TOTAL
TOTAL E&P PNG LIMITED

PAPUA LNG PROJECT

UPSTREAM ENVIRONMENTAL IMPACT STATEMENT

VOLUME 1: MAIN REPORT

Chapter 1: Introduction

TOTAL E&P PNG LIMITED

December 2019
(Report No. 01215B_23_v5)

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1. Introduction

1.1 Overview

Total E&P PNG Limited (TEP PNG) and its joint venture partners (Section 1.2) propose to commercialize the Elk-Antelope gas and condensate reserves in Petroleum Retention License 15 (PRL-15), located in Gulf Province, Papua New Guinea. This Project, referred to as the Papua LNG Project, will involve producing and processing the gas and condensate, and then transporting it via pipeline overland and then offshore in the Gulf of Papua to the existing PNG LNG producing and exporting facility in Caution Bay, Central Province (Figure 1.1).

This environmental impact statement (EIS) is the statutory basis for the environmental and social impact assessment of the Project under s. 53 of the *Environment Act 2000,* which is administered by the Conservation and Environment Protection Authority (CEPA). This impact assessment, prepared according to *the Environment Act 2000*, will enable a decision from the Environment Council and the Minister for Environment, Conservation and Climate Change on whether the Project should proceed and, if so, under what conditions. This EIS excludes Papua LNG Project facilities inside the PNG LNG project lease boundary in Caution Bay, which are subject to a separate assessment and permitting process.

The EIS sets out a development proposal to enable an assessment of the Project's environmental and social impacts by:

- The relevant PNG Government agencies in evaluating the Project's potential environmental and social impacts and in formulating conditions under which it might proceed.
- The public in formulating their responses to the EIS.
- The joint venture partners in their decision to sanction the Project to proceed.

The EIS has been prepared to satisfy relevant PNG laws, regulations and permits; TOTAL internal requirements, and International applicable standards and guidelines. As the Project is likely to seek financing by international finance institutions ('Lenders'), applicable International Finance Corporation (IFC) Performance Standards on Environmental and Social Sustainability (IFC, 2012) and World Bank Group Environmental, Health and Safety Guidelines (IFC, 2007) have also been considered in this EIS.

This chapter provides background information on the proposed Project, including the proponent and the joint venture partners in the Project (Section 1.2); the nature and locations of the main facilities and infrastructure, the Project's development timetable and its current status (Section 1.3); the history of activities that led to this proposal and the proposal's viability, an outline of the Project's objectives, impacts and benefits, and its alignment with the State of Papua New Guinea economic and social development policies and strategies (Section 1.4); and information about the EIS statutory context and document structure, and how to obtain a copy of the report (Section 1.5).

1.2 Project Proponent

The Project is a joint venture between TEP PNG (40.13%), ExxonMobil PNG Antelope Limited and ExxonMobil PNG Elk Limited (collectively 37.03%, referred to as 'ExxonMobil PNG'), and PAC LNG Assets Limited, PAC LNG International Limited, PAC LNG Investments Limited, PAC LNG Overseas Holding Limited and PAC LNG Holdings Limited (collectively 22.84%, referred to as 'Oil Search PNG'). The Project involves constructing upstream and downstream facilities including a processing plant, gas and condensate pipelines, and liquefaction trains. The Project makes efficient

PROJECT LOCATION

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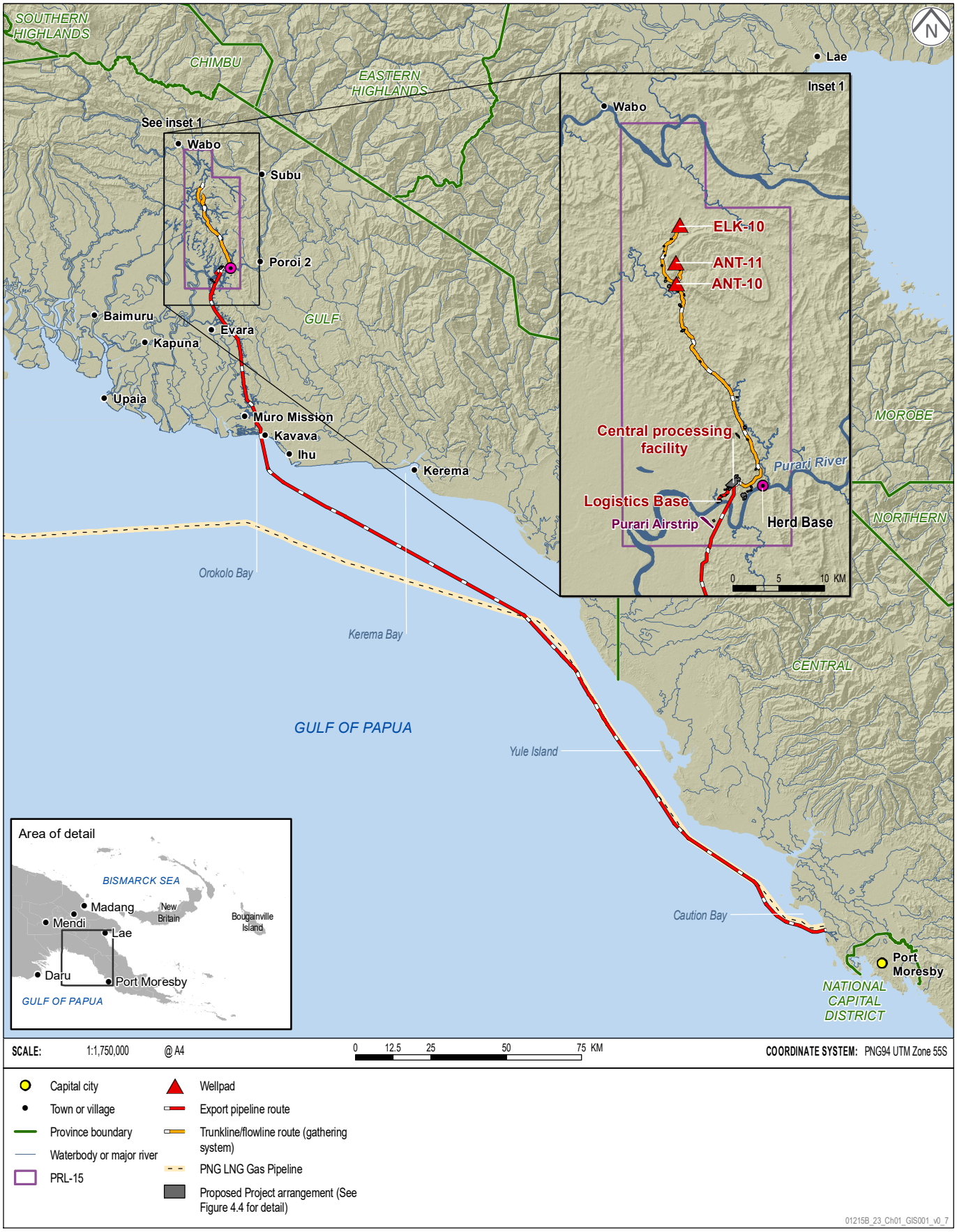
FIGURE 1.1



use of multiple operators to capture synergies through collaboration to stimulate work-sharing campaigns and to adopt improved execution and contracting models, taking advantage of the expertise of each of the selected operators while respecting the terms of existing legal agreements.

The Project separates operatorship of what are referred to as the 'upstream' and 'downstream' facilities between two operators. TEP PNG will design, construct and operate the upstream aspects of the Project including the wells and associated infrastructure at the gas production field in PRL-15, an upstream central processing facility (CPF) and onshore and offshore gas and condensate export pipelines up to the PNG LNG project lease boundary. TEP PNG is the proponent of, and will operate, the upstream facilities on behalf of the other joint venture partners. This EIS, i.e., the upstream EIS, addresses the upstream facilities.

The downstream LNG facilities of the Papua LNG Project will be added to the existing PNG LNG facilities at Caution Bay, 20 km northwest of Port Moresby. To enhance synergies with the existing PNG LNG project, Niugini LNG Operating Company Limited, an affiliate of Exxon Mobil will design, construct and operate, and seek approval for, the Project's downstream facilities.

The State of Papua New Guinea, through the government and the legally recognized landowners, have rights under the *Oil and Gas Act 1998* to acquire up to a 22.5% participating interest in the development license. Should this right be exercised, the current participating interests would be reduced accordingly.

1.2.1 Total E&P PNG Limited

TEP PNG is the proponent and will be the operator of the Project's upstream facilities. The company is a wholly-owned subsidiary of TOTAL S.A. (TOTAL), the second-largest global LNG company with operations in more than 130 countries. TOTAL is a French multinational integrated oil and gas company. Its businesses cover the oil and gas chain from exploration and production to power generation, transportation, refining, petroleum product marketing, and international crude oil and product trading. It is also a large-scale chemicals manufacturer and a major player in the natural gas and solar energy industries.

TEP PNG is committed to developing the Project in a manner that minimizes adverse environmental and social effects of the development activities, enhances positive impacts, and safeguards assets and third-party interests. The Project will be developed in accordance with TOTAL company, Total E&P[1] and TEP PNG standards and specifications as described in Chapter 2, Regulatory Framework, Policies, Standards and Guidelines.

1.2.2 Project Partners

ExxonMobil is a world-leading petroleum and petrochemical company based in the United States. Its wholly-owned affiliates, ExxonMobil PNG Antelope Limited and ExxonMobil PNG Elk Limited are partners in the Project.

ExxonMobil PNG Limited, a subsidiary of ExxonMobil, is operator of the PNG LNG joint venture, which includes affiliates of Oil Search, Santos, Kumul Petroleum, JX Nippon and Mineral Resources Development Company. The PNG LNG project is an integrated LNG development with gas production and processing facilities in Hela and the Southern Highlands. The project, which includes natural gas liquefaction and storage facilities located northwest of Port Moresby at Caution Bay, produces approximately 8.0 million tonnes of LNG per year. Over 700 km of pipelines connect the facilities.

1 Total E&P is a division of TOTAL S.A.

Oil Search is an oil and gas exploration and development company that has been operating in Papua New Guinea since 1929. The company is the country's largest oil and gas producer and has interests in all the nation's producing oil and gas fields. Oil Search's main asset is a 29% interest in the PNG LNG project operated by ExxonMobil PNG Limited. Its wholly-owned affiliates PAC LNG Assets Limited, PAC LNG International Limited, PAC LNG Investments Limited, PAC LNG Overseas Holding Limited and PAC LNG Holdings Limited are partners in the Project.

1.3 Project Overview

1.3.1 Development Outline

The Elk-Antelope gas fields are in PRL-15 in Baimuru Rural local-level government area, in Kikori District, Gulf Province. It is situated in a remote area approximately 120 km northwest of the provincial capital of Kerema, which is on the coast of the Gulf of Papua, and 340 km northwest of Port Moresby and the National Capital District (see Figure 1.1).

The Project will comprise the upstream development of the gas resources from the Elk and Antelope reservoirs in PRL-15, construction and operation of facilities to extract gas, and an upstream central processing facility (CPF). The CPF will also be in PRL-15, approximately 30 km south of the gas field, close to the Purari River and the existing Herd Base (see Figure 1.1).

Onshore and offshore export pipelines will convey gas and condensate from the CPF to the new LNG facilities to be co-located with the existing PNG LNG Facilities at Caution Bay, 20 km northwest of Port Moresby (Figure 1.2). The new LNG facilities at Caution Bay are subject to a separate EIS and approvals process.

The design life for the Project will be 25 years (40 years for the export pipelines).

Further Project details are provided in Chapter 4, Project Description.

1.3.2 Producing the Gas and Condensate

Both the Elk and Antelope reservoirs will be developed to produce gas and condensate, with one and seven gas producing wells, respectively. Two wellpads will be developed, one for each reservoir, i.e., an Elk production pad and an Antelope production pad.

Raw gas from the Antelope production wells will be conveyed to the CPF by two buried, 22-inch diameter pipelines (trunklines) of about 28 km each. Raw gas from the Elk production well will be conveyed to the CPF via a buried 14-inch diameter pipeline (flowline) of about 38 km. The Elk flowline will follow the same route as the Antelope trunklines to the CPF, for most of its route.

The CPF will separate reservoir fluids into gas and condensate, and process the gas and condensate to meet export specifications. During approximately the first 10 years of production, the Antelope reservoir has sufficient pressure for the CPF to operate without gas compression. The wellhead pressure is expected to decrease progressively during the production life due to reservoir depletion, and additional compression facilities; therefore, will be required to maintain the CPF operating conditions. Dedicated compression is required for the ELK trunkline so the pressure matches that of the Antelope reservoir and to lower the Elk production system pressure to rapidly deplete the Elk reservoir.

Several acid gas management concepts were, and still are, being assessed that variously consider acid gas removal; these are described in more detail in Chapter 5, Project Options and Alternatives. The concept presented in the EIS entails removing and processing small quantities of hydrogen

SIMPLIFIED BLOCK FLOW DIAGRAM OF THE OVERALL PAPUA LNG PROJECT

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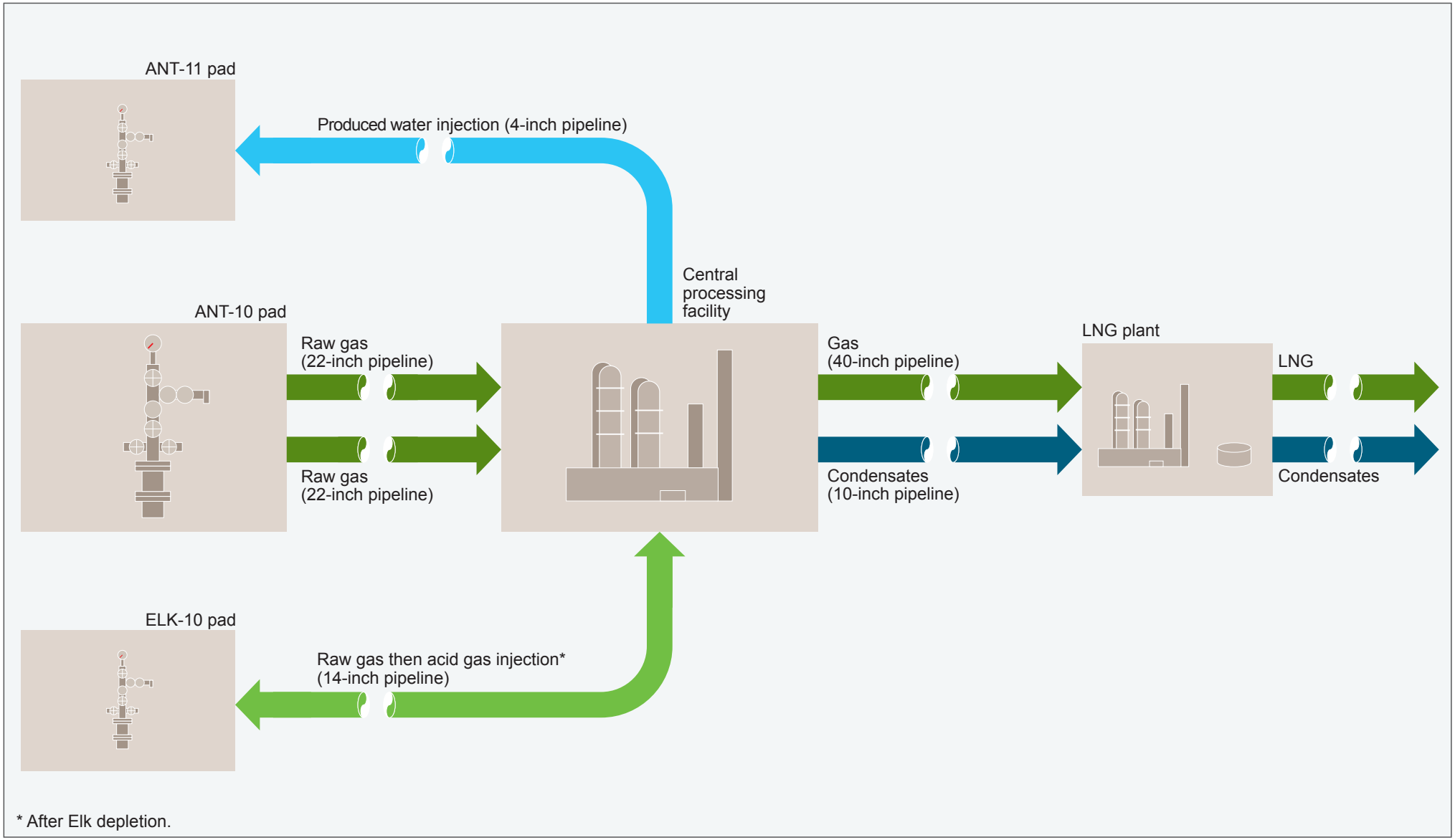
FIGURE 1.2



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sulfide (H_2S) and carbon dioxide (CO_2) in the raw gas, which are initially released to the atmosphere, before injection into the Elk reservoir is possible (after its depletion). A 4-inch-diameter pipeline will transport treated produced water from the CPF to the Antelope injection pad for injection into the Antelope reservoir.

1.3.3 Transporting the Gas and Condensate

Gas and condensate will be transported separately from the CPF to the Project's liquefaction facilities in the LNG Plant at Caution Bay, Central Province, using a 40-inch diameter pipeline for the gas and a 10-inch diameter pipeline for the condensate. The onshore export pipeline route will extend from the Purari River at the south end of PRL-15 for approximately 60 km to the coast at Orokolo Bay. From there, the export pipelines will traverse approximately 260 km of the Gulf of Papua and will generally follow the same route as the marine PNG LNG gas pipeline, before connecting with new LNG facilities in Caution Bay.

In 2017, TEP PNG and ExxonMobil began discussing the addition of gas processing facilities at the existing PNG LNG plant to treat the Project's gas. Finally, integration of the Project's downstream LNG facilities with the existing PNG LNG plant has been retained as the base case (Section 1.3.1). Two additional liquefaction trains will be constructed for the Papua LNG Project at the LNG Plant. These trains will use the spare capacity of the existing utility, storage and loading facilities; and existing common facilities will be expanded, as needed, to meet additional requirements of the expanded facility. The gas commercialization alternatives investigated by TEP PNG are summarized in Chapter 5, Project Options and Alternatives.

1.3.4 Infrastructure

Facilities and infrastructure that will be constructed to support the construction and operation include a new logistics base on the Purari River; extension of the existing Purari Airstrip (see Figure 1.1); temporary construction and permanent operation accommodation camps; a road network between the main facilities (e.g., wellpads, CPF and camps and new logistics base) on the northern side of the Purari River in PRL-15; and waste facilities, e.g., landfills. A minor access road (the former construction running track) will follow the export pipeline route in the export pipeline right of way from the Purari River south to Orokolo Bay for monitoring and maintenance during operations.

1.3.5 Logistics

The Project's logistics solution is complex due to the remote location, and the complete absence of roads and infrastructure. Equipment and materials will be transported from Port Moresby by sea offshore of Central and Gulf provinces and then principally along the Purari River to Herd Base initially and later to the new logistics base. Land transport will then access the remainder of the Project area from these bases.

The workforce will be transported to the CPF site by air to and from the upgraded Purari Airstrip.

1.3.6 Current Project Status and Development Timeline

TEP PNG completed feasibility and alternatives studies from 2014 to 2019 through its preliminary, screening, conceptual and pre-Project[2] phases. The pre-Project phase refined the Project development concept with inputs from environmental and social investigations undertaken as part

2 This is equivalent to the pre-front-end engineering and design (FEED) phase of a project.

of the EIS (see Chapters 3 and 5), and set the base case design for the impact assessment in this EIS.

The Project intends to move into the Basic Engineering[3] phase and will further refine the pre-Project design. An indicative Project schedule is provided in Chapter 4

1.4 Project History and Viability

1.4.1 History of the Resource

InterOil Corporation (InterOil) made the first gas discovery in the Elk-Antelope gas field in the Elk structure in 2006, with subsequent wells drilled through 2006 and 2007, followed by the discovery of gas in the Antelope structure in 2008 (Figure 1.3).

Specifically:

- 2006: The Elk reservoir was discovered by drilling the Elk-1[4] exploration well.
- 2007: Elk-2 was drilled about 4.5 km north of Elk-1.
- 2008: The Elk-4 exploration well discovered the Antelope reservoir.

InterOil was an independent oil and gas business that was formed in 1997 and incorporated in Canada. InterOil's main interests were in Papua New Guinea where the company held exploration licences.

Drilling the ANT-1, ANT-2 and ANT-3 wells between 2008 and 2012 at Antelope further confirmed the petrochemical properties.

InterOil initially proposed to develop the Elk-Antelope gas field in a different joint venture development known as the Elk-Antelope Gasfield Project or the Gulf LNG Project, and had plans to construct and operate pipelines, condensate stripping plants, liquefaction plants and associated infrastructure.

This development did not proceed, and TEP PNG and Oil Search PNG subsequently acquired interests in PRL-15 in March 2014. TEP PNG, holding the largest interest in the joint venture, was appointed operator of PRL-15 and of the Papua LNG Project in August 2015. Appraisal well drilling has been ongoing on the Elk-Antelope gas field since 2014 (see Figure 1.3), and the results from these activities informed the pre-Project engineering studies. The drilling involved the following wells:

- 2014 to 2016: ANT-4, ANT-5 and ANT-6 wells were drilled.
- 2016 to 2017: ANT-7 was drilled as the last appraisal well of the Antelope structure.

On 21 July 2016, an agreed transaction for ExxonMobil to acquire all outstanding shares of InterOil was announced (ExxonMobil, 2016), with the transaction being completed in February 2017 (OET, 2017). This transferred beneficial ownership of InterOil's 37.03% interest in the Elk-Antelope gas field to ExxonMobil PNG Antelope Limited and ExxonMobil PNG Elk Limited, thus becoming partners in the Papua LNG Project.

In November 2018, TEP PNG and its joint venture partners signed a Memorandum of Understanding (MoU) with the Independent State of Papua New Guinea defining the key terms of

3 This is equivalent to the FEED phase of a project.
4 In the exploration phase, Elk wells were referred to in sentence case (e.g., Elk-1) and Antelope wells were referred to in capitals (i.e., ANT-1). Wellpad names for the Project development phase are all presented in capitals for both reservoirs, e.g., ELK-2 and ANT-4.

ELK-ANTELOPE APPRAISAL WELLS INCLUDING YEAR OF ACTIVITY

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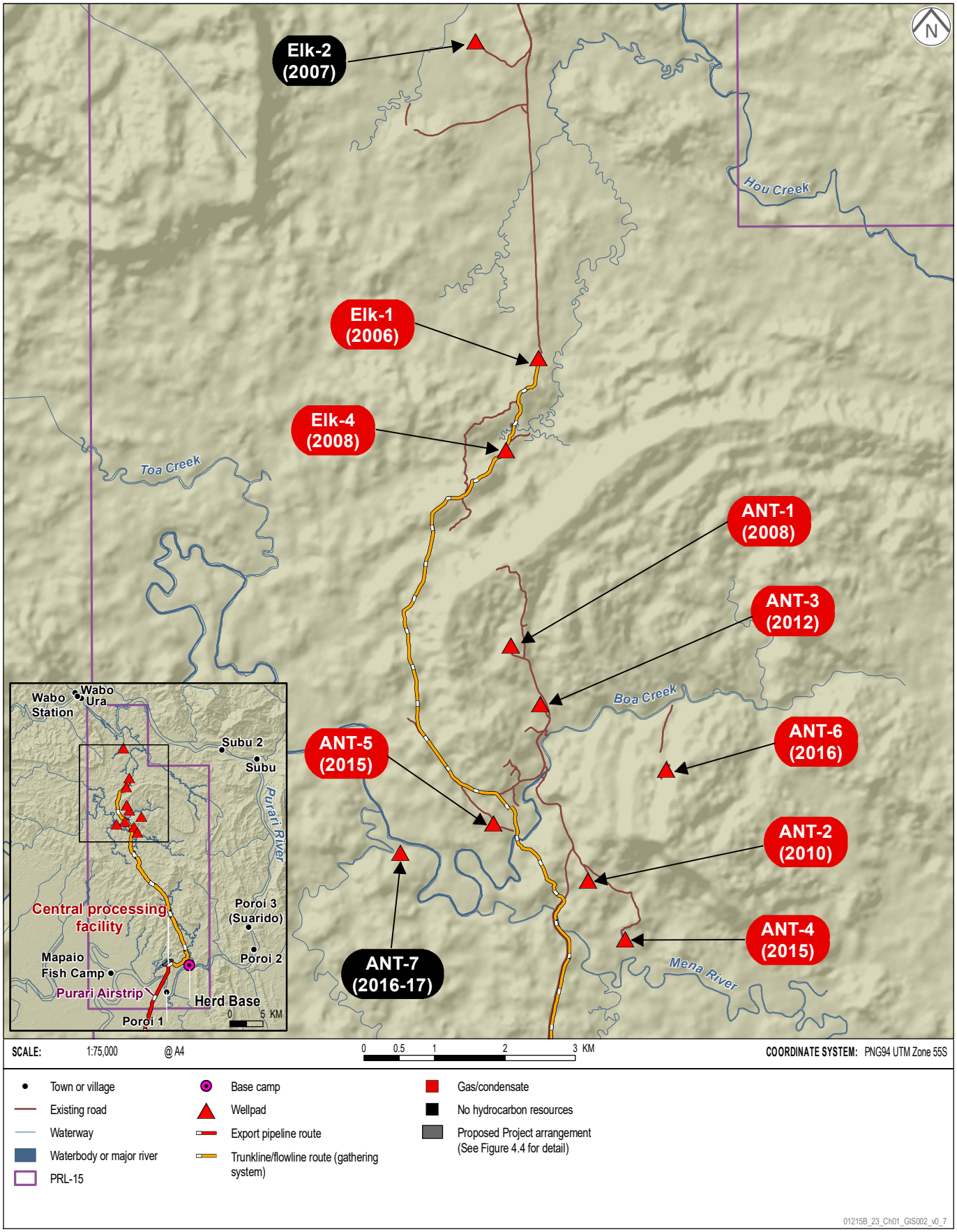
FIGURE 1.3



Note: During the exploration/appraisal phase, Elk wellpads were referred to in sentence case. In the development phase, wellpad names are presented in capitals for both reservoirs (ELK and ANT).

the Gas Agreement for the Papua LNG Project. In accordance with the *Oil and Gas Act 1998*, the Gas Agreement, executed in April 2019, sets out the definition and extent of the Project, terms for transfer and assignment of the State's equity interest to a company held by the State, additional benefits to the State, and the fiscal regime applicable to the Project.

1.4.2 Scale of the Resource

The Elk-Antelope gas reservoirs contain an initial gas in place ranging from 6.2 to about 7.5 Tcf of hydrocarbon gas with a condensate to gas ratio estimated between 15 and 20 bbl/MMscf. The Elk and Antelope wells will be able to deliver close to 900 million standard cubic feet per day (MMscfd) of raw gas to the CPF which is designed to export about 820 million MMscfd of treated gas at peak (Figure 1.4), along with 15,000 barrels of condensate per day. Assuming a 94% availability of the facilities, this will result in an average production of 840 MMscfd of raw gas and 770 MMscfd of treated export gas on an annual basis.

1.4.3 Objectives and Purpose of Development

The Project objective is to develop the gas and condensate resources in the Elk-Antelope gas field in PRL-15 and export petroleum primarily internationally but also domestically, while considering the environmental, social, political and commercial constraints. Commercializing this gas will enable the significant contribution made by the petroleum sector, and by TEP PNG to date, to the PNG economy to continue. The main environmental and socio-economic[5] objective is for the Project to deliver meaningful benefits to legally recognized landowners, the Project-affected communities and Papua New Guinea with minimal adverse impacts on these communities and the environment.

In line with TEP PNG standards and specifications presented in Chapter 2, the Project will aim to :

- Provide a healthy and safe workplace, pursuing the goal of zero harm to people.
- Comply with all relevant national and local regulations.
- Develop and implement a systematic approach to risk identification and risk reduction.
- Reduce harmful emissions and effluents and where reasonably practicable eliminate them.
- Minimize the environmental footprint, with the highest respect for environmental protection and biodiversity conservation.
- Promote transparency, anti-corruption and respect for human rights and labor standards.
- Maintain constructive relationships with key stakeholders.

1.4.4 Consistency with the State of PNG Development Policy and Strategies

Developing the Project is consistent with the national goals and directive principles of Papua New Guinea, which promote developing its resources through various policies aimed at encouraging investment. The PNG Government encourages foreign investors and allows the development of national resources; simultaneously, it maintains that the people of Papua New Guinea must benefit from any development.

The Project aligns with the PNG Constitution and various PNG Government policies, as described in the following sections.

5 The terms socio-economic, societal and social are used interchangeably in this report.

RAW GAS PRODUCTION

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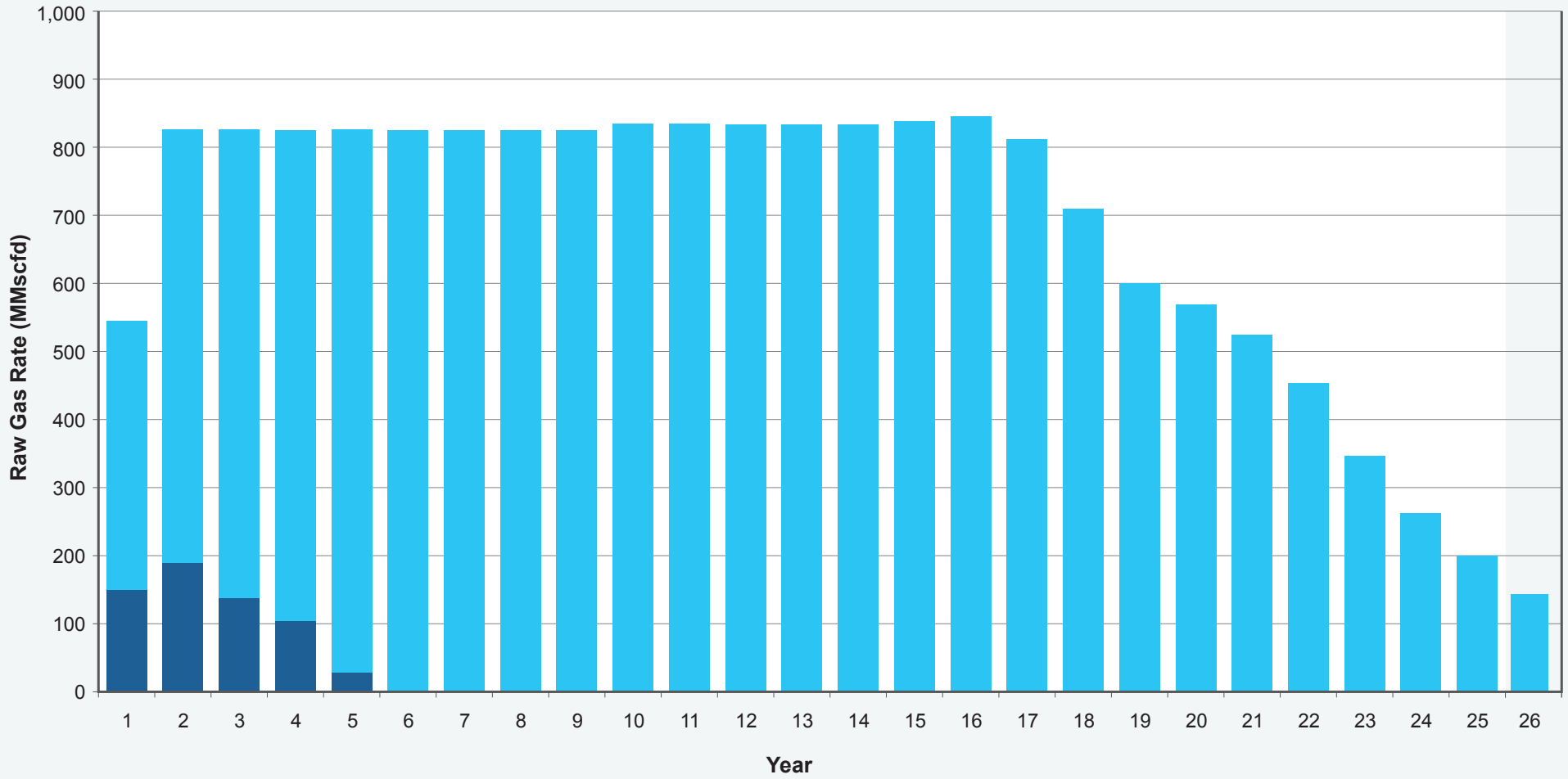
FIGURE 1.4



MMscfd – Million standard cubic feet per day

Elk Antelope

Note: At the stage of the Project development when this figure was produced there was some variation in Project duration due to gas pressure.

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1.4.4.1 Constitutional Goals

As outlined in the Constitution of Papua New Guinea (1975), key aspirations and principles for developing the nation are presented in Goals 3 and 4:

> We declare our Third Goal to be for Papua New Guinea to be politically and economically independent, and our economy basically self-reliant.
>
> We declare our Fourth Goal to be for Papua New Guinea's natural resources and environment to be conserved and used for the collective benefit of us all, and be replenished for the benefit of future generations.

During the Project's life cycle, the PNG economy will benefit from the payment of royalties, and direct and indirect taxation, thus bringing the country a step closer to economic independence. Further, in developing the Elk-Antelope gas field, the Project is expected to contribute to the nation's balance of trade; to provide training and employment opportunities during construction, operations and decommissioning; and to enhance the capacity of the national workforce and infrastructure to support future development projects, which in turn should also contribute to the growth and diversification of the economy, employment opportunities and improvements in infrastructure and services.

1.4.4.2 PNG Vision 2050

Developing the Project aligns with Vision 2050 (NSPT, 2010), a national strategy developed by the National Strategic Plan Taskforce in 2009, where 'wealth creation' and 'human capital development, gender, youth and people empowerment' is one of the key strategic focus areas. The Project will strengthen and support a productive regional economy and provide a potential new source of wealth and growth for Papua New Guinea and provide employment-related training increasing the skills base of the local and/or regional communities.

1.4.4.3 Papua New Guinea Development Strategic Plan

The PNG Department of National Planning and Monitoring (DNPM, 2010) released the Papua New Guinea Development Strategic Plan 2010 to 2030 to support the implementation of Vision 2050. The strategic plan sets out the framework to achieve the government's targets and strategies, particularly those outlined in Vision 2050.

For the petroleum sector, the core goal is to:

> Build a world leading petroleum industry that maximises benefits to PNG and landowners, minimises impacts on the environment and social welfare, and provides PNG with energy security.

In addition to this strategic plan, the DNPM has developed shorter-term initiatives in the form of medium-term development plans that have goals stemming from Vision 2050. The overarching goal of the 2016–2017 development plan is to increase PNG's human development index, and its goal in relation to petroleum and gas is to (DNPM, 2015):

> Maximize socioeconomic and environment benefits from the petroleum and gas industry.
>
> The Project will be developed in a manner that seeks to deliver meaningful benefits to legally recognized landowners, Project-affected communities and Papua New Guinea.

The strategic plan acknowledges the prospective wealth still to be generated by the country's natural gas reserves and states that the number of LNG projects in Papua New Guinea should total at least three by 2030 (DNPM, 2010). The Project development will contribute to this goal.

The Project primarily traverses the petroleum resource area economic corridor (PRAEC), which includes the Southern Highlands and parts of Enga, Gulf and Central provinces, described in the strategic plan (DNPM, 2010). Key objectives specific to the PRAEC include:

- Improve the quality of life for people in the PRAEC zone by investing in the zone.
- Improve the quality of life for people throughout Papua New Guinea by integrating infrastructure and services in the PRAEC with the national network.
- Ensure that gas revenues bring about tangible and sustainable improvements to the living standards of Papua New Guinea's people.
- Replace cash handouts with a well-managed and well-coordinated system of investment to the benefit of affected communities.

The Project development will facilitate the meeting of PRAEC objectives. TEP PNG aims to work with the government of Papua New Guinea, during the Project life cycle, to bring about improvements to the quality of life of the local population including by generating employment, improving the skills and capacity of the local workforce, and implementing tailored community investment projects.

TEP PNG's community relations team aims to build an environment of trust between TEP PNG and the local population through regular engagement with potentially affected stakeholders. Project-affected communities and local, district and provincial governments are regularly consulted to encourage their active participation in Project decision-making to achieve sustainable outcomes. Further information about TEP PNG's stakeholder engagement strategy is provided in Chapter 6.

1.4.4.4 National Strategy for Responsible Sustainable Development

The Constitution of Papua New Guinea directs the country to focus on long-term development to achieve growth, equity and sustainability for the benefit of present and future generations. The National Strategy for Responsible Sustainable Development (DNPM, 2014) has developed strategic issues and policy responses to address these issues, shifting the country's socio-economic growth from the current unsustainable growth strategy towards a future that is responsible and sustainable, and will make Papua New Guinea competitive. The strategy promotes economic growth driven by sustainable clean energy and resource use where carbon emissions and pollution are reduced, and energy efficiency is enhanced. At its simplest, a green economy is 'one that is low carbon, resource efficient and socially inclusive.' (DNPM, 2014). Additionally:

> It promotes the principles of inclusive economic and social growth, inclusive environmental conservation, and innovation that integrates the considerations of the three spheres of growth – economy, social and environment as factors of equal value and importance.

The decision-making processes presented in Chapter 5 describe how key features were avoided to reduce potentially adverse impacts on biodiversity and resources, and the proposed mitigation and management measures, and associated management plans, described in the impact assessment in Chapters 11 to 16 further identify how the Project will avoid and reduce environmental and social risks, and enhance social and economic growth in the Project area.

1.4.4.5 National Biodiversity Strategy and Action Plan

As a contracting party to the Convention on Biological Diversity (see Chapter 2), Papua New Guinea prepared a national biodiversity strategy and action plan in 2007 that is currently in the process of being updated (DEC, 2014). The plan has six main goals of which development of the Project is aligned with (GPNG, 2007):

> Goal 1 To conserve, sustainably use and manage the country's biological diversity.

In particular, the Project is contributing to the program on research and information on biodiversity.

1.4.4.6 National Climate Compatible Development Management Policy

Climate change was addressed in Vision 2050 (Section 1.4.4.1) and the Papua New Guinea Development Strategic Plan 2010 to 2030 (Section 1.4.4.3), and the National Climate Compatible Development Management Policy (OCCD, 2014) has been developed to focus on sustainable development and key policy areas for climate change mitigation and adaptation and provides monitoring and evaluation of these activities.

The policy looks to building a climate-resilient and carbon neutral pathway through sustainable economic development for Papua New Guinea. 'Particular emphasis is also placed on the promotion and adoption of cost-effective measures to reduce green-house gas emissions driven mainly by abatement measures in Agriculture, Land Use, Land Use-Change and Forestry (LULUCF) sectors and become carbon neutral while investing into low-carbon infrastructure.' (OCCD, 2014). The Project has undertaken a greenhouse gas and climate change assessment (Chapter 15) that considers emissions in the context of PNG's ability to comply with the policy.

1.4.5 Impacts and Benefits of the Project

Constructing and operating a project of the magnitude and complexity of the Papua LNG Project will have unavoidable direct and indirect impacts to the biophysical and social environments. The Project is likely to occupy a footprint of approximately 940 ha (see Chapter 04). Construction will involve clearing and ground disturbance, and there will be discharges and emissions to the environment during construction and operations. The Project will require access to customary-owned land to develop facilities and infrastructure.

The Project is expected to generate substantial financial benefits for Papua New Guinea. The preliminary median capital cost estimate for the upstream portion of the Papua LNG Project development costs is estimated at US$4.0 billion in 2018 Real Terms for the initial development, plus approximately US$0.9 billion for the subsequent compression phases. The Gulf and Central provinces will experience direct financial benefits through royalties and development levies, and indirect financial benefits through the stimulation of economic activities.

Legally recognized landowners, as determined under s. 47 (i.e., social mapping and landowner identification studies) of the *Oil and Gas Act 1998*, will receive statutory benefits via the State; and the wider Project-affected communities in the Project area are likely to benefit through Project training, employment or other business opportunities.

The approach to National Content is built around three pillars, aiming at developing a PNG workforce, involving local businesses and assisting with the socio-economic development of communities in the Project area and Papua New Guinea as a whole.

Constructing and operating the proposed facilities will have some negative impacts on the natural and social environment, and the Project is also likely to change the current subsistence-based livelihoods of stakeholders and communities in the Project area; however, TEP PNG expects that these will be managed to be as low as reasonably practicable by implementing best available practicable controls.[6] The Project potential impacts and proposed mitigation and management measures are detailed in Chapters 11 to 18 of this EIS.

6 An approach based on adopting the best technological controls available to limit adverse impacts, at reasonable cost, during construction and when operating under normal conditions.

1.5 This Document

1.5.1 Statutory Context

Section 50 of the *Environment Act 2000* (*Environment Act*) requires the proponent, on receiving a notice from the Director, to undergo an environmental impact assessment for the Project to support the application for an environment permit. In accordance with that legislation and related regulations, this is a two-step process that commenced with the submission of an environmental inception report (EIR) in October 2016. The Director of Environment approved the EIR in December 2016 and TEP PNG was directed to submit an EIS. The EIS has been prepared with reference to the Information Guideline for Conduct of Environmental Impact Assessment and Preparation of Environmental Impact Statement (GL-Env/02/2004) (DEC, 2004) and the assessment procedures of the (*Environment Act*).

Attachment 1.1 cross-references the EIS sections to the guidelines and requirements of CEPA, formerly the Department of Conservation and Environment. It also provides a guide between the relevant sections of the EIS and the requirements of the EIS as identified in the EIR.

Additional information about statutory requirements for the Project is provided in Chapter 2, Regulatory Framework, Policy, Standards and Guidelines.

1.5.2 EIS Process Timeline

The EIS process timeline commenced in October 2015 with the submission of the application for an environment permit. It is expected to be completed in 2020, when a decision from the Environment Council and the Minister for Environment and Conservation on whether the Project should proceed and, if so, under what conditions, is made and ultimately an environment permit is issued (Table 1.1).

Table 1.1 – EIS Process Timeline

Date	Report Process
October 2015	Submission of an Application for an Environment Permit
October 2016	Submission of the Papua LNG Project EIR to CEPA
December 2016	Approval of the Papua LNG Project EIR by CEPA
June 2019	Submission of the revised EIR to CEPA
July 2019	Approval of the revised EIR by CEPA
Q4 2019	Submission of the EIS to CEPA
Q1 2020	EIS roadshow

1.5.3 EIS Objectives

The purpose of this EIS is to seek approval to construct, commission and operate the Papua LNG Project upstream facilities. The report is intended to provide CEPA and other stakeholders with a clear and definite description of potential environmental and social impacts on which CEPA and other stakeholders can base their assessment and any subsequent approval may be granted.

1.5.4 EIS Structure

The EIS consists of an executive summary and three volumes:

- Executive summary: Provides an overview of the Project impact assessment process and the key conclusions of the assessment for non-technical readers.
- EIS Main Report (this report, Volume 1): Intended to be understood without reference to the technical studies on which it is based. This report documents the Project's potential biophysical, socio-economic and cultural impacts, and describes the proposed mitigation,

management measures and residual impacts, and any benefits associated with the Project. Stakeholder engagement is also discussed.

- Environment and social baseline (Volume 2): Twenty-two technical study discipline baseline reports, and one additional part that collates the field survey scope and methods document, that are summarized in Volume 1 Chapters 7 to10. These reports document the results of the 13-month field survey baseline program.
- Technical studies for impact assessment (Volume 3): Five targeted, technical reports focused on modeling and technical studies to support the impact assessment in Volume 1. These reports provide additional details regarding the models and technical information used to predict the impacts associated with the Project.

Figure 1.5 provides a guide to the EIS structure and lists the appendices on which the main report is based.

1.5.5 Guide to the Document

1.5.5.1 Referencing

For reading ease, the reference list for each chapter is provided at the end of each chapter, rather than being compiled into one chapter for the entire report and placed at the end of the EIS.

The reference lists are specific to the chapter, e.g., the reference for DEC (2004b) in one chapter may not be the same reference in another chapter.

1.5.5.2 Cross-references

Cross-references refer the reader to another part or parts of the document, such as figures, tables, plates, boxes, sections, chapters, attachments or appendices; and each of these parts will have a unique number. The first cross-reference will contain the part of the document and the unique number, e.g., Plate 7.2 will be the second plate in Chapter 7. Subsequent occurrences of a cross-reference are always in parentheses and preceded by the word ‘see’.

1.5.5.3 Conventions

Key conventions adopted in preparing this report are:

- The EIS does not disclose information that is confidential for cultural or commercial reasons; however, TEP PNG may provide the latter in confidence to CEPA upon request.
- Currency conversions have been made at the exchange rate at 7 March 2019 and are:
  - PGK1 = US$0.30.
  - US$1 = PGK3.37.
  - PGK1 = AU$0.42.
  - AU$1 = PGK2.38.
- Although the Project and its related activities are a proposal, the use of ‘will’ rather than ‘would’ has been adopted for this report.

PAPUA LNG PROJECT UPSTREAM EIS STRUCTURE

Papua LNG Project | Environmental Impact Statement

FIGURE 1.5

Executive Summary	Volume 1				Volume 2	Volume 3
	The Project	Existing Environment	Impact Assessment and Mitigation	Resources	Environmental and Social Baseline	Technical Studies
	1. Introduction 2. Regulatory Framework, Policy, Standards and Guidelines 3. Impact Assessment Process and Methods 4. Project Description 5. Project Options and Analysis of Alternatives 6. Stakeholder Engagement	7. Existing Environment - Terrestrial 8. Existing Environment – Marine 9. Existing Environment – Social, Economic and Cultural 10. Existing Environment – Amenity	11. Impacts: Terrestrial 12. Impacts: Marine 13. Impacts: Social 14. Impacts: Cultural Heritage 15. Impacts: Amenity 16. Impacts: Ecosystem Services 17. Cumulative Impacts 18. Major Hazards, Mitigation and Assessment 19. Environmental and Social Management, Monitoring and Reporting 20. Commitments Register	21. Glossary and Abbreviations 22. Study Team	Part 1 Upstream Geology, Terrain and Soils Baseline Report Part 2 Upstream Hydrology and Meteorology Baseline Report Part 3 Upstream Surface Water and Sediment Quality Baseline Report Part 4 Upstream Groundwater Baseline Report Part 5 Upstream Freshwater and Estuarine Biodiversity Baseline Report Part 6 Upstream Terrestrial Biodiversity Baseline Report Part 7 Upstream Deforestation Baseline Report Part 8 Upstream Vegetation Regeneration Baseline Report Part 9 Seabed and Coastal Geomorphology Baseline Report Part 10 Physical Oceanography Baseline Report Part 11 Marine Water and Sediment Quality Baseline Report Part 12 Marine Biodiversity Baseline Report Part 13 Marine Fisheries and Resources Baseline Report Part 14 Upstream Community and Demographics Baseline Report Part 15 Upstream Governance and Economics Baseline Report Part 16 Upstream Community Health Baseline Report Part 17 Upstream Cultural Heritage and Archaeology Baseline Report Part 18 Upstream Land and Natural Resources Baseline Report Part 19 Upstream Air Quality Baseline Report Part 20 Upstream Noise Baseline Report Part 21 Upstream Landscape and Visual Amenity Baseline Report Part 22 Marine and River Traffic and Transport Baseline Report Part 23 Field Survey Scope and Methods Documents	Part 1 Underwater Noise Modeling for Impact Assessment Part 2 Air Quality Modeling for Impact Assessment Part 3 Noise Modeling for Impact Assessment Part 4 Marine Modeling for Impact Assessment Part 5 Greenhouse Gas and Climate Change Impact Assessment

- Onshore Project activities can occur in one or more of three areas: PRL-15, the export pipeline route or the river transport corridor. Collectively, these areas are referred to as the onshore Project area.
- PRL-15 generally refers to land and communities in and around the PRL-15 license area unless specifically stated.
- The river transport corridor is defined as the rivers that may be used for access to the Project; and the villages along those rivers.
- The baseline reports in Volume 2 of the EIS that characterize the upstream environment are prefixed with 'Upstream', except those with a marine component.
- Generally, when referring to the pipeline infrastructure, it is referred to in plural, e.g., onshore export pipelines or trunklines or flowlines; however, typically, the singular form is used when referring to the route or right of way, e.g., onshore export pipeline route, referring collectively to the gas and condensate pipelines that will be located in the one trench. Similarly, the trunkline route refers to the bundle of pipelines and cable in the two trenches along the route.
- The EIS assumes the Project will be developed primarily as described herein based on the pre-Project design at December 2018; however, information presented in the EIS may vary as the design has evolved in parallel with the preparation of this EIS. Additional refinements may occur as additional information (e.g., engineering, environmental, social or commercial) becomes available, subject to the Project management of change process, which is defined in Chapter 3, Impact Assessment and Methods.
- Unique codes, e.g., [ED001], identify embedded Project design controls throughout the document, and are collated in Chapter 4, Project Description.
- Unique codes, e.g., [EM001] (environmental mitigation) or [SM003] (social mitigation), identify mitigations and management measures throughout Chapters 11 to 16, and are collated in Chapter 20, Commitments Register.

Chapter 3, Impact Assessment Methods, and Chapter 21, Glossary and Abbreviations, provide other report conventions that have been used throughout the document.

1.5.6 Public Review and Submissions

The EIS will be made available to the public in accordance with the *Environment Act 2000*, tentatively aiming for the roadshow to be held Q1 2020.

1.6 References

DEC. 2004. Guideline for Conduct of Environmental Impact Assessment and Preparation of Environmental Impact Statement (GL-Env/02/2004). Department of Environment and Conservation, Port Moresby, Papua New Guinea.

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Attachment 1.1. Cross-reference of CEPA Requirements and Guidelines to EIS Sections

Table 1 provides reconciliation between the contents of the Papua LNG Environmental Impact Statement (this EIS) and the scope of the EIS as described in the Papua LNG Environmental Inception Report (EIR).

Table 1 – Cross-refence Between the EIS and the EIR

EIR	EIS Chapter,Volume (and Part) addressing the Requirement
Consider the potential environmental and socio-economic (including health and cultural) impacts of the Project with respect to their value (i.e., positive or negative), nature (direct, indirect or cumulative), duration (short, medium or long-term), geographical extent (local, regional or national) and magnitude (degree of severity) taking into account the sensitivity of the receptor.	Chapter 11 Chapter 12 Chapter 13 Chapter 14 Chapter 15 Chapter 16 Chapter 17 Chapter 18
Describe measures to mitigate and manage potentially adverse impacts that may occur as a result of the Project. One of the main purposes of the EIS process is to develop mitigation and management measures and these will be based on the mitigation hierarchy of avoid, minimize, reduce and restore. Measures will be developed via an iterative and integrated process with the Project engineering team as the impact assessment progresses and the Project engineering design advances.	
Assess the residual environmental and socio-economic impacts of the Project, once mitigation and management measures have been determined.	

Table 2 provides reconciliation between the contents of the Papua LNG EIS with the Department of Environment and Conservation (DEC) Guideline for Conduct of Environmental Impact Assessment and Preparation of Environmental Impact Statement (CEPA Guideline) (DEC, 2004). The main EIS chapters where the guidelines' requirement has been primarily addressed are listed. Other EIS sections may address the requirement, but they are not documented in this table.

Table 2 – Cross-reference Between the EIS and CEPA Guideline

	CEPA Guideline	EIS Chapter, Volume (and Part) addressing the Requirement
	Letter of Transmittal or Cover Letter	
	It is important that an Environmental Impact Statement on the proposal must be transmitted to DEC* with a cover letter signed by the responsible company official or its authorised representative (i.e., consultant - engaged by the company to act on its behalf). If an external consultant is used, the letter must also authorise the consultant to make statements and provide further information on behalf of the company in relation to the application.	Submitted with EIS.
1.	***Executive Summary or Overview of Proposal***	
	Information provided in the Executive Summary shall concisely describe the following:	
	♦ The proposed development activity and its objectives.	Executive Summary
	♦ Anticipated bio-physical and socio-economic impacts (direct/indirect, reversible/irreversible) of the activity.	Executive Summary
	♦ Remedial actions that are proposed.	Executive Summary
	♦ All benefits to be derived from the project.	Executive Summary

Table 2 – Cross-reference Between the EIS and CEPA Guideline (cont'd)

	CEPA Guideline	EIS Chapter Volume (and Part) addressing the Requirement
1.	***Executive Summary or Overview of Proposal (cont'd)***	
	♦ The consultation program undertaken by the applicant, including degree of public interest.	Executive Summary
	♦ Rehabilitation and/or end-use plans for the development activity in relation to community needs.	Executive Summary
2.	***Purpose of the Development***	
	This section shall include but not be limited to the following:	
	♦ Describe if the development is in line with the Fourth National Goal and Directive Principle of the National Constitution of PNG.	Chapter 1
	♦ Explain if the proposed development is compatible with National, Provincial and Local Level Government development goals and planning guidelines.	Chapter 1
	♦ Detail the economic benefits to the Nation, Province, Local Level Governments and to the local community being impacted.	Chapter 1 Chapter 13
3.	***Viability of the Project***	
	Provide information on the viability of the proposed development activity. These details shall include but not be limited to the following:	
	♦ Information on the capital cost associated with the development.	Chapter 1
	♦ Details of the proponent's technological expertise and resources.	Chapter 1 Chapter 22
	♦ Results of any feasibility investigations that have been carried out.	Chapter 5
	♦ Information on the extent of landowner and/or resource owner support, including a copy of the formal written approval of their consent.	Chapter 13*
	♦ Details of the life-span and development phases of the project.	Chapter 1 Chapter 4
4.	***Description of the Proposed Development Activity***	
	All relevant details on the proposed development activity required under this section should be provided where it is applicable to the proposal. Details to be provided under this section may include the following:	
	♦ Background information to the proposal, process technologies to be employed etc.	Chapter 1 Chapter 4
	♦ Detailed location maps (drawn to scale), site layout, etc.	Chapter 4
	♦ Information on method of site selection including alternatives investigated, plant or building designs, relevant diagrams and drawings.	Chapter 5
	♦ Detailed flowcharts, mass balances (including feedstocks, products and wastes generated), etc.	Chapter 1 Chapter 4
	♦ Description of nearby development activities that may contribute to additive effects on background pollution levels or other baseline conditions.	Chapter 17
	♦ Information on associated infrastructure/facilities that is to be constructed.	Chapter 4

Table 2 – Cross-reference Between the EIS and CEPA Guideline (cont'd)

	CEPA Guideline	EIS Chapter, Volume (and Part) addressing the Requirement
5.	***Development Timetable***	
	Information on the development timetable provided under this section should be clear and easy for DEC# to understand the different phases in the development proposal. For reasons of clarity, a Flow chart, Gantt or PERT chart should be used where appropriate. Information provided in this section shall include but not limited to the following:	
	♦ Information on funding arrangement for proposed activity or if availability of funds subjected to this or other approvals being granted.	Chapter 1
	♦ Details of pre-construction activities.	Chapter 4
	♦ Information on consultation program with all affected parties (i.e., parties that may be directly and indirectly affected).	Chapter 1 Chapter 3 Chapter 6
	♦ Details of construction schedule, staging, etc.	Chapter 4
	♦ Details of commissioning and operational schedules.	Chapter 4
	♦ Details of infrastructure development schedule.	Chapter 4
	♦ Details of closure and rehabilitation schedule.	Chapter 4
6.	***Characteristics of the Receiving Environment***	
6.1	**Available Environmental Studies and Investigations**	
	Information provided in this sub-section shall include but not be limited to the following:	
	♦ Historic or current baseline data on physical, biological and social systems. ♦ A written estimate of research and/or study time already expended and to be further undertaken.	Chapter 7 Chapter 8 Chapter 9 Chapter 10 Volume 2: Parts 1 to 23
6.2	**Physical Environment**	
	Provide details on the existing physical environment including data on ambient environmental quality of various segments of the environment. Information provided in this sub-section shall include but not be limited to the following:	
	♦ Geomorphological, topographical and geological characteristics.	Chapter 7 Chapter 8 Volume 2, Part 1 Volume 2, Part 9
	♦ Any natural or induced hazard in the area (e.g., flood, earthquake, volcanic zone, etc.).	Chapter 7 Volume 2, Part 1
	♦ Climatic regime (e.g., rainfall, temperature, etc.).	Chapter 7 Volume 2, Part 2
	♦ Air quality and meteorological data set for air dispersion modelling, etc.	Chapter 7 Chapter 10 Volume 2, Part 2 Volume 2, Part 19

Table 2 – Cross-reference Between the EIS and CEPA Guideline (cont'd)

	CEPA Guideline	EIS Chapter, Volume (and Part) addressing the Requirement
	♦ Seasonal surface water quality and hydrological information.	Chapter 7 Chapter 8 Volume 2, Part 3 Volume 2, Part 10 Volume 2, Part 11
	♦ Seasonal ground water quality and flow regime.	Chapter 7 Volume 2, Part 4
	♦ Noise levels.	Chapter 8 Chapter10 Volume 2, Part 20
6.3	**Biological Environment**	
	Detailed information should be provided on the existing biological environment and shall include but not be limited to the following:	
	♦ Presence of a protected area (Conservation Area or Wildlife Management Area), if any.	Chapter 7 Chapter 8 Volume 2, Part 6 Volume 2, Part 12
	♦ Details of any special purpose areas (e.g., wetland area, etc.).	Chapter 7 Volume 2, Part 6
	♦ Aquatic and terrestrial ecology of the area.	Chapter 7 Chapter 8 Volume 2, Part 5 Volume 2, Part 6
	♦ Information on vulnerable (endangered) species.	Chapter 7 Chapter 8 Volume 2, Part 5 Volume 2, Part 6 Volume 2, Part 12
	♦ Other relevant biological information.	Chapter 7 Chapter 8 Volume 2, Part 7 Volume 2, Part 8 Volume 2, Part 12 Volume 2, Part 13
6.4	**Social Environment**	
	Issues that may arise within and outside of the project area should be identified including whether this is a direct or indirect outcome of the physical, biological or socio-economic effects of the proposed development activities. Information provided in this sub-section shall include but not be limited to the following:	
	♦ Demographic information.	Chapter 9 Volume 2, Part 14
	♦ Information on existing infrastructure.	Chapter 9 Chapter 13 Volume 2, Part 14 Volume 2, Part 16
	♦ Information on public health issues (if applicable).	Chapter 9 Chapter 13 Volume 2, Part 16

Table 2 – Cross-reference Between the EIS and CEPA Guideline (cont'd)

	CEPA Guideline	EIS Chapter, Volume (and Part) addressing the Requirement
	♦ Information on present economic status of the project area.	Chapter 9 Chapter 13 Volume 2, Part 13 Volume 2, Part 15 Volume 2, Part 18
	♦ Description of existing social services.	Chapter 9 Chapter 13 Volume 2, Part 14 Volume 2, Part 18
	♦ Details of archaeological, historical, cultural or religious features of the project area under consideration, etc.	Chapter 9 Chapter 14 Volume 2, Part 17
7	***Waste Minimisation, Cleaner Production and Energy Balance***	
	Information detailed in this section should include consideration of options associated with waste minimisation, cleaner production and energy balance and the ability of the proponent to employ these strategies in its proposed activities. Information to be covered in this section shall include but not limited to the following:	
	♦ Details of other alternative "cleaner production" technologies or processes that has been considered.	Chapter 5
	♦ Information on the basis for choosing the proposed technology or process.	Chapter 4 Chapter 5
	♦ Available technical background on the process chosen.	Chapter 4 Chapter 5
	♦ Details of the Waste Minimisation Strategy developed for the proposal.	Chapter 4
	♦ Details of an "energy balance" for the proposal.	Chapter 4 Chapter 15
8.	***Environmental Management, Monitoring and Reporting***	
	Information to be covered in this section shall include but not limited to the following:	
	♦ Details of information on plant operating conditions, including management and monitoring strategy.	Chapter 4
	♦ Information on socio-economic management and monitoring strategy.	Chapter 2 Chapter 13 Chapter 16 Chapter 19
	♦ Mechanism and frequency for reporting monitoring results to DEC* and other stakeholders, especially to directly affected stakeholder groups.	Chapter 6 Chapter 19
	♦ Availability of contingency and/or emergency plans drawn up for the proposal.	Chapter 18 Chapter 19
	♦ Details of Environment Improvement Plan.	Chapter 19
	♦ Details of Waste Minimisation and/or Management Plans.	Chapter 4 Chapter 11 Chapter 15 Chapter 19

Table 2 – Cross-reference Between the EIS and CEPA Guideline (cont'd)

	CEPA Guideline	EIS Chapter, Volume (and Part) addressing the Requirement
	♦ Information on potential rehabilitation issues and its strategies including Rehabilitation Plan.	Chapter 4 Chapter 7 Chapter 11 Chapter 19 Volume 2, Part 8
9.	***Other Statutory Decisions***	
	Provide detailed information on other statutory decision(s) that are relevant to this proposed development activity. Provide the draft or finalised Project Development Contract, Memorandum of Agreements or other similar legal decisions that are relevant to the proposal.	Chapter 2
10.	***Confidential Information***	
	Details of classified information relating to a manufacturing or industrial process or trade secret used in carrying on or operating any particular undertaking or equipment or information of a business or financial nature in relation to the proposed activity should be clearly defined. Such information would be classified as "confidential information" and excluded from the EIS before the document is made available for public review.	Noted
11.	***References***	
	Provide details of reference materials used in sourcing information and/or data used in the EIS.	References are provided at the end of Chapters 1 to 19, relevant to each chapter.
12.	***Acknowledgements***	
	Detail relevant acknowledgments.	Chapter 22
13.	***References***	
	Provide detailed information on persons who assisted in the conduct of the environmental impact assessment study and compilation of the EIS.	Chapter 22

Notes: * Addressed via the approach described in Chapter 13. # Now CEPA.