthorized access attempts.
        - Verify that all access events are appropriately authorized.
    - Physical Checks
        - Conduct spot checks at entry and exit points to ensure procedures are being followed.
        - Inspect badges and passes for validity.
- Surveillance Monitoring
    - System Checks:
        - Daily checks of CCTV and other surveillance equipment to ensure functionality.
        - Immediate repair or replacement of faulty equipment.
    - Footage Review
        - Periodic review of surveillance footage for security analysis.
        - Secure storage and controlled access to recordings.
- Incident Monitoring
    - Maintain a centralized system for reporting and tracking security incidents.
    - Analyze incident data to identify trends and areas for improvement.
- Personnel Monitoring and Performance Evaluations
    - Regular assessments of security personnel performance, adherence to protocols, and professionalism.
    - Address any training needs or disciplinary issues promptly.
- Coordination Monitoring and Meeting Records
    - Document outcomes of coordination meetings with CICPA and ADNOC Security.
    - Track action items and ensure timely follow-up.

6.4.6 Responsibilities

- Project Director / General Manager
    - Overall responsibility for ensuring the Security Management Plan is effectively implemented.
    - Allocate adequate resources for security measures and personnel.

- Security Manager
    - Oversee the development and implementation of the Security Management Plan.
    - Coordinate with CICPA, ADNOC Security, and other relevant authorities.
    - Manage security personnel and ensure they are properly trained and equipped.
    - Conduct regular security risk assessments and update the plan accordingly.
- Security Supervisors
    - Manage day-to-day security operations in their assigned areas.
    - Ensure compliance with security procedures and post orders.
    - Supervise security guards and provide guidance as needed.
    - Report incidents and coordinate responses.
- Security Guards
    - Control access at gates and checkpoints.
    - Monitor and patrol assigned areas to detect and deter security threats.
    - Enforce security policies and report any suspicious activities.
    - Maintain logs and records as required.
- Information Security Officer (if applicable)
    - Oversee the protection of sensitive information and cybersecurity measures.
    - Implement information security policies and procedures.
    - Coordinate with IT departments and address any information security incidents.
- All Employees and Contractors
    - Comply with security policies, procedures, and access control requirements.
    - Attend required security training and awareness programs.
    - Report any security incidents, breaches, or concerns promptly.

6.4.7 Reporting

- Incident Reporting
    - Immediate Notification:
        - Security personnel must report any security incidents, breaches, or suspicious activities to the Security Manager without delay.

- Serious incidents should also be reported to CICPA and ADNOC Security as per protocols.

- Incident Reports:
  - Complete detailed incident reports documenting the nature of the incident, response actions taken, and outcomes.
  - Include photographs, witness statements, and any other relevant evidence.

- Daily Reports
  - Security Logs:
    - Security guards to maintain daily logs of activities, including access control records, patrols conducted, and any anomalies observed.
    - Submit logs to Security Supervisors for review.

- Monthly Reports
  - Security Summary:
    - The Security Manager to compile monthly summary reports of security activities, incidents, monitoring results, and KPIs.
    - Identify trends, challenges, and recommendations for improvements.

- Regulatory Reporting
  - Compliance Reporting:
    - Submit required reports to CICPA, ADNOC Security, and other regulatory bodies as mandated.
    - Ensure timely and accurate reporting in compliance with legal obligations.

6.4.8 Training and Awareness

- Security Personnel Training
  - Mandatory Training:
    - Ensure all security staff receive training in:
    - Security policies, procedures, and post orders.
    - Emergency response and incident management.
    - Legal requirements, including use of force.
    - Communication and reporting protocols.
    - First aid and basic life support (if applicable).

- Certification: Verify that security personnel hold valid certifications as required by UAE regulations.
- Refresher Training: Conduct regular refresher courses and drills to maintain skills and awareness.

- Employee Awareness Programs
  - Security Induction Training for all personnel covering:
    - Facility security policies and procedures.
    - Access control requirements and badge usage.
    - Responsibilities in reporting security incidents or concerns.
    - Prohibited items and behaviors.
  - Ongoing Awareness:
    - Include security topics in regular meetings, newsletters, and communications.
    - Promote a culture of security consciousness among all staff.
- Visitor Orientation
  - Briefing:
    - Provide a concise security and HSE orientation to all visitors before granting site access.
    - Emphasize safety rules, prohibited areas, and emergency procedures.

6.4.9 Review and Update

- Periodic Review:
  - Semi-annual Reviews:
    - Assess the effectiveness of the Security Management Plan semi-annually.
    - Review security risk assessments, incident data, and compliance with procedures.
  - Annual Evaluation:
    - Conduct a comprehensive evaluation of the plan's performance over the year.
    - Update the Security Risk Assessment to reflect any changes in the threat environment..
- Security Audits
  - Internal Audits: Conduct regular internal audits to assess compliance with security procedures and identify areas for improvement.

- External Audits: Facilitate audits by CICPA, ADNOC Security, or third-party assessors as required.

- Continuous Improvement
    - Lessons Learned: Incorporate findings from incident investigations and audits into the plan.
    - Update procedures and training materials accordingly.
    - Stakeholder Feedback: Seek feedback from security personnel, employees, and authorities to enhance security measures.
- Documentation and Version Control
    - Maintain up-to-date documentation of the Security Management Plan and related procedures.
    - Implement a version control system to track changes and ensure accessibility to current documents.

6.4.10 Coordination with Authorities

- CICPA Coordination
    - Compliance:
        - Ensure all security operations comply with CICPA regulations and directives.
        - Obtain necessary approvals and permits for security measures.
    - Information Sharing: Provide timely updates to CICPA on security matters, incidents, and changes in operations.
    - Joint Exercises: Participate in joint security exercises and emergency response drills organized by CICPA.
- ADNOC Security Collaboration
    - Alignment with Standards: Align facility security measures with ADNOC security standards and guidelines.
    - Regular Meetings: Hold regular coordination meetings with ADNOC Security to discuss security issues and initiatives.
- Local Law Enforcement and Emergency Services
    - Liaison: Establish communication channels with local police, civil defense, and emergency medical services.
    - Emergency Response: Coordinate response efforts during security incidents or emergencies affecting the facility or surrounding communities.
- Regulatory Compliance:

- Legal Obligations:
  - Stay informed of changes in UAE security laws and regulations.
  - Ensure all security practices are compliant and up to date.

7. OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT PLAN

7.1 OBJECTIVES

The main objectives of the occupational health and safety management plan during the operations phase of the RLNG Project are to:

- Ensure a Safe and Healthy Working Environment: Provide a workplace that minimizes risks to the health and safety of all personnel involved in the project.
- Prevent Accidents and Occupational Illnesses: Implement proactive measures to prevent injuries, illnesses, and incidents arising from operation activities.
- Promote a Safety Culture: Promote an environment where safety is a core value, and all workers are committed to maintaining high safety standards.
- Comply with Regulations: Adhere to all relevant UAE laws, Abu Dhabi regulations, ADNOC standards, and international best practices related to occupational health and safety.
- Continuous Improvement: Seek ongoing enhancement of OHS performance through regular monitoring, review, and implementation of best practices.

7.2 REGULATORY FRAMEWORK AND STANDARDS

The OHS Management Plan aligns with the following regulatory frameworks, standards, conventions, and guidelines:

UAE Laws and Regulations

- Federal Laws
    - Federal Law No. 8 of 1980: Regulation of Labor Relations and its amendments
    - Federal Decree-Law No. 33 of 2021: Regulation of Labor Relations
    - Federal Law No. 24 of 1999: Protection and Development of the Environment
    - Federal Law No. 6 of 1973: Concerning Entry and Residence of Foreigners
    - Ministerial Resolution No. 32 of 1982: Protection of Workers from Work Hazards
    - Ministerial Resolution No. 44 of 2022: Concerning Occupational Health and Safety and Labor Accommodation
- Abu Dhabi Regulations
    - Abu Dhabi Occupational Safety and Health System Framework (OSHAD SF)
    - UAE Fire and Life Safety Code of Practice, 2018
    - Abu Dhabi Environment, Health, and Safety Management System Regulatory Framework (AD EHSMS RF)

ADNOC Standards

- HSE-GA-ST02: HSE Management System Standard
- HSE-GA-ST04: Incident Notification, Investigation, and Reporting
- HSE-GA-ST06: Project HSE Plan and Standard
- HSE-GA-ST07: HSE Design Philosophy
- HSE-GA-ST08: HSE Performance Monitoring and Reporting
- HSE-GA-ST09: HSE Audit and Assurance
- HSE-EN-ST02: Pollution Prevention and Control
- HSE-EN-ST04: Waste Management
- HSE-EN-ST05: Environmental Performance Monitoring
- HSE-OH-ST01: Occupational Health and Safety Management
- HSE-OH-ST03: Occupational Health Risk Management
- HSE-OH-ST05: Health Screening & Surveillance
- HSE-CE-ST05: Emergency Response Plan

International Conventions and Protocols

- ILO Conventions:
    - No. 81: Labor Inspection Convention, 1947
    - No. 148: Working Environment (Air Pollution, Noise, and Vibration) Convention, 1977
    - No. 155: Occupational Safety and Health Convention, 1981
    - Convention No. 161: Occupational Health Services Convention, 1985
    - No. 170: Chemicals Convention, 1990
    - No. 187: Promotional Framework for Occupational Safety and Health Convention, 2006
- Basel Convention: Control of Trans-boundary Movements of Hazardous Wastes and Their Disposal, 1989
- Rotterdam Convention: Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, 1998
- Stockholm Convention: Persistent Organic Pollutants, 2001

WHO Guidelines

- WHO Global Plan of Action on Workers' Health, 2008–2017

- WHO Guidelines on Occupational Health Risk Assessment

International Best Practices

- ISO 45001: Occupational Health and Safety Management Systems
- ISO 31000: Risk Management Guidelines
- ISO 14001:2015 Environmental Management Systems
- ANSI/ASSP A10 Series: Safety Requirements for Operations and Demolition
- American Petroleum Institute (API) Standards
- International Association of Oil and Gas Producers (IOGP) Guidelines

7.3 ROLES AND RESPONSIBILITIES

7.3.1 ADNOC Group

- Senior Management:
    - Demonstrate commitment to OHS through active participation and resource allocation.
    - Approve and support the implementation of the OHS Management Plan.
    - Ensure integration of OHS considerations into all aspects of operations
- Group Health Safety and Environment Function (GHSEF):
    - Define appropriate standards for OHS, including methodologies for risk assessments.
    - Provide oversight and guidance on OHS matters.
    - Monitor compliance with ADNOC HSE policies and standards.

7.3.2 Facility Management

- Facility Manager / Operations Manager
    - Ensure implementation of the OHS Management Plan across all operational activities.
    - Allocate necessary resources for effective OHS management.
    - Promote a strong safety culture among all employees and contractors.
    - Ensure compliance with regulatory requirements and ADNOC standards.
- HSE Manager
    - Oversee all OHS activities and ensure compliance with standards and regulations.
    - Lead the Hazard Identification and Risk Assessment (HIRA) process.
    - Coordinate with contractors and subcontractors on OHS matters.

- Monitor OHS performance and report to senior management.
- Ensure incident investigations are conducted and corrective actions implemented.

- Occupational Health Subject Matter Expert (OH SME)
  - Facilitate and monitor the risk management process.
  - Assist in determining risk ratings and developing control measures.
  - Lead OHS training and awareness programs.
  - Oversee health surveillance and wellness programs.
- Supervisors and Team Leaders
  - Implement OHS policies and procedures within their areas of responsibility.
  - Ensure workers are aware of hazards and control measures.
  - Conduct regular safety meetings and toolbox talks.
  - Report any hazards, incidents, or near-misses promptly.

7.3.3 Employees

- Comply with all OHS policies, procedures, and safety rules.
- Use provided Personal Protective Equipment (PPE) correctly.
- Report any unsafe conditions, incidents, or near-misses.
- Participate in OHS training and meetings.
- Contribute to continuous improvement of OHS performance.

7.3.4 Contractors and Suppliers

- Contractor Management
  - Comply with all OHS requirements as per contractual agreements.
  - Develop and implement their own OHS plans compatible with this OHS Management Plan.
  - Ensure all workers are trained and competent in OHS practices.
- Supervisors and Foremen
  - Enforce OHS policies on-site.
  - Conduct regular safety briefings and toolbox talks.
  - Report any hazards or incidents promptly.
- Workers

- Comply with all OHS policies and procedures.
- Use provided PPE correctly and report any unsafe conditions.
- Participate in OHS training and meetings.

7.4 HAZARD IDENTIFICATION AND RISK ASSESSMENT

7.4.1 Process Overview

- Systematic Examination: Identify all potential hazards associated with operation activities, equipment, materials, and processes.
- Risk Assessment Methodology: Use qualitative and quantitative methods to assess risks, considering the likelihood and severity of potential incidents.
- Prioritization: Rank hazards based on risk levels to prioritize control measures.
- Documentation: Record all findings in the Risk Register (see Appendix A of this OHS Plan).

7.4.2 Key Hazards Identified

Some of the key hazards identified are listed below.

- Physical Hazards:
  - Process Equipment Operations: Risks associated with operating high-pressure systems, rotating equipment, and cryogenic processes.
  - Noise Exposure: From machinery, compressors, and other equipment.
  - Exposure to Extreme Temperatures: Due to working with cryogenic LNG and harsh weather conditions.
  - Slips, Trips, and Falls: Due to wet or uneven surfaces.
  - Manual Handling: Lifting and moving equipment or materials.
  - Electrical Hazards: From live electrical equipment and systems.
  - Marine Environment Hazards: Slippery surfaces, tides, waves, and potential for drowning.
- Chemical Hazards:
  - Handling of Hazardous Substances: Fuels, solvents, marine coatings, and anti-fouling agents.
  - Exposure to Dust and Fumes: From welding, cutting, and demolition activities
- Ergonomic Hazards:
  - Repetitive Tasks: Prolonged standing, bending, or awkward postures.
  - Vibration Exposure: Use of vibrating tools and equipment.

- Safety Hazards:
    - Equipment Operation: Cranes, heavy machinery, vessels, and barges.
    - Electrical Hazards: Temporary power supplies, water and electricity interface.
    - Fire and Explosion Risks: Due to flammable gases and liquids.
    - Confined Spaces: Entry into tanks, vessels, or other enclosed areas.
    - Working at Heights: Maintenance on elevated structures.
    - Vehicle and Traffic Hazards: Movement of vehicles and equipment on-site.
    - Navigation Risks: Interaction with marine traffic.
- Psychosocial Hazards:
    - Stress and Fatigue: Long working hours, shift work, and remote location.
    - Cultural and Language Barriers: Multinational workforce communication challenges.

7.4.3 Risk Assessment Matrix

A risk assessment matrix is used, as per applicable ADNOC Standard, to evaluate the level of risk associated with each hazard, considering:

- Likelihood: The probability of occurrence.
- Severity: The potential impact on health and safety.

7.5 CONTROL MEASURES

7.5.1 Hierarchy of Controls

Control measures will be implemented based on the following hierarchy:

1. Elimination: Remove the hazard where possible.
2. Substitution: Replace the hazard with a less dangerous option.
3. Engineering Controls: Isolate people from the hazard (e.g., guarding, ventilation).
4. Administrative Controls: Change work practices (e.g., training, procedures).
5. Personal Protective Equipment (PPE): Provide equipment to protect workers.

7.5.2 Specific Control Measures

- Physical Hazards
    - Process Equipment Operations:
        - Engineering Controls:

- Use of automated systems and interlocks to prevent unsafe operations.
- Regular maintenance and inspection of equipment.

- Administrative Controls:
- Develop Standard Operating Procedures (SOPs) for equipment operation.
- Implement Permit to Work (PTW) systems for non-routine tasks.

- Training: Provide operator training and certification.

- Noise Control:
  - Engineering Controls: Use low-noise equipment, install noise barriers.
  - PPE: Provide hearing protection devices.
  - Monitoring: Conduct regular noise level assessments.
- Temperature Exposure:
  - Administrative Controls: Schedule work during cooler hours, implement work-rest cycles.
  - Engineering Controls: Insulate cryogenic equipment and piping.
  - Facilities: Provide shaded rest areas and hydration stations.
  - Training: Educate workers on recognizing signs of heat stress.
- Slips, Trips, and Falls:
  - Engineering Controls:
    - Maintain good housekeeping.
    - Use non-slip flooring.
  - Administrative Controls:
    - Immediate cleanup of spills.
    - Regular inspections of walking surfaces.
- Marine Environment Hazards:
  - Engineering Controls: Install non-slip surfaces, guardrails on platforms and vessels.
  - PPE: Provide life jackets, safety boots with good grip.
  - Procedures: Develop marine safety procedures, including man-overboard drills.

- Chemical Hazards

- Hazardous Substances:
  - Substitution: Use less hazardous materials where possible.
  - Engineering Controls: Provide proper ventilation systems.
  - Administrative Controls: Implement safe storage, labeling, and handling procedures.
  - PPE: Provide appropriate gloves, masks, and protective clothing.
  - Training: Chemical handling and spill response training.
- Dust and Fumes:
  - Engineering Controls: Use dust suppression methods, local exhaust ventilation.
  - PPE: Provide respiratory protection suitable for the hazards.
  - Monitoring: Regular air quality assessments.

- Biological Hazards
  - Infectious Diseases:
    - Administrative Controls: Implement health screening, vaccination programs.
    - Hygiene Practices: Promote hand hygiene, provide sanitation facilities.
    - Awareness: Educate workers on disease prevention.
  - Marine Life:
    - Awareness Training: Inform workers about potential marine hazards.
    - First Aid: Provide treatment protocols for stings or bites.
- Ergonomic Hazards
  - Manual Handling:
    - Engineering Controls: Use mechanical lifting aids like cranes and hoists.
    - Administrative Controls: Implement job rotation, reduce manual handling tasks.
    - Training: Educate workers on proper lifting techniques.
  - Vibration Exposure:
    - Engineering Controls: Use anti-vibration tools and equipment.
    - Administrative Controls: Limit exposure time, provide rest periods.
    - Monitoring: Regular health checks for vibration-related conditions.
- Safety Hazards

- Equipment Operation:
  - Engineering Controls: Ensure equipment is fitted with safety devices.
  - Administrative Controls: Implement equipment maintenance programs, operator certification.
  - Exclusion Zones: Establish and enforce no-go areas around operating equipment.
- Electrical Safety:
  - Engineering Controls: Use Ground Fault Circuit Interrupters (GFCIs), proper insulation.
  - Administrative Controls: Lockout/tagout procedures, regular inspections.
  - Training: Electrical safety training for relevant personnel.
- Confined Spaces:
  - Procedures: Develop confined space entry permits, emergency rescue plans.
  - Monitoring: Conduct atmospheric testing before and during entry.
  - PPE: Provide appropriate respiratory protection and communication devices.
- Navigation Risks:
  - Coordination: Communicate with port authorities, use marine traffic control systems.
  - Training: Provide marine safety and navigation training.
- Working at Heights:
  - Engineering Controls: Install guardrails and safety nets.
  - Administrative Controls: Work at Height Permit system.
  - Ensure proper ladder and scaffold use.
  - PPE: Provide fall arrest systems, harnesses, and lanyards.
  - Training: Working at heights safety training.

- Psychosocial Hazards
  - Stress and Fatigue:
    - Administrative Controls: Manage workloads, ensure adequate rest periods.
    - Facilities: Provide comfortable accommodations and recreational facilities.
    - Training: Awareness on recognizing signs of fatigue.
  - Stress Management:
    - Support: Access to counseling services.

- Work Environment: Promote open communication.

- Cultural and Language Barriers:
    - Communication: Use multilingual signage, employ interpreters if necessary.
    - Training: Cultural sensitivity training for all staff.

7.6 Training and Competency

7.6.1 Training Programs

- Induction Training:
    - Mandatory for all workers before starting work on-site.
    - Covers OHS policies, site rules, emergency procedures, and hazard awareness.
- Job-Specific Training: Provided for roles with specific hazards (e.g., operators, maintenance technicians).
- Task-Specific Training: Provided for high-risk activities (e.g., working at heights, confined space entry).
- Ongoing Training: Regular refresher courses, toolbox talks, and safety briefings.
- Specialized Training: For roles such as HSE officers, first aiders, fire wardens, and emergency response team members.

7.6.2 Competency Assurance

- Verification of Competency: Assess and document workers' skills and qualifications.
- Certification: Ensure operators of equipment have valid certifications.

7.7 Communication and Consultation

- Communication channels for safety information.

7.7.1 Communication Channels

- Safety Meetings: Regular meetings to discuss OHS issues, updates, and feedback.
- Notice Boards and Signage: Display safety information, emergency contacts, and hazard warnings.
- Electronic Communications: Use emails, intranet, and other digital platforms to disseminate OHS information.
- Safety Bulletins and Newsletters: Provide updates on OHS matters and share best practices.

7.7.2 Worker Involvement

- Safety Committees: Establish committees with worker representatives to participate in OHS decision-making.
- Feedback Mechanisms: Encourage reporting of hazards and suggestions for improvement.
- Consultation Processes: Involve workers in risk assessments and development of control measures.

7.8 EMERGENCY PREPAREDNESS AND RESPONSE

7.8.1 Emergency Response Plan

- Development: Create a comprehensive plan detailing procedures for various emergencies (e.g., fire, medical incidents, chemical spills, explosion).
- Roles and Responsibilities: Assign specific roles to personnel (e.g., Incident Commander, First Aiders).
- Resources: Ensure availability of emergency equipment (e.g., fire extinguishers, first aid kits, spill kits)
- Communication: Establish clear communication protocols during emergencies.
- Coordination: Align with ADNOC and local emergency services' plans.

7.8.2 Drills and Exercises

- Regular Drills: Conduct evacuation drills and scenario-based exercises.
- Evaluation: Review drill performance and implement improvements.
- Involvement: Include contractors and relevant stakeholders in drills.

7.8.3 Coordination with External Services

- Liaison with Authorities: Coordinate with local emergency services (e.g., fire department, medical services).
- Access Information: Provide site maps and access routes to emergency responders.
- Mutual Aid Agreements: Establish agreements with nearby facilities for assistance during emergencies.

7.9 MONITORING AND REPORTING

7.9.1 Inspections and Audits

- Routine Inspections:
    - Conduct daily site inspections to identify hazards and verify compliance.
    - Use standardized checklists.
- Formal Audits:
    - Perform periodic audits against OHS standards and regulations.
    - Internal audits biannually; external audits annually.

7.9.2 Incident Reporting

- Reporting Procedures:
    - Establish clear processes for reporting incidents, near-misses, and unsafe conditions.
    - Immediate verbal report followed by written report within 24 hours.

- Data Analysis:
    - Track and analyze incident data to identify trends and areas for improvement.
    - Use software tools for data management.

7.9.3 Performance Indicators

- Key Performance Indicators (KPIs): Set measurable targets (e.g., Total Recordable Injury Rate, Lost Time Injury Frequency Rate, Number of safety observations reported, Training hours per employee).
- Regular Reporting:
    - Provide OHS performance reports to management and stakeholders monthly.
    - Include KPI trends, significant incidents, and corrective actions.

7.10 Health Management

7.10.1 Health Surveillance

- Medical Examinations: Conduct pre-employment, periodic, and exit medical examinations.
- Exposure Monitoring: Monitor worker exposure to hazardous substances (e.g., noise levels, air quality).
- Health Records: Maintain confidential health records in compliance with data protection laws.

7.10.2 Wellness Programs

- Health Promotion: Offer programs on nutrition, exercise, and smoking cessation.
- Mental Health Support: Provide access to counseling services and stress management resources.
- Vaccination Programs: Promote vaccinations for relevant diseases.

7.10.3 Occupational Disease Prevention

- Early Detection: Implement screening programs for occupational diseases (e.g., hearing loss, respiratory issues).
- Intervention: Provide medical intervention and adjust work conditions as necessary.
- Rehabilitation: Support workers returning to work after illness or injury.

7.11 Incident Investigation and Reporting

7.11.1 Investigation Procedures

- Immediate Response: Secure the incident scene, provide medical assistance, and prevent further harm.
- Investigation Team: Assign qualified personnel to investigate incidents.
- Root Cause Analysis: Identify underlying causes using methods like the Five Whys or Fault Tree Analysis.

- Corrective Actions: Develop and implement measures to prevent recurrence.

7.11.2 Reporting

- Documentation: Complete incident reports detailing findings and corrective actions.
- Notification: Report incidents to relevant authorities as required by law.
- Communication: Share lessons learned with all personnel to prevent future incidents.

7.12 Audit and Management Review

7.12.1 Internal Audits

- Audit Schedule:
    - Develop an audit plan covering all aspects of the OHS Management System.
    - Include different audit types: compliance, system, and performance audits.
- Audit Criteria:
    - Assess compliance with OHS policies, procedures, and legal requirements.
    - Evaluate effectiveness of control measures.
- Audit Findings:
    - Document findings, non-conformities, and recommendations.
    - Classify non-conformities based on severity.
- Corrective Actions: Implement corrective and preventive actions with assigned responsibilities and deadlines.

7.12.2 Management Review

- Review Meetings:
    - Senior management to review OHS performance quarterly.
    - Include Facility Manager, HSE Manager, and key stakeholders.
- Agenda Items:
    - Audit results
    - Incident trends and statistics
    - OHS objectives and KPIs
    - Resource needs
    - Opportunities for improvement
- Action Plans:

- Develop and track implementation of action plans arising from reviews.
- Assign responsibilities and timelines.

7.13 Document Control and Records Management

7.13.1 Documentation

- Policies and Procedures:
  - Maintain up to date OHS policies, procedures, and guidelines.
  - Review and update annually or as needed.
- Forms and Templates:
  - Use standardized documents for consistency (e.g., inspection checklists, incident report forms).
  - Include version numbers and approval signatures.

7.13.2 Records Management

- Record Keeping
  - Store records securely, ensuring confidentiality and accessibility.
  - Use electronic systems with backup protocols.
- Retention Period
  - Adhere to legal and organizational requirements for record retention.
  - Retain OHS records for at least five years or longer depending on regulatory requirements.
- Document Control
  - Implement version control and approval processes for all OHS documents.
  - Maintain a Document Register listing all controlled documents.

8. EMERGENCY RESPONSE PLAN

8.1 OBJECTIVES

The main objectives of the Emergency Response Plan (ERP) during the operation phase of the LNG Project in Ruwais, Abu Dhabi, are to:

- Minimize Environmental and Social Impacts: Ensure that all potential emergencies—both environmental and social—are managed effectively to minimize their impact on marine ecology, community health and safety, worker well-being, and local infrastructure.
- Risk-Specific Preparedness: Develop tailored emergency procedures based on the specific environmental and social risks identified in the Environmental Impact Assessment (EIA), Social Impact Assessment (SIA), and Environmental Hazard Identification (ENVID) studies, ensuring the project is equipped to handle emergencies effectively.
- Rapid Response and Recovery: Establish clear procedures for rapid response and recovery from incidents to mitigate any potential long-term environmental, social, or health impacts.
- Ensure Compliance: Adhere to all relevant UAE laws, Abu Dhabi regulations, ADNOC standards, and international best practices related to emergency preparedness and response.
- Enhance Stakeholder Confidence: Maintain transparent communication with stakeholders, demonstrating the project's commitment to safety and environmental stewardship.

8.2 REGULATORY FRAMEWORK AND STANDARDS

The Emergency Response Plan aligns with the following regulatory frameworks, standards, conventions, and guidelines:

ADNOC Standards

- HSE Governance and Administration Standards
    - HSE-GA-ST02: HSE Management System Standard
    - HSE-GA-ST04: Incident Notification, Investigation, and Reporting
    - HSE-GA-ST06: Project HSE Plan and Standard
    - HSE-GA-ST07: HSE Design Philosophy
    - HSE-GA-ST08: HSE Performance Monitoring and Reporting
    - HSE-GA-ST09: HSE Audit and Assurance
- HSE Crisis and Emergency Management Standards:
    - HSE-CE-ST05: Emergency Response Plan

- HSE-CE-ST06: Crisis Management

- HSE Occupational Health Standards:
  - HSE-OH-ST03: Occupational Health Risk Management
- HSE Environment Standards:
  - HSE-EN-ST02: Pollution Prevention and Control
  - HSE-EN-ST04: Waste Management
  - HSE-EN-ST05: Environmental Performance Monitoring

UAE Laws and Regulations

- Federal Laws:
  - Federal Law No. 24 of 1999: Protection and Development of the Environment
  - Federal Decree-Law No. 33 of 2021: Regulation of Labor Relations
  - Federal Law No. 6 of 1973: Concerning Entry and Residence of Foreigners
  - Ministerial Resolution No. 32 of 1982: Prevention Methods and Measures for Protecting Workers against Work Hazards
  - UAE Fire and Life Safety Code of Practice, 2018
- Abu Dhabi Regulations:
  - Abu Dhabi Occupational Safety and Health System Framework (OSHAD SF)
  - OSHAD SF Element 9: Emergency Preparedness and Response
  - Abu Dhabi Environment, Health, and Safety Management System Regulatory Framework (AD EHSMS RF)

International Standards and Guidelines

- International Finance Corporation (IFC) Performance Standards:
  - Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts
  - Performance Standard 4: Community Health, Safety, and Security
- ISO Standards:
  - ISO 22320: Security and Resilience—Emergency Management—Requirements for Incident Response
  - ISO 45001: Occupational Health and Safety Management Systems

- ISO 14001: Environmental Management Systems

- ILO Conventions:
  - No. 155: Occupational Safety and Health Convention, 1981
  - No. 170: Chemicals Convention, 1990

International Best Practices

- UNEP APELL: United Nations Environment Programme - Awareness and Preparedness for Emergencies at Local Level
- NFPA Standards: National Fire Protection Association guidelines for fire safety
- International Association of Oil & Gas Producers (IOGP) Guidelines

8.3 RISK ASSESSMENT

8.3.1 Overview

A risk assessment was conducted during the EIA, SIA, and ENVID studies to identify potential environmental and social emergencies that could arise during the operation phase. The ERP is designed to address these key risks by implementing appropriate preventive and responsive measures.

8.3.2 Identified Risks

- Marine Ecology Impact (Operation Activities)
  - Potential Emergencies:
    - Accidental spills of hazardous materials into marine environments.
    - Unplanned disturbances to sensitive marine habitats.
    - Underwater noise impacts on marine fauna.
  - Consequences:
    - Damage to coral reefs, seagrass beds, and mangroves.
    - Disruption of marine life, including endangered species like dugongs and marine turtles.
    - Negative effects on fisheries and local livelihoods.
- Community Health and Safety (Emergency Scenario occurring in RLNG plant):
  - Potential Emergencies:
    - Activation of the ground flare system and Emergency Diesel Generators (EDGs) due to process upsets.

  - Uncontrolled releases of hazardous substances.
  - Fire or explosion incidents affecting surrounding communities.
- Consequences:
  - Complaints and concerns from nearby communities due to mistakenly interpreting the ground flare illumination effect as a significant fire or explosion risk.
  - Increase in air pollution, leading to adverse health effects.
  - Property damage and potential injuries in extreme cases.

- Worker Wellbeing (Occupational Health and Safety)
  - Potential Emergencies:
    - Accidents resulting in serious injuries or fatalities.
    - Health emergencies due to exposure to hazardous substances or extreme conditions.
    - Activation of ground flare system and EDGs.
  - Consequences:
    - Loss of life or severe injuries.
    - Project delays and legal liabilities.
    - Increased risk of occupational illnesses.

8.4 ORGANIZATIONAL STRUCTURE AND RESPONSIBILITIES

An effective emergency response requires a well-defined organizational structure with clear roles and responsibilities:

- Facility Manager
  - Overall responsibility for emergency preparedness and response.
  - Ensures resources are available for effective implementation of the ERP.
  - Acts as the Incident Commander during major emergencies until relieved by higher authority.
- HSE Manager
  - Coordinates all emergency response activities.
  - Ensures compliance with ADNOC standards and regulatory requirements.
  - Liaises with external agencies and authorities.
  - Oversees training and drills related to emergency preparedness.
- Emergency Response Team (ERT)

- Team Leader:
  - Manages the ERT during an incident.
  - Coordinates response efforts and resources.
  - Communicates with the Incident Commander and Control Room.
- Emergency Coordinators:
  - Marine Response Coordinator: Manages marine spill response and coordinates with marine authorities.
  - Medical Emergency Coordinator: Oversees medical response and first aid activities.
  - Fire Safety Coordinator: Manages fire prevention, firefighting operations, and hazardous material incidents..
- First Aiders and Medical Staff:
  - Provide immediate medical assistance.
  - Coordinate with external medical services for evacuation if needed.
- Fire Wardens:
- Conduct fire prevention inspections.
- Use firefighting equipment to control and extinguish fires if safe to do so.
- Assist in evacuations and ensure all personnel are accounted for.
- Security Personnel: Secure the site and control access during emergencies.

- Social Manager
  - Manages social incidents involving the workforce and local communities.
  - Coordinates with community leaders and authorities to address social emergencies.
  - Implements communication strategies to mitigate community concerns
- Marine Ecologist and Biodiversity Experts
  - Provide expertise during marine-related emergencies.
  - Ensure response actions align with the Biodiversity Action Plan (BAP) / Biodiversity Management Plan (BMP).
  - Assess environmental impacts and advise on mitigation measures.
- Contractors and Suppliers
  - Contractor Management:

- Must comply with the ERP and participate in emergency preparedness activities.
- Ensure their personnel are trained and aware of emergency procedures.
- Report any incidents immediately to the facility management.

- Contractor Personnel:
  - Follow all instructions during an emergency.
  - Participate in drills and training sessions.
  - Report any hazards or incidents promptly.

8.5 EMERGENCY RESPONSE PROCEDURES

8.5.1 General Response Principles

- Immediate Action
  - Ensure the safety of personnel and the public.
  - Activate alarms and initiate appropriate emergency procedures without delay.
- Containment
  - Prevent escalation and minimize environmental and social impacts.
  - Use available resources and equipment to control the incident.
- Notification
  - Inform relevant internal and external stakeholders promptly.
  - Ensure accurate information is communicated to prevent misinformation.
- Documentation
  - Record all actions taken during the emergency.
  - Aintain logs of decisions, communications, and resource deployments.

8.5.2 Specific Emergency Scenarios

- Spill Response (Marine and Terrestrial) Procedures
  - Immediate Notification:
    - Alert the Emergency Response Team (ERT) and HSE Manager.
    - Notify the Control Room and relevant operational personnel.
  - Containment and Source Control:
    - Assess the spill type and extent.

- Deploy spill containment booms, absorbent materials, and other containment equipment.
- Stop the source of the spill if safe to do so (e.g., close valves, shut down pumps).

- Cleanup:
  - Initiate cleanup operations using appropriate methods.
  - Segregate and store recovered materials for proper disposal.
- Environmental Monitoring:
  - Conduct environmental assessments to determine the impact.
  - Implement remediation measures as advised by environmental specialists.
- Reporting:
  - Notify the Environment Agency - Abu Dhabi (EAD) and other relevant authorities.
  - Prepare detailed incident reports.

- Fire and Explosion Response Procedures
  - Alarm Activation:
    - Activate the fire alarm system upon detection of fire or explosion risk.
    - Announce evacuation orders clearly
  - Evacuation:
    - Guide personnel to designated assembly points via safe routes.
    - Fire Wardens to ensure all areas are evacuated.
  - Firefighting:
    - Trained fire wardens and ERT members to use firefighting equipment if safe.
    - Do not attempt to fight large fires; await professional firefighting services.
  - Emergency Services:
    - Contact Civil Defense (Fire Department) immediately.
    - Provide details of the incident and access information.
  - Site Security:
    - Secure the area to prevent unauthorized access.
    - Coordinate with security personnel to control site entry points.
- Gas Release and Toxic Exposure Procedures:

- Detection:
  - Gas detection systems to alert control room and personnel.
  - Immediate area monitoring for confirmation.
- Isolation:
  - Shut down affected equipment or pipelines remotely if possible.
  - Isolate the area and restrict access.
- Evacuation:
  - Evacuate personnel from the affected area following designated routes.
  - Use personal gas detectors and respiratory protection if required.
- Notification:
  - Inform ERT Leader, HSE Manager, and relevant authorities.
  - Notify nearby facilities if there is potential off-site impact.
- Response:
  - ERT to assess the situation and initiate control measures.
  - Ventilation or neutralization procedures as appropriate.

- Underwater Noise Exceedance and Marine Disturbance Procedures:
  - Monitoring:
    - Continuous monitoring of underwater noise levels during operations.
    - Visual monitoring for marine fauna presence.
  - Shutdown: Cease operations if noise exceeds thresholds or marine fauna are observed in the vicinity.
  - Notification: Inform the Marine Ecologist and HSE Manager.
  - Assessment: Evaluate the situation and determine when it is safe to resume work.
  - Mitigation Measures: Implement additional noise reduction techniques as needed.
  - Resumption: Resume activities only after clearance from environmental specialists.
- Traffic Accident and Road Safety Response Procedures:
  - Immediate Response: Secure the scene and provide first aid.
  - Emergency Services:
    - Call ambulance and police services.

  - Provide accurate location and incident details.
- Traffic Management: Implement traffic control measures to prevent further incidents.
- Notification: Inform the HSE Manager, Security Manager, and Social Manager.
- Investigation: Conduct a thorough investigation to determine causes.

- Worker Health and Safety Incidents Procedures:
  - Medical Assistance: Provide immediate first aid and arrange for medical evacuation if necessary.
  - Incident Reporting: Notify the ERT and HSE Manager.
  - Site Control: Secure the incident area to prevent further harm.
  - Investigation: Conduct an incident investigation following ADNOC standards.
  - Support Services: Provide support to affected workers and their families.
- Social and Community Incidents Procedures:
  - Immediate Action: De-escalate tensions and ensure the safety of all parties.
  - Notification: Inform the Social Manager and HSE Manager.
  - Engagement: Coordinate with community leaders and authorities.
  - Communication: Use emergency communication channels to inform stakeholders.
  - Resolution: Implement measures to address the root causes and prevent recurrence.

8.6 COMMUNICATION PLAN

8.6.1 Communication Protocols

- Internal Communication:
  - Chain of Command:
    - Follow established lines of communication within the project team.
    - ERT Leader communicates with Incident Commander and Control Room.
  - Incident Reports: Use standardized forms and methods for reporting incidents.
  - Shift Handover: Ensure seamless communication during shift changes.
- External Communication:
  - Authorities: Notify relevant authorities such as EAD, Civil Defense, police, and ADNOC Emergency Services as required.

- Community: Inform local communities of any incidents that may affect them through the Social Manager.
- Media Relations:
  - Designate a trained spokesperson for any media inquiries.
  - All external communications must be approved by senior management.
- Stakeholder Communication: Keep stakeholders informed as appropriate to maintain transparency.

8.6.2 Communication Methods

- Alarms and Alerts: Use sirens, alarms, and public address systems for immediate notifications.
- Radios and Telephones: Equip key personnel with reliable communication devices.
- Incident Command Center: Establish a central location for coordinating communication during an emergency.
- Emergency Contact List - Maintain an up-to-date list of contact details for:
  - Emergency services
  - Key project personnel
  - Local authorities
  - Community representatives
- Communication Equipment: Ensure redundancy in communication systems (e.g., backup power supplies, satellite phones).

8.7 EMERGENCY EQUIPMENT

- Spill Response Equipment
  - Marine Spill Kits:
    - Containment booms of various lengths and types.
    - Absorbent pads, rolls, and pillows for hydrocarbons.
    - Skimmers and pumps for recovery operations.
    - Storage containers and temporary storage tanks.
  - Terrestrial Spill Kits:
    - Absorbent materials suitable for chemicals and hydrocarbons.
    - Shovels, brooms, and waste containers.
    - Personal protective equipment (PPE) including gloves, goggles, and coveralls.

  - Neutralizing agents for chemical spills.

- Firefighting Equipment
- Portable Fire Extinguishers:
    - Appropriate types (e.g., A, B, C, D, K class) for different fire hazards.
    - Located strategically throughout the facility.
- Fixed Fire Protection Systems:
    - Fire hydrants and hose reels.
    - Automatic sprinkler systems.
    - Deluge systems for high-risk areas.
- Fire Detection and Alarm Systems:
    - Smoke, heat, and gas detectors connected to alarm panels.
    - Audible and visual alarms.
- Medical Equipment
    - First Aid Kits: Stocked according to the number of personnel.
    - Medical Supplies:
        - Stretchers
        - Defibrillators
        - Oxygen tanks
        - Medical Facilities: On-site clinic or first aid room staffed by qualified medical personnel.
        - Rescue and Safety Equipment
- Rescue and Safety Equipment
    - Personal Protective Equipment (PPE): Helmets, gloves, goggles, high-visibility clothing, safety harnesses.
    - Rescue Tools:
        - Confined space rescue equipment
        - Life rings and flotation devices (for marine areas)
    - Communication Devices:
        - Two-way radios
        - Satellite phones

- Maintenance and Readiness
    - Regular Inspections: Routine checks to ensure all equipment is functional.
    - Inventory Management: Keep updated records of equipment locations and quantities.
    - Accessibility: Ensure emergency equipment is easily accessible and not obstructed.

8.8 TRAINING AND AWARENESS

Training and awareness efforts for all workers, including subcontractors, during the operations phase of the LNG plant include:

- Induction Training
    - Emergency Procedures: All personnel to receive training on the ERP during induction.
    - Roles and Responsibilities: Clear understanding of individual roles during an emergency.
    - Use of Emergency Equipment: Basic training on how to use fire extinguishers, spill kits, and first aid equipment.
    - Emergency Exits and Assembly Points: Familiarization with evacuation routes and assembly areas.
- Regular Drills and Exercises
    - Quarterly Drills: Simulate different emergency scenarios (e.g., spills, fires, medical emergencies).
    - Marine Emergency Drills: Specific exercises for marine incidents involving spills or marine fauna disturbances.
    - Full-scale Exercises: Annual comprehensive exercises involving external agencies.
    - Evaluation and Feedback: Post-drill debriefings to assess performance and identify improvements.
- Specialized Training
    - Emergency Response Team (ERT): Advanced training in emergency response techniques.
    - First Aiders and Medical Staff: Certified training in first aid and emergency medical care.
    - Fire Wardens: Training in fire prevention and firefighting.
    - Marine Response Personnel: Training in marine spill response, wildlife protection, and use of marine equipment.
- Awareness Programs
    - Safety Campaigns: Regular initiatives to promote safety culture and emergency preparedness.

- Information Dissemination: Distribute manuals, posters, and bulletins on emergency procedures.
- Visitor and Contractor Orientation: Briefing on emergency procedures and site-specific hazards.

8.9 COORDINATION WITH LOCAL AUTHORITIES

Effective coordination with local authorities (enhances emergency response capabilities.

- Collaboration
  - Memorandums of Understanding (MOUs): Establish agreements with local emergency services and authorities.
  - Joint Planning: Participate in joint emergency planning sessions.
  - Information Sharing: Provide authorities with site plans, hazard information, and contact details.
- Emergency Services Integration
  - Access Facilitation: Ensure emergency services can access the site quickly.
  - Resource Sharing: Offer site resources to support local emergency responses if needed.
  - Community Notifications: Work with authorities to inform the public during emergencies.
- Regular Engagement
  - Meetings and Drills: Conduct regular meetings and joint drills with local authorities to enhance coordination.
  - Updates and Briefings: Keep authorities informed of any changes in operations that may impact emergency response.

8.10 INCIDENT REPORTING AND INVESTIGATION

Systematic reporting and investigation of incidents are essential for learning and prevention.

- Reporting Procedures
  - Immediate Notification: Report incidents to the HSE Manager and relevant authorities as required.
  - Documentation: Complete incident report forms with detailed information.
  - Regulatory Reporting: Comply with legal obligations for reporting to EAD, OSHAD, and other regulatory bodies.
- Incident Investigation
  - Investigation Team: Assign qualified personnel to investigate the incident.
  - Investigation Process: Gather evidence, interview witnesses, and analyze data.

- Root Cause Analysis: Use systematic methods to identify underlying causes.
- Recommendations: Develop corrective actions to prevent recurrence.

- Corrective Action Plans (CAPs)
  - Development: Propose corrective and preventive actions to address root causes.
  - Implementation: Assign responsibilities and timelines for corrective actions.
  - Monitoring: Track progress and verify the effectiveness of actions taken.
  - Communication: Share findings with all stakeholders to promote awareness.

8.11 CONTINUOUS IMPROVEMENT

Commitment to continuous improvement ensures the ERP remains effective and up-to-date.

- Post-Incident Reviews
  - Debriefings: Hold meetings after incidents and drills to discuss what went well and areas for improvement.
  - Documentation: Record findings and lessons learned.
- ERP Updates
  - Regular Reviews: Review the ERP annually or after significant incidents.
  - Stakeholder Input: Incorporate feedback from workers, contractors, authorities, and the community.
  - Regulatory Compliance: Ensure the ERP remains compliant with any new laws, regulations, or standards
- Audit and Assurance
  - Internal Audits: Assess the effectiveness of emergency preparedness and response.
  - Third-Party Audits: Engage external experts for unbiased evaluations.
  - Management Review: Senior management to review audit findings and ensure necessary improvements are implemented.
- Training Enhancements
  - Curriculum Updates: Update training programs based on new risks or changes in procedures.
  - Skill Development: Encourage continuous learning and professional development for emergency response personnel.
  - Competency Assessments: Regularly assess the competency of personnel involved in emergency response roles.

9. CONCLUSION

The LNG Project in Ruwais, Abu Dhabi, has developed a comprehensive Operations Environmental and Social Management Plan (OESMP) to effectively manage and mitigate environmental and social impacts during the operation phase. The OESMP encompasses a series of detailed management plans covering a wide range of environmental and social aspects, ensuring full compliance with UAE laws, Abu Dhabi regulations, ADNOC standards, and international best practices relevant to the oil and gas sector.

Environmental Management Plans

- Air Quality Management Plan: Addresses the control of air emissions to minimize impacts on ambient air quality.
- GHG Management Plan: Focuses on reducing greenhouse gas emissions associated with operation activities.
- Climate Risk Management Plan: Identifies climate-related risks and implements adaptation measures to enhance resilience against climate change impacts.
- Noise and Vibration Management Plan: Establishes measures to control noise and vibration levels to protect nearby communities and wildlife.
- Illumination Management Plan: Aims to reduce light pollution from ground flare and other illumination sources to protect nearby communities and wildlife.
- Soil and Groundwater Management Plan: Aims to prevent contamination of soil and groundwater resources through proper handling of materials and waste.
- Waste Management Plan: Ensures the safe handling, storage, transportation, and disposal of waste materials, including hazardous waste.
- Effluent, Drainage, and Wastewater Management Plan: Manages effluents and wastewater to prevent pollution of water bodies.
- Marine Ecology Protection Plan: Protects marine habitats and species during marine operation activities.
- Navigational Risk Management Plan: Addresses risks associated with marine navigation to prevent accidents and environmental impacts.
- Hazardous Materials Management Plan: Manages hazardous materials to prevent contamination and accidents.
- Resource Use Optimization Plan: Set measures to optimize resource use in operations, including water and energy usage.

Social Management Plans

- Labor and Working Conditions Management Plan: Ensures fair labor practices and safe working conditions in line with legal and international standards.

- Community Health and Safety Management Plan: Protects community health and safety from operational activities.
- Stakeholder Engagement Plan: Facilitates transparent communication and engagement with stakeholders throughout the operations phase.
- Security Management Plan: Protects personnel, assets, and information through effective security measures and coordination with authorities.

Additional Plans:

- Occupational Health and Safety Management Plan: Ensures a safe and healthy working environment by identifying hazards and implementing control measures.
- Emergency Response Plan: Establishes procedures for rapid response to emergencies to minimize potential environmental, social, or health impacts.
- Decommissioning and Rehabilitation Plan: Develops comprehensive, proactive strategies that outlines the steps, resources, and timelines required to safely decommission the RLNG plant and rehabilitate the site to minimize potential environmental, social, or health impacts.

These management plans provide a structured framework for addressing environmental and social risks, ensuring compliance, and promoting responsible project execution. The OESMP is designed to be a dynamic document, subject to regular reviews and updates to reflect the outcomes of ongoing monitoring activities and any changes in project conditions. This adaptive management approach ensures that the OESMP remains effective in responding to new environmental or social challenges, facilitating continuous improvement in performance.

Effective implementation of the OESMP requires active collaboration with all stakeholders, including local communities, regulatory authorities, and other relevant parties. Stakeholder engagement is essential for identifying potential impacts, incorporating feedback, and enhancing the overall environmental and social performance of the project.

In summary, the OESMP serves as a critical tool in managing the environmental and social aspects of the RLNG Project during the operations phase. By adhering to the guidelines and measures outlined in the OESMP, the RLNG aims to:

- Minimize Adverse Environmental and Social Impacts: Implement effective mitigation measures to reduce the project's footprint on the environment and communities.
- Ensure Regulatory Compliance: Adhere to all applicable laws, regulations, and standards to maintain legal and social license to operate.
- Protect Health and Safety: Safeguard the well-being of workers and local communities through rigorous health and safety practices.
- Promote Sustainable Resource Use: Optimize the use of resources such as energy and water to enhance efficiency and sustainability.

Strengthen Stakeholder Relationships: Build and maintain positive relationships with stakeholders through transparent communication and engagement.

Contribute to Sustainable Development: Support the sustainable growth of Abu Dhabi's energy sector and align with the UAE's environmental and social development goals.

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