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1. INTRODUCTION

The Papua LNG Project comprises two interrelated development components, these being the Papua LNG Project – Downstream (the Downstream component, hereafter referred to as ‘the Project’ and the component that is the subject of this Environmental Impact Statement (EIS)), and the Papua LNG Project – Upstream (the Upstream component).

The Papua LNG Project intends to expand the capacity of the existing facilities for liquefaction of natural gas (LNG Plant) located in Caution Bay (Central Province), approximately 20 km north-west of Port Moresby, and which are currently owned by the joint venture known as the PNG LNG Project. The Papua LNG Project is a gas development project for the Papua LNG Project Joint Venture participants, which at the date of this EIS are:

- TotalEnergies EP PNG Limited (TotalEnergies, an affiliate of TotalEnergies SA)
- ExxonMobil PNG Antelope Limited (EMPNGA) and ExxonMobil PNG Elk Limited
- Pac LNG Assets Limited, Pac LNG International Limited, Pac LNG Investments Limited, Pac LNG Overseas Limited and Pac LNG Holdings Limited (affiliates of Santos Limited)
- JX Nippon Oil and Gas Exploration Pty Ltd.¹

Gas will be supplied from the Elk and Antelope reservoirs located in Petroleum Retention Lease (PRL) 15 in the Eastern Fold Belt of the Gulf Province and are being developed for the Upstream component. Upstream infrastructure and facilities will include production wells and gas gathering pipelines, a central gas processing facility, approximately 60 km of onshore pipelines to transport gas and condensate south to the coast, and 260 km of offshore pipelines to the LNG Plant. These Upstream facilities, including the pipelines, are being constructed (up to the onshore scope break) and operated by TotalEnergies. The Upstream component is being assessed under a separate EIS, as the two components of the Papua LNG Project have different operators, geographical locations, and development timelines.

Tetra Tech Coffey Limited (Tetra Tech Coffey) have been commissioned by ExxonMobil PNG Antelope Limited to assist with the preparation of this EIS. This EIS has been prepared for the Project as the statutory basis for the environmental and social impact assessment of the Project under *Section 53* of the Papua New Guinea *Environment Act 2000*. This Act is administered by the Conservation and Environment Protection Authority (CEPA). The assessment will inform a decision from the Papua New Guinea Environment Council and Minister for Environment and Conservation on whether this Project should proceed and, if so, under what conditions.

This chapter provides background information on the proponent and co-venturers, an overview of the Project, a discussion of the justification for the Project including its relationship to the PNG LNG Project, and information about the objectives and structure of this EIS.

1.1 THE PROJECT PROPONENT

EMPNGA is the Project proponent and will be responsible for the construction of the Project. Niugini LNG Operating Company Limited (NLOC), an ExxonMobil affiliate, will be responsible for the operation of the integrated LNG Plant once it has been constructed and commissioned. For the purposes of this EIS, the term

¹JX Nippon Oil and Gas Exploration Pty Ltd became a Papua LNG Project Joint Venture participant on 6 July 2023. Some documents associated with this EIS, such as technical appendices, were completed before this date. Consequently, the list of Papua LNG Project Joint Venture participants in some EIS documents may not include JX Nippon Oil and Gas Exploration Pty Ltd.

‘ExxonMobil’ refers to EMPNGA and NLOC, or both, as the case requires. Nothing in this EIS is intended to override the corporate separateness of any entity.

ExxonMobil PNG Limited (EMPNG), an ExxonMobil affiliate, has developed and operated the existing PNG LNG Project since 2009, with the first liquefied natural gas (LNG) export in May 2014. The existing PNG LNG Project commercialises gas reserves in the Hela, Western and Southern Highlands provinces of Papua New Guinea. The gas is extracted and conditioned, then transported to the LNG Plant via pipeline where it is liquefied and exported as LNG by ship to international gas markets. The LNG Plant also currently supplies gas to the NiuPower Port Moresby Power Station and the Dirio Central Province Power Station (DCPPS) for the domestic electricity market.

EMPNGA and NLOC are committed to developing and operating the Project to meet the environmental and social performance standards of the existing PNG LNG Project, as well as the standards to be applied by the Papua LNG Project.

EMPNGA and NLOC operate in accordance with ExxonMobil’s environmental and social management system, which was prepared under the auspices of their ExxonMobil Environment Policy (Figure 1.1). Project activities will also be undertaken in accordance with relevant elements of ExxonMobil’s Operations Integrity Management System (see Chapter 18 Environmental and Social Management, Monitoring and Reporting). EMPNGA will develop an environmental and social management plan (ESMP) for the construction phase of the Project. ExxonMobil will develop an operations phase ESMP for the integrated LNG Plant prior to integrated operations commencing, based on the existing PNG LNG production ESMP.

1.2 PAPUA LNG PROJECT – DOWNSTREAM

The Project will build on and increase the current capacity of the existing LNG Plant. Gas will be supplied from the Elk and Antelope reservoirs being developed for the Upstream component of the Papua LNG Project. The LNG Plant occupies three separate lease areas: Portion 2456, Portion 2457 (coastal strip) and Portion 2458 (offshore).

The Project incorporates the expansion of the LNG Plant’s existing onshore and marine facilities in Caution Bay, including the installation of new LNG processing trains (SMR technology). The new LNG processing trains will expand the capacity of the LNG Plant by approximately 4 million tonnes per annum (mtpa) stream day capacity (SDC), while also providing gas to utilise up to 2 mtpa of latent capacity of the existing LNG trains. This expansion will bring the total capacity of the integrated LNG Plant to approximately 12.8 mtpa SDC.

The location of the Project relative to the other projects and existing facilities is shown in Figure 1.2.

1.2.1 Project overview

Two new feed pipelines (referred to as the ‘Papua LNG pipelines’, see Chapter 2 Project Description, Section 2.1.3.1), one each for gas and condensate, will be installed as part of the Upstream component of the Papua LNG Project. The onshore portion of these pipelines (after the designated scope break) will traverse the existing LNG Plant and is assessed within this EIS. The Papua LNG pipelines shore crossing will be to the south of the existing LNG Plant jetty. Three shore crossing route options were considered as part of studies used to inform this EIS, and these are shown along with the proposed marine facilities for the Project in Figure 1.3.

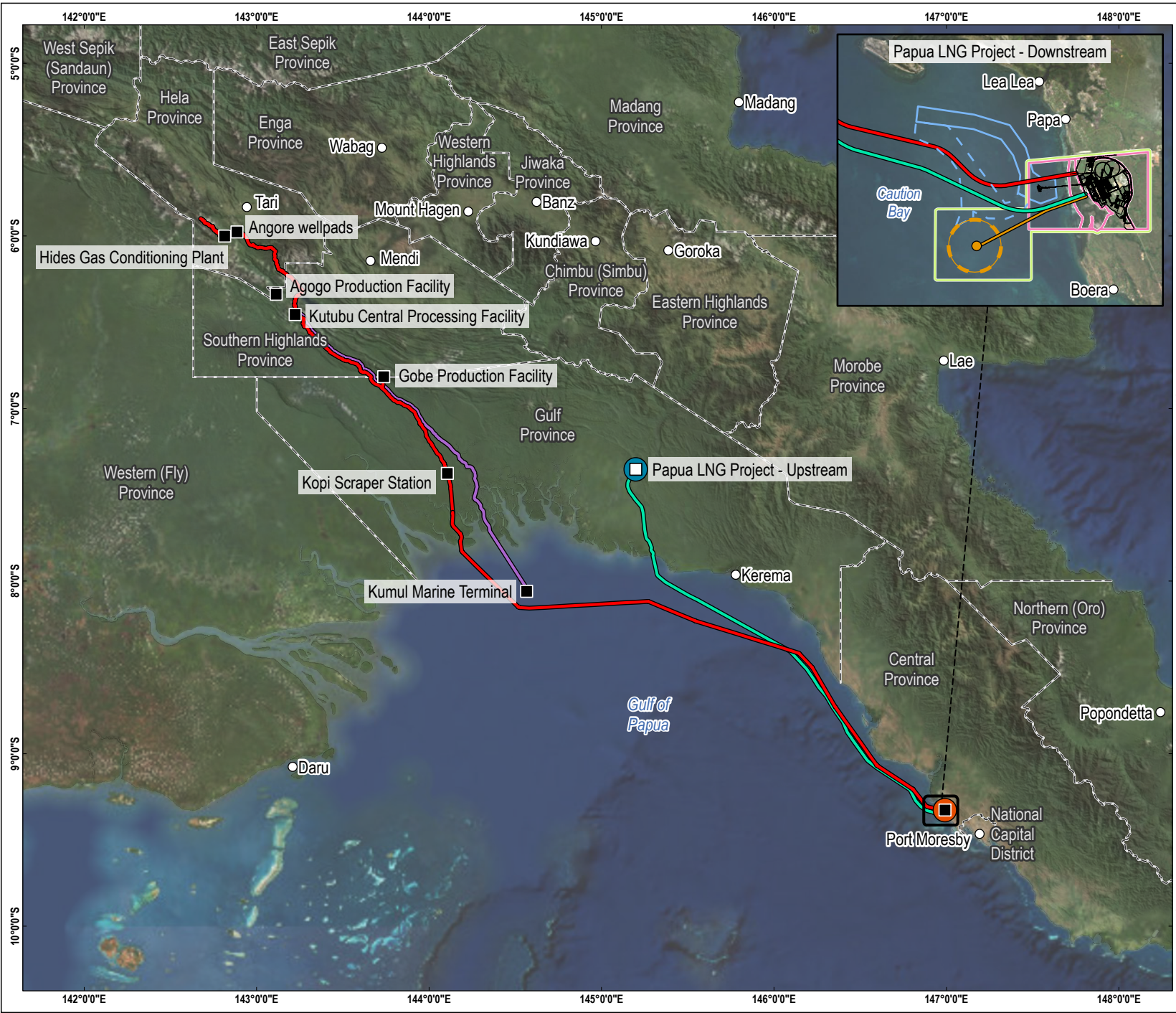
To accommodate the feed gas, the Project will construct gas treatment facilities and new liquefaction trains at the existing LNG Plant, adjacent to the existing liquefaction Trains 1 and 2. The treatment facilities will remove water, heavy hydrocarbons, and other contaminants from the upstream feed gas, after which the treated gas will be sent to the existing trains and the new trains for liquefaction. The proposed onshore facilities for the Project are shown in Figure 1.4.

ENVIRONMENT POLICY

It is ExxonMobil's 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, ExxonMobil's 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, emphasize every employee's responsibility in environmental performance, and foster appropriate operating practices and training;
- ▶ Work with government and industry groups to foster timely development of effective environmental laws and regulations based on sound science and considering risks, costs, and benefits, including effects on energy and product supply;
- ▶ Manage its business with the goal of preventing incidents and of controlling emissions and wastes to below harmful levels; design, operate, and maintain facilities to this end;
- ▶ Respond quickly and effectively to incidents resulting from its operations, in cooperation with industry organizations and authorized government agencies;
- ▶ Conduct and support research to improve understanding of the impact of its business on the environment, to improve methods of environmental protection, and to enhance its capability to make operations and products compatible with the environment;
- ▶ Communicate with the public on environmental matters and share its experience with others to facilitate improvements in industry performance;
- ▶ Undertake appropriate reviews and evaluations of its operations to measure progress and to foster compliance with this policy.



LEGEND

- Papua LNG Project - Downstream
- Papua LNG Project - Upstream
- Existing facility
- Province capital
- PNG LNG pipeline
- Proposed Papua LNG pipelines
- Santos oil pipeline
- Existing and proposed plant layout
- PPFL2 boundary
- APPFL boundary
- Province boundary
- Current navigational channel
- Proposed navigational channel
- Proposed CALM buoy components**
- CALM buoy
- Naphtha and condensate pipelines
- CALM buoy navigational area

SOURCE
Infrastructure data from EMPNGA and Tetra Tech Coffey (indicative only).
Place names from NGIA.
Provinces from NSO.
Imagery from ArcGIS Online.

0 50 100 km

SCALE 1:3,500,000

PAGE SIZE: A4

PROJECTION: GCS WGS 1984

EXXONMOBIL PNG ANTELOPE LIMITED

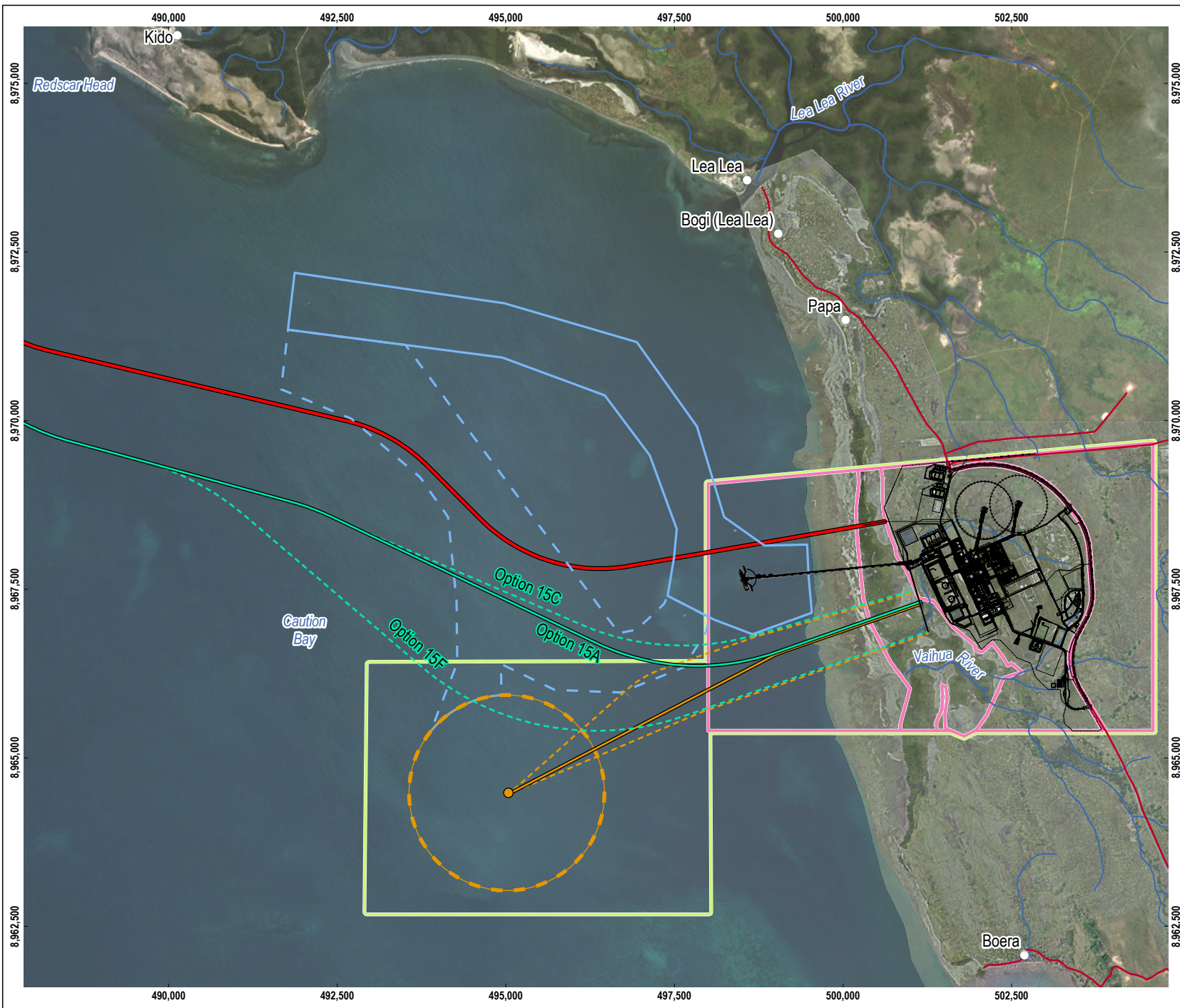
PAPUA LNG PROJECT – DOWNSTREAM

FIGURE 1.2

Papua LNG Project – Downstream Project location

TETRA TECH
COFFEY

DATE: 04.07.23 PROJECT: 754-MELANS00733 FILE: 300733_02_F01.02_GIS



LEGEND

- Village
- Road
- Watercourse
- PNG LNG pipeline
- Proposed Papua LNG pipelines route
- - - Proposed Papua LNG pipelines route alternate
- Existing and proposed plant layout
- PPFL2 boundary
- APPFL boundary
- Current navigational channel
- - - Proposed navigational channel
- Proposed CALM buoy components
- CALM buoy
- Naphtha and condensate pipelines
- - - Naphtha and condensate pipelines alternate
- CALM buoy navigational area

SOURCE
Infrastructure, roads, watercourses and lease boundary from EMPNGA.
Imagery from EMPNGA and Planet Labs.



0 1 2 km
SCALE 1:80,000
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PROJECTION: WGS 1984 UTM Zone 55S

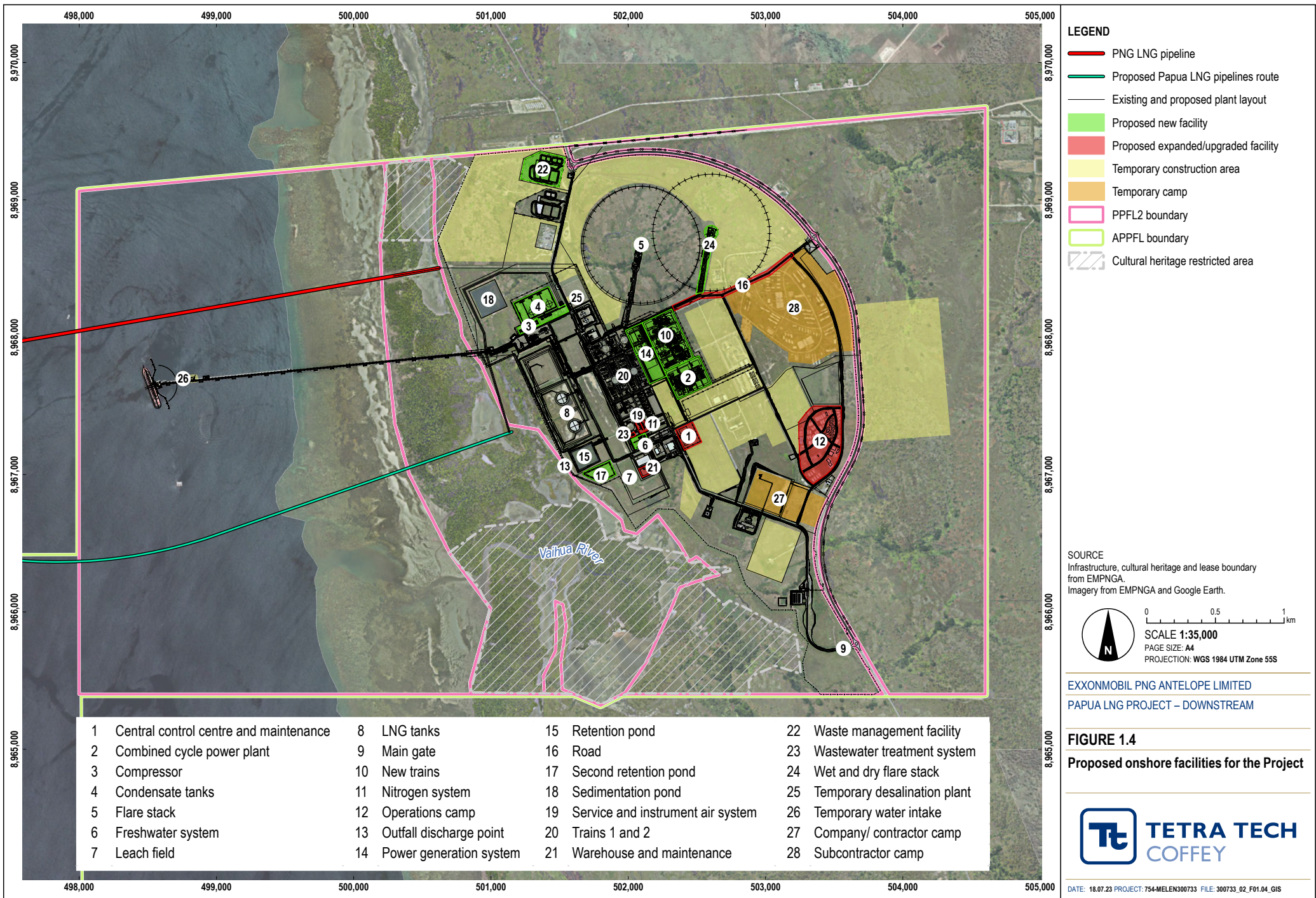
EXXONMOBIL PNG ANTELOPE LIMITED
PAPUA LNG PROJECT – DOWNSTREAM

FIGURE 1.3

Proposed marine facilities for the Project



DATE: 04.07.23 PROJECT: 754-MELN300733 FILE: 300733_02_F01.03_GIS



The main products produced by the Project will include LNG and naphtha. Naphtha recovered from the inlet treating system will be blended with the Papua LNG field condensate and stored in new storage tanks.

In addition to the Papua LNG pipelines, two additional export pipelines (24-inch diameter each) will also be constructed, along with a pipeline end manifold (PLEM) as part of the Upstream component. The new export pipelines will convey naphtha and condensate from the LNG Plant to a catenary anchor leg mooring (CALM) buoy that will be constructed as part of the Project. A CALM buoy will be installed for the Project and delink the non-LNG liquids (naphtha and condensate) from LNG offloading at the existing berth. The CALM buoy, PLEM and the two export pipelines will be designed and operated as part of the Project. Establishment of the CALM buoy will require a new navigation channel and marine exclusion zones.

Additionally, upgrades to the existing berth are being considered to improve maintainability such as the installation of a maintenance crane and/or replacement of the existing condensate loading arm with an LNG loading arm.

The LNG, via the existing berth, and the naphtha and condensate, via the CALM buoy, will be exported by ship to international markets.

Existing as well as new facilities and infrastructure will be required to support the operation of the new liquefaction trains at the integrated LNG Plant. The shared facilities will be common to existing and new liquefaction trains and will utilise the available capacity of the existing LNG Plant systems with some modifications and upgrades to provide expanded capacity where required. Table 1.1 lists the shared and new facilities.

Table 1.1 Shared and new facilities at the LNG Plant

Shared facilities to be expanded	New facilities
- Hot oil system - Service and instrument air system - Nitrogen system - Fresh water system - Desalinated water system - Fire water supply system - Potable water system - Diesel oil storage and distribution system - Open and closed drain systems - Sanitary wastewater treatment systems (sewage treatment plant, STP)	- Integrated fuel gas system - Power generation system (Combined Cycle Power Plant (CCPP)) - Tempered water system - Highly demineralised water system for the Heat Recovery Steam Generators (HRSGs) - Wet and dry flare systems - Thermal oxidiser

Temporary facilities will be required during construction and include laydown areas, offices, workshops, a temporary desalination facility and concrete batching plants. These facilities will be located within the existing LNG Plant lease boundaries.

Most construction material will be imported by ship via Motukea Port and trucked to site along the Lea Lea Road. The road may require repairs or upgrade, including relocation of overhead cables, to accommodate transport of large modules. Transport of construction and operations personnel from Port Moresby will also occur along this road.

Commissioning activities will be required to test the modified shared facilities and new facilities at the LNG Plant. During operation, the monitoring, inspection, and maintenance procedures are expected to be similar to those in place at the existing LNG Plant.

1.2.2 Project objectives

The objectives of the Project are to:

- Process hydrocarbons from the Elk and Antelope reservoirs by expanding the processing and export capacity of the LNG Plant through leveraging latent capacity and constructing new facilities and infrastructure.
- Minimise the Project's impacts on the environment and affected communities by largely constructing and operating the onshore portion of the integrated LNG Plant within the existing LNG Plant footprint, in accordance with applicable government requirements and good industry practice, building on the LNG Plant's existing legacy of excellence in environmental and regulatory performance in Papua New Guinea.
- Enhance existing social benefits from the LNG Plant to the Independent State of Papua New Guinea, through the increased contribution by the Project to the State's economy.

These objectives are framed by the laws and governmental processes of the Independent State of Papua New Guinea in accordance with the planning and development priorities of the country. The objectives are also supported by the principles and values of the Project proponent.

1.2.3 Development timeline

Construction for the Project is expected to occur between 2024 to 2028. The indicative development timeline, that is subject to final investment decision (FID), is presented in Figure 1.5.

1.3 PROJECT JUSTIFICATION

The Project intends to expand the capacity of the existing LNG Plant near Port Moresby. The existing LNG Plant (operated by EMPNG) includes two liquefaction trains and started producing LNG ahead of schedule in April 2014. In May of that year, the first shipment of LNG was delivered to Tokyo, Japan. The LNG Plant has the capacity to produce more than 8.3 million tonnes of LNG, an increase of 20 percent from the original design specification of 6.9 mtpa.

Demand for natural gas continues to rise in the Asia-Pacific (and Papua New Guinea) domestic markets. Asia-Pacific countries are increasing the proportion of natural gas in their energy portfolios and the LNG generated from the new liquefaction trains will assist with meeting this demand. Increasing the capacity of the existing LNG Plant will create further benefits for Papua New Guineans, including in the form of:

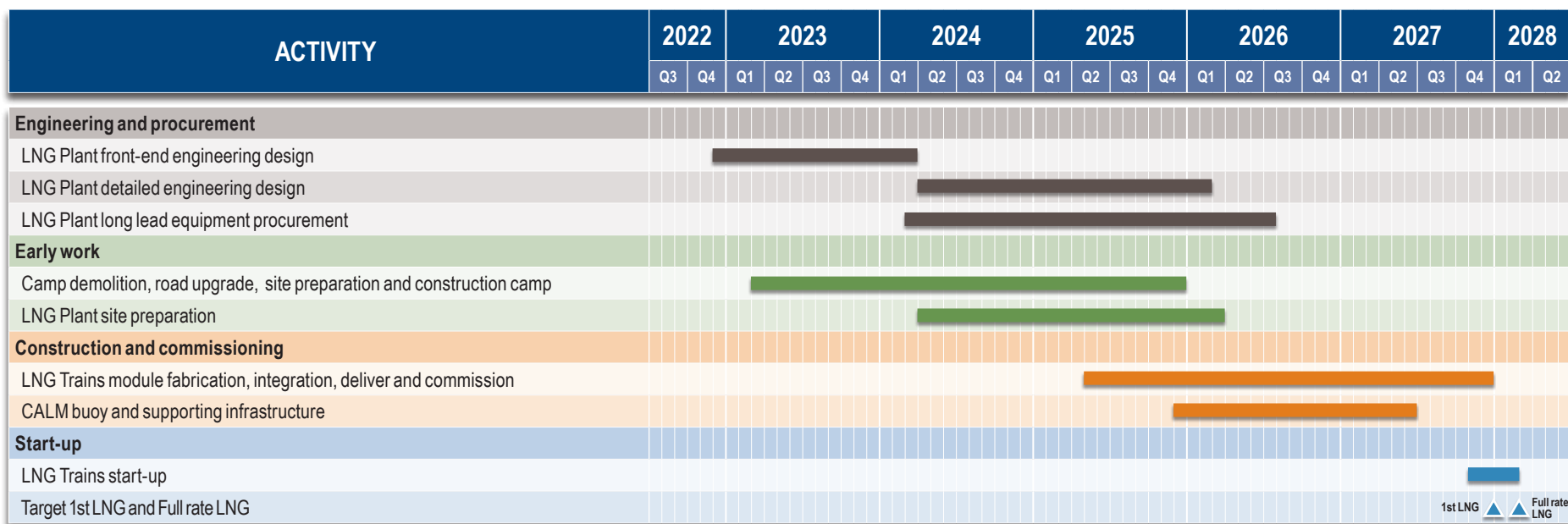
- Local business development opportunities through the supply of equipment and materials required for the construction and operation of the integrated LNG Plant
- Employment and training opportunities for Papua New Guineans.

Papua New Guinea promotes the development of its mineral resources through various policies to encourage investment. The government prioritises benefits to Papua New Guineans from the development of the country's resources. The development of the Project is consistent with the Constitution which includes national goals and directives that outline the aspirations and principles for the development of the nation.

The Constitution's Third Goal states:

'We declare our third goal to be for Papua New Guinea to be politically and economically independent, and our economy basically self-reliant'.

Development of the Project aligns with this goal in that it will contribute to Papua New Guinea's economic self-reliance by supporting increased local workforce participation and economic productivity.



EXXONMOBIL PNG ANTELOPE LIMITED

PAPUA LNG PROJECT – DOWNSTREAM

FIGURE 1.5

Indicative development timeline

SOURCE
EMPNGA, 2023

NOTE
Subject to FID



The Fourth Goal, which refers to natural resources and the environment, states:

‘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’.

The Constitution is supported by a legislative and policy framework that ensures that proposed developments assess, reduce and manage any residual social and environmental impacts such that they are as low as practicable. The Project will be developed to prudently use Papua New Guinea’s ‘...natural resources and the environment...’ in a manner that promotes:

‘the conservation and replenishment for the benefit of ourselves and posterity, of the environment and its sacred, scenic, and historical qualities’;

and which takes:

‘all necessary steps... to give adequate protection to our valued birds, animals, fish, insects, plants and trees.’

1.4 ENVIRONMENTAL IMPACT STATEMENT

The EIS builds on the lessons learnt from preparation of the PNG LNG Project EIS and the experience gained from the construction and operation of that project.

1.4.1 Statutory context

The existing LNG Plant has a current petroleum processing facility licence and environment permit EP-L3(210), held by EMPNG. The construction of the new liquefaction trains, and facilitating infrastructure, will require the Project to obtain a separate petroleum processing facility licence for its activities. The Project will obtain new construction and operations environment permits, as required for the integrated LNG Plant, and the scope of EP-L3(210) will be appropriately amended.

This document constitutes an EIS under Section 53 of the *Environment Act 2000* and under the direction of the CEPA’s Section 50 Notice to Undertake an Environment Impact Assessment, dated 10 May 2022.

Under the Environment Act, preparation of an environment impact assessment is a two-step process:

- Submission of an environmental inception report (EIR)
- Submission of an EIS.

The Papua LNG Project – Downstream Environmental Inception Report was submitted to CEPA on 15 July 2022, with the objectives to:

- Identify potential environmental and socio-economic issues associated with developing the Project
- Describe the scope of the EIS to address those issues
- Initiate the formal process of consultation with government agencies
- Enable CEPA to review the proposed scope of the EIS and identify any potential gaps.

This EIS has been prepared with reference to the Department of Environment and Conservation (now known as CEPA) Information Guideline (GL-Env/02/2004) for Conduct of Environmental Impact Assessment and Preparation of Environmental Impact Statement.

On 1 September 2022, the EIR was approved by CEPA, and EMPNGA was directed to conduct an environmental impact assessment and submit an EIS. Additional information about statutory requirements for the Project is provided in Chapter 4 Legal, Administrative, and Planning Framework.

1.4.2 Document structure

This EIS consists of 4 volumes:

- **1. EIS Executive Summary:** A non-technical summary of the main findings of the impact assessment process and the key conclusions described in the EIS.
- **2. EIS Main Report (this document; chapters 1 through 21):** The EIS is a statement of the findings of various technical studies and includes information detailing the Project description and Project participants, guiding legislation, and a characterisation of the existing environmental context and social conditions potentially impacted by the Project. The EIS details the potential biological, physical, social and cultural impacts of the Project, management measures to be implemented, and residual impacts and benefits. The EIS also discusses cumulative impacts, waste management, greenhouse gases, stakeholder engagement and consultation activities, as well as environmental and social monitoring and reporting.
- **3. EIS attachments:** Documents that provide additional context to the EIS including cross-reference of CEPA guidelines and requirements, and social and environmental management.
- **4. Technical studies (appendices A to L):** Appendices to the EIS including various technical studies conducted to characterise the existing environmental, social and cultural heritage values, and where relevant, assist with identifying the potential impacts of the Project.

The EIS does not disclose information that is confidential for cultural or commercial reasons. The proponent may provide this information in confidence to CEPA upon request.

The detailed structure of the EIS is provided in Table 1.2.

Table 1.2 Structure of environmental impact statement, attachments and appendices

Volume 1: Executive summary (in English, Tok Pisin and Motu)		
Volume 2: EIS Main Report		
No.	Chapter	Description
1	Introduction	Provides background information on the proponent and an overview of the Project, including its relationship to the PNG LNG Project, and information on the structure of this EIS.
2	Project Description	Describes the components of the Project including how it will be constructed, operated and decommissioned.
3	Assessment of Project Alternatives	Discusses the assessment undertaken of alternatives to the Project and its components.
4	Legal, Administrative and Planning Framework	Provides an overview of relevant requirements of Papua New Guinea legislation, international agreements, and guidelines.
5	Overview of Impact Assessment Method	Discusses the methods used to identify and assess project impacts and determine management measures.
6	Stakeholder Engagement	Describes the consultation program undertaken and proposed for the Project, including once it is being constructed and operated.
7	Receiving Environment: Onshore	Describes the existing biological and physical environment for components of the Project located on land (LNG Plant and vicinity).
8	Receiving Environment: Marine	Describes the existing biological and physical environment for components of the Project located offshore.
9	Social Environment	Describes the existing social environment.
10	Cultural Heritage Environment	Describes the existing cultural heritage environment.
11	Environmental Impact Assessment: Onshore	Documents the environmental impact assessment undertaken for onshore components of the Project, including potential impacts, proposed management measures and residual impacts.
12	Environmental Impact Assessment: Marine	Documents the environmental impact assessment undertaken for marine components of the Project, including potential impacts, proposed management measures and residual impacts.
13	Social and Cultural Impact Assessment	Documents the social and cultural heritage impact assessment, potential impacts, management measures and residual impacts.
14	Cumulative Impact Assessment	Documents the assessment of potential cumulative impacts that may result from interaction of elements of the Project with other credible future projects.
15	Greenhouse Gases and Climate Change	Outlines the Project's estimated contribution to the existing LNG Plant global, national and state greenhouse gas emissions.
16	Waste Management	Outlines the waste management principles and practises to be undertaken by EMPNGA and NLOC throughout the Project.
17	Environmental Hazard and Risk Management	Outlines potential environmental hazards, incidental events and corresponding safeguards.
18	Environmental and Social Management, Monitoring and Reporting	Provides a summary of the proposed environmental and social management measures and proposed monitoring, auditing, and reporting.
19	Glossary	Glossary of terms and abbreviations/acronyms used in the EIS.
20	Bibliography	Lists bibliographic details for each reference used in the main report.
21	Study team	Lists the study team involved in the preparation of the EIS.

Volume 3: EIS Attachments	
No.	Name
1	Reconciliation with relevant Independent State of Papua New Guinea Guidelines and CEPA-approved Environmental Inception Report
2	ExxonMobil Operations Integrity Management System
3	Management measures register
Volume 4: EIS Appendices	
Appendix	Name
A	Cultural Heritage Impact Assessment
B	Community Health Baseline
C	Social Baseline
D	Traffic and Land Use
E	Nearshore Marine Baseline
F	Greenhouse Gas Assessment
G	Noise Impact Assessment
H	Groundwater Baseline
I	Flood Assessment
J	Air Quality Assessment
K	LNG Plant Weed Survey
L	Caution Bay Fisheries Resource Use Study