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18. ENVIRONMENTAL AND SOCIAL MANAGEMENT, MONITORING AND REPORTING

18.1 INTRODUCTION

This chapter outlines the framework for environmental and social management, monitoring and reporting for the Papua LNG Project – Downstream (the Project).

ExxonMobil PNG Antelope Limited (EMPNGA) is the Project proponent and the ExxonMobil affiliate responsible for the environmental and social management during construction of the Project. Niugini LNG Operating Company Limited (NLOC) is the ExxonMobil affiliate responsible for the environmental and social management during operation of the Project once it has been constructed and commissioned, thereby also encompassing the integration of the Project with the existing LNG Plant (referred to as the integrated LNG Plant) and associated Environment Permit. EMPNGA and NLOC (referred to jointly as ExxonMobil where appropriate) are committed to developing and operating the Project to meet the environmental and social performance standards of the existing LNG Plant, and the Papua New Guinea Government, as well as the standards to be applied by the Project.

The chapter provides an overview of the:

- Relevant policy, legislation, guidelines, and standards applicable to the management of Project impacts (Section 18.2).
- Overarching Environmental and Social Management System (ESMS) under which the Project will be constructed and operated (Section 18.3) that incorporates relevant elements of the Operations Integrity Management System (OIMS).
- Environmental and Social Management Plan (ESMP) for environmental, social aspects and health and safety (Section 18.4).
- Organisational structure (Section 18.5).
- Framework for monitoring and reporting, including in relation to the expected conditions of the environment permits for the Project (Section 18.6).

18.2 POLICY, LEGISLATION, GUIDELINES AND STANDARDS

The management of Project environmental and social activities and impacts and the design of facilities and other equipment will be governed by criteria defined in applicable Papua New Guinea Government legislation, ExxonMobil policies and guidelines, and other applicable standards and regulations, including those of international financial institutions. EMPNG currently conducts operations in accordance with Papua New Guinean laws and regulations. This includes monitoring compliance with 1,436 regulatory obligations and 2,429 licenses, permits and certifications, while also meeting PNG LNG Lender Group commitments.

Chapter 4 Legal, Administrative and Planning Framework, describes the legal, administrative, and planning framework that will govern the preparation and implementation of the ESMP developed for the construction phase of the Project, including the environmental, health and social standards that will guide management actions. A summary of those aspects most relevant to environmental and social management is provided below.

18.2.1 Legislation

The laws and regulations of Papua New Guinea, and other international legislative requirements relevant to the Project are discussed in detail in Chapter 4 Legal, Administrative and Planning Framework.

The principal legislation associated with environmental and social management that applies to oil and gas development projects in Papua New Guinea are the *Environment Act 2000* and the *Oil and Gas Act 1998*. These Acts govern the activities and standards for environmental protection and sustainability under which the Project will operate. The *Environment Act 2000* is administered by the Conservation and Environment Protection Authority (CEPA) and sets out the requirements for assessment, documentation, approval, and environmental permitting.

Practical aspects relating to the development of an Environmental Impact Statement (EIS) are described in Guidelines for Conduct of Environmental Impact Assessment and Preparation of EIS and Social Impact Assessment Guidelines (2004).

The legal and regulatory framework stipulates the requirements the Project will be consistent with to minimise negative impacts, which are reflected in this overarching Environmental and Social Management System (ESMS).

18.2.2 Company policies

ExxonMobil is committed to conducting business in a manner which protects the environmental, social, and economic needs of the communities in which it operates, including protecting the safety, security, and health of these communities and employees of the company.

ExxonMobil uses their Environmental Aspects Guide to identify and evaluate various potential environmental and socioeconomic risks and impacts throughout the life of an asset or project. Based on the results, management plans are developed to avoid adverse environmental and socioeconomic impacts, reduce the impacts to acceptable levels, or remedy the impacts.

ExxonMobil has also developed a National Content Strategy for its activities globally which commits to:

- Recruiting and developing local workforces.
- Developing and using local vendors for the supply of goods and services.
- Investing in health, education, and infrastructure to assist the development of local capacities.

The commitments in the ExxonMobil Environment Policy (described in Section 18.2.2.4) are put into practice through a framework called the Operations Integrity Management System (OIMS) (Section 18.3.1), the relevant elements of which are also incorporated into the overarching ESMS. The OIMS is a mandatory framework across all ExxonMobil projects and outlines common worldwide expectations for addressing risks. The OIMS is compliant with ISO 14001, the International Organization for Standardization (ISO) standard for environmental management systems.

Contractors engaged for the Project will be required to comply with ExxonMobil policies and standards, and the ESMP.

ExxonMobil's Standards of Business Conduct form the framework by which ExxonMobil and its subsidiaries operate, providing employees with the principles and an understanding of ExxonMobil standards. The Standards of Business Conduct include the foundation policies shown in Table 18.1.

The Standards of Business Conduct and its foundation policies are put into practice through the OIMS framework (Section 18.3.1). Selected topics in Table 18.1 that are particularly relevant to the scope of the ESMP are described in further detail below.

Table 18.1 Standards of Business Conduct foundation policies

Standards of Business Conduct	
Ethics	Health
Conflicts of Interest	Environment
Corporate Assets	Safety
Directorships	Product Safety
Gifts and Entertainment	Customer Relations and Product Quality
Anti-Corruption	Alcohol and Drug Use
Political Activities	Equal Employment Opportunity
International Operations	Harassment in the Workplace
Antitrust	-

18.2.2.1 Ethics

The policy of ExxonMobil is to comply with all governmental laws, rules, and regulations applicable to its business.

In addition, where the law is permissive, ExxonMobil chooses the course of highest integrity. Local customs, traditions, and mores differ from place to place, and this must be recognised. But honesty is not subject to criticism in any culture. Shades of dishonesty simply invite demoralising and reprehensible judgments. A well-founded reputation for scrupulous dealing is itself a priceless corporate asset.

ExxonMobil cares how results are obtained, not just that they are obtained. Directors, officers and employees should deal fairly with each other and with ExxonMobil suppliers, customers, competitors and other third parties.

ExxonMobil expects compliance with its standard of integrity throughout the organisation and will not tolerate employees who achieve results at the cost of violation of law or who deal unscrupulously. ExxonMobil directors and officers support and expect employees to support, any employee who passes up an opportunity or advantage that would sacrifice ethical standards.

It is ExxonMobil policy that all transactions will be accurately reflected in its books and records. This, of course, means that falsification of books and records and the creation or maintenance of any off-the-record bank accounts are strictly prohibited. Employees are expected to record all transactions accurately in ExxonMobil books and records, and to be honest and forthcoming with the ExxonMobil internal and independent auditors.

ExxonMobil expects candour from employees at all levels and adherence to its policies and internal controls. One harm which results when employees conceal information from higher management or the auditors, is that other employees think they are being given a signal that the ExxonMobil policies and internal controls can be ignored when they are inconvenient. Such circumstances can result in corruption and demoralisation of an organisation. The ExxonMobil system of management will not work without honesty, including honest book-keeping, budget proposals, and economic evaluation of projects.

It is ExxonMobil policy to make full, fair, accurate, timely, and understandable disclosure in reports and documents that ExxonMobil files with the United States Securities and Exchange Commission, and in other public communications. All employees are responsible for reporting material information known to them to higher management so that the information will be available to senior executives responsible for making disclosure decisions.

18.2.2.2 International operations

It is the policy of ExxonMobil to comply with all governmental laws, rules, and regulations applicable to its operations outside the United States of America (U.S.) and to conduct those operations to the highest ethical standards.

Laws that apply to operations outside the U.S. include those of the countries where the operations occur, and may also include certain U.S. laws which govern international operations of U.S. companies and U.S. persons, broadly defined. Accordingly, directors, officers, and employees of ExxonMobil who are involved with the ExxonMobil operations outside the United States should consult with the Law Department for advice on applicable U.S. laws, especially laws regarding boycotts, trade sanctions, export controls, and foreign corrupt practices, and are expected to comply with those laws.

18.2.2.3 Health

It is ExxonMobil policy to:

- Identify and evaluate health risks related to its operations that potentially affect its employees, contractors or the public.
- Implement programs and appropriate protective measures to control such risks, including appropriate monitoring of potentially affected employees.
- Communicate in a reasonable manner to potentially affected individuals or organisations, and the scientific community knowledge about health risks gained from its health programs and related studies.
- Determine at the time of employment and thereafter, as appropriate, the medical fitness of employees to do their work without undue risk to themselves or others.
- Provide or arrange for medical services necessary for the treatment of employee occupational illnesses or injuries and for the handling of medical emergencies.
- Comply with all applicable laws and regulations and apply responsible standards where laws and regulations do not exist.
- Work with government agencies and others to develop responsible laws, regulations and standards based on sound science and consideration of risk.
- Conduct and support research to extend knowledge about the health effects of its operations.
- Undertake appropriate reviews and evaluations of its operations to measure progress and to foster compliance with this policy.
- Provide voluntary health promotion programs designed to enhance employees' well-being, productivity, and personal safety. These programs should supplement, but not interfere with, the responsibility of employees for their own health care and their relationships with personal physicians. Information about employees obtained through the implementation of these programs should be considered confidential and should not be revealed to non-medical personnel except at the request of the employee concerned, when required by law, when dictated by overriding public health considerations, or when necessary to implement the Alcohol and Drug Use policy.

18.2.2.4 Environment

It is ExxonMobil policy to conduct its business in a manner that is compatible with the balanced environmental and economic needs of the communities in which it operates. ExxonMobil is committed to continuous efforts to improve environmental performance throughout its operations.

Accordingly, the ExxonMobil policy is 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, emphasise 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 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 organisations and authorised 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.

18.2.2.5 Safety

It is ExxonMobil policy to conduct business in a manner that protects the safety of employees, others involved in its operations, customers, and the public. ExxonMobil will strive to prevent all accidents, injuries, and occupational illnesses through the active participation of every employee. ExxonMobil is committed to continuous efforts to identify, and eliminate or manage, safety risks associated with its activities.

Accordingly, the ExxonMobil policy is to:

- Design and maintain facilities, establish management systems, provide training, and conduct operations in a manner that safeguards people and property.
- Respond quickly, effectively, and with care to emergencies or accidents resulting from its operations, in cooperation with industry organisations and authorised government agencies.
- Comply with all applicable laws and regulations and apply responsible standards where laws and regulations do not exist.
- Work with government agencies and others to develop responsible laws, regulations, and standards based on sound science and consideration of risk.
- Conduct and support research to extend knowledge about the safety effects of its operations, and promptly apply significant findings and, as appropriate, share them with employees, contractors, government agencies, and others who might be affected.
- Stress to all employees, contractors and others working on its behalf their responsibility and accountability for safe performance on the job and encourage safe behaviour off the job.
- Undertake appropriate reviews and evaluations of its operations to measure progress and to foster compliance with this policy.

18.2.2.6 Equal employment opportunity

It is the policy of ExxonMobil to provide equal employment opportunity (EEO) in conformance with all applicable laws and regulations to individuals who are qualified to perform job requirements. ExxonMobil

administers its personnel policies, programs, and practices in a non-discriminatory manner in all aspects of the employment relationship, including recruitment, hiring, work assignment, promotion, transfer, termination, wage and salary administration, and selection for training.

Managers and supervisors are responsible for implementing and administering this policy, for maintaining a work environment free from unlawful discrimination, and for promptly identifying and resolving any problem area regarding equal employment opportunity.

In addition to providing equal employment opportunity, it is also ExxonMobil policy to undertake special efforts to:

- Develop and support educational programs and recruiting sources and practices that facilitate employment of minorities and women.
- Develop and offer work arrangements that help to meet the needs of the diverse work force in balancing work and family obligations.
- Establish company training and developmental efforts, practices, and programs that support diversity in the work force and enhance the representation of minorities and women throughout ExxonMobil.
- Foster a work environment free from sexual, racial, or other harassment.
- Make reasonable accommodations that enable qualified disabled individuals to perform the essential functions of their jobs.
- Emphasise management responsibility in these matters at every level of the organisation.

Individuals who believe they have observed or been subjected to prohibited discrimination should immediately report the incident to their supervisors, higher management, or their designated Human Resources Department contacts.

Individuals will not be subjected to harassment, intimidation, discrimination, or retaliation for exercising any of the rights protected by this policy and the various EEO statutes.

18.2.3 Engineering design and management principles

The engineering design and management principles for the Project include adherence to appropriate engineering design codes and standards, such as the ExxonMobil Engineering Practices System, select international engineering standards, and Papua New Guinea-specific codes and standards. The engineering design codes and standards applicable to the Project are referred to in Chapter 2 Project Description and also mitigation and management measures (Attachment 3 of this EIS) developed for the Project, where applicable.

Project-specific design philosophies have also been developed that cover operational practices that overlap with aspects of environmental management. These include equipment and materials handling, facility shutdown, machinery audit, security systems, flare relief and blowdown, loss prevention, and flow assurance. These design codes and standards will be provided to prospective Project contractors early in the Project design and planning stages to ensure their inclusion in the contractors' designs and work practices.

18.2.4 Mitigation and management measures

In addition to the policy, legislation, guidelines, standards, and engineering design features discussed above, the Project will implement appropriate environmental and social management and mitigation measures throughout the construction, operations, and decommissioning stages of the Project.

The Project's approach to the mitigation and management of impacts aligns with the principles set forth in the mitigation hierarchy (see Chapter 5 Approach to Impact Assessment) and consists of avoiding impacts where possible, minimising impacts when avoidance is impossible, and when they remain, considering rehabilitation or restoration, and ultimately compensation/offsetting.

Mitigation and management measures (Attachment 3 of this EIS) will be documented in and activated through the ESMP and draw on the measures contained in this EIS, and those implemented for the PNG LNG Project, inclusive of the most up to date revisions, as well as aligning with the overarching Papua LNG Project ESMS framework that is described below in Section 18.3.

18.3 ENVIRONMENTAL AND SOCIAL MANAGEMENT SYSTEM OVERVIEW

The ESMS is the overarching Joint Venture environmental and social management system for both the upstream and downstream phases of the Papua LNG Project. Construction and operations of the Project will be managed under the ESMS. The ESMS provides context and describes applicable generic 'system' elements. The ESMS framework is shown in Figure 18.1 and includes:

- A set of policies, Project requirements and expectations.
- The systems, processes, plans and procedures established to manage risks and impacts, monitor, and evaluate performance.
- The role of contractors in meeting the Project's environmental and social objectives.

Both the Upstream and Downstream scopes of the Papua LNG Project will have separate Environmental and Social Management Plans (ESMPs) that will be 'bridged' by the ESMS. The Project will have a construction ESMP and an operations ESMP. The operations ESMP will be integrated with the existing LNG Plant Production ESMP as necessary as the Papua LNG Project scope begins operation, and the integrated LNG Plant is brought under the oversight of NLOC.

The ESMS incorporates relevant elements of the OIMS that are described below.

18.3.1 Operations Integrity Management System

Project environmental management aspects are to be prepared under the auspices of the ExxonMobil OIMS and operate according to a guiding principle of '*Protect Tomorrow. Today.*' This principle promotes a company culture mindful of the environment and the need to protect it for future generations.

The OIMS provides a set of environmental expectations and globally accepted best practices that are part of day-to-day operations around the world. The OIMS creates a platform for environmental leadership and continuous improvement in environmental performance. The framework for environmental and social management, monitoring and reporting is consistent with that developed for the PNG LNG Project.

Operations integrity relates to all business aspects that can impact business performance. Application of the OIMS framework is required across all of ExxonMobil, with particular emphasis on design, construction, and operation.

The OIMS framework establishes common worldwide expectations for addressing inherent risks. The framework includes 11 elements, each of which contains an underlying principle and a set of expectations.

Managers are responsible for ensuring that management systems satisfy the OIMS framework and are established and implemented as a normal part of business activities. The scope, priority and pace of management system implementation should be consistent with the risks associated with the business.

OIMS provides a systematic, structured, and disciplined approach to measure progress and track accountability for safety, security, health and environmental performance across business lines, facilities, and projects.

ENVIRONMENTAL AND SOCIAL MANAGEMENT SYSTEM

Overarching 'system' document

Theme-based

Activity-based

Pollution prevention

- Air quality, greenhouse gases and energy efficiency
- Noise
- Waste
- Hazardous materials
- Spill prevention and response

Natural resources

- Water use and effluent discharges
- Raw materials
- Acid sulphate soils
- Erosion and sediment control

Biodiversity

- Biodiversity
- Invasive species, pathogens and pests

Community

- Stakeholder engagement
- National content
- Community development
- Community health, safety and security
- Cultural heritage management
- Project-induced in-migration management
- Livelihood support

Labour

- Workforce relations and working conditions

Occupational health, safety & security

- SIMOPS management strategy
- Work permissions management strategy

Emergency response

- Emergency response

Activity specific

- Restoration and rehabilitation
- Hydrotesting
- Marine operations
- Traffic and transport
- Camp and accommodation requirements
- Trenching

LEGEND

■ Environmental

■ Socioeconomic

■ OHSS

■ Multi-discipline

EXXONMOBIL PNG ANTELOPE LIMITED

PAPUA LNG PROJECT – DOWNSTREAM

FIGURE 18.1

Project Environmental and Social Management
System framework overview

SOURCE
EMPNGA, 2023



In 2018, Lloyd's Register Quality Assurance, Inc., reviewed ongoing performance and attested that OIMS is consistent with the standard on environmental management systems of the International Organization for Standardization (ISO 14001:2015) and the Occupational Health and Safety Assessment Series for health and safety management systems (OHSAS 18001:2007).

The framework and elements of the OIMS are shown in Figure 18.2 and described further below. OIMS Element 3, Element 4 and Element 6 are particularly relevant as they require risks to social, health and the environment to be minimised using sound standards, procedures, and management systems for facility construction. OIMS Element 6-7 (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).

ExxonMobil OIMS System 1.1 Management Leadership and Accountability requires the allocation of sufficient resources for the implementation and continuous improvement of operations integrity, along with the establishment of OIMS-related roles and responsibilities.

The objectives of the 11 elements of OIMS are listed below.

- **Element 1: Leading, managing and driving performance:**
 - leadership behaviours and actions required to drive effective application of the OIMS and operations integrity objectives are defined
 - each business unit has effective management systems and processes to consistently meet operations integrity objectives
 - management and supervisor accountability is clarified throughout the organisation
- **Element 2: Identifying, assessing, mitigating and accepting risk:**
 - operations integrity hazards inherent to the business are identified, including hazards to people, communities, the environment, and our facilities
 - the risk(s) associated with these hazards is assessed, communicated, prioritised and mitigated to an acceptable level
 - risk management safeguards are identified and mapped to systems to ensure there is a mechanism to maintain the safeguards' health
 - decision making associated with risk mitigation and acceptance are made at the right level within the organisation and based on thorough analysis
- **Element 3: Designing, constructing and preparing assets (facilities) for start-up:**
 - risks are identified, assessed, mitigated and communicated during facility design, construction and startup
 - design and construction meet approved standards, and deviations are approved at the appropriate level within the organisation
 - quality assurance processes are in place during construction to ensure facilities and materials are consistent with design specifications
 - readiness to operate is confirmed through execution of a pre-startup review
- **Element 4: Providing information needed for asset construction, operation and maintenance:**
 - information and documentation needed to meet operating integrity objectives are accurate, accessible, and appropriately retained



Element 5: Selecting, training, engaging and enabling people:

- people are selected and placed consistent with their abilities and job requirements
- people are trained to achieve and maintain competency
- collective competency is maintained over time
- human performance principles are applied to enable people to successfully perform their work

• **Element 6: Operating and maintaining assets:**

- procedures and work instructions effectively guide operations, maintenance and construction activities
- work to mitigate potential risks associated with operations, maintenance and construction activities is permitted and managed
- interfaces to manage risk associated with simultaneous activities and operations are recognised, managed and operated
- the mechanical integrity of facilities, equipment and wells is preserved
- risk associated with the defeat or degradation of safeguards are managed
- governmental and regulatory requirements, applicable laws, permits and external obligations are met

• **Element 7: Managing changes:**

- changes in operations, procedures, site standards, facilities, or organisations are evaluated and managed to ensure operations integrity safeguards remain healthy and risks remain at an acceptable level

• **Element 8: Selecting and engaging with third-party providers:**

- third-party providers' performance expectations are established and third parties are selected (and supported, as required) in a manner to meet these expectations
- third-party providers are monitored and held accountable to performance objectives

• **Element 9: Learning from operating experience and incidents:**

- higher consequence potential incidents, events and near misses are thoroughly investigated.
- root causes including failed safeguards are identified
- lessons learned are shared openly and implemented proactively across operating sites and organisations and from other companies

• **Element 10: Preparing for emergencies and managing potential risks to the community:**

- equipment, facilities and personnel are prepared to respond to operations integrity emergencies
- communities are engaged proactively to build and maintain relationships and manage potential operations integrity risks

• **Element 11: Assessing and driving effectiveness:**

- Operations Integrity Objectives are met through the effective application of OIMS and gaps and their root causes are identified, corrected and remain closed

The OIMS is detailed further at the following weblink: <https://corporate.exxonmobil.com/Operations/Energy-technologies/Risk-management-and-safety/Operations-Integrity-Management-System>.

18.4 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

Management plans are an intermediate step between the general requirements and commitments defined by corporate policy and the regulators, and the specific tasks for Project staff and contractors defined in individual work procedures. These are part of a range of more specific plans covering environmental, occupational health and safety, cultural heritage, and social matters.

The ESMP is comprised of a main document that describes the overall environmental and social management processes applicable to the construction phase of the Project and covers topics which are common to all environmental and social disciplines. A series of appendices (management plans) accompany the ESMP, which are detailed plans covering each of the topics discussed in the main ESMP document.

The ESMP captures the EIS commitments and any conditions of approval stipulated by the Papua New Guinean Government, as well as the potential requirements of lending institutions associated with the Project. The ESMP will also define the framework that contractors will be required to follow when preparing their more detailed construction Contractor Implementation Plans (CIPs). Contractors working on the Project will be contractually obligated to comply with the requirements, specifications and procedures set out in the ESMP, as applicable to their specific scope of works.

An ESMP will be prepared for the construction phase of the Project that incorporates relevant aspects of the existing LNG Plant Production ESMP and associated EMPs, as appropriate and applicable to Project activities. The construction ESMP will also form the basis of the subsequent operations ESMP for the integrated LNG Plant (that is, incorporating the Project and PNG LNG Project), as the Project moves through construction into operations (see Chapter 2 Project Description).

In addition to industry good practice procedures, the construction and operations ESMPs will address the specific environmental and social issues associated with the Project identified during the environmental and social impact assessment process. Potential impacts may be addressed in one or more of the management plans, as impacts overlap various sensitivities.

The objectives of the ESMP are to:

- Describe specific measures required to implement construction related management and mitigation commitments made in the Project EIS.
- Describe specific additional measures required to implement construction related good industry practice, EIS approval conditions stipulated by the Papua New Guinean Government and applicable international finance institution 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' CIPs.

The ESMP meets the above objectives by including the following components:

- Legal and other regulatory requirements.
- Identified issues and impacts.
- Monitoring requirements and activities.
- Implementation schedules.
- Training, awareness, and competency.
- Performance indicators and targets.
- Roles, responsibilities, and lines of communication.

18.4.1 Construction environmental and social management plan

For the construction phase of the Project, as appendices to the ESMP, a series of aspect-specific construction environmental and social management plans have been developed to address the following aspects:

- Air quality, Greenhouse Gases and Energy Efficiency

- Noise
- Waste Management
- Hazardous Materials
- Water Use and Effluent Discharges
- Raw Materials
- Acid Sulphate Soils
- Biodiversity
- Invasive Species, Pathogens and Pests
- Stakeholder Engagement
- National Content
- Community Development
- Community Health, Safety, and Security
- Cultural Heritage Management
- Project-induced In-migration Management
- Livelihood Support
- Workforce Relations and Working Conditions
- Emergency Response
- Spill Prevention and Response
- Hydrotesting
- Marine Operations
- Traffic and Transport
- Restoration and Rehabilitation
- Erosion and Sediment Control
- Camp and accommodation requirements
- Simultaneous Operations (SIMOPS) Management Strategy
- Work Permissions Management Strategy
- Trenching.

The Occupational Health, Safety and Security plan has not been included as part of the ESMP for the Project. These plans will be captured in other documents as part of the engineering, procurement, and construction (EPC) procedures.

18.4.2 Operations environmental and social management plan

An operations ESMP will be prepared prior to the commencement of operations. The requirements will apply across normal operating conditions and in reasonably foreseeable abnormal operating conditions or emergency situations. The operations ESMP will be inclusive of the integrated LNG Plant and developed with PNG LNG. Once developed, the operations ESMP will be implemented through Environmental Protocols in a manner similar to those established and currently utilised for the PNG LNG Project. These will be updated for the integrated LNG Plant and are anticipated to address the following aspects:

- Emissions to air, ambient air quality and greenhouse gases
- Noise
- Discharges to water and water quality

- Spill prevention and response
- Materials management
- Pre-disturbance survey and clearance
- Reinstatement and regeneration
- Invasive species
- Induced access
- Cultural heritage
- Waste.

A decommissioning plan will also be developed for the Project. It is expected that this will be finalised and submitted to the Papua New Guinean Government near the end of Project life (see Chapter 2 Project Description).

18.4.3 Contractor environmental management plans

Prior to the ESMP being completed, approved, and implemented, early works contractors for the Project will operate under the existing PNG LNG Project ESMP and associated Environmental Management Plans. Each major contractor selected during the early stage of the Project will be contractually obligated to prepare, for ExxonMobil approval, an ESMP (termed Contractor Implementation Plan, CIP) for the work areas or activities for which they are responsible. During construction, CIPs will be required to be developed in accordance with the ESMP and approved by EMPNGA prior to the commencement of works.

Each CIP will include a compilation of topic-based CIPs as they pertain to the contractor's activities as listed in Section 18.4.1 and be supported by procedures, protocols, 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).
- 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.

18.4.4 Health, safety and security management plans

The operator will manage health and safety aspects of the Project. The health and safety framework for early works, construction and operations will include a series of plans to address the varied health and safety issues associated with the Project and are envisaged to address the following aspects:

- Community health plan
- Community safety plan

- Security management plan
- Worker health plan
- Worker safety plan.

18.5 ORGANISATIONAL STRUCTURE AND RESPONSIBILITIES

The Project will maintain an appropriate organisational structure and sufficient resources to support effective implementation of the ESMP.

ExxonMobil has established environmental and social organisations dedicated to implement and oversee the implementation of the ESMP. ExxonMobil's Safety, Security, Health and Environment (SSHE) organisation has overall responsibility for the implementation and ongoing oversight of the ESMP.

ExxonMobil's environmental organisation forms part of the SSHE organisation for the Project. ExxonMobil's social organisation forms part of the Land and Community Affairs Organisation for the Project.

The organisational structure and reporting relationships for the implementation and monitoring of the construction and operations stages of the Project will reflect those developed for the PNG LNG Project and be detailed in the Project construction ESMP.

18.5.1 Overview of the environmental and social management organisation

A team of professional staff will form the core of the Project's environment and social organisation. The environment and social organisation will be responsible for:

- Developing and implementing the Project ESMPs for construction, operations and decommissioning.
- Communicating expectations and commitments related to environmental and social performance throughout the project organisation and to contractors.
- Environmental and social performance monitoring for the construction, operations and decommissioning of all project components.

The staffing of the Project's environment and social organisation will be commensurate with location and work demands. For example, key personnel will be located on site, while those less directly involved will be located at the Port Moresby administrative office or elsewhere. Implementation is likely to be staged during early works and is anticipated to reach a peak staffing level during the height of construction activities. Similarly, as management needs change over time, the nature of the environment and social organisation will evolve to adapt to changed circumstances.

The SSHE team will oversee the Project's environmental and social responsibility, and will:

- Further develop and implement the Project's environmental and social management framework for the respective Project phases.
- Communicate expectations, including legal obligations, standards and targets that must be met, and the commitments of the workforce and contractors.
- Assist contractors to implement the Project's ESMP.
- Train or induct the workforce and contractors appropriately.
- Support and monitor the implementation of the management measures throughout all Project phases and activities.
- Monitor defined performance indicators and evaluate results against performance objectives.
- Systematically audit and assess environmental and social management to evaluate conformance, compliance, and integrity.

- Review management measures and strategies, and revise, adapt and improve the ESMP when necessary.
- Maintain management systems and documentation.
- Undertake regulatory and Lender reporting as required.
- Interface with government bodies and other authorities regarding SSHE requirements.
- Maintain community engagements in relation to Project activities, grievances, and mitigation programs.

Key positions, roles and responsibilities in environmental and social organisations adopted for the Project during the construction phase will be consistent with those that are defined in the PNG LNG ESMP, and are presented in Table 18.2. The anticipated environmental and social organisation during operations is presented in Table 18.3.

EMPNG's SSHE organisation will be adapted as required to meet conditions and operational needs throughout the Project's lifecycle.

18.5.2 Responsibilities

The ESMP will detail the responsibilities of the social, security, environment, and safety organisation, which are anticipated to include:

- Assisting the operator and its contractors with the implementation of the ESMP.
- Monitoring and evaluating the operator's implementation of the ESMP.
- Monitoring defined indicators of the Project's environmental impacts.
- Reviewing project plans, designs and strategies in relation to environmental, social and health considerations.
- Maintaining environmental management systems and documentation.
- Preparing and submitting various reports to relevant government agencies and lenders.
- Following up to ensure that non-conformance situations have been successfully addressed by contractors.
- Instituting lessons learned.
- Interfacing with government authorities.

Table 18.2 Project environmental and social organisation - construction

Position	Description
Project SSHE Manager	• Reports to the Senior Project Manager (direct reporting relationship) • Directly oversees the activities of the Project Environmental and Regulatory Lead and Project Socioeconomic Lead. • Responsible for the Project's overall regulatory, environmental, and social performance, including the implementation and monitoring of the regulatory compliance plan (RCP) and the ESMPs. • Responsible for setting overall SSHE goals and objectives for the Project and communicating specific 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. • Liaises with the EMPNG SSHE group on regulatory compliance and environmental and social management issues as needed. • Ensures that industry best SSHE practices are incorporated into the Project's processes and procedures.
Project Socioeconomic Management Lead	• 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 national content, stakeholder engagement and other socioeconomic regulations throughout the FEED and detailed engineering phases and into construction. • Works closely with the EMPNG's Land and Community Affairs teams to manage the public consultation process as it relates to delivery of the social management components of the ESMP. • Assists in development and delivery of social impact and public health mitigation strategies, policies, plans and tools. • Builds relationships with enabling local and international non-government organisations and for-profit service providers. • Coordinates interfaces with government agencies and external stakeholders on social program implementation. • Advises and interprets social mitigation program requirements with Project Team and interfaces with contractors as needed. • Interfaces with the Project's construction engineering team and Environmental and Regulatory team to ensure that EPC execution plans are consistent with the Project's social programs, requirements, and commitments and obligations.

Position	Description
	• 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 SSHE Organisation as a whole to ensure consistency of the social program's execution across EPCs, that social issues are adequately and properly addressed and managed, that best practices and lessons learned are implemented and that all other social programs are adequately supported. • 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 of work consistent with Project's expectations, commitments, and requirements.
Project Environmental and Regulatory Lead	• Provides day-to-day direction and leadership to the Project Environmental and Regulatory Team and manages the Project Environmental and Regulatory 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/licence/authorisation/approval conditions throughout FEED and detailed engineering phases and into construction. • Provides regulatory and environmental technical support to design and execution engineers and construction teams as required/requested. • Reviews site- and activity- specific regulatory compliance and environmental execution plans generated by the contractors. • Works closely with contractors to ensure the successful execution of the regulatory compliance and environmental protection/performance aspects of their work. • Contacts regulatory authorities on behalf of the Project regarding regulatory and environmental matters, including required notifications and reporting. • Responsible for internal and external Project Environmental and Regulatory stewardship and reporting, including monthly reporting to Lenders and applicable Papua New Guinea agencies. • Interfaces with the Project's construction engineering team and Environmental and Regulatory 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.

Position	Description
	• Interfaces with the Project SSHE Organisation as a whole to ensure consistency of Environmental and Regulatory execution across EPCs, that Environmental and Regulatory related issues are adequately and properly addressed and managed, that best practices and lessons learned are implemented and that all other Environmental and Regulatory-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 Environmental and Regulatory matters. • Supports other Environmental and Regulatory responsibilities as required to ensure successful execution of EPC work scope consistent with Project's environmental expectations, commitments, and requirements. • Prepares Project's RCP. • Review and provide endorsement to Environmental and Regulatory Manager of Contractors Regulatory documentation. • Assesses the need for and coordinates permit/license/authorisation/approval applications; provides direction to the contractors regarding the preparation of such applications. • Shepherds permits/license/authorisation/approval applications through the regulatory process. • Distributes and communicates permit/license/authorisation/approval conditions to the Project organisation. • Stewards permit/license/authorisation/approval status to the Project Team • Clarifies conditions in permits/licenses/authorisations/approvals for the Project as requested. • Development and stewardship of the Project's Approval Management System.
Project Field Environmental Advisor	• Provides day-to-day direction and leadership to the EPC execution team. • Maintains and implements environmental component of the ESMP. • Implements detailed environmental performance metrics, monitors results, and continues to enhance performance. Track environmental program metrics and steward progress. • Plans, develops, and implement field environmental programs including logistics. • Coordination with PNG LNG Field Environment Team for simultaneous operations.
Project SSHE Execution Lead	• Leads efforts in development and implementation of SSHE-related EMCAPS deliverables to support project execution, stewardship of SSHE performance indicators and management of SSHE-related interfaces with stakeholders.

Position	Description
	• Sets expectations for SSHE activities, manages safety resources and performs evaluations through project wide assessments as well as determining the need for process and program improvements. • Confirms that the project is meeting the goals and requirements of the overall SSHE programs and that OIMS expectations are being achieved. • Leads and reviews incident investigations, analyses data and identifies improvement opportunities. • Evaluates EPC Contractor's SSHE processes for implementation effectiveness. • Develop collaborative positive working relationship with EPC Contractor and subcontractors to achieve Project SSHE expectations. • Facilitate and support contractor engagements efforts. • Responsible for care/case management and reporting for all stewardable incidents. • Align with relevant Project Manager and Senior Project Manager on incident classification prior to up line communications (reference Incident Notification Guide). Project management ultimately owns the final classification of an incident. • Responsible for ensuring incident corrective actions are following up on, tracked to closure (e.g., stewardable recordable events and stewardable / non-stewardable high potential events). • Regularly review incident data, LSA checklists and contractor metrics – to include work hours, leading and lagging indicators. Proactively seek out and highlight trends to the Project Management Team. • Manages SSHE interfaces between projects and operations during hookup and commissioning to include incident notification and stewardship transfer alignment.

Table 18.3 Integrated environmental and social organisation - operations

Position	Description
LNG Plant Manager	- Overall accountability for conformance with the requirements of the ESMP pertaining to the LNG Plant. - Ensure operational resources are allocated for the effective implementation of the ESMP, in respect of the Project operations.
SSHE Manager	- Overall responsibility for conformance with the requirements of the ESMP. - Engages to requirements with Project Team and interfaces with contractors as needed. - Coordinating SSHE-led community development support activities with the Public and Government Affairs department. - Reviewing all environment-related community development support activities to ensure consistency in approach and progress in terms of environmental outcomes. - Managing the monitoring of all environment-related community development support activities, using defined indicators agreed with the Public and Government Affairs department.
Public and Government Affairs Manager	- Coordinating implementation of the Socioeconomic Management Plan. - Reporting of non-conformances and developing and implementing corrective actions as appropriate. - Reviewing performance trends on a regular basis and stewarding performance against objectives and targets. - Assessing compliance with the requirements of this Plan and developing and implementing corrective actions as appropriate - Periodically reviewing the effectiveness of this Plan and providing recommendations for improvements. - Ensuring adequate resources and budget are available to meet the objectives of this Plan. - Confirming that training programs meet the minimum requirements established in this Plan. - Providing final endorsement for all community development support activities. - Actively managing and supporting internal relationship development. - Implementing Best Practices in External Affairs to develop and maintain positive, effective working relationships with key government organisations, advisory bodies and relevant institutions and other stakeholders that impact EMPNG.
Environmental, Regulatory and Biodiversity Manager	- Ensure environmental and biodiversity resources are allocated to the effective implementation of the ESMP. - Supports the SSHE Manager. - Oversees the stewardship of Environmental, Regulatory and Biodiversity teams, while managing and supporting the respective Supervisors of each team.

18.6 MONITORING AND REPORTING

To monitor the effectiveness of management and mitigation measures, assess potential impacts and demonstrate compliance with applicable legal and other requirements, and fulfill conditions of Environment Permit EP-L3(210), field-based sampling and analysis is undertaken as part of the PNG LNG Project ESMP (and associated EMP). ExxonMobil and its contractors will implement an ESMP for the Project, likely to be commensurate with the existing PNG LNG Project ESMP, with appropriate modifications based on environmental monitoring requirements established in the ESMP. Based on the existing PNG LNG Project ESMP, aspects such as waste, ecology, spill prevention and response, water quality, air quality and noise will be addressed.

The objectives of the ESMP will be to:

- Define environmental monitoring requirements.
- Summarise ExxonMobil's process for inspection and verification of management and mitigation commitments.
- Summarise ExxonMobil's process for periodic assessment and audit to evaluate the implementation and effectiveness of the environmental program.
- Summarise ExxonMobil's process for reporting to applicable government agencies in relation to monitoring, verification, audit and assessment programs.

Monitoring programs will be developed as the Project proceeds into detailed design to take into consideration the requirements of the *Environment Act 2000* that may arise from the EIS approvals process. The types of parameters to be measured and potential measurement methods are typically stipulated in regulatory permits and licences.

Monitoring requirements will be revisited and expanded with specific key performance indicators, monitoring locations and frequencies in the Project and contractor ESMPs. These will be individually tailored for each project component and each stage of the Project (construction, operations, and closure) once the final design and location of the Project facilities have been determined.

ExxonMobil and its contractors will establish and maintain a record system to ensure that the environmental management systems are in place and effectively implemented.

The ESMP is expected to evolve as the findings of environmental management system audits are implemented.

18.6.1 Monitoring criteria

Monitoring requirements are informed by the parameters used to assess the Project's compliance with the requirements of the Papua New Guinean Government and other applicable international guidelines or regulatory jurisdictions. It is anticipated that the Project will align, where relevant, with the existing Environment Permit EP-L3(210), regulatory criteria, and any conditions that may be required during the permitting and approval process for the construction phase Environment Permit.

Monitoring will likely be akin to that required under the PNG LNG Project ESMP, and incorporate any additional aspects as determined by co-venture participants, Lender requirements and CEPA.

Relevant monitoring criteria to be implemented for the Project are detailed in this EIS in relevant management plans, and include the following indicative aspects:

- Ecology
 - Monitoring of benthos, mangroves, seagrass, coral reefs, and reef fish. Visual monitoring for marine mammals and turtles will be undertaken.
- Marine and surface water quality
 - As per criteria presented in Section 18.6.1.1 and described in full in the PNG LNG Project Environment Permit EP-L3(210) and Environmental Management Plan: LNG Plant and Marine Facilities (document reference: PGGP-EH-OPZZZ-000004-003)¹.
- Marine sedimentation
 - Criteria (seawater): Turbidity: no alteration greater than 25 NTU. Total suspended solids: 50 mg/L or no change >10% from background levels at any time.
- Groundwater
 - Criteria: No alteration above natural background of required parameters.
- Weeds, plant pathogens and pests
 - establish and enforce a project-wide quarantine program
 - prohibit the establishment of gardens with introduced plant species and the introduction of exotic plants or animals by project workers and contractors
 - comply with international maritime organisation requirements and industry good practice with respect to ballast water discharge
- Stormwater
 - Criteria: pH: 6.5 to 9. Turbidity: no alteration greater than 25 NTU. Electrical conductivity / dissolved oxygen: not less than 6 mg/L (5 mg/L for seawater) or no change >10% from background levels at any particular time. Oil and grease: No visible film
- Erosion and sediment control
 - erosion control structures will be monitored until adequate slope stabilisation, sediment control and subsidence control has been achieved
- Reinstatement
 - assessed visually and required immediately upon completion of construction
- Waste
 - waste tracking shall be undertaken across all worksites to provide data from generation through to disposal. Data to be recorded includes source, type, quantity/volume, storage/containment/treatment and transportation and location details
- Air emissions (see Section 18.6.1.2).
- Noise (see Section 18.6.1.3).

¹ https://pnglng.com/media/PNG-LNG-Media/Files/Environment/Production%20ESMP/EMP-LNG-Plant-and-Marine-Facilities-Rev-3_PUBLIC.pdf

18.6.1.1 Water quality

Annex 2 (Table 1-1) of the existing PNG LNG Project Environment Permit EP-L3(210) requires that the discharge of liquid effluents from any worksite shall not cause the water quality within the natural surface water to exceed the appropriate specified criteria based on the receiving water body. Table 18.4 lists the receiving water quality discharge criteria from Annex 2 of PNG LNG Project Environment Permit EP-L3(210) (Table 1-1), with associated maximum permitted criteria of ammonia-nitrogen for protection of freshwater aquatic life provided in Table 18.5. These criteria will be adopted for the Project, alongside additional International Finance Corporation (IFC) (2007) Environmental, Health, and Safety Guidelines for Onshore Oil and Gas Development criteria, as applicable (shown in Table 18.6).

Table 18.4 Environment Permit EP-L3(210) onshore and offshore water quality criteria

Parameter*	Freshwater	Seawater
Ammonia-nitrogen (NH ₃ -N)	Dependent on pH and temperature [†]	-
Barium	1.0	1.0
Biological oxygen demand	25	25
Boron	1.0	10.0
Cadmium	0.01	0.001
Chemical oxygen demand	125	125
Chromium (hexavalent form)	0.05	0.01
Cobalt	Limit of detection - using graphite furnace atomic absorption spectrometry (for both fresh water and seawater)	
Copper	1.0	0.03
Cyanide (as HCN)	0.005	0.01
Dissolved oxygen	Not less than 6.0 mg/L or no change of more than 10% below background levels at any particular time (whichever is smaller)	Not less than 5.0 mg/L or no change of more than 10% below background levels at any particular time (whichever is smaller)
Faecal coliform bacteria	Not to exceed 200 colonies / 100 mL [§]	
Fluoride	1.5	1.5
Grease	None	None
Insoluble residues	No insoluble residues or sludge formation to occur (for both fresh water and seawater)	
Iron	1.0	1.0
Lead	0.005	0.004
Manganese	0.5	2.0
Mercury	0.0002	0.0002
Nickel	1.0	1.0
Nitrate (as NO ₃ ⁻ + NO ₂ ⁻)	45.0	45.0

Parameter*	Freshwater	Seawater
Oil and grease	No visible film (for construction discharges); and 10 mg/L (for operations discharges (for both fresh water and seawater)).	
Oxygen	Not less than 6.0	Note less than 5.0
Pesticides	None	None
pH	6.5 - 9	No alteration to natural pH
Phenol [†]	0.085	0.270
2-chlorophenol [†]	0.340	-
4-chlorophenol [†]	0.160	-
2,4-dichlorophenol [†]	0.120	-
2,4,5-trichlorophenol [†]	0.003	-
2,3,4,5-tetrachlorophenol [†]	0.010	-
Pentachlorophenol [†]	0.0036	0.011
Selenium	0.01	0.01
Silver	0.05	0.05
Sulphate (as SO ₄ ²⁻)	400	-
Sulphide (HS ⁻)	0.002	0.002
Temperature	No alteration greater than 2°C (<i>for both fresh water and seawater</i>)	
Tin	0.5	0.5
Total suspended solids	50 mg/L or no change >10% from background levels at any particular time (whichever is greater)	
Turbidity (nephelometric turbidity unity, NTU)	No alteration greater than 25 NTU or no change > 10% from background at any particular time (whichever is greater)	
Zinc	5.0	5.0

Source: Annex 2 of PNG LNG Project Environment Permit (Table 1-1) Onshore and Offshore Water Discharge Criteria.

* All values are in mg/L unless otherwise specified. Metal concentrations are for dissolved substances (passing through a nominal 45 µm medium)

[†] Ammonia guideline values (see Table 18.4) are dependent on temperature and pH of freshwater; e.g. a value of 3.6 mg/L is based on temperature of 25°C and pH of 7, as per Annex 2 of PNG LNG Project Environment Permit (Table 1-2) Onshore and Offshore Water Discharge Criteria and Environment (Water Quality Guidelines) Regulation 2002.

[‡] Source: ANZECC/ARMCANZ Australian and New Zealand Guidelines for Fresh and Marine Water Quality. October 2000. Trigger values adopted for a 99% level of protection for a slightly to moderately disturbed aquatic ecosystem with a high conservation value.

[§] Source: Ecwise Environmental (2010): Characterisation of human health risks derived from stormwater. Victorian Smart Water Fund, final report. Based on minimum of five water samples collected over a 30-day period for testing purposes.

Table 18.5 Ammonia-nitrogen, pH and temperature criteria for freshwater

Temperature (°C)	pH		
	7	8	9
5	16.1	1.6	0.2
10	11.0	1.1	0.1
15	7.5	0.8	0.09
20	5.2	0.5	0.07
25	3.6	0.4	0.06
30	2.6	0.3	0.05
35	1.6	0.2	0.04

Table 18.6 International Finance Corporation guideline criteria for emissions, effluent and waste levels from onshore oil and gas development

Parameter	Guideline value
Produced water*	For discharge to surface waters or to land: • Total hydrocarbon content: 10 mg/L[†] • pH: 6 to 9 • BOD: 25 mg/L • COD: 125 mg/L • TSS: 35 mg/L • Phenols: 0.5 mg/L • Sulphides: 1 mg/L • Heavy metals (total)[‡]: 5 mg/L • Chlorides: 600 mg/L (average), 1200 mg/L (maximum)
Completion and well workover fluids	For discharge to surface waters or to land: • Total hydrocarbon content: 10 mg/L[†] • pH: 6 to 9
Stormwater drainage	Stormwater runoff should be treated through an oil/water separation system able to achieve oil and grease concentration of 10 mg/L. [†]
Cooling water	The effluent should result in a temperature increase of no more than 3°C at the edge of the zone where initial mixing and dilution take place. Where the zone is not defined, use 100 m from point of discharge.

* Treatment and disposal for hydrotest water is as per guidance in section 1.1 of International Finance Corporation (2007) Environmental, Health, and Safety Guidelines for Onshore Oil and Gas Development. For hydrotest discharge to surface waters or to land, see parameters for produced water in this table.

[†] Project design will work to meet this criteria, subject to facilities design optimisation during FEED and detailed design.

[‡]Heavy metals include arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, vanadium, and zinc.

Additional criteria that are not included in the Environment Permit but are also relevant to the Project due to their inclusion in the PNG LNG Project Environmental Management Plan: LNG Plant and Marine Facilities² include the following³:

² Document reference: PGGP-EH-OPZZZ-000004-003, available at: https://pnglng.com/media/PNG-LNG-Media/Files/Environment/Production%20ESMP/EMP-LNG-Plant-and-Marine-Facilities-Rev-3_PUBLIC.pdf

³ Site-specific criteria for MDEA, DEA, EA, piperazine and ammonia-nitrogen approved by CEPA in their letter dated 20 April 2017 (reference: 2017_12067.1)

- Methyl diethanolamine (MDEA): 1.50 mg/L (seawater)
- Diethanolamine (DEA) 0.36 mg/L (seawater)
- Ethanolamine (EA): 0.38 mg/L (seawater)
- Piperazine: 3.70 mg/L (seawater)
- Potassium 5.0 mg/L (freshwater) 600 mg/L (seawater)
- Ammonia-nitrogen 0.5 mg/L (seawater).

18.6.1.2 Air quality

Table 18.7 shows the air quality criteria proposed for the Project. All criteria align with the existing PNG LNG Plant Environment Permit and PNG LNG Project Environmental Management Plan: LNG Plant and Marine Facilities criteria, aside from the 24-hour averaging criteria for SO₂ and the annual averaging criteria for NO₂. For these parameters it is proposed that the criteria limits be amended from 20 µg/m³ to 40 µg/m³ for SO₂ and from 40 µg/m³ to 10 µg/m³ for NO₂, to reflect the most recent World Health Organisation (2021) criteria.

18.6.1.3 Noise

For the Project, it is proposed that the noise monitoring criteria reflect the IFC General Health and Safety (EHS) Guidelines (2007) for industrial and commercial receptors, as follows:

- 70 dBA LAeq between 7.00 a.m. and 10.00 p.m. and 70 dBA Leq from 10.00 p.m. to 7.00 a.m. at the boundary of facilities (that is, the LNG Facilities fence line). These criteria are expected to apply during both construction and operations.⁴

This represents a change from the IFC General Health and Safety (EHS) Guidelines (2007) for residential, institutional, and educational receptors criteria, however these criteria will still be required at the nearest sensitive receptors, as follows:

- 55 dBA LAeq between 7.00 a.m. and 10.00 p.m. and 45 dBA LAeq from 10.00 p.m. to 7.00 a.m. These criteria apply for both construction and operations.

Planned short-term high intensity noise events that occur during construction will be limited and potentially affected communities will be notified in advance of the intended work and its duration wherever possible.

Table 18.7 Proposed air quality criteria for the Project

Pollutant	Averaging period	Air quality limit criteria (µg/m ³)	Source
Sulphur dioxide (SO ₂)	10-minute	500	Environment Permit (EP-L3(210))
	24-hour	40*	WHO (2021)
Nitrogen dioxide (NO ₂)	1-hour	200	Environment Permit (EP-L3(210))
	Annual	10*	WHO (2021)
Carbon Monoxide (CO)	15-minute	100,000	PNG LNG Environmental Management Plan: LNG Plant and Marine Facilities [†]
	30-minute	60,000	
	1-hour	30,000	
	8-hour	10,000	

⁴ Noise should not exceed the levels presented or result in a maximum increase in background levels of 3dBA at the nearest off-site receptor.

Pollutant	Averaging period	Air quality limit criteria ($\mu\text{g}/\text{m}^3$)	Source
Hydrogen sulphide (H_2S)		No offensive odour at boundary, less than $5 \text{ mg}/\text{m}^3$	Environment Permit (EP-L3(210))
PM ₁₀	24-hour	150	PNG LNG Environmental Management Plan: LNG Plant and Marine Facilities [†]
	1-year	70	
PM _{2.5}	24-hour	75	PNG LNG Environmental Management Plan: LNG Plant and Marine Facilities [†]
	1-year	35	
Total suspended particulates (TSP)	24-hour	150 to 230	PNG LNG Environmental Management Plan: LNG Plant and Marine Facilities [†]
	1-year	60 to 90	
Ozone	8-hour, daily max	100 (not to be exceeded more than 24 times per year)	PNG LNG Environmental Management Plan: LNG Plant and Marine Facilities [†]

* Current WHO (2021)⁵ criterion value. The Project intends to align the Environment Permit with the most recent WHO criterion value of $40 \mu\text{g}/\text{m}^3$ (for 24-hr averaged SO_2) and $10 \mu\text{g}/\text{m}^3$ (for annual averaged NO_2) which represents a change from the current Environment Permit criteria of $20 \mu\text{g}/\text{m}^3$ and $40 \mu\text{g}/\text{m}^3$ respectively.

[†] Source document: PGGP-EH-OPZZZ-000004-003 available at: https://pnglng.com/media/PNG-LNG-Media/Files/Environment/Production%20ESMP/EMP-LNG-Plant-and-Marine-Facilities-Rev-3_PUBLIC.pdf.

18.6.2 Reporting

The general framework for reporting and notifications associated with the ESMP, both internal and external, are described in this section.

18.6.2.1 Internal

Monitoring results from the implementation of the ESMP, including any non-conformances and associated corrective actions, will be periodically reported to ExxonMobil.

Contractors provide a regular (monthly) environmental and social report commensurate with their work scope and potential impacts, as they relate to Project activities. These reports will include both contractor and subcontractor data.

Internal reporting and contractor reporting generally includes detail on:

- Preconstruction surveys in the reporting period and additional or modified management measures arising where applicable.
- Environmental monitoring (sampling and analysis) and social monitoring.
- Waste volumes generated.
- Freshwater usage.
- Raw materials volumes.
- Reporting of performance indicators applicable during the reporting period.
- Incident notifications.

⁵ World Health Organisation (2021) Global air quality guidelines: particulate matter (PM_{2.5} and PM₁₀), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide. Available at: <https://apps.who.int/iris/bitstream/handle/10665/345329/9789240034228-eng.pdf>

- Notifications and other reports made to Papua New Guinean Government agencies.
- Non-conformances and field observations documented as part of monitoring and evaluation.
- Evaluation (audit and performance) reports.
- Grievance management (worker and community) applicable during the reporting period.
- Stakeholder engagement activities conducted during the reporting period.
- Cultural heritage chance finds.
- Threatened species.
- Unexpected occurrences of contaminated land.
- Number and details of Papua New Guinean Government agency inspections (location, date, time, and outcome).

18.6.2.2 External

The Project will comply with notification and reporting requirements, and those in accordance with applicable permits and licenses and any other applicable law.

A quarterly construction environmental report will be prepared and submitted to the Independent Environmental and Social Consultant /Lender Group that, as a minimum, is expected to contain the following information:

- Details of preconstruction environmental and social surveys undertaken in the reporting period (the ESMP and associated plans provide 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 (the ESMP and associated plans contain 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.
- Summary and status of non-conformances and field observations and corrective actions undertaken or planned in response.
- 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.

The PNG LNG Project submitted quarterly environmental reports to CEPA during construction, transitioning to annual reporting during operations. The Project will maintain this convention, as required by CEPA. The structure, content, and format of reporting documentation will be agreed with CEPA, and likely align with that prepared for the PNG LNG Project. In this regard, the report will include:

- Details of environmental monitoring (sampling and analysis) undertaken during the reporting period.
- Details of additional monitoring locations defined during execution.
- Details of stakeholder engagement activities undertaken during the reporting period.
- A summary and status of incidents that occurred during the reporting period.
- A summary and status of non-conformances and corrective actions undertaken or planned.

A structured, management-led process is used to determine notification and reporting requirements in situations where the characteristics of an incident make notification and reporting requirements unclear.

Notification and reporting is conducted in accordance with the following aspects:

- Serious incidents that have a material adverse impact on the environment, worker health and safety, or a Project-affected community.
- Occurs because of Project activities, whether occurring inside or outside of established fenced facilities and at Project associated facilities/areas.
- Involves Project-dedicated aviation/marine/ground transportation which occurs outside of the Project associated facilities/areas.
- Incidents considered work-related in nature; meaning there was an identifiable 'industrial' event/exposure which occurred in, or was triggered by, the work environment and caused/contributed to the incident.

Courtesy notifications are considered for serious incidents that do not address the applicable criteria, particularly for incidents that are slow to evolve and/or may generate media reports that may come to the attention of the Papua New Guinean Government.

The incident management system includes detailed guidance for performing notifications to internal stakeholders (e.g., field, asset, business unit, and corporate levels) and external stakeholders and/or designated Papua New Guinean authorities (e.g., Department of Petroleum and Energy, Department of Labour and Industrial Relations, CEPA, Department of Health, National Maritime Safety Authority, Civil Aviation Safety Authority). Contact information for internal and external stakeholders will be included in the incident management system and will be aligned with corporate protocols and Papua New Guinean statutory obligations.

Environmental and social reports will be prepared and provide information about Project safety, health, environment, and social management progress during operations.

18.6.3 Performance indicators and quality assurance and control procedures

ExxonMobil's OIMS requires periodic assessments of systems, programs, and procedures to help ensure continued improvements in performance. Annual reviews of the overall effectiveness of the Project's environmental, health and social management strategy will be undertaken to ensure sustainability and effectiveness. Where environmental, health and social procedures are found to be deficient because of routine monitoring, or following an evaluation or investigation after an incident, they will be revised where necessary and the ESMP updated to reflect the new procedures.

As part of the assessment process, performance indicators will be used to measure and track the performance of the management measures described in the project environmental and social management plan. Performance indicators will also be developed for contractors if appropriate and incorporated into relevant management documents. The performance indicators will be periodically reviewed in accordance with OIMS Element 1: Leading, Managing and Driving Performance.

EMPNG currently applies a 'Management of Change' procedure for any temporary or permanent modifications to facilities, or to critical documents that impact the operation of facilities. The Management of Change procedure will be adopted for the Project and will use local tools and procedures developed to meet the requirements of continued improvements in performance, as outlined in the OIMS System, such as those of Element 7: Managing Changes. The principles of the process of change management will be to:

- Manage permanent, temporary, and urgent/emergency changes to procedures or process equipment.
- Provide for a thorough evaluation of the proposed change.
- Consider factors for the identification and control of potential risks associated with the proposed change.

- Communicate the proposed change to personnel whose job tasks may be affected by the change and who may require training prior to implementing the change.
- Ensure critical documentation remains up-to-date with changes as they are implemented.

A proposed change is communicated to workers whose job tasks may be impacted and who may require training before the change is implemented. Changes are classified and managed according to potential impacts and consequences. Classification also serves as the basis for determining Lender Group notification and/or review requirements.

18.6.4 Assessment and audit

Periodic assessments and audits may be undertaken to evaluate the implementation and effectiveness of Project environmental and social activities, monitoring programs, and work sites. These assessments and audits are undertaken in accordance with predetermined agreed-upon protocols, as relevant. These assessments and audits may be instigated by The Independent Environmental and Social Consultant on behalf of the Lender Group, co-venture participants, or ExxonMobil.

Upon completion of the assessments and audits, draft assessment and audit reports will be provided. The reports will be discussed between relevant parties as appropriate at review meetings, following which a final audit report will be provided.

ExxonMobil maintains an Environmental Action Tracking System which includes all non-conformances and field observations. This will continue under the Project.