Esso Highlands Limited

Papua New Guinea LNG Project

Environmental & Social Management Plan

PGGP-EH-SPENV-000018-001

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1.0 INTRODUCTION

1.1 Project Overview

The Papua New Guinea (PNG) Liquefied Natural Gas (LNG) Project (the Project) aims to commercialise the gas resources in the Hides, Angore and Juha fields and associated gas resources in the Kutubu, Agogo, Gobe and Moran fields in the Southern Highlands and Western provinces of PNG.

The Project involves the production of gas and its transportation to a new LNG facility on the coast of the Gulf of Papua near Port Moresby. The gas is to be liquefied at the facility and the LNG product shipped to international markets.

A summary description of the Project is provided in Section 2.0 and a schematic of the main Project components provided in Figure 1-1 below.

The location of the Project components is shown in Figure 1-2 below.

The Project will be operated by Esso Highlands Limited, in a joint venture with parties representing Oil Search Limited, Santos Ltd, Nippon Oil Exploration Limited, Mineral Resources Development Company Limited (MRDC) on behalf of project area landowners and Petromin PNG Holdings Limited (PNG State).

The current Project schedule is shown in Figure 1-3 below. It is anticipated that it will take approximately four years from award of engineering, procurement and construction (EPC) contracts for the Project to be constructed and commissioned. LNG shipments are scheduled to commence in 2014.

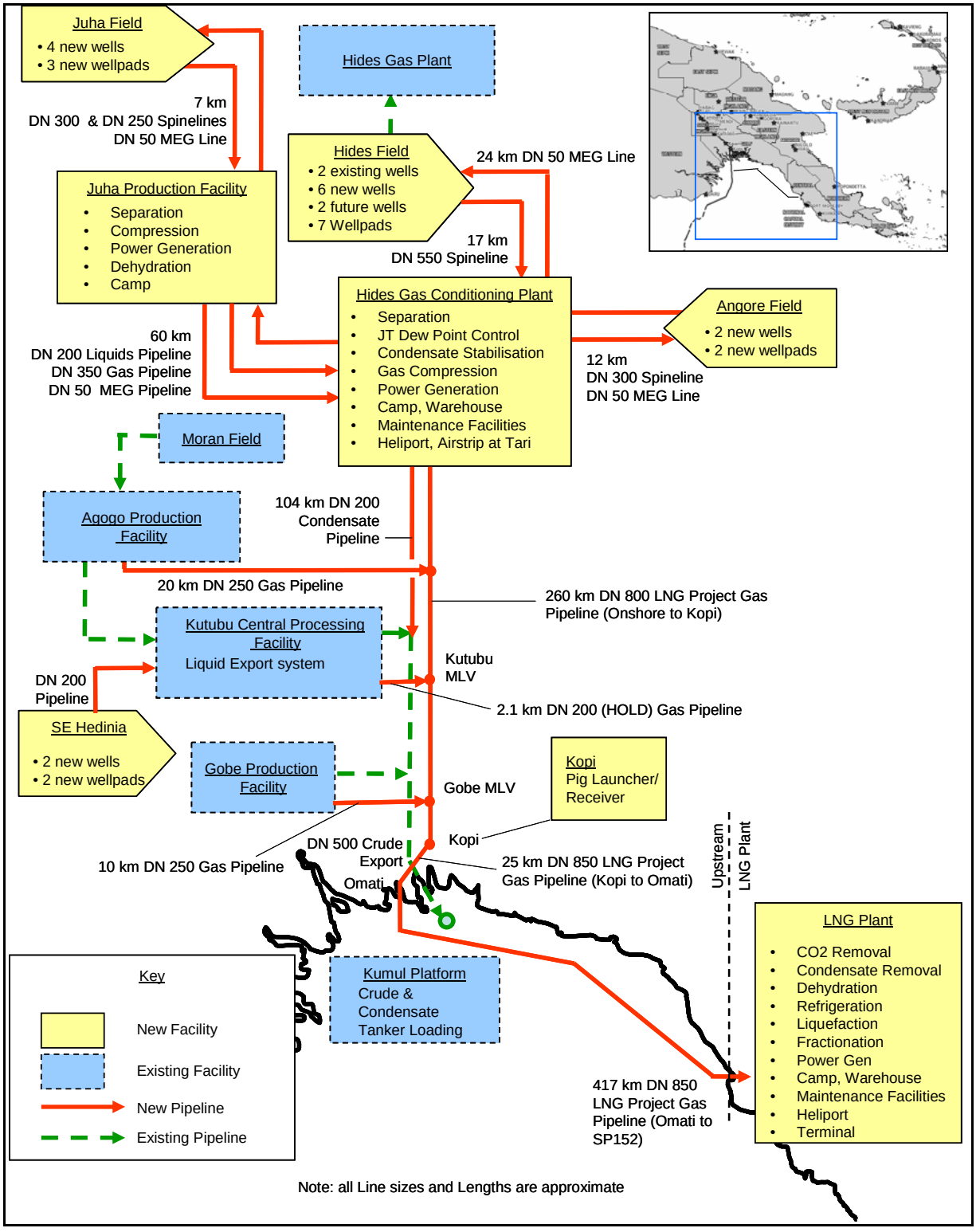


Figure 1-1: PNG LNG Overview Schematic

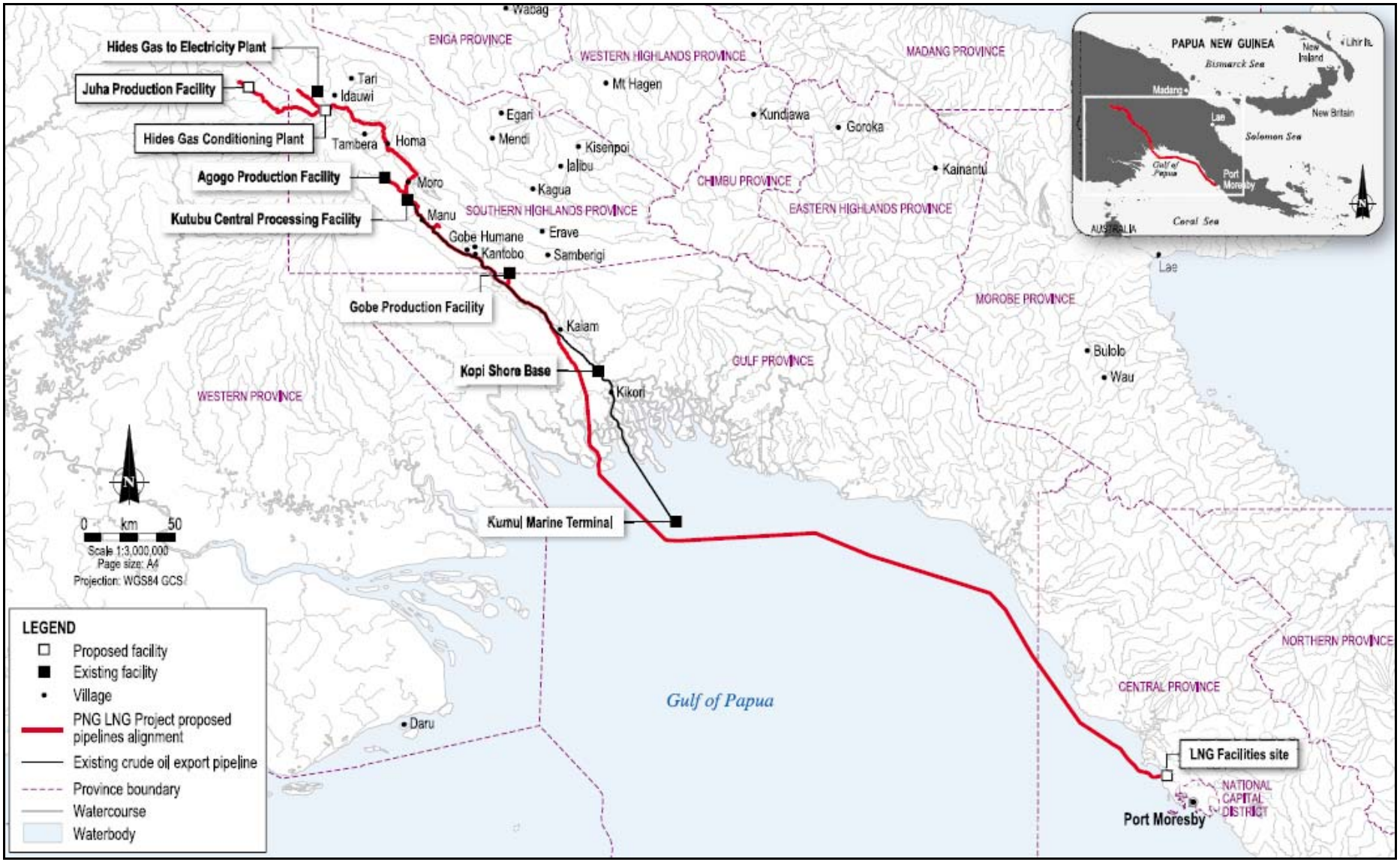


Figure 1-2: PNG LNG Project Location

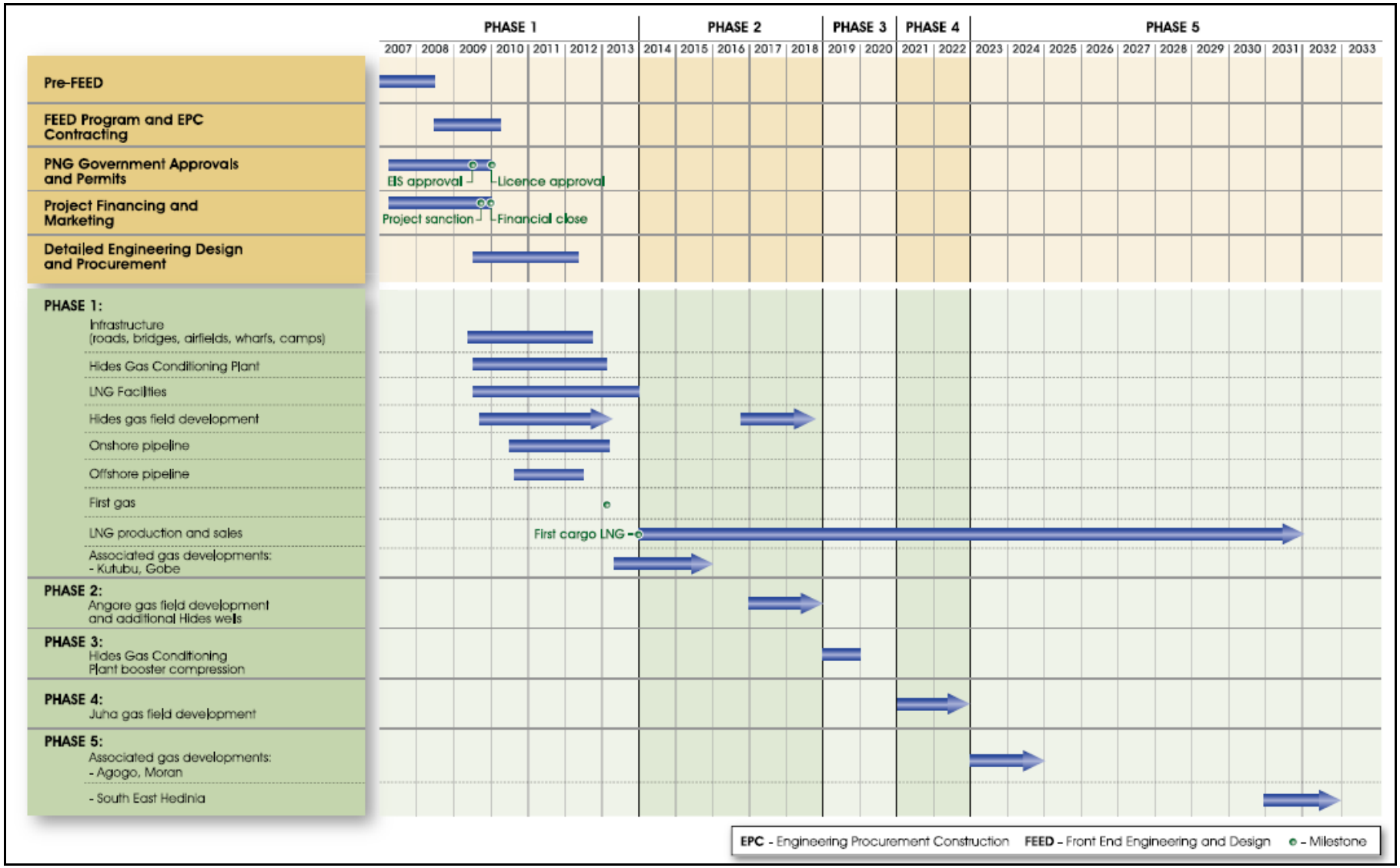


Figure 1-3: Indicative Project Schedule

1.2 Scope

Esso Highlands Limited (Company) has developed this Environmental and Social Management Plan (ESMP) as part of the safety, security, health and environmental (SSHE) management framework for the Project and in conjunction with this framework, Company has adopted policies, procedures, and guidelines as set forth in this document and appendices.

The ESMP is primarily based on the findings of PNG LNG Project Environmental Impact Statement (PNG LNG Project EIS) and its supporting studies.

Included in the scope of the ESMP are the current environmental and social aspects relevant to the Project, an overview of the environmental and social risks associated with its construction and an outline of environmental and social management and mitigation measures and monitoring requirements.

Safety, health, regulatory compliance or security aspects pertaining to the Project are not addressed in this ESMP and are discussed elsewhere in the Project documentation, including the Project Safety Management Plan, the Project Health Management Plan, the Project Regulatory Compliance Plan, and the Project Security Management Plan.

The ESMP is applicable to the construction and drilling execution of Phase I of the Project. Company will update the ESMP at least three months prior to each subsequent development phase (PNG LNG Project Phases II-VI).

The ESMP is not applicable to Operations. Company will, at least six months prior to commencement of production, develop an Operations ESMP.

The ESMP addresses all Project components.

A series of discipline specific Environmental Management Plan (EMP) and Social Management Plan (SMP) documents are included as appendices to the ESMP. References to the ESMP in this and other Company documents should be taken to include these appendices.

1.3 Objectives

It is Company's intention to avoid, when and where practical, those situations or incidents that could cause unacceptable, adverse biophysical, socioeconomic, or health impacts. For those situations or impacts that cannot be avoided, however, Company is committed to undertaking appropriate mitigation measures.

The objectives of this ESMP are to:

- Describe specific measures required to implement construction related management and mitigation commitments made in the PNG LNG Project EIS
- Describe specific additional measures required to implement construction related good industry practice, EIS approval conditions stipulated by the PNG Government and applicable International Finance Institution (IFI) requirements
- Outline the roles and responsibilities of the environmental and social management organisation for the Project
- Communicate environmental and social expectations throughout the Project organisation
- Establish the framework and minimum requirements for Contractors' ESMP documents.

Contractors and subcontractors shall comply with and implement the environmental and social management and mitigation requirements defined in this ESMP and its appendices, as applicable to each Contract scope of work.

Not all management and mitigation requirements are applicable to all Contract scopes of work. Company has developed an Environmental and Social Mitigation Register (see Section 5.3 for further details) which defines which management and mitigation measures are applicable to each Contract scope of work.

Contractors and subcontractors shall prepare, submit for Company review and approval, maintain and implement an ESMP. Contractor and subcontractor ESMP documents shall be developed in accordance with this ESMP.

Company will work closely with Contractors and subcontractors during development of Contractor and subcontractor ESMP documents to confirm that these meet good industry practice, are tailored to each Contractor's/subcontractor's specific scope of work and provide a commensurate level of detail.

The measures described in this ESMP are commitments made by Company. Company therefore remains ultimately accountable for the implementation of such commitments. Responsibility for the execution of many measures however rests to a large extent with Contractors and subcontractors. Company will verify, through a robust oversight programme described in this ESMP, that the measures in this ESMP are duly executed by Contractors and subcontractors.

1.4 ESMP Structure

The ESMP is comprised of this document (the ESMP main document) and a series of appendices.

This ESMP main document describes the overall environmental and social management processes applicable to the Project and covers topics which are common to all environmental and social disciplines.

The ESMP main document is structured as follows:

- Chapter 1: Introduction
- Chapter 2: Project Description
- Chapter 3: Legal & Other Requirements
- Chapter 4: Environmental & Social Assessment & Aspects
- Chapter 5: Environmental Management and Monitoring
- Chapter 6: Verification, Monitoring, Assessment and Audit
- Chapter 7: Reporting and Notification
- Chapter 8: Nonconformity & Corrective Action
- Chapter 9: Organisation, Roles & Responsibilities
- Chapter 10: Training, Awareness & Competence

Supporting this ESMP main document are a series of appendices which comprise discipline specific EMP and SMP documents and other necessary information. The appendices are listed in Table 1-1 below and a summary of the scope of the EMP and SMP documents is provided in Table 1-2.

Table 1-1: Environmental and Social Management Plan Appendices

Appendix Number	Document Title	Document Control Number
Appendix 1	Ecological Management Plan	PGGP-EH-SPENV-000018-003
Appendix 2	Air Emissions Management Plan	PGGP-EH-SPENV-000018-004
Appendix 3	Noise and Vibration Management Plan	PGGP-EH-SPENV-000018-005
Appendix 4	Waste Management Plan	PGGP-EH-SPENV-000018-006
Appendix 5	Water Management Plan	PGGP-EH-SPENV-000018-007
Appendix 6	Spill Prevention and Response Plan	PGGP-EH-SPENV-000018-008
Appendix 7	Hazardous Materials Management Plan	PGGP-EH-SPENV-000018-009
Appendix 8	Weed, Plant Pathogen and Pest Management Plan	PGGP-EH-SPENV-000018-010
Appendix 9	Erosion and Sediment Control Plan	PGGP-EH-SPENV-000018-011
Appendix 10	Raw Materials Management Plan	PGGP-EH-SPENV-000018-012
Appendix 11	Reinstatement Plan	PGGP-EH-SPENV-000018-013
Appendix 12	Induced Access Management Plan	PGGP-EH-SPENV-000018-014
Appendix 13	Cultural Heritage Management Plan	PGGP-EH-SPENV-000018-015
Appendix 14	Hydrotest Management Plan	PGGP-EH-SPENV-000018-016
Appendix 15	Acid Sulphate Soils Management Plan	PGGP-EH-SPENV-000018-017
Appendix 16	Dredging Management Plan	PGGP-EH-SPENV-000018-018
Appendix 17	Community Health & Safety Plan	PGGP-EH-SPENV-000018-021
Appendix 18	Community Impacts Management Plan	PGGP-EH-SPENV-000018-022
Appendix 19	Labour and Worker Conditions Management Plan	PGGP-EH-SPENV-000018-023
Appendix 20	Camp Management Plan	PGGP-EH-SPENV-000018-024
Appendix 21	Procurement & Supply Management Plan	PGGP-EH-SPENV-000018-025
Appendix 22	Community Engagement Plan	PGGP-EH-SPENV-000018-026
Appendix 23	Community Infrastructure Management Plan	PGGP-EH-SPENV-000018-027
Appendix 24	Community Health, Safety & Security Management Plan (Company)	PGGP-EH-SPENV-000018-028
Appendix 25	Community Support Strategy (Company)	PGGP-EH-SPENV-000018-029

Appendix Number	Document Title	Document Control Number
Appendix 26	Resettlement Framework Document (Company)	PGGP-EH-SPENV-000018-030
Appendix 27	Stakeholder Engagement Plan (Company)	PGGP-EH-SPENV-000018-031
Appendix 28	Environmental Monitoring Plan	PGGP-EH-SPENV-000018-032
Appendix 29	Environmental Performance Indicators (EPI) and Statutory Reporting and Notification Requirements	PGGP-EH-SPENV-000018-034
Appendix 30	Quarantine Management Program	PGGP-EH-SPENV-000018-035

1.5 Requirements Met

Operations Integrity Management System

As discussed further in Section 3.4, Company controls operations integrity risks and meets policy commitments through the use of its Operations Integrity Management System (OIMS). OIMS requires the preparation and approval for use of an Environmental Management Plan for project execution. The ESMP has been developed to fulfil OIMS requirements.

PNG Government Department of Environment and Conservation

As discussed further in Section 3.2, the ESMP constitutes the Project Environmental Management Plan (PEMP) referred to in the Environment Permit issued by the PNG Department of Environment and Conservation (DEC) on the 9 September 2009, pursuant to the PNG Environment Act 2000.

Lender Group

As discussed further in Section 3.3, debt financing has been secured for the Project through various Export Credit Agencies (ECA) and commercial banks. The ECA and commercial banks, collectively referred to in this document as the Lender Group, apply certain environmental and social principles and standards, namely the Equator Principles and the International Finance Corporation (IFC) Performance Standards.

The ESMP has been developed to fulfil the environmental and social requirements of the Lender Group, and for the most part addresses such requirements. However, the ESMP does not address all the Lender Group requirements and certain other information and documents are required to fully demonstrate conformance. Company documents which do not form part of the ESMP but which are nonetheless required to fully demonstrate conformance with Lender Group requirements are the Project Biodiversity Strategy, the Project Environmental and Social Standards, the Project Safety Plan, the Project Health Plan, the Project Regulatory Compliance Plan and the Project Journey and Traffic Management Procedure.

Other information not included in the ESMP but nonetheless required by the Lender Group, includes the required contents for Company's reporting to the Lender Group, Lender Group Management of Change and Associated Facilities. A separate document, the Lender Environmental and Social Requirements (LESR), has been prepared by Company to supplement the ESMP and provide a single point of reference to all information and documents which do not form part of the ESMP but are required to demonstrate conformance with Lender Group requirements. The Lender Group should read the ESMP in conjunction with the LESR.

1.6 Intended Users and Audience

The ESMP is a Company document that aims to communicate to Company's Project Team and Contractors the environmental and social management requirements, mitigation measures and commitments pertaining to construction execution of the Project.

Company's Project Team shall utilize this document during Project execution to achieve effective environmental and social management.

Contractors shall utilize this document to ensure their respective ESMP documents address the environmental and social management and monitoring requirements as applicable to each Contract scope of work.

In accordance with applicable IFI requirements and in the interests of transparency, this ESMP will also be made available to the public on the Project website (pnglng.com) in order to provide information to interested parties.

1.7 Document Control

The ESMP and its appendices are controlled documents stewarded by the PNG LNG Project Environmental and Regulatory (E&R) Department.

Changes requiring modifications to the ESMP and its appendices will be incorporated in accordance with the process defined in Company's Management of Change Procedure.

Changes to the ESMP and its appendices will be notified to relevant parties, including the Project Team, the Lender Group, the Independent Environmental and Social Consultant (IESC) and DEC.

Table 1-2: Scope of EMP and SMP Documents

	Ecological	Air Emissions	Noise and vibration	Waste	Water	Spill Prevention & Response	Hazardous Materials	Weed, Plant Pathogen & Pest	Erosion & Sediment Control	Raw Materials	Reinstatement	Induced Access	Cultural Heritage	Hydrotest	Acid Sulphate Soils	Dredging	Camp Management	Community Engagement	Community Health & Safety	Community Impacts	Community Infrastructure	Labour & Worker Conditions	Procurement & Supply
Clearing vegetation/ earthworks	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓										
Obtaining quarry material	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓	✓										
Timber use	✓							✓	✓	✓													
Blasting	✓		✓																				
Access way construction, including bridges	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓										
Horizontal drilling at watercourse crossings	✓		✓	✓	✓	✓	✓	✓	✓		✓												
Construction of water course crossings					✓			✓	✓														
Trenching/pipe-laying	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓										
Construction camps	✓			✓	✓			✓	✓	✓		✓	✓										
Water abstraction					✓									✓									
Construction of project facilities	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓										

	Ecological	Air Emissions	Noise and vibration	Waste	Water	Spill Prevention & Response	Hazardous Materials	Weed, Plant Pathogen & Pest	Erosion & Sediment Control	Raw Materials	Reinstatement	Induced Access	Cultural Heritage	Hydrotest	Acid Sulphate Soils	Dredging	Camp Management	Community Engagement	Community Health & Safety	Community Impacts	Community Infrastructure	Labour & Worker Conditions	Procurement & Supply
Well development	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓										
Pipeline hydrotesting	✓				✓	✓	✓	✓	✓					✓									
Vehicle movements	✓	✓	✓			✓	✓	✓		✓		✓											
In-migration	✓											✓					✓		✓	✓		✓	
Fuel storage and usage		✓			✓	✓																	
Disposing treated sewage effluent, wastewater and other liquid wastes	✓			✓	✓									✓									
Contamination from leaks or spills of oil/fuel/chemicals				✓	✓	✓	✓																
Seepage from landfills				✓	✓																		
Waste management (including incinerators and landfills)		✓		✓	✓		✓								✓	✓							
Discharges from marine vessels	✓			✓	✓	✓	✓	✓								✓							

	Ecological	Air Emissions	Noise and vibration	Waste	Water	Spill Prevention & Response	Hazardous Materials	Weed, Plant Pathogen & Pest	Erosion & Sediment Control	Raw Materials	Reinstatement	Induced Access	Cultural Heritage	Hydrotest	Acid Sulphate Soils	Dredging	Camp Management	Community Engagement	Community Health & Safety	Community Impacts	Community Infrastructure	Labour & Worker Conditions	Procurement & Supply
Discharge of desalination brine	✓		✓		✓																		
Marine and river traffic			✓	✓	✓	✓	✓	✓								✓							
Underwater pipeline laying	✓		✓	✓	✓	✓	✓	✓					✓			✓							
Marine dredging	✓		✓	✓	✓	✓	✓	✓					✓			✓							
Wharf/jetty construction	✓		✓		✓	✓	✓		✓														
Community relations	✓	✓	✓	✓	✓	✓	✓			✓			✓	✓			✓	✓	✓	✓	✓	✓	✓
Community Health																	✓		✓	✓			
Security of Community																	✓			✓			
Price Distortion/ Inflation																			✓	✓			✓
Local Procurement and Supply																	✓						✓
Worker Welfare & Living Conditions																	✓					✓	
Decommissioning & Retrenchment																	✓					✓	

	Ecological	Air Emissions	Noise and vibration	Waste	Water	Spill Prevention & Response	Hazardous Materials	Weed, Plant Pathogen & Pest	Erosion & Sediment Control	Raw Materials	Reinstatement	Induced Access	Cultural Heritage	Hydrotest	Acid Sulphate Soils	Dredging	Camp Management	Community Engagement	Community Health & Safety	Community Impacts	Community Infrastructure	Labour & Worker Conditions	Procurement & Supply
Recruitment of workers																						✓	
Worker pay and conditions																						✓	
Worker grievances																						✓	
Third party grievances	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓			✓	✓	✓	✓	✓	✓	✓
Managing community expectations																		✓		✓		✓	
Community environmental impacts		✓	✓	✓	✓	✓	✓	✓	✓	✓						✓	✓			✓			
Roads and Traffic												✓						✓		✓	✓		
Disruption to Services and Supplies																✓		✓			✓		

2.0 PROJECT DESCRIPTION

2.1 Overview

The Project is to be developed in a series of development phases, with Phase I scheduled to commence operations in 2014 through to Phase VI scheduled to commence operations in approximately 2024.

The Project description provided herein currently includes only Phase 1 of the Project. The Project description will be revised in due course as the ESMP is reviewed and updated for subsequent development phases.

Table 2-1: PNG LNG Project Phase I

Phase	Facilities	Timing
Phase I: Initial Development (and Drilling Campaign 1)	Hides Gas Field: Wellpads A, B, C, D, E, & G Angore Gas Field Wellpads A & B	2014
	Hides Gas Field Drilling: 8 New Wells / 2 Re-completions Angore Gas Field: Drilling 2 New Wells Produced Water Reinjection Well(s)	
	Hides Gathering System including the Hides Spineline	
	Hides-HGCP MEG Pipeline	
	Hides Gas Conditioning Plant (HGCP)	
	HGCP-Kutubu Condensate Pipeline	
	Kopi Scraper Station	
	LNG Project Gas Pipeline (Onshore/Offshore)	
	LNG Plant and Marine Facilities	
	Gobe Gas Pipeline	
	Kutubu Gas Pipeline	

The engineering, procurement and construction (EPC) for Phase I of the Project will be undertaken pursuant to the following main contracts:

- Upstream Infrastructure (C1)
- LNG Plant Early Works (C2)
- Telecommunications (EPC1)
- Offshore Pipeline (EPC2)
- LNG Plant and Marine Facilities (EPC3)
- HGCP and Hides Wellpads (EPC4)
- Onshore Pipelines and Infrastructure (EPC5A)
- Komo Airfield (EPC5B)

Drilling will be performed by Company under contracts separate to the above.

Linepipe will be procured directly by Company separate to the above.

A summary of the key works to be performed under the above contracts is provided below.

2.2 Upstream Infrastructure (C1)

A programme of infrastructure upgrades will be undertaken in advance of main construction activities in the Gulf Province and Southern Highlands Province. This programme includes civil works at and in the areas of Hides and Kutubu and the upgrade or new construction of roads and bridges along two main logistics routes. The scope of this work, referred to as Upstream Infrastructure, is summarised below:

Hides Region

- Bulk earthworks at the HGCP
- Site boundary fencing at the HGCP and Hides
- Vehicle washdown at the HGCP
- Temporary diesel fuel storage and distribution facility
- Water supply headworks at the HGCP
- Landfill and waste sorting facility in the Hides area (construction and operation)
- Temporary quarry and crushing and screening plant
- Temporary Medical facility
- Hides wellpads access track (26 km)
- Bulk earthworks and civil works for Hides

Kutubu Worksite (area of the existing Oil Search operations)

- Ridge Camp bypass road (1.4 km)
- Central Processing Facility (CPF) bypass road (0.8 km)
- Tamadigi Camp and Laydown Area

Southern Logistics Route Worksites (upgrade/new construction of roads and bridges along the Southern Logistics Route between Kantobo and Kopi)

- New road from Kantobo to Mubi River (11 km)
- Upgrading existing road from Mubi River to Gobe Airfield (18 km)
- New road deviation at the Kikori River bridge (3 km)
- Partial bypass road at Kopi shore base (3 km)
- New bridge across the Mubi River and Kikori River
- Bridge across Kwil Creek
- New wharf and roll-on/roll-off (RORO) ramp at Kopi shore base
- Laydown and construction camp area at Tamadigi, Gobe Airfield and Kopi
- Laydown area at Mubi River and Kikori River

Northern Logistics Route Worksites (upgrades to the Highlands Highway and 'Ring Road' from Lae to Poroma and Moro to the HGCP site)

- Installation of bridges and minor road maintenance to support construction logistics

2.3 LNG Plant Early Works (C2)

A programme of early works will be undertaken at the LNG Plant site and environs. The scope of this work, referred to LNG Plant Early Works, is summarised below:

- Upgrade of existing road from Motukea Island to LNG Plant Site
- New bypass road (rerouting of existing public road which transects LNG Plant site)
- LNG Plant Site Security Fence

2.4 Telecommunications (EPC1)

A telecommunications system will be installed, to support construction execution and operations by means of a separate contract: EPC 1 Telecommunications. Telecommunication facilities will be installed at six locations: Hides 1, Moran Peak, Iagifu, Gobe Tower, Kaiam and Mt. Hee, as part of the Project telecommunications network. The new facilities are all to be located at existing Oil Search Limited (OSL) telecommunication facilities.

2.5 Offshore Pipeline (EPC2)

The offshore pipeline length will be approximately 407 km from the Omati River onshore/offshore pipeline tie-in to the LNG Plant onshore/offshore tie-in. The Omati River landfall is located approximately 24 km up river from the open sea. The scope of work to be undertaken under the Offshore Pipeline (EPC2) contract is summarised below.

2.5.1 Omati River Bank Approach and Landfall

The Omati River landfall section of the pipeline will start at an onshore tie-in location approximately 200 m onshore from the river bank. This section of pipeline will be pulled ashore from a Shallow Water Lay Barge (SWLB) through a prepared trench to the tie-in location.

2.5.2 Shallow Water Section

The shallow water section of the Offshore Pipeline as defined herein includes all areas of pipe lay in water depths less than 10m LAT. From the tie-in location with the Onshore Pipeline at the Omati River landfall, the pipeline will run from the landfall for 24 km until it reaches the mouth of the Omati River.

2.5.3 Offshore Section

The offshore section of the Offshore Pipeline will start at a location beyond the mouth of the Omati River, in the Gulf of Papua. The pipeline will be laid on the seabed through the Gulf of Papua until it reaches the landfall at the LNG Plant.

2.5.4 LNG Plant Shore Approach and Landfall

The onshore tie-in point at the LNG Plant is located at approximately +1 m HAT. The shore approach zone is approximately 1.3 km in length. The pipeline will be pulled ashore through a prepared trench to the tie-in location.

2.6 LNG Plant and Marine Facilities (EPC3)

The LNG Plant will be located at Caution Bay near Port Moresby and its operations will occupy four separate lease areas: Portion 2456 and Portion 2459 (formally known as State Portion 152), Portion 2457 (Coastal Strip) and Portion 2458 (Offshore).

The LNG Plant will be designed to handle a stream day gas rate (inlet feed gas capacity) of 1133 kSm^3/hr (960 Mscfd) and will be capable of producing a nameplate peak capacity of approximately 6.6 MTPA LNG at a target specification of 42.56 MJ/m^3 (1140 Btu/scf) from either one or two liquefaction units as determined by the LNG Plant (EPC3) contractor.

The LNG Plant's processing facilities include inlet gas receiving, Acid Gas Removal Unit (AGRU), Dehydration, Mercury removal, Refrigeration, Liquefaction and Condensate

stabilization/fractionation. Major utilities include power generation, hot oil, air and nitrogen systems. Major offsite systems at the LNG Plant include LNG Storage (2 x 160,000m^3) tanks, condensate Storage (2 x 8,500m^3) tanks, firewater system, flare systems, fresh water system and effluent handling.

The LNG Plant's marine facilities design will accommodate the loading of LNG carriers in the size range of 125,000 m^3 to 220,000 m^3 and condensate tankers of 7,000 DWT. The marine facilities include LNG export berth, Condensate export berth, Tug landing area and Materials Offloading Facility (MOF) with permanent tug mooring berths.

A permanent operator personnel (rotator) camp will also be installed within the boundary of the LNG Plant site.

2.7 HGCP and Hides Wellpads (EPC4)

2.7.1 Hides Gas Conditioning Plant (HGCP)

The HGCP will be located in the Southern Highlands Province at the southeast base of the Hides Ridge near the village of Laite (1.5 km from the existing Hides A Wellpad). The HGCP will include the Processing Facility, Rotator Housing Community, and Industrial Park.

The HGCP Processing Facility will process gas and liquids from the Hides field and will be designed to stabilize condensate and gas. Process systems include inlet facilities including slug handling, gas and liquid inlet separation, dewpoint conditioning, compression, produced water injection, condensate stabilization and condensate transfer system.

The HGCP Processing Facility includes a number of utility systems that support the HGCP including fuel gas system, MEG storage, distribution, and regeneration, chemical injection systems, portable methanol skid, hot oil system, main power generation, essential power generation, diesel storage and distribution, instrument and utility air system, HP and LP flare systems, closed and open drain systems, MEG vent gas incineration, slop oil storage and transfer, fire water system, utility water storage and distribution, potable water system and nitrogen reticulation system.

The Rotator Housing Community will be within a shared security zone of the Processing Facility. It includes accommodation units, canteen and recreation building, indoor sports and fitness centre, administration office building including training centre, heliport and refuelling facility, medical centre, laundry, convenience store, muster and smoking shelters, outdoor sports ground, sewage treatment plant, municipal waste management depot and incinerator, and other associated infrastructure.

The HGCP Industrial Park will be a separate secure area adjacent to the Processing Facility and will provide the facilities necessary to support ongoing operations and maintenance of the HGCP. It includes a warehouse, chemical and hazardous materials storage shelter, outdoor storage yard, maintenance workshop, vehicle workshop, laboratory, diesel fuel storage and distribution station, waste management depot, industrial incinerator, and other associated infrastructure.

2.7.2 Hides Wellpads

New wellpads will be constructed or where they already exist, will be reinstated at Hides in preparation for planned drilling and workover activities.

2.8 Onshore Pipelines and Infrastructure (EPC5A)

The scope of the Onshore Pipelines and Infrastructure (EPC 5A) contract is summarised as follows:

- All onshore pipelines including the Hides Gathering System, the onshore portion of the LNG Project Gas Pipeline, the Condensate Pipeline and the Kutubu and Gobe Gas Pipelines
- Upgrade of existing track and bridges connecting Komo Airport and HGCP along Terejaga suitable for heavy load
- Upgrade of roads and bridges between Kopi to Moro and between Komo Airport to HGCP, through Tagari to meet construction logistics
- Upgrade/construction of infrastructure along pipeline route to support construction and operations (aviation, environmental and waste management facilities, vehicle Washdown stations).

2.8.1 EPC 5A Onshore Pipelines

The onshore pipelines are described in Table 2-2.

Table 2-2: Onshore Pipelines Description

Pipeline	Approximate Length	Description
Hides Spineline	19 km	The DN 550 (22-inch) spineline will collect well fluids from the flowlines starting at Wellpad E and transport them to the HGCP.
Hides MEG Pipeline	25 km	The DN 50 (2-inch) MEG pipeline will originate at the HGCP and deliver MEG to each wellpad.
Flowlines	11 km	The flowlines will consist of DN 150 (6-inch) and DN 250 (10-inch) flowlines from the wells to the Hides Spineline. Flowlines from Wellpads A - E will be relatively short but the wells F1 and G1 will have longer individual flowlines of 4 km and 7 km respectively. Flowline will have facilities for flow, temperature and pressure monitoring, sand detection, and corrosion probes and coupons.
HGCP to CPF Condensate Pipeline	109 km	DN 200 (8-inch) pipeline will be installed to transport condensate from the HGCP to the Kutubu CPF. It will run together with the Gas Pipeline.
LNG Project Gas Pipeline	292 km	The onshore section of the LNG Project Gas Pipeline will be installed from the HGCP to the Omati River landfall near Kopi, where it will connect to the offshore section of the pipeline. The onshore section of the Gas Pipeline will be designed as a DN 800 (32-inch) API 5L X60 and X65 pipeline from HGCP to Kopi Scraper Station, and from Kopi to Omati the line size will be DN 850 (34-inch) API 5L X65.
Oil Field Gas Pipelines	9.5 km Gobe 2.4 km Kutubu	Gas from the oil fields of Kutubu and Gobe will be connected to the LNG Project Gas Pipeline. The tie-ins to the LNG Project Gas Pipeline will be simple connections via MLVs for Kutubu and Gobe.

The onshore pipeline system includes facilities such as pig launchers and receivers, main line valve stations, check valve stations and cathodic protection sites.

2.8.2 EPC 5A Infrastructure

The infrastructure comprises roads and bridges required for project construction logistics and other items of infrastructure associated with the operation of the Project, including upgrade of approximately 20 km of existing road between HGCP & the Komo Airport, approximately 18 km of new access track to provide access to Angore Wellpads A and B, replacement of two existing bridges, repair and upgrade of other roads in Kopi to Moro section as required to support construction logistics, helipads at mainline valve stations and CP stations, waste management facilities at Kopi and Gobe and vehicle washdown stations at Kopi and Moro.

2.9 Komo Airfield (EPC5B)

A new government certified international airfield is to be constructed at Komo in the Hides area. The Komo Airfield is required as part of the Project in order to enable the delivery of large, heavy and bulky plant and equipment to the HGCP in a timely, efficient and dependable manner. The Airport is to be situated east of the existing Komo airstrip. It is designed for use of Dash 8 aircrafts with capability for heavy lift using Antonov AN 124-100 aircraft. The runway strip shall be 3200m x 45m, with an additional length of 60 m as a safety buffer at either end. The runway has a northern approach and departing aspect.

2.10 Development Drilling

The drilling activity associated with the PNG LNG Project comprises a total of fourteen new wells in the Hides (eight wells), Angore (two wells), and Juha (four wells) fields and re-completing two existing Hides Wells (Hides 1 and 4).

Drilling activities will occur in a phased approach, with the Hides and Angore activities occurring under a combined Phase 1-2 Drilling Campaign, and the Juha activities under a subsequent Phase 3 Drilling campaign. The Phase 1-2 Drilling Campaign (i.e., within the scope of this ESMP) consists of drilling eight new wells and re-completing two existing wells in the Hides field, and drilling two new wells in the Angore field (see Table 2-3).

Table 2-3: Phase 1-2 Development Drilling Campaign

Wellpad	Wells	Type
Hides A*	A1	New
	A2	New
	Hides 4	Workover
Hides B	B1	New
	B2	New
Hides C	C1	New
Hides D*	D1	New
Hides E*	Hides 1	Workover
Hides F	F1	New
Hides G	G1	New
Angore A	A1	New
Angore B	B1	New

*Existing Wellpad

Note: Table 2-3 does not include the Produced Water Reinjection well(s) the design and location of which have yet to be determined.

Six of the eight Hides development wells comprising the Phase 1-2 Drilling Campaign are planned to be drilled directionally. The wellpads (some with multiple drills) will be customized for each location to provide a surface that allows safe and efficient drilling, workover and production operations while minimizing the footprint and the amount of vegetation clearance required.

2.11 Construction Logistics

The main logistics route planned for work occurring in the Hides Region is the Northern Logistics Route commencing at the Port of Lae. The route makes use of the PNG public road system to a large extent and comprises five road sections: Lae to Mount Hagen (Highlands Highway), Mount Hagen to Poroma Junction, Poroma Junction to Tari, Tari to Idauwi and Idauwi to HGCP.

The Southern Logistics Route will be the main access route for the construction of the onshore pipeline. The route commences at the shore base on the Kikori River at Kopi and travels inland over a combination of existing and new project roads as far as Moro Junction. and, thence, by the PNG public road system to Poroma Junction.

Kopi Shore Base will be used as the primary entry point for pipe and other materials and equipment required for the construction of the onshore pipeline.

Aviation infrastructure is required to support the construction of the project and the operation of the HGCP. The aviation infrastructure is comprised of Komo Airport, Heliport at HGCP, Helipads at Kopi and Helipads at mainline valves and CP stations. The Komo Airport is planned to be used for the air transport of heavy or over-size loads to the HGCP site, which exceed the legal and safe transport limits along the Northern Logistics Route.

3.0 LEGAL AND OTHER REQUIREMENTS

3.1 Introduction

It is Company Policy to comply with all applicable environmental laws and regulations and apply responsible standards where laws and regulations do not exist.

Company's Operations Integrity Management System (OIMS) Standard System 6-1 (Environmental Management) requires environmental management processes to be compliant with applicable host-country environmental, socioeconomic, and health related regulatory requirements and project specific environmental, socioeconomic, and health related commitments and obligations (including but not limited to laws, regulations, decrees, permit/license/approval obligations, financing contracts/agreements).

The requirements applicable to the Project are those prescribed in the laws and regulations of Papua New Guinea and International Financial Institution (IFI) guidelines and standards.

A summary of these requirements is presented below and further details are provided in the each EMP and SMP document.

3.2 Laws and Regulations of Papua New Guinea

Laws and regulations of Papua New Guinea relevant to environmental and social matters are listed below.

- PNG Constitution 1975
- Oil and Gas Act 1998
- Environment Act 2000
- Environmental (Fees and Charges) Regulation 2002
- Environmental (Permits and Transitional) Regulation 2002
- Environmental (Prescribed Activities) Regulation 2002
- Environmental (Procedures) Regulation 2002
- Environmental (Water Quality Criteria) Regulation 2002
- Fauna (Protection and Control) Act 1966
- Conservation Areas Act 1978
- International Trade (Fauna and Flora) Act 1979 (Chapter 391)
- The Environmental Code of Practice for Sanitary Landfill Sites PNG 2001
- Dumping of Wastes at Sea Act 1979
- Prevention of Pollution at Sea Act 1979
- Employment Act 1978 and Regulation 1980
- Employment of Non-citizens Act 1978
- Industrial Organizations Act 1962 and Regulation 1963
- Industrial Relations Act 1962 and Regulation 1972
- Workers' Compensation Act 1978 and Regulation 1983
- Discriminatory Practices Act 1963
- HIV/AIDS Management and Prevention Act 2003
- Child Welfare Act 1961

- Land Act 1996
- Physical Planning Act 1989
- Building Act 1971 and Regulation 1994
- Customs (Prohibited Imports) Regulation 1973
- Explosives Act 1953
- Fire Service Act 1962 and Regulation 1966
- Industrial Safety, Health and Welfare Act 1961 and Regulation 1965
- Industrial Safety (Building Works) Order 1967
- Inflammable Liquid Act 1953 and Regulations
- Konebada Petroleum Park Authority Act 2008
- Motor Traffic Act 1950
- Licensing of Heavy Vehicles Act 1977
- Road Maintenance Act 1971
- Organic Law on Provincial Governments and Local-level Governments 1998
- Public Health Act 1973
- Public Health (Drinking Water) Regulation 1984
- Public Health (Infectious Diseases) Regulation 1973
- Public Health (Sanitation and General) Regulation 1973
- Public Health (Sewerage) Regulation 1973
- Water Supply and Sewerage Act 1996
- Food Sanitation Act 1991

The primary act governing environmental matters in PNG is the Environment Act 2000 (the Act), supported by the Environment (Prescribed Activities) Regulation 2002. As discussed further in Section 4.3, an Environment Permit is required pursuant to the Act. The Environment Permit was issued by DEC on 9 September 2009 and contains some 109 conditions.

Many of the Environment Permit conditions are addressed within the ESMP, although other conditions are to be fulfilled though the submission of other documents.

3.3 International Finance Institution Requirements

Debt financing for the Project has been obtained in the international markets through various Export Credit Agencies (ECA) and commercial banks.

The environmental and social requirements which apply to the Project by virtue of the project financing are summarised below.

3.3.1 Commercial Bank Requirements: Equator Principles

The Equator Principles represent a voluntary initiative developed by banks working in the project finance sector to develop a common and coherent set of environmental and social policies and guidelines that can be applied globally and across all industry sectors.

The Equator Principles are based on the guidelines and performance standards of the International Finance Corporation and accordingly represent a common benchmark for the project. The principles cover the following topics:

- Principle 1: Review and Categorisation
- Principle 2: Social and Environmental Assessment
- Principle 3: Applicable Social and Environmental Standards
- Principle 4: Action Plan and Management System
- Principle 5: Consultation and Disclosure
- Principle 6: Grievance Mechanism
- Principle 7: Independent Review
- Principle 8: Covenants
- Principle 9: Independent Monitoring and Reporting
- Principle 10: Reporting

3.3.2 Export Credit Agency Requirements

ECAs are private or quasi-governmental institutions that act as intermediaries between national governments and exporters to issue export financing. Many ECAs have environmental and social policies that, by virtue of their connection with national governments, and specifically those that are members of the Organization for Economic Co-operation and Development (OECD), revert to the Recommendation on Common Approaches on Environment and Officially Supported Export Credits (Common Approaches), e.g., Australia's EFIC. As is the case for private lenders, the Common Approaches apply the guidelines and performance standards of the International Finance Corporation.

3.3.3 International Finance Corporation

Applicable requirements of the International Finance Corporation (IFC) include the following:

- IFC Performance Standard 1: Social and Environmental Assessment and Management Systems
- IFC Performance Standard 2: Labor and Working Conditions
- IFC Performance Standard 3: Pollution Prevention and Abatement
- IFC Performance Standard 4: Community Health, Safety and Security
- IFC Performance Standard 5: Land Acquisition and Involuntary Resettlement
- IFC Performance Standard 6: Biodiversity Conservation and Sustainable Natural Resource Management
- IFC Performance Standard 7: Indigenous Peoples
- IFC Performance Standard 8: Cultural Heritage

3.4 Company Policy and Management System

Company's Standards of Business Conduct forms the framework by which Company operates. The Standards of Business Conduct include guiding principles and foundation policies.

Company policies relevant to the scope of this ESMP are presented below.

3.4.1 Environment Policy

It is Company policy to conduct its business in a manner that is compatible with the balanced environmental and economic needs of the communities in it operates.

Company is committed to continuous efforts to improve environmental performance throughout its operations worldwide.

Accordingly, it is Company policy to:

- Comply with all applicable environmental laws and regulations and apply responsible standards where laws and regulations do not exist
- Encourage concern and respect for the environment, emphasize every employee's responsibility in environmental performance, and foster appropriate operating practices and training
- Work with government and industry groups to foster timely development of effective environmental laws and regulations based on sound science and considering risks, costs, and benefits, including effects on energy and product supply
- Manage its business with the goal of preventing incidents and of controlling emissions and wastes to below harmful levels; design, operate, and maintain facilities to this end
- Respond quickly and effectively to incidents resulting from its operations, in cooperation with industry organizations and authorized government agencies
- Conduct and support research to improve understanding of the impact of its business on the environment, to improve methods of environmental protection, and to enhance its capability to make operations and products compatible with the environment
- Communicate with the public on environmental matters and share its experience with others to facilitate improvements in industry performance
- Undertake appropriate reviews and evaluations of its operations to measure progress and to foster compliance with this policy.

Company will plan and execute an environmentally responsible development consistent with Company's vision of *Protect Tomorrow. Today.*

Company environmental expectations are based on the following principles:

- Deliver superior environmental performance, which will also lead to competitive advantage
- Drive environmental incidents with real impact to zero, through a process of continuous improvement
- Achieve industry leadership in focus areas that are valuable to the business (focus areas are functionally-defined, locally implemented, and of high environmental significance).

3.4.2 Labour Practices

Company's Standards of Business Conduct provides a framework for responsible operations with regard to employment practices. Company supports these standards by developing policies, procedures, and practices in light of applicable laws and specific circumstances. With regard to employment practices, Company supports the following principles:

- Freedom of Association And Right To Collective Bargaining: Company recognizes and respects its employees' right to join associations and choose representative organizations for the purpose of engaging in collective bargaining
- Elimination of Forced or Compulsory Labor: Company does not use forced or compulsory labor. It recruits its employees and provides working conditions, including payment of wages and benefits, in compliance with applicable laws and regulations.
- Abolition of Child Labor: Company forbids the use of children in its workforce throughout its worldwide operations. All employees are above the legal employment age in the country of their employment

- Equal Employment Opportunity: Company provides equal employment opportunity in conformance with all applicable laws/regulations to individuals who are qualified to perform job requirements.

3.4.3 Health

Company's Health Policy states:

- Identify and evaluate health risk related to its operations that potentially affect its employees, contractors or the public
- Communicate in a reasonable manner to potentially affected individuals or organizations and the scientific community knowledge about health risks gained from its health programs and related studies.

Company's Statement on Strategic Health Management states that Company maintains an active commitment to the communities in which it works. Company's believes that self-sustaining improvements in public health are a key enabler for broader economic and social gains. By incorporating workforce and community health consideration in project planning, Company plays a role in addressing the broader economic and social development of the communities in which it operates.

3.4.4 Human Rights

Company is committed to conducting business in a way that protects the security of its personnel, facilities and operations and respects human rights.

Company's Standards of Business Conduct establish the Company's approach and its practices and operations reflect the spirit and intent of the Universal Declaration of Human Rights as it applies to private companies and the spirit and intent of the Fundamental Principles and Rights at Work of the 1998 ILO Declaration.

Company policies support its commitment to human rights and include freedom of association, elimination of forced or compulsory labor, abolition of child labor, and equal employment opportunity. Company condemns human rights violations in any form.

While recognizing that host governments have the responsibility of maintaining law and order, security and respect for human rights, the private sector also has a responsibility to respect human rights within the legitimate role of business.

Company believes that:

- It has an important role to play in promoting respect for human rights
- Its business presence can and should have a positive influence on the treatment of people in the communities in which it operates
- Security and respect for human rights can and should be compatible
- Human rights violations are not acceptable and should be condemned.

Company formally documented its support of the Voluntary Principles on Security and Human Rights in 2005 through its Statement of Principles on Security and Human Rights.

3.4.5 Transparency

Company is committed to honest and ethical behaviour and opposes corruption by supporting transparency. It is also committed to promoting respect for human rights and to serving as a positive influence in the communities where it operates. It is the right and responsible thing to do and doing so promotes stable and constructive business environments. As part of its commitment to honest and ethical behaviour, Company constructively participates in transparency and anti-corruption programs.

Company is an active participant of transparency initiatives that apply universally to all companies - publicly traded, private, and state-owned - with an interest in a country's extractive industry; protect truly proprietary information; and do not violate the laws of a host government or a company's contractual obligations.

3.4.6 External Affairs

Development of the Project will adhere to Company's Best Practices in External Affairs (BPEA) regarding Community Relations Management. The BPEA states that wherever Company operates, it forms collaborative partnerships and consults with community leaders to help build economic and social capacity that benefits communities and Company's business over the long term.

3.4.7 Operations Integrity Management System

As discussed, Company is committed to conduct business in a manner that protects the safety and health of employees, others involved in its operations, its customers, and the public and is committed to conduct business in a manner that is compatible with the balanced environmental and economic needs of the communities in which it operates.

These commitments require compliance with all applicable laws and regulations, facilities that are designed, constructed and operated to high standards, and systematic identification and management of safety, health, and environmental risks.

Company has adopted the Operations Integrity Management System (OIMS) which provides a structured approach to meeting these commitments.

OIMS is a disciplined management framework which establishes common worldwide expectations for controlling operations integrity risks inherent in its businesses. Operations Integrity addresses all aspects of Company's business, including security, which can impact safety, health and environmental performance.

OIMS has been recognized as meeting the requirements of OHSAS 18001:1999 and International Standards Organization (ISO) 14001.

The OIMS Framework is comprised of eleven Elements. Each Element contains an underlying principle and a set of Expectations. Esso Highlands Limited has properly designed and documented management systems that address all the Elements and Expectations set out in the OIMS Framework. An outline of OIMS is shown in

Figure 3-1.

Figure 3-1: OIMS Elements & Systems

OIMS Element 1
Standard System 1-1 Project Management of OIMS
Standard System 1-2 OIMS for OBO Project Management

OIMS Element 2
Standard System 2-1 Risk Management / Loss Prevention

OIMS Element 3
Standard System 3-1 Design Specs & Standards
Standard System 3-2 Quality Management

OIMS Element 4
Standard System 4-1 Information Management
Standard System 4-2 Regulatory Compliance

OIMS Element 5
Standard System 5-1 Personnel Selection, Training, Development & Changes
Standard System 5-2 Occupational Health Management
Standard System 5-3 Project Safety Management
Standard System 5-4 Security Management

OIMS Element 6
Standard System 6-1 Environmental Management

OIMS Element 7
Standard System 7-1 Management of Change

OIMS Element 8
Standard System 8-1 Evaluating, Selecting & Monitoring Third Party Services
Standard System 8-2 Contractor Interface Management

OIMS Element 9
Standard System 9-1 Incident Management

OIMS Element 10
Standard System 10-1 External Affairs
Standard System 10-2 Emergency Preparedness & Response

OIMS Element 11
Standard System 11-1 OIMS Assessment

OIMS Elements are outlined below:

- Element 1: Management, leadership, commitment and accountability: Employees at all levels are held accountable for safety, health and environmental performance
- Element 2: Risk assessment and management: Systematic reviews evaluate risks to help prevent accidents from happening
- Element 3: Facilities design and construction: All construction projects from small improvements to major new expansions are evaluated early in their design for safety, health and environmental impact
- Element 4: Information and documentation: Information that is accurate, complete and accessible is essential to safe and reliable operations
- Element 5: Personnel and training: Meeting high standards of performance requires that employees are well trained
- Element 6: Operations and maintenance: Operations and maintenance procedures are frequently assessed and modified to improve safety and environmental performance
- Element 7: Management of change: Any change in procedure is tested for safety, health and environmental impact
- Element 8: Third-party services: Contractors are important to safe operations.
- Element 9: Incident investigation and analysis: Any incident, including a 'near miss,' is investigated
- Element 10: Community awareness and emergency preparedness: Good preparation can significantly reduce the impact of an accident
- Element 11: Operations integrity assessment and improvement: A process that measures performance relative to expectations is essential to improved operations integrity.

As discussed in Section 1.5, OIMS Element 6 System 6-1 Environmental Management requires the preparation and approval for use of an Environmental Management Plan for project execution. This ESMP has been developed to meet this OIMS requirement.

4.0 ENVIRONMENTAL AND SOCIAL ASSESSMENT AND ASPECTS

4.1 Introduction

This section summarizes the key environmental and social aspects which require management as part of this ESMP. It provides:

- An overview of the physical, biophysical and social environments in which the Project is to be developed
- A summary of the statutory environmental and social assessment and approvals process undertaken for the Project to date
- A summary of the PNG LNG Project EIS in terms of the process used to identify, characterize and assess environmental and social impacts and aspects
- A summary of the impacts identified as part of the PNG LNG Project EIS

4.2 Environment and Social Overview

An overview of the key environmental and social features associated with the PNG LNG Project area as discussed in EIS is presented below.

4.2.1 Physical Environment Overview

The Project covers a substantial and diverse footprint categorized by several distinct areas.

4.2.1.1 PNG Highlands and Kikori Basin

The Project ranges from northwest-southeast trending ridges and ravines and karst landforms of the higher elevations of the Papuan Fold Belt in the PNG Highlands to the Kikori Basin lowlands and the Gulf of Papua.

The furthest westerly extent of the project is at Juha, which lies in lowland hills at an elevation of about 1,000 m. The terrain becomes steadily steeper and more elevated towards Hides (2,700 m).

Descending from Hides to Kutubu at an elevation of about 1,500 m, the terrain becomes progressively lower in elevation and less rugged across the limestone Darai Shelf to the floodplain and delta landforms of the Kikori River. The Kikori River basin is one of the more remote areas of Papua New Guinea.

The Kikori River basin stretches from the alpine grasslands of Doma Peaks to the extensive mangrove wetlands of the Gulf Province.

Key physical aspects in the PNG Highlands and the Kikori River basin include:

- Hides Ridge, a high altitude karst-dominated area with sinkhole swamps
- Karst landforms with intricate cave systems, aquifers and underground streams, sharp-edged escarpments and sinkholes
- Volcanic landforms, such as Mt Bosavi, Mt Sisa and the Doma Peaks
- Areas of fluvial deposition, comprising plains, fans, back plains and swamps
- Large watercourses, such as the Omati, Kikori, Tagari, Hegigio, Ai'io and Baia rivers.
- Lake Kutubu, a Ramsar-listed waterbody.

4.2.1.2 Gulf of Papua

The offshore pipeline route will cross the coast of PNG through the low-lying, swampy, prograding delta complexes of the distributary channels of the Kikori and Omati rivers, before running east across the Gulf of Papua to the LNG Facilities site.

The Gulf receives very large volumes of fresh water (15,000 m^3/s) and sediment (350 Mt/year) from rivers draining the southern slopes of the PNG Highlands. The key physical aspect of the Gulf of Papua is a prodelta and shore-attached sediment wedge associated with sediment accumulation and coastal progradation in the inner gulf.

4.2.1.3 LNG Facilities Site

The LNG Facilities site is located to the south of the village of Papa and was cleared early in the twentieth century for a sisal plantation on what was then the Fairfax Station. Subsequently, the site was used for cattle grazing although this practice ceased in the last few years. At present there are no active agricultural pursuits on the property.

The site consists of a coastal floodplain and low hills to the south east. The site is largely vegetated by pasture grasses and weeds with the exception of isolated pandanus and low trees on drainage lines discharging to the Vaihua River. The key physical aspect at the site is unconsolidated mudflat/saltpans adjacent to a mangrove strip.

4.2.2 Biophysical Environment Overview

The Project will have a footprint that will extend through several regions with distinct biodiversity characteristics.

4.2.2.1 PNG Highlands and Kikori Basin

These areas feature extensive tracts of less disturbed and sparsely populated montane, lowland hill and lowland forest. This habitat supports a range of plants and animals, notably the birds-of-paradise, cassowaries, fruit doves, tree kangaroos, microhylid frogs, fruit bats, vireya rhododendrons, ferns and orchids. Opportunities for discovery of new species in the project area are thought to be high.

Key biological aspects in the PNG Highlands and the Kikori River basin include:

- High montane bioregions (i.e., Western Volcanics and the Northern Montane Karst), which have specialised and restricted fauna
- Kikori River lowlands and the Moro region bioregions, which are important for waterbirds, swamp fauna and over-wintering migratory waders
- Hides Ridge, which supports a high-altitude beech (Nothofagus spp.) forest, dominated by epiphytes and ferns, with noteworthy ecological values - this forest is slow to regenerate and susceptible to die-back
- Caves featuring cave-dwelling bats
- Sinkhole swamps, the main breeding habitat in the karst area for tree frogs and other water-dependent frogs
- Swamp forests that support a range of specialist vertebrates including the twelve-wired bird-of-paradise, the New Guinea flightless rail and a range of aquatic fauna
- Streams in the higher-altitude hill and mid-montane forest, which maintain populations of specialist vertebrates such as torrent frogs and Salvadori's teal
- Lowland rivers, which support crocodiles and freshwater turtles
- Areas of conservation value within the PNG highlands and Kikori Basin include formally gazetted wildlife management areas (WMA) [i.e., the Kutubu WMA and the Neiru Aird Hills WMA] and WWF-designated (i.e., unofficial) conservation areas.

4.2.2.2 Gulf of Papua

The marine habitats of the Gulf of Papua are predominantly the deltaic muds of the main distributary channels and delta front, descending to the carbonate (Halimeda) platform below depths of 40 to 50 m.

Key biological aspects of the Gulf of Papua include tropical rock lobsters' annual migration path across the Gulf of Papua to the reefs of Yule Island and further east along the Papua New Guinea coast, prawn spawning grounds and presence of marine turtles, cetaceans and dugongs.

4.2.2.3 LNG Facilities Site

The only intact, original vegetation remaining on the site is a strip of mangroves along the coast and at the mouth of the Vaihua River. These mangroves are widest (approximately 600 m) just north of the Vaihua River and narrow to a break with a small beach just beyond the northern boundary of the site.

Salt pans are present between the mangroves and the cleared agricultural areas. The cleared areas are covered in pasture grasses and weeds. Some isolated patches of Pandanus and low trees on shallow drainage lines exist near the Vaihua River.

Key biological aspects at the LNG Facilities site include offshore, fringing reef, scattered coral reef bommies and seagrass beds, coastal mangrove strip and potential presence of sensitive nearshore marine species such as dugongs and turtles.

4.2.3 Social Environment Overview

The Project will extend through several regions with a multiple discrete social environments.

4.2.3.1 PNG Highlands and Kikori Basin

Southern Highlands Province occupies approximately 25,700 km^2 in the central western part of Papua New Guinea. The total population of the province in 2000 was 546,265. Population densities are highest in the Tari Basin at approximately 190 persons/km^2; areas around Lake Kutubu support approximately 40 persons/km^2. In the western part of the Komo–Margarima district, the population density is less than 20 persons/km^2.

Gulf Province occupies approximately 13,500 km^2 on the south coast of Papua New Guinea, where the estuaries of six major rivers converge into one large delta of islands, swamps and channels. The total population of the province in 2000 was 106,898. Population densities range from 25 to 35 persons/km^2 in the most densely settled areas to less than 10 persons/km^2 in other areas.

The key social aspects in the PNG Highlands and the Kikori River Basin areas are: land disputes, in-migration of people to current oil project areas, high incidence of malaria and HIV, significant number of archaeological and cultural sites, limited health infrastructure, limited education opportunities and limited infrastructure and transportation routes.

4.2.3.2 Gulf of Papua

The Gulf of Papua supports a commercial prawn-trawling fishery. Prawn trawling grounds in the Gulf of Papua extend from the Fly River delta to the village of Iokea in the east of the Gulf. A variety and abundance of fish such as barramundi, threadfin salmon, jewfish, mud crab, prawn and lobster along the Gulf of Papua coast support fishing for subsistence and sale to local markets. The key social aspects in the Gulf of Papua are commercial and subsistence fisheries.

4.2.3.3 LNG Facilities Site

The LNG Facilities site is located in the Central Province, within the Kairuku-Hiri District and the Hiri Rural Local Level Government area. The closest villages to the site are Papa (population 885[1]) to the north and Boera (population 1,310[2]) to the south. These villages are inhabited by the Motu-Koita speaking people who extend from Gaba Gaba (50 km southeast of Port Moresby) to Manumanu (approximately 50 km northwest of Port Moresby).

[1] PNG census (2000) population data
[2] PNG census (2000) population data

Coastal people in the region are engaged in minor sales of betel nut, coconut, fish and other fresh food, and further derive income from wage employment and local small businesses. Sweet potato, banana and cassava are also important staple crops. Land potential is relatively poor due to a combination of poor soils, seasonal inundation and land degradation. The agricultural system in general is characterised by high-intensity agriculture in a low-potential area. The social aspects at the LNG Facilities site include subsistence fisheries, local resource base (subsistence gardens) and potential for nearshore marine archaeological sites related to the Hiri trade.

4.3 Statutory Environmental and Social Assessment Process

4.3.1 Background

By notice dated 18 May 2007, Company submitted a *Notification of Preparatory Work on Level 2 and Level 3 Activities* to the Department of Environment and Conservation (DEC) under the provisions of the Environment Act (2000).

This notification identified the main activities of the Project to be *Level 3 Activities* as listed in Sub-category 18 of the Environment (Prescribed Activities) Regulation 2002, namely: *18.1-Recovery, processing, storage or transportation of petroleum products requiring the issue of a Petroleum Development Licence or a Pipeline Licence under the Oil and Gas Act 1998 and 18.2-Liquefaction of natural gas requiring a Petroleum Processing Facility Licence issued under the Oil and Gas Act 1998.*

In accordance with Section 5 of the Regulation the following categories of *Level 2* activities are also relevant to the Project: *Manufacture of organic chemicals requiring a Petroleum Processing Facility License issued under the Oil and Gas Act 1998 (Category 5.1), Pipeline transport and storage using facilities with a holding capacity of more than 0.5 million litres (Category 5.2), Quarrying involving the extraction of more than 100,000 tonnes per year (Category 7.4), Operation of fuel burning power stations with a capacity of more than 5MW but not including emergency generators (Category 10.2), Incineration, reprocessing, treatment or disposal of industrial … waste of a capacity greater than 10 tonnes per year (Category 11.4), Construction of electricity transmission lines or pipelines greater than 10 km in length (Category 12.6) and Damming or diversion of rivers or streams (Category 13.1).*

By notice dated 31 May 2007, DEC issued a Section 50 *Notice to Undertake Environment Impact Assessment*, which entails the submission of an Environmental Inception Report (EIR) and Environmental Impact Statement (EIS).

4.3.2 Environmental Inception Report

Company's *PNG LNG Project Environmental Inception Report* was submitted to DEC in October 2007. The primary objectives of the EIR were to identify the key potential environmental and social issues associated with the Project, define the scope of the environmental and social assessment required to address those issues, initiate the process of stakeholder consultation and enable DEC to review and approve the proposed EIS scope.

DEC approved the EIR in November 2007 and directed Company to conduct an environmental impact assessment and submit an EIS.

4.3.3 Environmental Impact Statement

Following DEC approval of the Environmental Inception Report in November 2007, Company commenced the environmental and social assessment for the Project in earnest, leading to the preparation of the PNG LNG Project Environmental Impact Statement (EIS).

Company engaged Coffey Natural Systems to undertake an environmental and social assessment and prepare an EIS in accordance with the requirements of Section 53 of the Act and taking account of DEC's Information Guideline (GL-Env/02/2004) for Conduct of Environmental Impact Assessment and Preparation of Environmental Impact Statement.

Baseline surveys were undertaken during the first half of 2008, in order to establish the key environmental and social characteristics of the Project areas against which potential impacts could be determined. The assessment of impacts and associated development of management was undertaken in the second half of 2008.

The EIS builds on and supplements work already undertaken as part of the environmental assessment undertaken by Company for the PNG Gas Project and documented in the PNG Gas Project Environmental Impact Statement (December 2005).

The EIS was submitted to DEC in January 2009 as the statutory basis for the environmental and social assessment of the project under Section 50 of the Environment Act (2000) to enable a decision from the Environment Council and the Minister of Environment on whether the Project should proceed and, if so, under what conditions.

The EIS is an integral part of the overall approval process for the Project and its approval, and subsequent issuance of the Environment Permit, is a pre-requisite for submittal of Petroleum License Applications (PLA). Only once the Petroleum Licenses have been obtained can further development and construction of the Project take place.

The Environment Permit was issued by DEC on 9 September 2009.

4.3.4 Consultation and Disclosure

Extensive consultation and disclosure has been undertaken in respect of the EIS.

Public consultation in relation to the EIR was undertaken in November 2007 (Project Awareness and Environmental Inception Report Roadshow) in order to disseminate the information contained therein and provide stakeholders with the opportunity to provide input to the scope of the subsequent EIS.

Consultation in relation to the draft EIS was undertaken with affected communities and other stakeholders, including DEC and non-government organizations, in November 2008 (Project Community Awareness and Mitigation Roadshow).

In accordance with the Environment Act (2000), DEC undertook further public consultation in relation to the EIS in April 2009.

Details of all consultation undertaken in respect of the EIS are contained in the EIS Consultation and Disclosure Plan, Coffey Natural Systems, April 2009.

4.4 Environmental Impact Statement - Structure and Format

The EIS consists of three parts in nine volumes.

Volume 1 of the EIS is the Executive Summary which provides an overview of the Project impact assessment process and stakeholder consultation for non-technical readers. This summary is available in English, Tok Pisin and Motu.

Volumes 2 & 3 of the EIS (the main report) are intended to be understood without reference to the specialist studies on which it is based. The report documents the potential biophysical and socio-cultural impacts of the Project and describes the Project's proposed mitigation and management measures and residual impacts (as well as the benefits to be derived from the Project) and the stakeholder consultation program.

A series of specialist studies (Volumes 4 to 9) are included as appendices to the EIS.

Twenty-six specialist studies were conducted to assess the potential impacts of the Project. In addition, as the upstream Project area corresponds with a large portion of the previously proposed PNG Gas Project, specialist studies conducted for that Project are either included as appendices to the EIS or have been referenced where appropriate.

The main report is divided into the following parts:

- **Part I:** The Project: Information on the history of the project, its participants, its substantiation, and the guiding legislation; the proposed project elements and the related construction, operations and decommissioning activities; and stakeholder consultation
- **Part II**: Existing Environment: Information on the characteristics of the existing environmental and social conditions of the onshore and marine environments potentially impacted by the project
- **Part III**: Environmental and Social Impact Assessment and Management: Assessment of potential impacts, means of mitigation and management, and predicted residual impacts, as well as discussion of cumulative and associated impacts, project waste management, greenhouse gases, and a hazard and risk consequence assessment. Summary of proposed mitigation and management measures, description of environmental management plans, and ongoing environmental monitoring and reporting
- **Part IV:** Reference: The glossary (which defines technical terms and abbreviations used in the EIS), the bibliography and the study team chapters, as well as the attachments to the EIS.

Figure 4-1 below shows the contents and structure of the EIS.

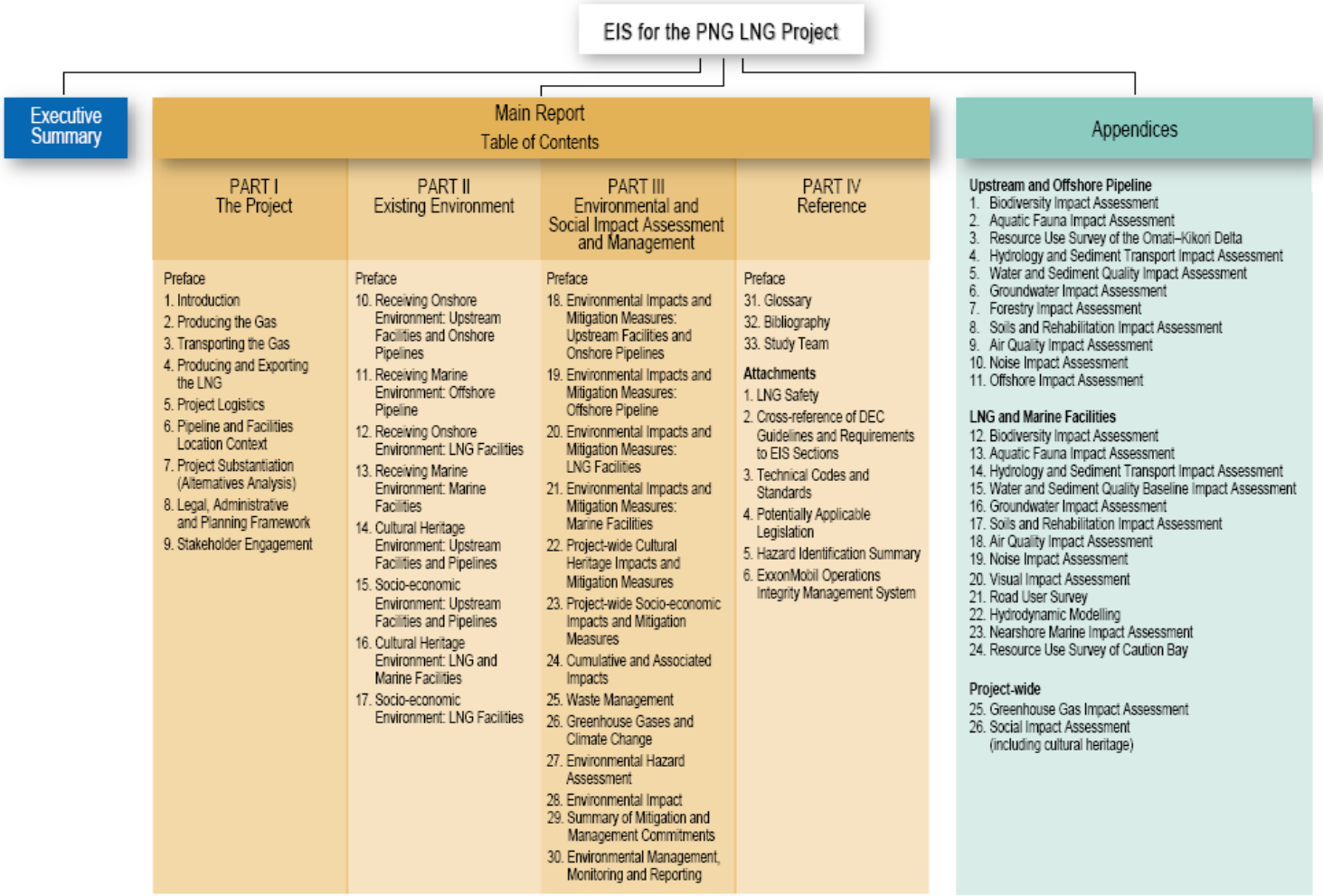


Figure 4-1: PNG LNG Project EIS Structure & Contents

4.5 Environmental Impact Statement - Impacts/Aspects Identification

The environmental and social aspects of the Project are identified as part of the impact assessment conducted for the EIS.

Twenty-six specialist studies were conducted to assess the potential impacts of the Project, reported as appendices to the EIS (Volumes 4 to 9).

The impact assessments cover such topics as terrestrial biodiversity, water and groundwater, forestry, soils, air quality, noise, and cultural heritage and social impacts.

The assessments were carried out by independent specialists (many of whom have had long experience in Papua New Guinea and the Kikori River region particularly).

The results of the impact assessments set out in the appendices are summarized in Part III of the EIS for the upstream onshore facilities and pipelines (Chapter 18), the offshore pipeline (Chapter 19), the LNG Facilities site (Chapter 20), and the LNG marine facilities (Chapter 21). The results of the cultural heritage impact assessments and of the socio-economic impact assessments are given on a project-wide basis in Chapters 22 and 23 of the EIS, respectively. The Project's cumulative and associated impacts, waste management, greenhouse gases and environmental hazard assessment are discussed in Chapters 24, 25, 26 and 27 of the EIS respectively.

4.6 Environmental Impact Statement - Impact/Aspects Significance Assessment

The impact predictions and mitigations proposed by the specialists, as discussed above, were reviewed at a workshop with the Project's Front End Engineering Design (FEED) engineers and Project Management and with the EIS consultant (Coffey Natural Systems).

This workshop was utilized to agree which mitigation measures would be incorporated into Project planning and design and to assess the implications for Project schedule and cost. The resultant set of agreed mitigation and management commitments was then used by the specialists to determine the residual environmental and social impacts utilizing an impact significance assessment process.

The environmental and social impact significance assessment process applied can be expressed in a matrix of the value (or sensitivity) of a receptor and the magnitude of the impact (see Figure 4-2) for terrestrial biodiversity, water and groundwater, forestry, soils, air quality and noise. In the case of the cultural heritage and social components, the process is somewhat different, utilizing a matrix of valence (positive or negative), nature of impact (direct, indirect or cumulative), duration, extent, magnitude and likelihood (see Figure 4-3).

The impact significance assessment process brings structure to complex interactions and takes a range of factors into account, including extent, duration and severity of impact, and whether it is a positive or negative, direct or indirect impact.

General assessment criteria for the components of the assessment matrices (sensitivity of receptor, magnitude, valence, nature of impact, etc) were utilized for most Project areas and topics (including the LNG facilities site, offshore, social, cultural heritage) however because of the natural diversity of the Upstream Project area and the different types of impacts being assessed specific criteria were developed. Figure 4-4 shows an example of specific criteria for the Upstream Project area with an understanding that the general criteria for the other areas and topics are of a similar format and content.

	Sensitivity of Resource/Receptor				
Magnitude of Impact	**Very High**	**High**	**Medium**	**Low**	**Minimal**
Very High	Major	Major	Major	Moderate	Minimal
High	Major	Moderate	Moderate	Minor	Minimal
Medium	Moderate	Moderate	Minor	Minor	Minimal
Low	Moderate	Minor	Minor	Minor	Minimal
Minimal	Minimal	Minimal	Minimal	Minimal	Minimal
Positive	Positive	Positive	Positive	Positive	Positive

Figure 4-2: Impact Significance Matrix

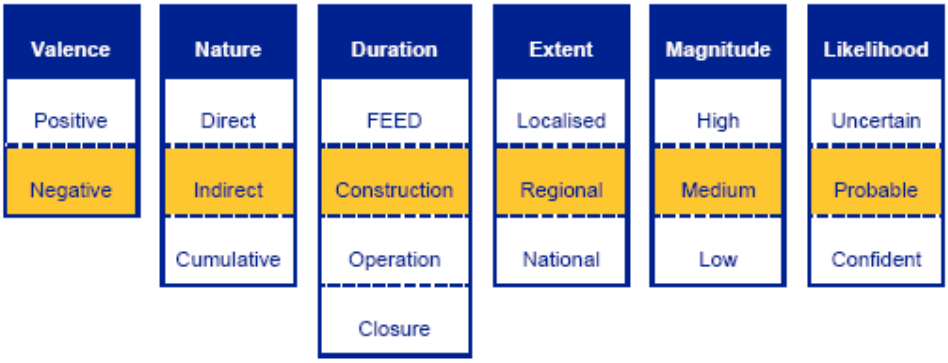


Figure 4-3: Impact Matrix: Cultural Heritage/Social Assessments

Category	Description
Very High	Soil disturbance and displacement may occur up to 200 m from construction sites. Spoil volumes are high and the propensity for slumping and erosion are high. Active regeneration that needs close monitoring is required.
High	Soil disturbance and displacement may occur up to 100 m from construction sites. Spoil volumes are considerable, much of which will erode. Prone to erosion and requires rehabilitation to naturally regenerate.
Medium	Soil disturbance and displacement are localised to within 50 m of construction sites. Spoil volumes and the propensity for surface erosion are low and revegetation can occur by natural processes without intervention.
Low	Soil disturbance and displacement are highly localised to construction sites. Spoil volumes and the propensity for surface erosion are very low.
Minimal	Unlikely to cause detectable change in the environment.

Category	Description
High	Soils have adverse properties if disturbed e.g., unstable and or dispersive. Vegetation is sensitive to disturbance and has a limited capacity to regenerate from a soil seed bank. Recovery may take decades. Sensitive to other disturbances such as fire and weeds.
Medium	Soils may be unstable and relatively easily disturbed. Includes sensitive soils such as very wet, water logged or peaty soils that are easily damaged. Vegetation has some capacity to regenerate if severely disturbed, i.e., from established seedlings or seed rain. Recovery may take decades due to slow growth rates.
Low	Soils are not erosion prone if exposed and have no major adverse properties. Vegetation can recover relatively rapidly by regeneration or by limited active revegetation measures.

Figure 4-4: Magnitude of Impacts, Sensitivity of Receptor (Soils, Upstream)

The impact significance assessment approach described above is similar to Company's preferred risk-based assessment approach. Both methods utilize criteria concerning magnitude and susceptibility to determine the significance/risk of an impact and appropriate avoidance/mitigation measures to reduce the significance/risk of the identified impacts to acceptable levels.

Section 6.2 provides the Impact Significance Summary considering implementation of the proposed avoidance/mitigation measures.

4.7 Environmental Impact Statement - Environmental and Social Aspects

Key environmental impacts, as predicted in the EIS, are summarized below in tabular form (see Table 4-1, Table 4-2, Table 4-3 and Table 4-4).

Residual impact (i.e., the impact remaining after implementation of mitigation) is based on the matrix of the magnitude of impact following mitigation and the sensitivity of the resource or receptor. Residual impact is considered a negative impact unless otherwise stated.

Each impact/aspect identified in the tables below has an associated management and/or mitigation measure, discussed in Section 5.0.

Table 4-1: Impact Summary: LNG Facilities

Potential Impact Description (Before Mitigation)	Magnitude of Impact (After Mitigation)	Sensitivity of Resource/ Receptor	Residual Impact Significance (After Mitigation)
Soils and Landforms			
Acid sulfate soils	Low	High	Minor
Vegetation recovery	Minimal	Low	Minimal
Groundwater			
Contamination by construction spills	Minimal	High	Minimal
Contamination by processing and utilities system spills	Low	High	Minor
Contamination by storage facility spills	Medium	High	Moderate
Hydrology and Sediment Transport			
Impacts to water yield, stream flows and bed material load in the Vaihua River and Karuka Creek catchments	*	*	Minimal
Impacts to water yield, stream flows and bed material load in the North Vaihua River catchment	*	*	Minor
Water Quality			
Sediment loading			Minor
Release of metals and nutrients to surface waters			Minimal
Acid drainage			Minor
Discharge of wastewaters			Minor
Aquatic Ecology			
Introduction of exotic pests and diseases	Minimal	Low	Minimal
Habitat quality and connectivity	Minimal	Low	Minimal
Terrestrial Biodiversity			
Habitat loss: introduction of exotic weeds and pathogens	Low	Medium	Minor
Habitat loss: causeway construction through mangroves	Low	Medium	Minor
Habitat loss: savanna, open woodlands and gallery forests	Low	Medium	Minor
Habitat loss: Vaihua River ecosystem complex	Low	Medium	Minor
Habitat loss: listed species	Low	Medium	Minor
Air Quality			

Potential Impact Description (Before Mitigation)	Magnitude of Impact (After Mitigation)	Sensitivity of Resource/ Receptor	Residual Impact Significance (After Mitigation)
Dust emissions			Will meet assessment criteria
Vehicle exhausts			Will meet assessment criteria
NOx emissions			Will meet assessment criteria
BTEX emissions			Will meet assessment criteria
Noise			
Construction and operations noise levels	Low	High	Minor
Construction traffic noise	Medium	High	Moderate
Visual			
Loss of visual amenity			Subjective response only**

* Resource sensitivity was not considered in the assessment of hydrology and sediment transport, as these are not dependent on resource sensitivity. See EIS Table 20.1 for the impact criteria used.

** Perception of change to visual amenity is subjective and cannot be interpreted via the matrix.

Table 4-2: Impact Summary: Upstream Project Area

Potential Impact Description (Before Mitigation)		Magnitude of Impact (After Mitigation)	Sensitivity of Resource/ Receptor	Residual Impact Significance (After Mitigation)
Landform and Soils				
Hides Ridge:	Short term	Medium	High	Moderate
	Medium term			Minimal
Juha to Hides area:	Short term	Low	High	Minor
	Medium to long term			Minimal
Homa deviation:	Short term	Medium	Medium	Minor
	Long term			Minimal
Swamps and wetlands of the Kikori delta:	Short term	Low	High	Minor
	Medium to long term			Minimal
Plant sites:	Short term	Low	Low	Minor
	Medium to long term			Minimal
Quarries:	Short term	Low	Low	Minor
	Medium to long term			Minimal
Groundwater				
Contamination: drilling fluids		Minimal	Very High	Minimal
Contamination: accidental spills		Minimal	Low	Minimal
Water Resources and Hydrology				
Water yield		*	*	Minimal
Stream-flow regime: Hydrotest water abstraction and disposal		*	*	Minimal
Watercourses crossings		*	*	Minimal
Increased sediment loadings to watercourses and lakes		*	*	Minimal
Water Quality*				
Increased total suspended sediment		*	*	Minimal
Increase in metals concentrations		*	*	Minimal
Contamination of watercourses by sewage and spills		*	*	Minimal

Potential Impact Description (Before Mitigation)	Magnitude of Impact (After Mitigation)	Sensitivity of Resource/ Receptor	Residual Impact Significance (After Mitigation)
Biodiversity			
Habitat loss	Minimal	Very High	Minimal
Edge and barrier effects: Most areas	Minimal	Very High	Minimal
High-altitude karst areas	Low		Moderate
Most species	Minimal		Minimal
Arboreal species in high karst	Medium		Moderate
Erosion, movement of spoil and changes to hydrology: Most areas and species	Minimal	Very High	Minimal
Arboreal species in high karst	Medium		Moderate
Death of fauna	Minimal	Very High	Minimal
Flora or fauna impacts from spills; hydrotest water disposal; dust, noise, lights and other disturbances; and physical damage and disturbance to caves	Minimal	Very High	Minimal
Fire	Low	Very High	Moderate
Pests, weeds and diseases	Low	Very High	Moderate
Hunting and collecting	Minimal	Very High	Minimal
Improved access	Low	Very High	Moderate
Noteworthy areas – Juha: Direct	Minimal	Very High	Minimal
Indirect	Low		Moderate
Noteworthy areas - Hides Ridge: Direct and indirect	Low	Very High	Moderate
Noteworthy areas - high-altitude forests: Direct	Minimal	Very High	Minimal
Indirect	Low		Moderate
Noteworthy areas – caves: Direct and indirect	Low	High	Minor
Noteworthy areas - upland streams	Low	High	Minor
Noteworthy areas – sinkhole swamps and swamp forests: Direct and indirect	Low	High	Minor
Noteworthy areas – upland streams: Direct and indirect	Low	High	Minor
Noteworthy areas - stream refuges in unstable landscales: Direct	Medium	High	Moderate
Indirect	Low	High	Minor

Potential Impact Description (Before Mitigation)		Magnitude of Impact (After Mitigation)	Sensitivity of Resource/ Receptor	Residual Impact Significance (After Mitigation)
Other noteworthy areas	Direct and indirect	Medium to Minimal	High	Moderate
				Minimal
Conservation areas – Kikori River Programme:	Direct and indirect	Low	Very High	Moderate
Conservation areas – WMA:	Direct	Medium	Very High	Moderate
	Indirect	Low		Moderate
Conservation areas – WWF Most areas:	Direct	Low	High	Minor
Agogo/Iwo:	Direct	Medium		Moderate
	Indirect	Low		Minor
Impacts to listed species:	Direct and indirect	Low to Minimal	High	Minor
				Minimal
Air Quality				
Dust emissions				Will meet assessment criteria
Vehicle exhausts				Will meet assessment criteria
NOx emissions				Will meet assessment criteria
BTEX emissions				Will meet assessment criteria
Noise				
Pipeline construction noise levels		Low	High	Minor
Drilling construction noise		***	High	Will meet assessment criteria at 500 m at night
Operations noise levels		Minimal	High	Minimal

*See EIS Table 18.11 for the specific impact criteria for water resources and hydrology.

**Aquatic ecology residual impacts mirror those for water quality. For the meaning of 'minimal' in relation to aquatic ecology, see EIS Table 18.17.

***Medium before mitigation. Consultation with affected landholders will be undertaken to agree on appropriate mitigation measures.

Table 4-3: Impact Summary: Marine Facilities and Offshore Pipeline

Potential Impact Description (Before Mitigation)	Magnitude of Impact (After Mitigation)	Sensitivity of Resource/ Receptor	Residual Impact Significance (After Mitigation)
Offshore Pipeline			
Disturbance to seafloor habitats	Minimal	Minimal	Minimal
Increased suspended sediments	Low	Low	Minor
Alteration of riverine barging route hydrology: construction	Low	Medium	Minor
Waste discharges	Minimal	Low	Minimal
Accidental spills	Low	High	Minor
Disposal of hydrotest water	Low	Low	Minor
Alteration to Omati River hydrology: operations	Minimal	Low	Minimal
Interaction with marine mammals	Minimal	High	Minimal
Underwater noise	Low	High	Minor
Light emissions	Minimal	High	Minimal
Interaction with commercial fisheries	Low	Medium	Minor
Interaction with subsistence fishers and small craft	Low	High	Minor
Fishing equipment or anchors entangling with pipeline	Minimal	High	Minimal
Marine traffic: • Gulf of Papua	Low	Low	Minor
• Omati-Kikori delta	Medium	Medium	Minor
Introduction of non-native marine flora and fauna	Medium	Low	Minor
LNG Marine Facilities			
Coastal processes at Vaihua River	Low	High	Minor
Increased suspended sediment during construction	Medium	High	Moderate
Increased suspended sediment during operations	Low	Medium	Minor
Disposal of dredged material (based on an estimated volume of 200,000 m3 of dredge material)	Medium	Low	Minor
Disposal of hydrotest water	Minimal	Low	Minimal
Discharge of brine and wastewater	Low	Medium	Minor
Accidental spills of restricted substances	Low	High	Minor

Potential Impact Description (Before Mitigation)	Magnitude of Impact (After Mitigation)	Sensitivity of Resource/ Receptor	Residual Impact Significance (After Mitigation)
Discharge from vessels	Low	Medium	Minor
Loss of marine habitat at the Materials Offloading Facility	Medium	High	Moderate
Loss of marine habitat during pipelaying	Low	High	Minor
Shipping collisions with marine mammals	Minimal	High	Minimal
Underwater noise	Low	High	Minor
Effects of lighting on marine fauna	Low	High	Minor
Interaction with subsistence fisheries and marine traffic; pipelaying	Low	High	Minor
Interaction with subsistence fisheries – LNG Facilities exclusion zones	See discussion in EIS Section 21.6.3.2, Operations.		
LNG Facilities site – exclusion from mangrove resource utilisation	See discussion in EIS Section 21.7, Mangrove Resource Utilization.		
Introduction of non-native marine flora and fauna	Low	High	Minor

Table 4-4: Impact Summary: Cultural Heritage

Description of Potential Impact	Extent of Potential Impact
Project-wide	
Disturbance to or loss of currently unknown cultural heritage sites.	Site-dependent
Disconnection of communities from cultural heritage sites and loss of sites from oral tradition.	Site-dependent
Juha to Hides (Indicative Sites*)	
Indirect and cumulative disturbance to sites IKR, ILF, ILJ, ILK, ILN, ILO, ILP, ILQ, ILR, ILW, IMJ, IMN, IMO, IMS, IMY, LSK and LSO due to increased visitor traffic.	Local
Indirect and cumulative disturbance to sites IKE, IKF, ILC, ILG, ILH, ILI, ILJ, ILL, ILM, ILS, ILT, ILU, ILV, ILX, ILY, IMB, IMC, IMD, IME, IMF, IMG, IMI, IMK, IML, IMM, IMP, IMQ, IMR, IMT, IMU, IMV, IMW, IMZ, INB, INC, IND, LSA, LSC, LSD, LSG, LSH, LSI, LSL, LSM, LSR, LSS, LST, LSU, LSV, LSW, IKR, ILF, ILJ, ILK, ILN, ILO, ILP, ILQ, ILR, ILW, IMJ, IMN, IMO, IMS, IMY, LSK and LSO due to increased visitor traffic.	Local
Juha to Hides (Indicative Sites*) (cont'd)	
Indirect disturbance to sites IKA, IKB, ILE and LSJ located downstream of the pipeline construction disturbance area due to the potential deposition of material eroded as a result of construction and operation of the pipeline, and alteration of the river hydrology during construction.	Local
Indirect and cumulative disturbance to burial caves IKI, IKJ, IKK, ILZ and IMH due to increased visitor traffic.	Local
Direct, indirect and cumulative disturbance to sites IKC, IKD, IKG, IKH, IKL, IKS, IKX, IKY, ILB, IMX, INA*, LSB, LSE, LSN, LSP, LSQ, LSX, LSY, LSZ, LTA and LTB due to construction, operation and post-operation landscape remediation activities.	Local
Hides to Kutubu	
Direct disturbance to sites within the Tipuripu area due to site establishment, construction and upgrade of access to the alternative Hides Gas Conditioning Plant site (an alternative option to the proposed Hides Gas Conditioning Plant site in the Ketereanda area).	Regional
Direct disturbance to sites HD163, HD165, HD182, HD200, HD206, HD207, HD208, HD209 and HD117 in the Hides Wellpad A area due to construction.	Regional
Indirect and cumulative disturbance to sites HD183, HD185, HD159, HD224, HD210, HD212 and HD201 in the Hides Wellpad A area due to construction.	Local and regional
Direct disturbance to sites HD133, HD135, HD137, HD138, HD141, HD147, HD148, HD152, HD163 to 168, HD171, HD173, HD178, HD181, HD191, HD122 to HD125 and HD232 to HD233 due to upgrading and maintenance of the road from Hides to Nogoli.	National
Direct disturbance to sites HD312 and HD313 within the environs of the Hides Gas Conditioning Plant and industrial area (Ketereanda area) due to construction.	National[†]
Direct disturbance to sites HD304 to HD307 within the area surrounding the Hides Gas Conditioning Plant site (Ketereanda area) due to construction.	Local
Direct disturbance to sites BE075 to BE080, BE082, BE083, BE090 to BE093, BE095 and BE115 due to construction of the LNG Project Gas Pipeline along the Homa to Idauwi alignment.	Local
Indirect disturbance to sites BE001 BE075 and BE124 to BE169 located at least 1 km from the expected Homa to Idauwi alignment.	Local and regional
Hides to Kutubu (Indicative Sites*)	
Direct disturbance of HD312 to HD314, HD317, HD320, HD321, HD326, HD338 and HD342 due to pipeline construction.	Local

Description of Potential Impact	Extent of Potential Impact
Indirect and cumulative disturbance to sites HD330, HD340, HD341, HD342, HD343, HD322, HD323 and HD325 to HD339 due to pipeline construction and operation (indirect) and increased visitation and resettlement in the vicinity of the sites (cumulative).	Local
Direct disturbance of sites AG133 to AG135, AG138, AG141, AG145, AG147, AG148, AG152, AG153, AG157, AG159, AG160, AG162, AG163, AG164 and AG175 due to pipeline construction.	Local and regional
Direct disturbance of sites HR103 to HR108, HR101, HR125 to HR144, HR148, HR146, HR154 and HR183 due to pipeline construction.	Local and regional
Direct disturbance of sites HR100, HR102, H108 (a), HR109, HR110 HR115, HR118, HR119, HR127 (a), HR152, HR158, HR165, HR170, HR124, HR166, HR177, HR178 and HR180 in the Hides Ridge area.	Local and regional
Direct disturbance of sites JH100 to JH123 in the Juha area.	Local
Direct disturbance of sites LK071 to LK077 in the Wage Creek pipeline deviation area.	Local
Direct, indirect and cumulative disturbance to sites ID004, ID006, ID008, ID013, ID017, ID027, ID047, ID053, ID069, ID092, ID093 and ID097 due to expansion of the existing road corridor and increased road use.	Local
Direct, indirect and cumulative disturbance to sites DA001, DA048, DA057, DA065, DA071, DA072, DA073, DA074 and DA077 due to pipeline construction, road corridor development and increased road use.	Local
Indirect disturbance of HP051 due to pipeline construction and operation.	Local
Indirect and cumulative disturbance to BA004 and BA006 due to expansion of the road corridor.	Local
Indirect disturbance of HP053 due to pipeline construction and operation.	Local
Kutubu to Kaiam	
Direct disturbance to the open burial area LK045 located near the western end of Moro Camp.	Local
Direct and indirect disturbance to caves and rock shelters LK046, LK048, Lk049 and LK050 in the Moro Camp area due to further road, pipeline, camp and/or airstrip development.	Local
Indirect disturbance to burial sites LK040 and LK041.	Local
Indirect disturbance to burial sites LK039, LK042, LK043, LK047 and LK055.	Local
Indirect disturbance to rock art and burial sites in the southeastern area of Lake Kutubu LK001 to LK037 and LK056 to LK063.	Local
Direct and indirect disturbance to caves and rock shelters FF006, FF056, FF057, FF101, FF108, FF109, FF115, FF116 and FF161 located throughout the Foi–Fasu area due to further road, pipeline, camp and/or airstrip development.	Local
Indirect disturbance to burial and settlement sites FF060, FF061, FF068, FF098, FF105, FF106, FF107 and FF117.	Local
Direct disturbance to sites FF058, FF059, FF062, FF063, FF064, FF065, FF066 and FF100 located in the Tamatigi village/KP30 area due to pipeline construction.	Local
Direct disturbance of spirit sites GB006 and GB008 due to pipeline and road construction.	Local
Direct and indirect disturbance of former settlement sites GB009, GB013, GB012 and GB016 and burials located close to the pipeline route.	Local

Description of Potential Impact	Extent of Potential Impact
Kaiam to Goaribari Island	
Direct disturbance to sites KG1, KG2 and KG3 due to pipeline construction.	Local
Direct, indirect, cumulative disturbance to sites KG4 to KG7, KG10, KG19 to KG21, KG23, KG25, KG44, KG91 and KG94 to KG101 due to pipeline construction.	Local
Cumulative disturbance to sites KG52 to KG55, KG61 and KG78 due to wave action along the banks of the southern reaches of the Omati River.	Local
Indirect and cumulative disturbance to sites KG64 to KG69, KG72 to KG76, KG80, KG82 to KG86 and KG88 to KG90 located at the mouths of creeks feeding into the Omati River due to wave and current action during pipeline construction.	Local
Direct, indirect and cumulative disturbance to KG11 due to pipeline construction on the adjacent limestone outcrop and clearing of surrounding forest.	Local
Indirect and cumulative impacts to sites KG13, KG17, KG26, KG39, KG40, KG51, KG58 to KG60, KG62, KG63, KG70, KG71, KG81 and KG92 due to erosion from increased wave action near the coastline and increased visitation during construction.	Local
Direct, indirect and cumulative disturbance to KG14 and KG28 due to pipeline construction and operation.	Local and regional
Direct, indirect and cumulative disturbance to KG15 due to pipeline construction and operation.	Local
Direct impact of human skeletal material in the small limestone cave KG16.	Local and regional
Direct, indirect and cumulative disturbance to sites KG22, KG27, KG77, KG79 and KG110 due to pipeline construction.	Local
Direct, indirect and cumulative disturbance to the old village site of Puriau (KG24) due to further growth of facilities associated with Kopi Shore Base.	Local
Indirect and cumulative disturbance to KG37 due to southern expansion of the storage and facilities area between Kopi Shore Base and Kikori River.	Local
Indirect and cumulative disturbance to village sites and sacred sites KG29, KG30, KG31, KG32, KG33, KG34 and KG35 due to northern expansion by 50 m or more of the storage and facilities area located between the Kopi Shore Base and the Kikori River.	Local
Indirect and cumulative disturbance to the previously excavated ossuary KG42 due to increased visitor traffic.	Local
Direct, indirect and cumulative disturbance to complex of sacred sites KG106 to KG108 and KG111 due to pipeline construction increased visitation.	Local and regional
Kaiam to Goaribari Island – Kopi Bypass (Indicative Sites)*	
Disturbance to site KG7 located within the immediate vicinity of the Kopi Bypass survey corridor area.	Local and regional
Disturbance to sites KG162 and KG166 within immediate vicinity of the Kopi Bypass survey corridor.	Local
Direct, indirect and cumulative disturbance to significant sites near the Kopi Bypass survey corridor, including Amukate rockshelter (KG163), Noa swamp (KG9), Kepamo Kaho cave (KG167), Kepamo burial cave (KG168), Kekamoro sacred sinkhole (KG169), Are O'o sacred sinkhole (KG170), Arukai cave (KG171), Nahope cave (KG160), Amoho Kakate cave (KG161), Komo Kouhi cave (KG173), Yaya ancient village (KG174) and Hohokomane cave (KG175).	Local and regional
Disturbance to oral tradition sites KG12, KG13, KG14, KG41, KG42, KG43, KG110, KG144, KG145, KG149, KG150, KG151, KG152, KG153, KG154, KG155, KG156, KG157, KG158, KG159, KG163, KG164, KG165 and KG172 for which there is uncertainty about whether they are located within the Kopi Bypass survey corridor.	Local and regional
Disturbance to oral tradition site KG157 for which there is uncertainty about whether it is located within the Kopi Bypass survey corridor.	Local

LNG Facilities	
Direct disturbance to sites ARD, ARG, ARH, ARI, ARJ, ARM, ML4, ML5, ML7, ML9, ML13, ML14, ML15, ML16, ML17, ML18, ML19, ML20, ML21, JD6, JD8, JD9, JD10, JD11, JD12, JD13, JD14, JD15, JD16 (SC5), JD17, AAHL, AAHM, AAHN, AAHO, AAHP, AAHQ, AAHR, AAHS, AAHT, AAHU, AAHV, AAHW, AAHX, AAHY, AAHZ, AAIB, AAIC, AAID, AAIE, AAIF, AAIG, AAIH, AAII, AAIJ, AAIK, AAIL, AAIM, AAIO, AAIR, AAIS, AAIT, AAIU and AAIV located within the LNG Facilities site security fence due to construction activities.	Local
Direct disturbance to sites LNG1, LNG2, LNG3, LNG4, ML12 and JD7 located on, or within a few metres of, the proposed LNG Facilities site security fence due to fence construction.	Local
Direct impact to Sisal Farm/Schimmer airstrip/Fairfax Cattle Station by works undertaken within the proposed LNG Facilities site security fence.	Local
Indirect and cumulative disturbance to ML1, ML2, AAIN, JD1, JD2, JD3, JD5, ML3 (Part of SC4), JD4, ML6, ML8, ML10, ML11, Konekaru village, AAIP, AAIQ, ARQ, AAGM, ABG, ABI, AEZ, AFA, AFB, AHY, AOH, AOI, AOJ, AOK, AOL, AOM, AOX, APC, APF, APG, ARE, ARF, ARK, ARL, JDA17 and CB30 due to increased visitor traffic.	Local and regional
Indirect and cumulative impacts to AHW, ANN, ANO, CB10 (SC7), CB11, CB12, CB7, CB8, ASM (some of the SC6 Sites), AADI, ABH, AMG, AMH, AMI, ANA, ANU, AOG, AWL, Ava Garau, Davage, Taubarau, Nemu, Daeroto and Dirora due to changing demographics, settlement patterns and access routes resulting in increased access and, therefore, increased visitor traffic.	Local and regional
Indirect and cumulative impacts to Aemakara due to increased visitor traffic.	Local and regional
Offshore	
Indirect and cumulative impacts to CB1 due to increased erosion from alteration of coastal geomorphology by construction of the LNG Jetty.	Local
Indirect and cumulative impacts to CB13, CB14 and CB15 due to village growth (e.g., new house constructions and changing erosion patterns) and increased erosion and sand accretion from LNG Jetty construction.	Local and regional
Indirect and cumulative impacts may occur to sites CB16, CB17 and CB18 surveys find these within marine facilities disturbance area.	Local and regional
Indirect and cumulative impacts to site CB4 if it is located within the vicinity of dredging or localised scouring of the shipping channel.	Local
Direct and indirect impacts to CB6, CB22, CB23, CB24, CB25, CB26, CB27, CB28, CB29, P-39 Airacobra Plane Crash Site and B-24 Consolidated Liberator Plane Crash Site due to construction of the shipping channel, dredging or localised scouring of the seabed.	Local and regional
Direct and indirect impacts to CB5 if the site is located within the vicinity of the shipping channel, dredging or localised scouring of the seabed.	Local, regional national
Indirect and cumulative impacts to Boera freshwater wells due to increased freshwater requirements and accessibility caused by population growth.	Local and regional

* Indicative cultural heritage sites were recorded through a various combinations of interview discussions, reference to maps, helicopter flyovers and field visits in the vicinity of the sites; however, indicative sites have not been subject to ground survey.

† The potential impact to sites HD312 and HD313 is recorded as being of national extent because a waisted blade (stone tool) was found in the area (the sites themselves are of local extent). The provenance of the waisted blade is unknown but it is reportedly possible that it comes from outside the area in which it was found. Preconstruction surveys will determine whether there are any other archaeological materials in the area and whether impacts to the site would be of local, regional or national extent.

5.0 Environmental and Social Management and Mitigation

5.1 Introduction

This section provides information on how the environmental and social management and mitigation measures proposed in the PNG LNG Project EIS (see EIS Section 29) have been taken forward in the development of the ESMP. Also summarized are the environmental and social objectives for the Project during construction execution.

Appropriate measures to eliminate, reduce, or control potential adverse environmental effects resulting from Project activities will be implemented. Such measures may include both preventative and corrective actions to reduce the impact significance of an environmental effect.

5.2 Management and Mitigation Measures

The proposed management mitigation measures identified in the PNG LNG Project EIS for the natural environment appear as 223 specific commitments. The EIS contains an additional 51 management and mitigation measures recommended as part of the social impact assessment to apply to the management of social issues[3]. Additionally, the EIS contains 39 management and mitigation measures recommended as part of the cultural heritage impact assessment.

Each management and mitigation commitment contained in the EIS is assigned a reference code commencing with an M, e.g. M27. A summary of all the management and mitigation measures is presented in Section 29 of the EIS.

The management and mitigation measures contained in the EIS form the basis of this ESMP and are reproduced verbatim herein (see Mitigation Reference Number column in Table 1 of each EMP).

It should be noted that some mitigation measures have been reworded to provide further clarity or more detailed information regarding required measures. In these instances, the code is displayed in italics (see Mitigation Reference Number column in Table 1 of each EMP) and these reworded measures supersede what is in the EIS.

Since the finalization of the EIS, Company has identified certain other management and mitigation measures which are necessary to implement construction good industry practice, EIS approval conditions stipulated by the PNG Government and applicable International Finance Institution (IFI) requirements. These additional management and mitigation commitments are identified with a code commencing with an 'A' (see Mitigation Reference Number column in Table 1 of each EMP).

5.3 Environmental and Social Mitigations Register

All environmental and social management and mitigation commitments made by Company are identified in the PNG LNG Project Environmental and Social Mitigations Register.

Each commitment contained in the register has been allocated to a specific EMP or SMP and is allocated to a responsible party/parties (Company or specific Contractor).

The register is utilized by Company to track and document the implementation and status of each commitment.

The register will be updated as necessary to incorporate new commitments which arise as construction progresses, including site specific mitigation and management measures which arise from preconstruction environmental surveys and other alternative and/or additional

[3] Some of these are measures are beyond Company's control, specifically those applicable to the issues of benefits sharing and distribution, social services and infrastructure, squatting, and law and order. These issues are for the consideration of the PNG Government and landowners.

measures identified as Project execution progresses and lessons learned from field programs are documented.

5.4 Contractor Environmental and Social Management Plans

Contractors and subcontractors shall prepare, submit for Company review and approval, maintain and implement an ESMP. Contractor and subcontractor ESMP documents shall be developed in accordance with this ESMP.

Company will work closely with Contractors and subcontractors during development of Contractor and subcontractor ESMP documents to confirm that these meet good industry practice, are tailored to each Contractor's/subcontractor's specific scope of work and provide a commensurate level of detail.

Company expects Contractor and subcontractors ESMP documents, supported by procedures, instructions, method statements and other working documents as necessary, to:

- Establish detailed site specific measures to prevent, reduce, mitigate, and otherwise manage and control environmental and social risks and impacts and define how the execution of those measures will be achieved
- Define how compliance with legal and other obligations will be achieved and verified
- Establish site specific monitoring activities and define how these activities will be achieved (including components to be measured, sampled or monitored, sampling/monitoring methods, location and frequency etc.)
- Designate appropriate workforce, supervisory and management personnel responsible for the execution of measures to prevent, reduce, mitigate, and otherwise manage and control environmental and social risks and impacts
- Define roles and responsibilities for work site management and supervisory personnel, and the workforce, and describe how roles and responsibilities are communicated to personnel
- Describe training requirements for all Contractor and subcontractor personnel (management, supervisory and workforce) responsible for environmental and social performance.

Prior to acceptance of Contractor ESMP documents, Contractors and Company will undertake a joint environmental and social risk assessment to identify any gaps between Contractors' execution basis and the provisions made in the PNG LNG Project EIS and Company's ESMP. Contractor ESMP documents will incorporate measures to address any identified gaps and prevent, control and otherwise mitigate any identified risks and impacts.

5.5 Environmental and Social Objectives

Key environmental and social objectives for the Project, in addition to compliance with legal and other requirements, are summarized in Table 5-1.

Table 5-1: Project Environmental and Social Objectives

EMP/SMP Appendix	Objectives
Ecological Management Plan	• Avoid where practicable and reduce impacts on terrestrial, aquatic and marine habitats and specific habitat features of ecological importance
Air Emissions Management Plan	• Reduce the impact of project activities on ambient air quality • Optimise equipment to reduce greenhouse gases
Noise and Vibration Management Plan	• Reduce noise and vibration impacts from project activities to local residents and specific fauna habitat, including marine fauna and bats
Waste Management Plan	• Contain, transport, handle and dispose of solid and liquid wastes arising from project construction activities in such a manner as to avoid impacts to human health and the environment. • Dispose of wastes at facilities approved by Company, for which disposal (with or without prior treatment) is the only practicable option
Water Management Plan	• Reduce the impact on water quality (and associated beneficial values) from construction activities • Reduce the impact on existing surface water flow regimes and groundwater aquifers (and associated beneficial values) arising from construction activities
Spill Prevention and Response Plan	• Prevent spills • In the event of a spill, minimize environmental and social impact
Hazardous Materials Management Plan	• Avoid the use of chemicals and hazardous materials subject to international bans or phase-outs • Prevent uncontrolled release of any hazardous materials during transportation, handling, storage and use
Weed, Plant Pathogen and Pest Management Plan	• Prevent exotic weeds, plant pathogens and pests from entering, spreading or becoming established in the project areas during construction works. • Identify and contain, suppress or manage significant weeds, plant pathogens and pests already in the project area to prevent spread by project activities. • Implement measures to reduce the risk of spread of dieback in Nothofagus forests
Erosion and Sediment Control Plan	• Maintain stable landforms to reduce erosion and enhance reinstatement. • Maintain integrity of assets (through stable landforms) • Reduce adverse impacts on stream water quality, and associated beneficial values, and in-stream sedimentation
Raw Materials Management Plan	• Extract aggregate from company-approved locations and manage according to the relevant, individual management plans (see below) • Maximise use of cleared timber and purchase any additional timber from Company approved sources
Reinstatement Plan	• Establish stable landform conditions in areas disturbed as a result of construction activities • Create ground conditions conducive to natural plant regeneration.
Induced Access Management Plan	• Control access to new Project roads and reduce the occurrence of potentially damaging non-project activities (i.e., via improved access).
Cultural Heritage Management Plan	• Avoid known cultural heritage sites (including both archaeological sites and oral tradition sites) where necessary and practicable. • Where avoidance is not possible, manage cultural heritage sites in consultation with PNG Government and landowners.
Hyrdotest Management Plan	• Reduce environmental impacts related to water abstraction and discharge.
Acid Sulphate Soils Management Plan	• Provide measures to avoid or minimise the disturbance of Acid Sulfate Soils and to contain, mitigate and minimise the impacts of disturbed Acid Sulfate Soils. • Protect the local environment from adverse impacts arising from the disturbance of Actual Acid Sulfate Soils and Potential Acid Sulfate Soils.
Dredging Management Plan	• Reduce impacts of dredging on the marine life and water quality • Reduce sediment (turbid plume) mobilisation during dredging and placement of dredge material
Community Health & Safety Management Plan	• Avoid or minimize risks to and impacts on the health and safety of the local community during construction from both routine and non-routine circumstances • Ensure that the safeguarding of personnel and property is carried out in a legitimate manner that avoids or minimizes risks to the community's safety and security

EMP/SMP Appendix	Objectives
Community Impacts Management Plan	• Avoid or minimise the risk and consequential adverse impacts of Contractor activities on the health, safety and well-being of the community, and therefore the occurrence of grievances • Establish the basis for keeping communities aware and informed of pending construction activities and the potential for disruption of daily activities. • Establish the basis for realistic community expectations
Labour and Worker Conditions Plan	• Maximise work opportunities of PNG citizens during construction of the Project • Recruit workers in accordance with the geographic priorities determined by the Project and in particular, give first priority for employment to PNG citizens originating from within the Lanco areas • Implement an equitable and transparent recruitment process • Provide fair terms and conditions of employment and comply with relevant laws • Enhance PNG citizens' skills base through training provided during employment
Camp Management Plan	• Avoid or reduce negative impacts on the community and maintain constructive relationships between local communities and workers' camps • Establish standards on worker welfare and living conditions at the camps that provide a healthy, safe, comfortable and enjoyable environment
Procurement & Supply Management Plan	• Maximise Project procurement from local suppliers and economic benefit for local businesses • Improve capacity and skills of local business to capture business opportunities associated with the project both locally and nationally
Community Engagement Plan	• Establish and maintain positive community relations through effective communication and consultation. In doing so, Contractor will coordinate its work with Company Lands & Community Affairs (L&CA) personnel and align its practices with those described in the Company's Stakeholder Engagement Plan (SEP) • Effectively manage community grievances and comply with the Project Third Party Grievance Procedure outlined in Section 11 of the SEP
Community Infrastructure Management Plan	• Avoid or reduce the risk and /or consequential impacts of construction activities on existing community infrastructure and hence disruption to community activities and well-being • Avoid delays to the construction schedule from community-related grievance arising from negative impacts on community infrastructure
Community Health, Safety & Security Management Plan (Company)	• Avoid or reduce risks to and impacts on community health during the project life cycle from both routine and non-routine circumstances • Document, monitor and evaluate the identified health aspects and periodically review actual performance against health performance objectives and stewardship • Ensure that the safeguarding of personnel and property is carried out in a legitimate manner that avoids or minimizes risks to the community's safety and security
Community Support Strategy (Company)	• Promote the development of conditions conducive to enhancing the livelihoods of PNG communities, thereby fostering the development and maintenance of stable operating conditions for the Project.
Resettlement Framework Document (Company)	• Minimising impacts on households affected by Project resettlement • Timely and responsible execution of resettlement Project-related activities • Maintaining and when possible improving standard of living through community development projects
Stakeholder Engagement Plan (Company)	Immediate objectives: • Inform stakeholders of development plans, project's goals, parameters and schedule. This information will be delivered in an integrated fashion that conveys the potential effect of the proposed plans over the short and long term • Gather opinions and concerns about the project from stakeholders, especially project-affected community groups, so that these can be included in project management and planning processes • Implement appropriate mitigation measures • Identify opportunities to maximize benefits to stakeholders • Provide feedback to the community on how their concerns are being taken into account • Regularly update all stakeholders on project developments and activities. Longer-term objectives:

EMP/SMP Appendix	Objectives
	• Building trust with key stakeholders • Ensuring project initiatives do not set unacceptable precedent that may impair future business practices • Gaining broad stakeholder support and effectively leveraging this support • Engage stakeholders with information that is accurate and in a format that is easy to access and understand (location of meetings, language of information, graphic format, etc) • Ensure that engagement is conducted in and open and honest fashion; • Collect feedback from stakeholders and integrate it into the project design where appropriate • Develop and maintain a constructive relationship with stakeholders, and • Ensure that minority and/or vulnerable groups are engaged

6.0 Verification, Monitoring, Assessment and Audit

6.1 Introduction

This section outlines the processes of verification, monitoring, assessment and audit associated with the ESMP. These processes are necessary in order to:

- Verify and document the due implementation of, and in some cases the effectiveness of, management and mitigation measures identified the ESMP
- Monitor and document the effectiveness of management and mitigation measures and assess actual impacts
- Demonstrate compliance with applicable legal and other requirements
- Evaluate the implementation and effectiveness of the environmental and social program.

6.2 Verification

Company will undertake verification of the management and mitigation activities for which it is responsible as defined in this ESMP.

In addition to the checking and review of Contractors' and subcontractors' inspection and verification documentation (discussed below), Company will undertake inspection and verification at all worksites.

Contractors and subcontractors shall implement a field based inspection programme in order to verify and document the due implementation of, and in some cases the effectiveness of, mitigation measures identified in Contractor and subcontractor ESMP documents.

Contractor and subcontractor ESMP documents shall define the inspection and verification program. Contractors' and subcontractors' inspection and verification program is subject to Company approval.

Contractors and subcontractors shall make available to Company upon request all inspection/verification documentation.

6.3 Monitoring

Company will undertake monitoring of the management and mitigation activities for which it is responsible as defined in this ESMP.

In addition to the checking and review of Contractors' monitoring documentation (discussed below) Company will undertake environmental monitoring (sampling and analysis) and social monitoring.

Contractors and subcontractors shall implement a field based environmental monitoring (sampling and analysis) program and a social monitoring program in order to monitor the effectiveness of management and mitigation measures, assess impacts and demonstrate compliance with applicable legal and other requirements.

Contractor and subcontractor ESMP documents shall define the monitoring program. Contractors' monitoring program is subject to Company approval.

Contractors shall provide to Company monthly a Construction Environmental Report and a Construction Social Report which provide details and results of all monitoring undertaken during the reporting period (including subcontractor data).

6.4 Assessment

Company will undertake internal assessments of the management and mitigation activities for which it is responsible as defined in this ESMP.

Company will undertake periodic assessments to evaluate the implementation and effectiveness of Contractors' and subcontractors' environmental and social programme.

Such assessments will be undertaken in accordance with predetermined protocols agreed with Contractor. Contractors shall cooperate fully with Company in the execution of assessments. Upon completion of the assessments, Company will provide Contractor with a draft assessment report. The assessment report will be discussed between Company and Contractor at an assessment review meeting, following which Company will provide Contractor with a final assessment report. Contractors shall steward findings of the assessment as described in Section 8.0.

Contractors shall undertake internal assessments in order to evaluate the implementation and effectiveness of Contractors' and subcontractors' environmental and social programme.

The internal assessments shall be undertaken to a frequency agreed by Company. The internal assessments shall be executed in accordance with a predetermined assessment protocol and by an assessment team agreed by Company. Contractor shall provide to Company the results of all internal assessments as described in Section 7.0 and steward findings of the internal assessments as described in Section 8.0.

6.5 Audit

Company may undertake environmental and social audits, at its discretion, of Contractor and subcontractor activities and work sites, including camps. Such audits will be undertaken in accordance with predetermined protocols agreed with Contractor. Contractors shall cooperate fully with Company in the execution of audits. Upon completion of the audits, Company will provide Contractor with a draft audit report. The audit report will be discussed between Company and Contractor at an audit review meeting, following which Company will provide Contractor with a final audit report. Contractors shall steward findings of the audit as described in Section 8.0.

The Independent Environmental and Social Consultant (IESC) will, on behalf of the Lender Group, undertake periodic environmental and social audits of Project activities and work sites, including camps. Such audits will be undertaken in accordance with a predetermined protocol to be agreed with Company. Company, Contractors and subcontractors shall cooperate fully with the IESC in the execution of audits. Upon completion of the audits, the IESC will provide Company and Lender Group with a draft audit report. The audit report will be discussed between the IESC, Company and Lender Group, following which the IESC will provide Company with a final audit report. Company will steward findings of the audits as described in Section 8.0.

Coventure parties may, at their discretion, undertake environmental and social audits of Project activities. Such audits will be undertaken in accordance with a predetermined protocol to be agreed with Company. Company, Contractors and subcontractors shall cooperate fully with the coventure parties in the execution of audits.

DEC may, at its discretion, undertake environmental and social audits of Project activities. Company, Contractors and subcontractors shall cooperate fully with DEC in the execution of audits.

Contractor and Company will steward findings of all audits as described in Section 8.0.

6.6 Performance Indicators & Management Review

The EMP and SMP appendices to this ESMP each contain performance indicators and assign reporting frequency for each. Further performance indicators are to be developed and agreed between Company and Contractor. Contractor's ESMP shall incorporate the agreed performance indicators.

7.0 REPORTING AND NOTIFICATION

7.1 Introduction

This section outlines reporting and notification associated with the ESMP.

7.2 Reporting

7.2.1 Contractor Monthly Reporting

Contractors shall provide to Company a monthly Construction Environmental Report and a monthly Construction Social Report. Contractor and subcontractor data shall be included.

Contractors shall work closely with Company prior to commencement of work to define the structure, content and format of the monthly Construction Environmental Report and Construction Social Report, however as a minimum, the report shall contain the following information:

- Details of preconstruction environmental surveys undertaken by Contractor in the reporting period (see EMP and SMP appendices for details of survey requirements) and additional management and mitigations arising where applicable
- Details of environmental monitoring (sampling and analysis) and social monitoring undertaken by Contractor during the reporting period (see EMP and SMP appendices for details of monitoring requirements)
- Reporting of Company required Performance Indicators applicable during the reporting period
- Reporting of additional environmental and social performance indicators applicable during the reporting period
- Summary and status of all incident notifications described in Section 7.3
- Summary and copies of notifications and other reports made by Contractor to PNG Government agencies pursuant to Section 7.4
- Summary and status of Non Conformances and Field Observations documented as part of Contractors' verification and monitoring (see Sections 6.2 and 6.3)
- Summary and status of Non Conformances and Field Observations documented as part of Company's verification and monitoring programme (see Sections 6.2 and 6.3)
- Assessment and audit reports (see Section 6.4) and summary and status of all Non Conformances raided therein
- Number of PNG Government agency inspections (location, date, time and outcome)
- Copies of all written communications from PNG Government agencies related to environmental and social aspects of the work
- Waste volumes generated on Company provided work sites[4]
- Freshwater usage[5]

[4] Restricted or other regulatory defined waste volumes and construction waste volumes will be reported separately. Reported waste quantities must include all Company specified wastes leaving the work site as well as those sent to storage. Waste calculation methodology and reporting format will be developed and provided by Company.

[5] Freshwater usage includes purchased raw or potable water as well as water taken from surface or ground sources. Estimates for freshwater usage based on defensible technical data may be sufficient in some instances for reporting purposes.

7.2.2 Company Quarterly Reporting

Company will prepare and submit to DEC a quarterly Construction Environmental Report. The structure, content and format of the Construction Environmental Report will be agreed with DEC prior to commencement of work, however as a minimum the report will contain the following information:

- Details of preconstruction environmental surveys undertaken in the reporting period (see EMP and SMP appendices for details of survey requirements) and additional management and mitigations arising where applicable
- Details of environmental monitoring (sampling and analysis) and social monitoring undertaken during the reporting period (see EMP and SMP appendices for details of monitoring requirements)
- Details of stakeholder Engagement activities undertaken during the reporting period
- Summary and status of incidents having occurred during the reporting period and associated remedial actions taken and corrective actions undertaken or planned in response thereto
- Summary and status of Non Conformances and Field Observations (see Section 8.0) and corrective actions undertaken or planned in response thereto
- Records of volume of water extracted from surface water points in excess of 1000 liters (per day), including records from the work site(s) that are exempted from obtaining a water extraction license[6]
- Changes to the work schedule

Company will prepare and submit to the IESC/Lender Group a quarterly Construction Environmental and Social Report. The quarterly Construction Environmental and Social Report will, as a minimum, contain the following information:

- Details of preconstruction environmental and social surveys undertaken in the reporting period (see EMP and SMP appendices for details of survey requirements) and additional management and mitigations arising where applicable
- Details of environmental monitoring (sampling and analysis) and social monitoring undertaken during the reporting period (see EMP and SMP appendices for details of monitoring requirements)
- Reporting of environmental and social performance indicators applicable during the reporting period
- Summary of verification, monitoring, assessment and audits undertaken during the reporting period.
- Summary of all notifications described in Section 7.3 and Section 7.4.
- Summary and status of Non Conformances and Field Observations (see Section 8.0) and corrective actions undertaken or planned in response thereto
- Summary of grievance management (workers grievances and community grievances) applicable during the reporting period
- Summary of public consultation and disclosure activities applicable during the reporting period
- Summary of workforce statistics, procurement and supply chain statistics
- Details of land acquisition and compensation and details of resettlement.

[6] See Condition 31 of the Environment Permit (9 September 2009)

7.3 Incident Notification & Reporting

All environmental and social incidents will be appropriately documented, notified and reported in accordance with established Company procedures.

Company has developed an incident management process for the Project which defines the requirements for managing safety, health, environmental, social and security related incidents, including near misses. The incident management process defines the method and timing required for the notification and reporting of incidents dependent upon classification of severity level (<0, 0, 1, 2, 3).

The incident management process is discussed further in Section 8.2. A summary of the requirements of the process as it pertains to the notification and reporting of environmental and social incidents is presented below.

7.3.1 Contractor Incident Notification and Reporting

Contractors shall notify Company immediately following occurrence/discovery of environmental or social incidents occurring at Company provided worksites.

Environmental or social incidents include but are not limited to:

- Spills (e.g. oil, chemical, drilling fluids)
- Chemical and light hydrocarbon releases to atmosphere (reportable quantities)
- Unauthorized use of land
- Community incidents (Contractors shall work closely with Company prior to commencement of work to define these)
- Damage to/destruction of public infrastructure
- Unauthorised damage to cultural artefacts
- Permit and regulatory compliance excursions (for an event that involves multiple excursions, each excursion must be reported independently)
- Violations of any applicable local, state, national, or international law or rule, regardless of whether or not it is cited in a permit
- Fines
- Enforcement Proceedings
- Near miss incidents.
- Worker unrests/strikes

Contractors shall within 24 hours submit a written report to Company detailing the incident. These reports shall contain all information required by Company's Incident Reporting Form P-020. In all cases the report shall contain as a minimum the date, time, location and description of events, materials involved, volumes for spills and releases, root cause analysis, remedial actions taken and corrective actions required to prevent future occurrences.

Contractors shall notify and report to government agencies in accordance with applicable laws and regulations (and in accordance with the timeframes established in Company's incident management process of environmental and social incidents which occur at Contractor provided work sites.

Contractors shall notify Company in accordance with the timeframes established in Company's Incident Management process following occurrence/discovery of environmental or social incidents occurring at Contractor provided worksites.

Contractors shall immediately notify Company of any verbal/written communication with governmental agencies regarding Contractor violations of regulatory requirements and provide Company with copies of all such communications.

Contractors' monthly Construction Environmental Report and/or Construction Social Report shall summarize all incidents that occurred in the reporting period. The number of excursions/incidents must be separated into the categories of air, water, waste, and other.

The above requirements apply equally to subcontractors and subcontractor data must be included in Contractors' data.

7.3.2 Company Incident Notification and Reporting

Company will notify applicable PNG Government agencies of incidents pursuant to statutory notification requirements presented in Appendix 30 to the ESMP.

Company will notify the IESC/Lender Group of incidents pursuant to the terms and conditions agreed upon in the Financing Agreements.

7.4 Statutory Notifications and Reporting

Additional notification requirements established in relevant PNG laws & regulations are presented in Appendix 30 to the ESMP.

Company has provided this list of statutory reporting requirements for information purposes only and it shall not be relied upon by Contractors as complete or accurate.

In general, Contractor shall notify PNG Government agencies directly in the case of notification requirements pertaining to Contractor provided work sites and/or permits and licenses held by Contractor. In such cases, Contractor shall provide copies to Company of related documentation.

Company will notify PNG Government agencies in the case of notification requirements pertaining to Company provided work sites and/or under permits and licenses held by Company. Contractors will, in a timely manner, provide Company with all necessary information to enable Company to fulfill statutory notification and reporting requirements which are applicable in respect of Company provided work sites or by virtue of Company's role as license holder.

Company and Contractors shall work closely together to identify and agree all such notification and reporting requirements.

The above requirements apply equally to subcontractors.

7.5 Reporting of Non Conformance

Company has assigned three levels of Non Conformance and an additional observation level, as presented in Table 7-1.

Table 7-1: Non Conformance Levels

Level	Description	Disposition
Field Observation	A potential Non Conformance situation where an observation, intervention, and/or corrective action is required in order to prevent Non Conformance.	Field Observations will generate a corrective action request or a recommendation for further action. A Field Observation that is not closed out in a timely manner or repeat Field Observations may escalate to Non Conformance.
Level I	A Non Conformance situation not consistent with ESMP requirements, but not believed to involve damage or reasonable expectation of damage to environment or community or individual. Typically aligned in terms of potential consequence with Company definitions for Severity Level <0 and 0 Incidents.	Level I Non Conformances will generate a corrective action request or a recommendation for further action.
Level II	A non-conformance situation, typically including observed damage or a reasonable expectation of damage to environment or community or individual. Requires expeditious corrective action to prevent occurrence or reoccurrence. Typically aligned in terms of potential consequence with Company definitions for Severity Level 1 Incidents.	Level II Non Conformances will generate a corrective action request and a formal Non Conformance notice. Level II Non Conformances may result in a Stop Work Order.
Level III	A critical Non Conformance situation, typically including observed significant damage or a reasonable expectation of significant damage to a sensitive environment or community or individual. Requires expeditious corrective action to prevent occurrence or reoccurrence. Typically aligned in terms of potential consequence with Company definitions for Severity Level 2 and 3 Incidents.	Level III Non Conformances will generate a corrective action request or a recommendation for further action and will result in a Stop Work Order.

Note: Non-conformances may, at Company's discretion, be escalated from one level to the next in case of repeated occurrence or lack of corrective action.

As referenced in Table 7-1, the categorization of Non Conformances is aligned with Company's incident levels (levels <0, 0, 1, 2, 3) as defined in Company's incident management process and shown in Figure 8-1 below, thus enabling consistency with Company notification and reporting Esso Highlands Limited and the IESC/Lender Group.

Contractors' monthly Construction Environmental Report and Construction Social Report shall include a summary and status of all Non Conformances identified during Contractors' verification, monitoring and assessment processes discussed in Sections 6.2, 6.3 and 6.4.

Company shall report to the DEC/IESC/Lender Group Non Conformances identified during the verification, monitoring, assessment and audit processes (Section 6.0) as described below.

Level III Non Conformances shall be notified to the IESC/Lender Group and DEC within three business days. A report shall be provided within five business days.

Level II Non Conformances will be reported to the IESC/Lender Group and DEC in summary form as part of the quarterly Construction Environmental and Social Report.

Level I Non Conformances and Field Observations will be reported to the IESC/Lender Group and DEC as a numeric total as part of the quarterly Construction Environmental and Social Report.

All documentation relating to Non Conformances will be made available as part of the periodic audits undertaken by the IESC/Lender Group and DEC.

8.0 INCIDENT MANAGEMENT, NON CONFORMITY AND CORRECTIVE ACTION

8.1 Introduction

This section summarizes the process of corrective and remedial action required following environmental and social incidents and as a result of environmental and social Non Conformances and field observations resulting from the verification, monitoring, assessment and audit activities described in Section 6.0 and Section 7.0.

8.2 Incident Management

As mentioned in Section 7.3, Company has developed an incident management process which defines the requirements for managing safety, health, environmental, social and security related incidents, including near misses, for the Project. A summary of the incident management process is provided below.

The objectives of the incident management process are to define Company requirements for managing Company, Contractor and subcontractor incidents, to provide users with guidance to effectively implement incident management processes and tools to support effective and consistent implementation.

An incident is defined as a specific event, sequence of events, or extended condition that had an unwanted or unintended impact on safety, security, health and/or livelihood of people, property, or the environment, or on legal / regulatory compliance.

Incident management consists of those post incident actions which are performed to ensure the appropriate level of post incident care is provided to people and the environment, address requirements related to good business practices (i.e. notification, understanding corrective actions to prevent recurrence, and liability protection) and ensure regulatory compliance (i.e. notification and reporting).

The dominant organization at a worksite is responsible for implementing the incident management process. The dominant onsite organization may be Company or a Contractor or subcontractor. In the case that Contractor or subcontractor is the dominant onsite organization (i.e. most construction worksites), Contractor or subcontractor will utilize its incident management process, as approved by Company. Company will provide implementation oversight to Contractor and subcontractor incident management processes to ensure their effectiveness. When Company is the dominant onsite organization, Company will implement all aspects of Company's incident management process.

Project incidents will be managed according to the following principles:

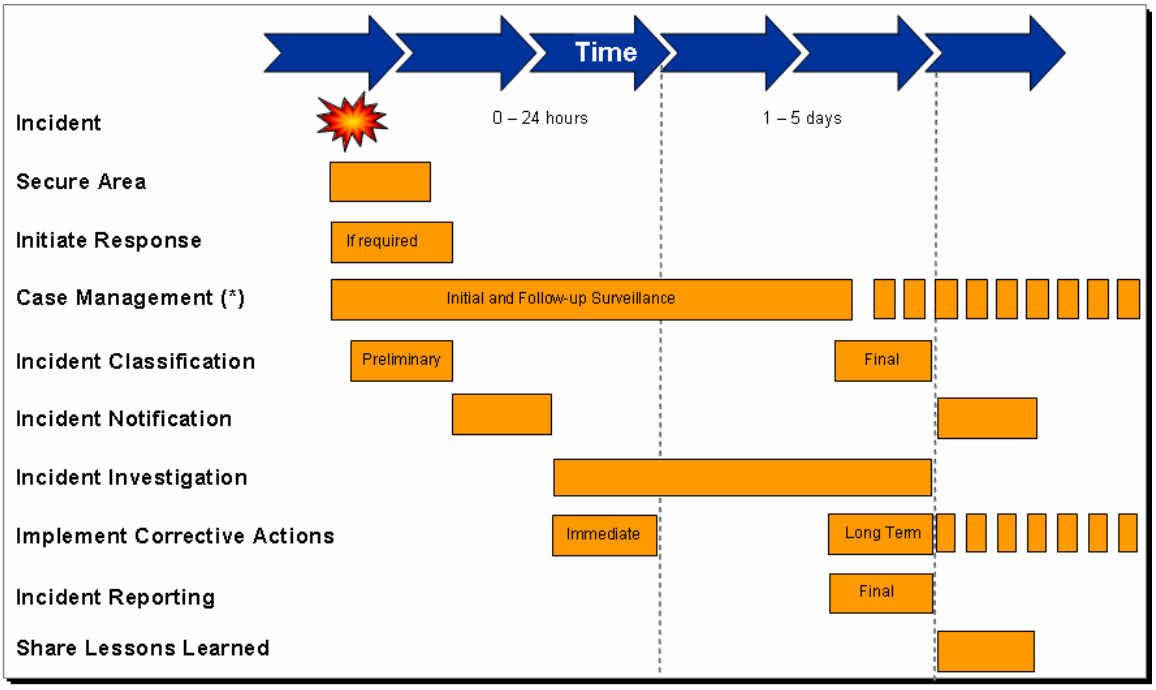
- Reduce further harm to personnel, the environment, and assets
- Confirm prompt and proper medical care / treatment of injured or ill persons, and perform the appropriate level of follow-up surveillance to ensure injuries and illnesses do not escalate
- Notify and / or report incident details to internal and external stakeholders as appropriate
- Investigate all incidents, regardless of the severity level, in order to identify causes and implement corrective actions to prevent incident recurrence
- Stimulate learning opportunities by sharing lessons learned internally and externally as appropriate
- Address potential legal sensitivities and involve legal counsel as required

The incident management process is comprised of the following key elements, some of which occur concurrently during implementation:

- Secure the area
- Initiate emergency response (if required)
- Perform case management for injuries and illnesses (if required)
- Incident classification
- Incident notification
- Incident investigation
- Implement corrective actions
- Distribute incident report
- Share lessons learned

Figure 8-1 below describes the timing and sequential relationships between the key elements of the incident management process.

Figure 8-1: Incident Management Process



(*) As required for injuries or illnesses

In addition to the requirements established in the incident management process, Contractors shall develop and maintain an Environmental and Social Action Tracking System which will include the details of all environmental and social incidents, identify the remedial / corrective action required, assign actions/timings to responsible parties and indicate the status of the remedial / corrective action. Contractors shall maintain the Environmental and Social Action Tracking System current at all times. Company will periodically check Contractors' Environmental and Social Action Tracking System. Contractor shall cooperate fully with Company in this regard and make the Environmental and Social Action Tracking System available for Company review upon request. The above requirements apply equally to subcontractors and subcontractor data must be included in Contractors' data.

Company will maintain an Environmental and Social Action Tracking System, as described above, for environmental and social incidents which relate to its scope of work. Company will maintain the Environmental and Social Action Tracking System current at all times. Company will make the Environmental and Social Action Tracking System available to the IESC/Lender Group upon request.

Refer to 7.0 for notification and reporting of environmental and social incidents.

8.3 Non Conformity Corrective Action

The Environmental and Social Action Tracking System described above, or similar system, shall be utilized for the tracking and stewardship of Non Conformances identified as part of the verification, monitoring, assessment and audit activities described in Section 6.0.

Contractors' Environmental and Social Action Tracking System will include the details of all environmental and social Non Conformances (all levels) and Field Observations, identify the remedial / corrective action required, assign actions/timings to responsible parties and indicate the status of the remedial / corrective action. Contractors' Environmental and Social Tracking System shall include Non Conformances and Field Observations raised by Contractor, Company, the IESC/Lender Group or DEC. The above requirements apply equally to subcontractors and subcontractor data must be included in Contractors' data.

Company will maintain an Environmental and Social Action Tracking System, as described above, for environmental and social Non Conformances and Field Observations which relate to its scope of work. Company will maintain the Environmental and Social Action Tracking System current at all times. Company's Environmental and Social Tracking System will include Non Conformances and Field Observations raised by Company, the IESC/Lender Group or DEC.

Refer to 7.0 for notification and reporting of environmental and social Non Conformances.

9.0 ORGANIZATION, ROLES AND RESPONSIBILITIES

9.1 Introduction

This section provides a summary of the organization, roles and responsibilities associated with the ESMP, including Company and Contractor resources.

Detailed organizational charts and job descriptions will be defined in the Project Organization Plan as part of the detailed execution planning.

9.2 Company Organisation, Roles and Responsibilities

Company has established environmental and social organizations dedicated to implement and oversee the implementation of the ESMP.

Company's environmental organization forms part of the Safety, Security Health and Environmental (SSHE) organization for the Project.

Company's social organization forms part of the Social Economics and Land & Community Affairs (SELCA) Organization for the Project.

Key positions, roles and responsibilities in Company's environmental and social organizations are defined in Table 9-1.

Table 9-1: Project Environmental and Social Organizations - Generic Job Descriptions[7]

Position	No. of Staff	Description
SSH&E Manager	1	• Reports to the Project Executive (direct reporting relationship) • Directly oversees the activities of the Project's E&R Manager and maintains interface with Project's Social Manager • Responsible for the Project's overall regulatory compliance and environmental performance, including the implementation and monitoring of the RCP and the ESMP • Responsible for setting overall E&R goals and objectives for the Project and communicating specific regulatory compliance and environmental protection and performance strategies and objectives for the Project as a whole and for specific components of the Project as necessary • Responsible for ensuring that the appropriate resources are assigned to support the Project's regulatory compliance and environmental management activities, including the implementation and monitoring of the ESMP and the RCP • Approves E&R-related execution plans and reporting metrics in consultation with the E&R Manager. • Responsible for endorsing regulatory compliance and environmental performance stewardship indicators and maintaining on-going E&R stewardship to the Project Executive and the Project Team (PT) • Liaises with the Company E&R Function and the EHL SHE Group on regulatory compliance and environmental management issues as needed • Provides direction to the Contractors regarding regulatory compliance and environmental protection and performance matters • Manages the Project's E&R budget • Works with the Project's Technical Manager, Community and Land Affairs Team, and Social Team to interface with key external stakeholders regarding environmental matters, including the general public • Ensures that external Regulatory Compliance Assessments are conducted as per the scheduled provided in the Project's RCP • Ensures that worldwide best E&R practices from Company projects are incorporated into the Project's processes and procedures

[7] Does not include In-Country Permitting Organization as described in more detail in the Project's RCP

Position	No. of Staff	Description
Social Programs/ Manager	1	• Provides day-to-day direction and leadership to the Project Social Programs Team and manages the Project Social Program team staffing plans. • Oversees the implementation and monitoring of the Social components of the ESMP • Assists the Project Team in understanding applicable environmental laws, regulations, codes, guidelines, and permit/licence/authorization/approval conditions throughout the Front End Engineering and Design (FEED) and detailed engineering phases and into construction • Works closely with the Project's Community and Land Affairs Teams to manage the public consultation process as it relates to delivery of the Social management components of the ESMP. • Responsible for internal and external Project Social stewardship and reporting, including monthly reporting to Lenders and applicable PNG agencies. • Assists in development and delivery of social impact and public health mitigation strategies, policies, plans and tools • Develops specific action plans based on approved mitigation plans • Conducts program performance analysis, identifying and managing major risks • Documents and stewards implementation results of social programs, responding to information requests from stakeholders • Build relationships with enabling local and international NGO's and for-profit service providers • Coordinate interfaces with Government agencies/external stakeholders on social program implementation • Advise and interpret social mitigation program requirements with Project Team and interface with Contractors as needed
Social Program Advisor	3	• Interfaces with the Project's construction engineering team and E&R team to ensure that EPC execution plans are consistent with the Project's social programs, requirements, and commitments/obligations • Interfaces with EPC planners and engineers to ensure construction and execution plans have the necessary work processes and procedures for monitoring, recordkeeping and reporting social programs performance • Interfaces with the Project SSH&E Organization as a whole to ensure consistency of the social programs execution across EPCs, that social issues are adequately and properly addressed/managed, that best practices and lessons learned are implemented and that all other social programs are adequately supported • Supports the Social Programs/Manager regarding compliance and performance reporting • Reviews the Contractors' social management documents and deliverables for acceptability • Participates in Contractor management orientation and training sessions specific to social matters • Supports other social programs responsibilities as required to ensure successful execution of EPC scope fop work consistent with Project's expectations, commitments and requirements.
Environmental & Regulatory Manager	1	• Provides day-to-day direction and leadership to the Project E&R Team and manages the Project E&R team staffing plans. • Oversees the implementation and monitoring of the Project's RCP and the Environmental components of the ESMP • Manages and maintains the Project's RCP and ESMP and updates these documents as necessary • Assists the Project Team in understanding applicable environmental laws, regulations, codes, guidelines, and permit/license/authorization/approval conditions throughout the Front End Engineering and Design (FEED) and detailed engineering phases and into construction • Maintains key interfaces with regulatory agencies, EPC contractors, and the overall Project Team • Provides regulatory and environmental technical support to design and

Position	No. of Staff	Description
		execution engineers and construction teams as required/requested • Endorses Project execution plans and participates in formal construction readiness reviews to ensure environmental performance/protection and regulatory compliance • Provides regulatory and environmental input to support the development of the Project's Coordination Procedures, ITT packages, and other contractor bid packages • Reviews contractor bid submissions from a regulatory compliance and environmental performance/management viewpoint • Reviews site- and activity-specific regulatory compliance and environmental execution plans generated by the Contractors • Works with the Project's SSH&E Organization as a whole to incorporate the required regulatory compliance and environmental content into training programs for workers and others • Works closely with the Contractors to ensure the successful execution of the regulatory compliance and environmental protection/performance aspects of their work • Works closely with the Project's Community and Land Affairs Teams to manage the public consultation process as it relates to regulatory compliance and environmental performance/management matters • Contacts regulatory authorities on behalf of the Project regarding regulatory and environmental matters, including required notifications and reporting • Provides a single window for all Project regulatory and environmental issues, and ensures that required recordkeeping is being properly undertaken • Coordinates internal regulatory compliance and environmental performance assessments and readiness reviews, including external Regulatory Compliance Assessments • Responsible for PNG LNG permit/license/authorization/approval applications and government reporting, as needed • Approves environmental submissions to regulatory agencies • Maintains regular contact with the EHL SHE Group and the Company E&R Function • Responsible for internal and external Project E&R stewardship and reporting, including monthly reporting to Lenders and applicable PNG agencies. • Develops E&R business plans and budgets, and supports the Project SSH&E Manager in stewarding the Project's E&R budget • Supports the Project's SSH&E Manager
Project Environmental Advisor	4	• Interfaces with the Project's construction engineering team and E&R team to ensure that EPC execution plans are consistent with the Project's regulatory compliance and environmental protection/performance expectations, requirements, and commitments/obligations • Interfaces with EPC planners and engineers to ensure construction and execution plans have the necessary work processes and procedures for monitoring, recordkeeping and reporting regulatory compliance and environmental protection/performance • Interfaces with the Project SSH&E Organization as a whole to ensure consistency of E&R execution across EPCs, that E&R-related issues are adequately and properly addressed/managed, that best practices and lessons learned are implemented and that all other E&R-related activities are adequately supported • Supports the Field Environmental Lead and Regulatory Advisor regarding regulatory compliance and environmental protection/performance reporting • Reviews the Contractors' environmental documents and deliverables for acceptability, as prescribed in the Project's Coordination Procedures • Participates in Contractor management orientation and training sessions specific to E&R matters • Supports other Environmental and Regulatory responsibilities as required to ensure successful execution of EPC work scope consistent with Project's

Position	No. of Staff	Description
		environmental expectations, commitments and requirements.
Regulatory Advisor	1	• Prepares Project's RCP • Review and provides endorsement to Environmental and Regulatory Manager of Contractors Regulatory documentation. • Assesses the need for and coordinates permit/license/authorization/approval applications; provides direction to the Contractors regarding the preparation of such applications • Shepherds permits/license/authorization/approval applications through the regulatory process • Distributes and communicates permit/license/authorization/approval conditions to the Project organization • Responds to questions from the Project Team about the permitting process • Stewards permit/license/authorization/approval status to the Project Team • Clarifies conditions in permits/licenses/authorizations/approvals for the Project as requested • Support interface with PNG regulatory agencies to successful delivery permitting requirements. • Support Environmental and Regulatory Manager
Regulatory & Permitting Coordinator	1	• Develop and stewardship of the Project's Approval Management System • Assists with the preparation of permit, license, authorization and approval applications • Assists with establishment of obligations in the absences of PNG regulations. • Determine responsibility and completion timing for each obligation in Project RegFrame • Provides ongoing consultation to Project Team, Contractors on Regulatory matters. • Interface with Law department on interpretation of regulations and obligations. • Maintains the Project permit/license/authorization/approval acquisition schedule • Supports E&R Regulatory Advisor
RegFrame Database Management Technician	1	• Responsible for the management and maintenance of RegFrame database for the Project • Responsible for advising about upcoming obligations, tracking requirements and documentation for completed items and overall stewardship of the Regulatory Compliance process • Ensures the timely entry of regulatory requirements and other Project obligations into the RegFrame database • Prepares the appropriate RegFrame reporting to support Project regulatory compliance performance. • Provides and arranges for RegFrame training for project personnel requiring such training • Ensures regulatory records and documents are filed correctly in RegFrame • Supports preparation of required permit, license, authorization, and approval applications • Supports E&R Regulatory Advisor
Field Environmental Lead	1	• Provides day-to-day direction and leadership to the PNG LNG Field Environmental Team and manages the PNG LNG Field Environmental Team's staffing plans • Maintains and implements Environmental component of the Project's Environmental and Social Management Plan (ESMP) and the Project's Environmental Monitoring Plan • Implements detailed environmental performance metrics, monitor results and continues to enhance performance. Track environmental program metrics and steward progress • Plans, develops and implement field environmental programs including logistics

Position	No. of Staff	Description
		• Facilitate Environmental Audits, Assessment, and Reviews to help find improvement opportunities • Ensure delivery of appropriate Field Environmental Training and orientations for Project Team and Contractors • Works with Contractors and Project Team to resolve field environmental issues (non-conformities, incidents, etc) and provide guidance
Field Environmental Officers	8+	• Works with Company and Contractor's site management and Security, Safety, Health, and Environment (SSHE) organizations to implement the project and site environmental monitoring programs • Advises site team (company, contractor, and subcontractors) of company, contractor, and local authorities' environmental requirements, regulations, expectations, and best practices. • Coaches and advising contractor and subcontractors to establish, communicate, and implement environmental expectations and initiatives; monitor and stimulate execution with contractor's environmental policy, rules, and procedures; and monitor conformance with project and site environmental management plans and implement improvements where appropriate • Collects and analyzing data on environmental management performance for reporting to project and functional management • Identifies and assists with prioritization of opportunities for site environmental management process improvements • Supports Field Environmental Supervisor

9.3 Contractor Organisation, Roles and Responsibilities

Contractors shall ensure sufficient resources are allocated on an ongoing basis to achieve effective implementation of the requirements established in this ESMP and Contractors' ESMP documents.

Contractor shall ensure that its subcontractors allocate sufficient resources to achieve effective implementation of the requirements established in this ESMP and Contractors' ESMP documents, as applicable to each subcontract scope of work.

Contractor's ESMP shall describe the resources allocated to and responsible for the execution of each task and requirement contained therein.

Contractors shall work closely with Company to define the appropriate level of environmental and social staffing and associated organizational structure.

Company recognizes that staffing levels and organizational structure will vary as a function of each Contract scope of work, execution activity levels, and environmental and social risk.

Key positions within Contractors' and subcontractors' environmental and social organizations are subject to Company review and approval.

Prior to the commencement of work, Contractors shall provide to Company assurance of their capacity to fulfill the environmental and social requirements established in this ESMP and Contractors' ESMP documents and provide dedicated, competent and appropriately qualified environmental and social resources.

10.0 TRAINING, AWARENESS AND COMPETENCY

10.1 Introduction

This section provides a summary of training, awareness and competency requirements associated with the ESMP.

Contractors shall ensure that all Contractor and subcontractor personnel responsible for the execution of the tasks and requirements contained within this ESMP and Contractor ESMP documents are competent on the basis of education, training and experience. Company will equally ensure that all Company personnel are competent on the basis of education, training and experience.

Contractor's ESMP shall describe the training and awareness requirements necessary for its effective implementation. Contractor's training, awareness and competency program, including delivery and verification thereof, is subject to Company review and approval.

Company, Contractors and subcontractors shall provide personnel with environmental and social training appropriate to their scope of activity and level of responsibility. Focused training shall be undertaken to ensure that all personnel are fully conversant with the aspects of this ESMP and Contractor/subcontractor ESMP documents which are relevant to their duties.

Company, Contractors and subcontractors shall appropriately document the environmental and social training activity by means of a training needs assessment, training matrix/plan and records of training undertaken.

10.2 Competency Levels and Training Needs

Company, Contractors and subcontractors shall undertake an initial evaluation of training needs associated with this ESMP and Contractor/subcontractor ESMP documents.

On the basis of the training needs assessment, Company, Contractors and subcontractors shall develop and maintain a training matrix (Environmental and Social Training Matrix) detailing the training needs of each member of the organization based on job description and level of environmental and social responsibility and involvement.

Company, Contractors' and subcontractors' environmental and social training program shall include several levels of competency and training as a function of individual personnel environmental and social responsibility and involvement:

Induction & General ESMP Awareness

Induction awareness and overview of the ESMP for visitors and personnel who do not have direct roles and responsibilities within it, providing a summary of the key environmental and social aspects, the control/mitigation measures in place and relevant instructions.

Management ESMP Awareness

Introduction to the ESMP geared for management, covering the key aspects of the ESMP and providing an overview of each EMP and SMP document within it.

ESMP Roles and Responsibilities

Job specific training and awareness for all personnel who have direct roles and responsibilities within it or whose specific work activities may have an environmental or social impact, providing a detailed review of the components of the ESMP specific to that employee, including a detailed description of employee duties.

10.3 Minimum Environmental and Social Training Requirements

Company is committed to the vision of *Protect Tomorrow. Today.* and to have personnel empowered to make decisions and take actions that meet Company's environmental and social expectations and requirements. Similarly to safety, there is an environmental and/or

social component to every job or work activity. All personnel (Company, Contractor and subcontractor) will therefore, receive general environmental and social training before or shortly after the commencement of work on the Project as outlined in Table 10-1.

Table 10-1: Minimum Environmental and Social Training Requirements

Personnel	Topic	Frequency
All Project Personnel (Company, Contractor and subcontractor)	Environmental and Social Awareness Training: • Company Policy and environmental and social expectations and requirements • General Project environmental and social expectations and requirements • Project environmental and social objectives and general overview of environmental and social effects avoidance and mitigation measures • Project environmental and social incident reporting • Environmental and social sensitivity training of key issues (biodiversity, cultural heritage, waste management, etc.).	• Once (with refreshers as needed) • Timing could be associated with Safety training because of similar audiences
Project Environmental and Social Advisors, Monitor, Specialists or Personnel identified as responsible for specific tasks (Company, Contractor and subcontractor)	Environmental and Social Issue Training: • Detailed training on the management, commitments, and mitigation measures of the EMP/SMPs • Field monitoring, incident investigation and response • Other environmental and social issues dependent on roles and responsibilities Typical Topics include: • Ground disturbance • Surface water release • Waste management • Air emissions reporting • Cultural Heritage • Social Awareness • Social Interaction Principles.	• Ongoing, with training to be provided prior to start-up of identified tasks • Updated if tools or procedures change • Refresher frequency as required, based on environmental risks associated with the task
Site Personnel (Company, Contractor and subcontractor)	Environmental and Social Site Awareness Training: • Detailed site-specific training to understand the Project expectations, requirements, and commitments	• Once (with refreshers as needed) • Timing could be associated with Site Safety training because of similar audiences
Management/Supervision (Company, Contractor and subcontractor)	Environmental and Social Management Strategy training: • Project environmental and social vision overview • General monitoring, verification, and incident response processes • General overview of Project mitigation measures, management plans, and reporting requirements • Other environmental and social site specific and strategic management issues and requirements.	• Once (with refreshers as needed)

10.4 Roles and Responsibilities

Table 10-2 provides a broad overview of roles and responsibilities for environmental and social training processes and procedures among Project personnel.

Table 10-2: General Environmental and Social Training Roles and Responsibilities

Position	Responsibilities
Management	• Responsibility to ensure competent and trained resources is available to execute the project
Site Supervision	• Ensure individuals have the required knowledge and skills to perform job tasks in an environmentally and socially compliant manner • Provide time and resources required to complete and maintain training • Steward the completion of required training
Project Environmental and Social Advisor, Monitors, Specialist	• Develop environmental and social training with support from training resources
All Personnel	• Complete training requirements • Provide feedback on training received
Training Resources	• Develop environmental training programs with support from Environmental and Social Advisors/Monitors/Specialists personnel • Deliver training and evaluate training results
Contractors and subcontractors	• Ensure Environmental and Social Management Plan details the training requirements, responsibilities, and timing for Environmental and Social training consistent with Company ESMP • Coordinate Environmental and Social training for their workers

10.5 Training Programs and Delivery

Company will develop and implement an environmental and social training program specific to the construction execution phase of the Project.

All Company personnel will receive, at a minimum, the PNG LNG environmental and social awareness training package. Contractors are expected to develop and implement a similar environmental and social training program.

Environmental and social training, beyond the basic environmental and social awareness program that will be provided to all personnel, may consist of a mixture of on-the-job (OTJ) training, mentoring, self-study, classroom instructions, seminars, workshops, computer based training (CBT), and emergency response or similar drills.

CBT and/or other training documents will be used to track competency, training scheduling and re-qualification requirements. Personnel training records will be retained for reference or inspection. Training progress will be reviewed periodically.

Contractors will be responsible for developing and delivering to its workers and subcontractors training for topics not covered under the basic environmental and social awareness training and applicable to their scope of work as approved by Company.

Contractor shall document the training activity by means of an Environmental and Social Training Matrix detailing the training needs of each member of the organization supported by other documentation necessary to attest to the planning, delivery and validation of training and the maintenance of training records.

APPENDICES

Appendix 1: **Ecological Management Plan**

Appendix 2: **Air Emissions Management Plan**

Appendix 3: **Noise and Vibration Management Plan**

Appendix 4: **Waste Management Plan**

Appendix 5: **Water Management Plan**

Appendix 6: **Spill Prevention and Response Plan**

Appendix 7: **Hazardous Materials Management Plan**

Appendix 8: **Weed, Plant Pathogen and Pest Management Plan**

Appendix 9: **Erosion and Sediment Control Plan**

Appendix 10: **Raw Materials Management Plan**

Appendix 11: **Reinstatement Plan**

Appendix 12: **Induced Access Management Plan**

Appendix 13: **Cultural Heritage Management Plan**

Appendix 14: **Hyrdotest Management Plan**

Appendix 15: **Acid Sulphate Soils Management Plan**

Appendix 16: **Dredge Management Plan**

Appendix 17: **Community Health & Safety Plan**

Appendix 18: **Community Impacts Management Plan**

Appendix 19: **Labour and Worker Conditions Management Plan**

Appendix 20: **Camp Management Plan**

Appendix 21: **Procurement & Supply Management Plan**

Appendix 22: **Community Engagement Plan**

Appendix 23: **Community Infrastructure Management Plan**

Appendix 24: **Community Health, Safety & Security Management Plan (Company)**

Appendix 25: **Community Support Strategy (Company)**

Appendix 26: **Resettlement Framework Document (Company)**

Appendix 27: **Stakeholder Engagement Plan (Company)**

Appendix 28: **Environmental Monitoring Plan**

Appendix 29: **Environmental Performance Indicators and Statutory Reporting and Notification Requirements**

Appendix 30: **Quarantine Management Program**