Ok Birim Tailings Storage Facility Project

Environmental and Social Impact Assessment

Chapter 1

Introduction

TETRA TECH COFFEY

OK TEDI MINING

1. INTRODUCTION

This environmental and social impact assessment (ESIA) has been prepared by Tetra Tech Coffey Pty Ltd (Tetra Tech Coffey) on behalf of Ok Tedi Mining Ltd (OTML) for the proposed Ok Birim Tailings Storage Facility (TSF) Project (the project).

By establishing a new TSF, OTML proposes to largely eliminate the currently approved practice of riverine tailings disposal at the Ok Tedi Mine, with mine tailings managed and disposed in accordance with industry guidelines on managing mine waste, such as the Global Industry Standard on Tailings Management (GISTM) (ICMM et al. 2020). This is proposed to sustain the profitable operation of the Ok Tedi Mine, including ongoing copper, gold and silver production over the medium- to long-term.

The project involves storing tailings on land in an engineered TSF to limit further additions of mine-derived sediment to the Ok Tedi and Fly River system. This represents a significant opportunity to enhance the mine's environmental and social performance while contributing positively to the mine's legacy as a responsible and sustainable mining operation. This TSF is expected to be operational in 2030.

The project requires a major amendment to Environment Permit EP-L3(636) under the *Ok Tedi Environment Management Act 2019* (OTEMA). This ESIA has been prepared to fulfil the requirement under OTEMA for an environmental impact statement to support the application for an amended environment permit. The project will result in a range of environmental and social impacts, both positive and negative, which are assessed in this ESIA.

1.1 PROJECT OVERVIEW

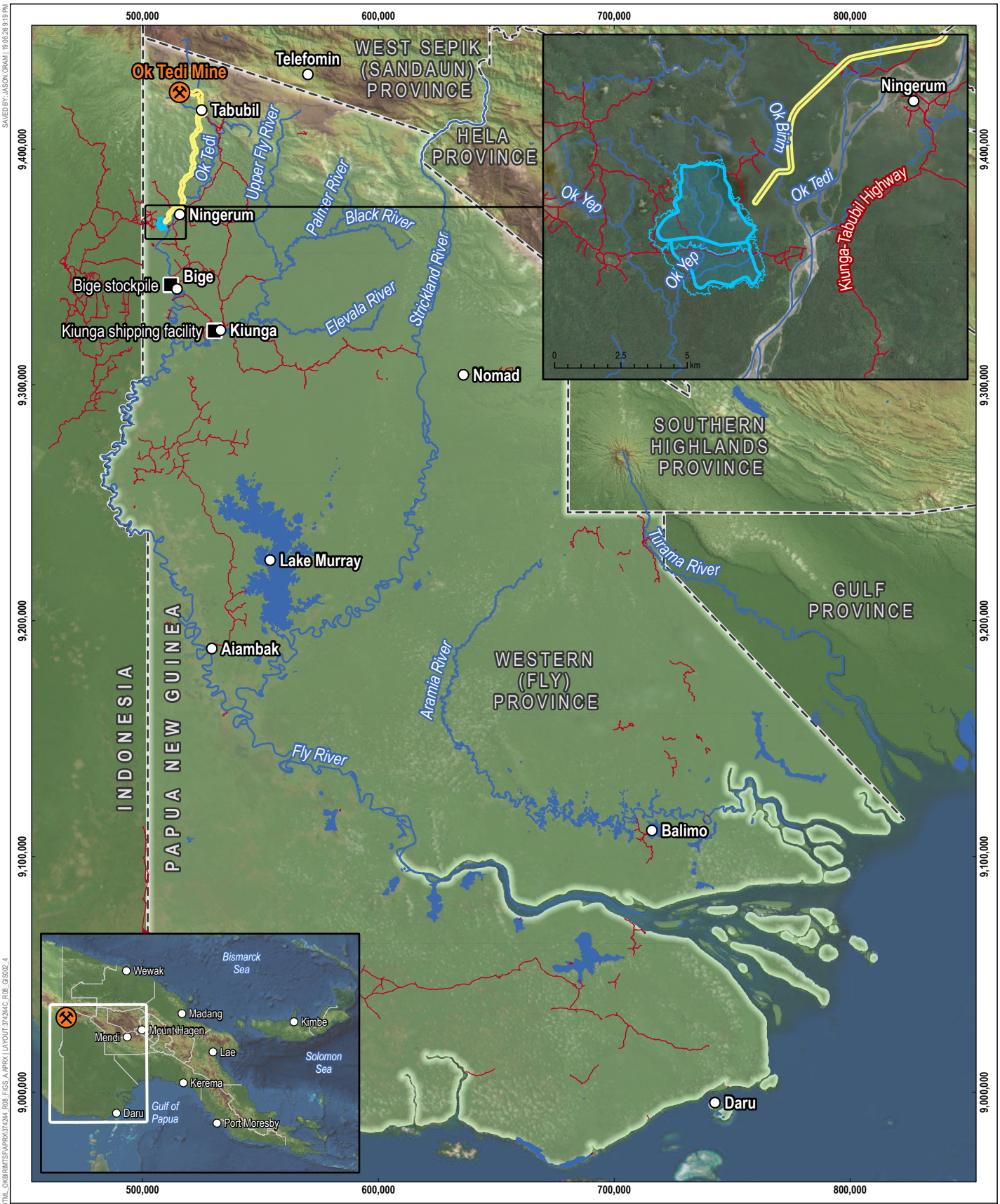
The project is located near the confluence of the Ok Birim and Ok Tedi, approximately 60 km south, or 90 km via the Kiunga-Tabubil Highway, from the existing Mt Fubilan open pit (referred to as Ok Tedi Mine) in Western Province; and approximately 800 km west of Port Moresby, the capital of Papua New Guinea (PNG) (Figure 1.1). The site lies approximately 5 km west of the Ok Tedi, a tributary of the larger Fly River, in the relatively undeveloped northwest corner of Western Province. 'Ok' means 'river' in the local language.

The Ok Tedi Mine is located in mountainous terrain with steep slopes covered in rainforest and where the average annual rainfall exceeds 10,000 mm per year (i.e., 10 m per year). The mine is drained by the tributaries of the Ok Tedi that flows into the Fly River before being joined by the Strickland River and then flowing through the delta area to the Gulf of Papua, almost 900 km from the mine. Some 103,000 people live in 158 villages in the mine area and downstream of the mine

For more than 40 years, the Ok Tedi Mine has practised riverine disposal of tailings and waste rock. Up until 2025, over 2 billion tonnes of mine-derived sediment had been added to the Ok Tedi/Fly River system. OTML proposes a significant new mitigation measure to limit the downriver impacts of the Ok Tedi Mine: to store tailings on land in an engineered TSF from 2030. This will reduce the environmental and social impact of the mine and sustain its profitable operation.

The project will include (Figure 1.2):

- A ring-dyke TSF to contain up to 368 Mt tailings, accommodating the projected tailings from current mine life and planned life-of-mine (LOM) extensions up to 2050
- An on-site cyclone house to separate coarse material for the TSF embankment construction from fine material to be stored within the TSF
- An approximately 87-km-long pipeline for tailings transport
- Access road and river crossings, including bridges.



LEGEND

- Ok Tedi Mine
- Key infrastructure
- Town
- Road/track
- Watercourse
- Waterbody
- Province boundary
- Proposed TSF footprint
- Proposed infrastructure corridor

OK TEDI MINING

0 25 50 km

SCALE **1:2,250,000**
PAGE SIZE: **A4**
PROJECTION: **PNG94 PNGMG94 Zone 54**

SOURCE
Proposed infrastructure from KCB and OTML.
Topographic features from OSM.
Provinces from NSO.
DEM from SRTM. Imagery from ESRI.

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OK BIRIM TAILINGS STORAGE FACILITY PROJECT

FIGURE 1.1

Project location

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DATE: **19.06.26** PROJECT: **754-MELEN374244** FILE: **374244C_R08_F01.01_GIS**

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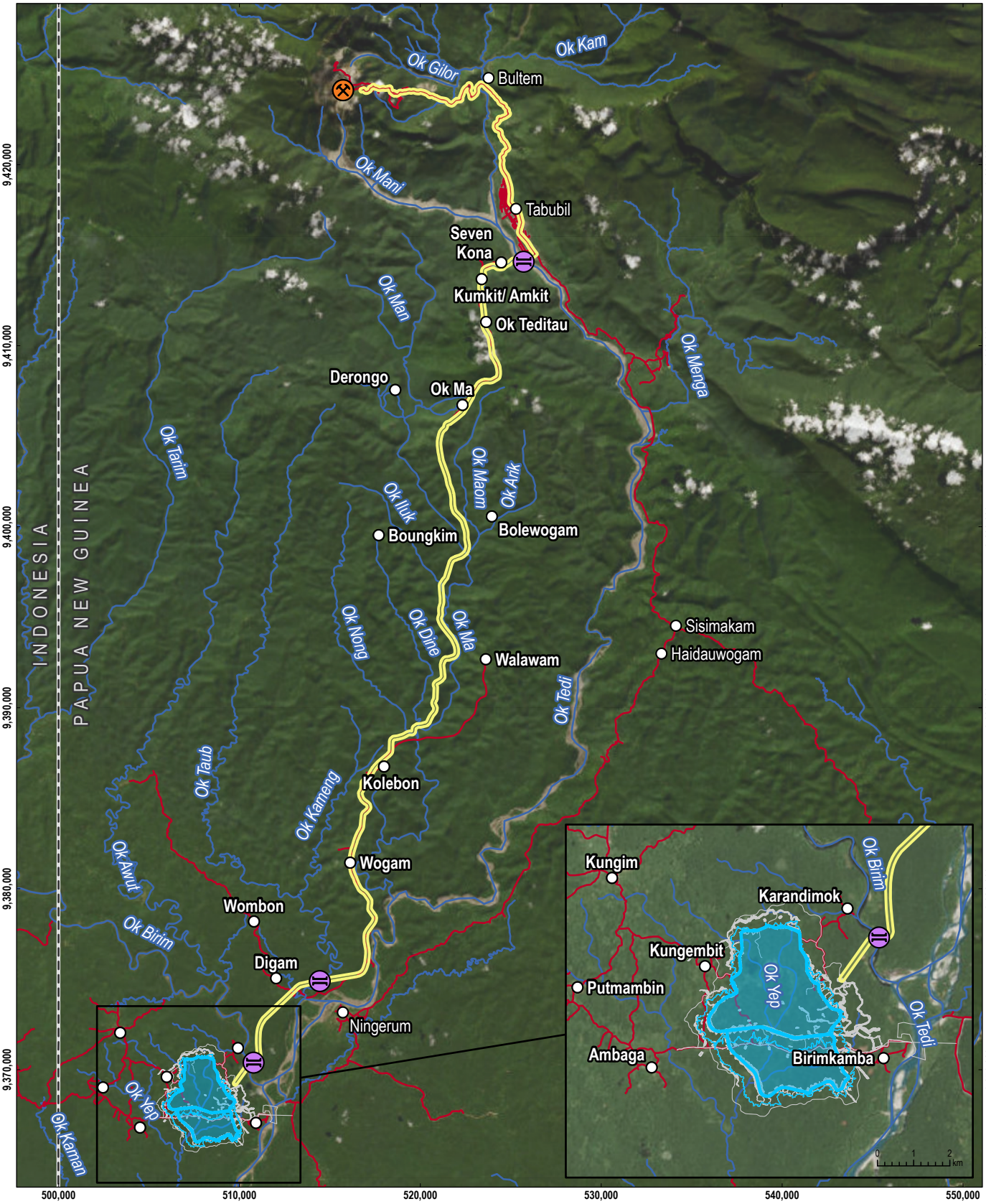

LEGEND

- Ok Tedi Mine
- Community
- Road/track
- Watercourse
- International border

Proposed layout

- Bridge (to be finalised)
- TSF detailed design
- TSF footprint
- Infrastructure corridor

SOURCE
Villages from Tetra Tech Coffey.
Proposed infrastructure from KCB and OTML.
Topographic features from OSM. Leases from MRA.
DEM from SRTM. Imagery from ESRI.

0 2.5 5 km

SCALE **1:300,000**
PAGE SIZE: **A4**
PROJECTION: **PNG94 PNGMG94 Zone 54**

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OK BIRIM TAILINGS STORAGE FACILITY PROJECT

FIGURE 1.2

Project components

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The proposed TSF is in the feasibility assessment phase with this study planned to be completed in mid-2026. Detailed design will follow this.

The viability of the project will be determined through ongoing feasibility studies that consider economic, engineering, environmental, and social factors. Material changes arising from the feasibility process will be communicated to the PNG Conservation and Environment Protection Authority (CEPA) and Mineral Resources Authority (MRA).

1.2 THE OK TEDI MINE OPERATION

The Ok Tedi Mine, primarily comprising copper, gold, and silver reserves, is currently mined as a large open pit, with ore processed on-site in a conventional flotation circuit. Copper concentrate is transported from the mine via a 156-km-long pipeline to port facilities at Kiunga, where it is dried in a filter plant and shipped via the Fly River to Port Moresby for export.

As of 2023, the mine has produced more than 5.2 Mt of copper, 16 Moz of gold, and 37 Moz of silver since the start of operations in 1984. The mine is projected to continue production as it transitions to ore sources from the East Wall of the Fubilan Pit (OTML 2023a). In 2023, the mine generated gross revenue of 4.1 billion Papua New Guinean Kina (PGK) (approximately $961.45 million USD), with projections indicating further growth driven by high-grade ore sources and a planned increase in production until around 2028, after which the total material moved and production decreases (OTML 2023a).

1.3 PROJECT CONTEXT

The projected increased production will result in continued production of waste rock and tailings, placing additional stress on the river system. Consequently, efforts to reduce the amount of sediment discharged into the river, including via tailings management, are particularly important to mitigate environmental impacts. The development of the proposed TSF will lead to a direct reduction in riverine tailings disposal at the mine's current and proposed material movement rates.

The original feasibility study for the Ok Tedi Mine included a plan to store tailings in a TSF at Ok Ma (OTML 1997). Construction of the TSF at Ok Ma was halted in 1984 due to a landslide affecting its foundation, with OTML instead adopting riverine mine waste disposal to manage tailings. This resulted in both main waste streams (tailings and waste rock) being released into the river. Tailings are discharged into the Ok Kumiup and waste rock placed in on-site eroding waste rock dumps from which the material is transported downstream via the Ok Tedi to Bige and beyond. OTML is currently developing an engineered waste rock dump to the north of the open pit.

Mine-derived sediment has vastly exceeded the sediment transport capacity of creeks near the mine where deposition has caused riverbed levels to rise (aggradation). In the Lower Ok Tedi and Middle Fly River, deposition of mine-derived sediment in the channel has also caused aggradation and increased the frequency and duration of flooding. This altered hydrologic regime has caused extensive vegetation dieback that now covers more than 2,000 km^2 of the Ok Tedi and Fly River floodplains.

Since 2009, regular dredging has been conducted at Bige, approximately 80 km downstream from the mine. Dredging recovers a portion of the sand component of the tailings and waste rock for land deposition. Captured sand-sized sediment is removed and stored on both sides of the river, then reworked into engineered stockpiles for revegetation, allowing dredging operations to continue. There are significant volumes of fine sediments discharged into the river that cannot be retrieved by dredging. The TSF will capture all fractions of tailings, including the fine fraction not captured by dredging, which will result in downriver benefits.

Reactive sulfide minerals in mine-derived sediments, especially tailings, are potentially acid forming. While this is controllable by treatment of the tailings and the addition of limestone to ore and waste rock, these

measures have not always been in place and this has led to localised oxidation of reactive sulfide minerals and release of acidity and dissolved metals and poor water quality under certain conditions, especially during El Ninõ events. In response to these observed effects and to reduce the risk of acid generation, OTML has progressively implemented a range of management measures over the past 27 years that have significantly improved the geochemistry of the mine waste and river system.

Water quality effects, aggradation by mine-derived sediment that has smothered river channel habitat plus consistently high suspended sediment concentrations have led to large reductions in the biomass and diversity of aquatic fauna in the Middle Fly River and its off-river water bodies.

Over the mine life, various studies have been completed to evaluate the feasibility of a TSF. In 2024, OTML engaged KCB Australia Pty Ltd to prepare a pre-feasibility study (PFS) against relevant guidelines, industry PFS-level benchmarks, and good engineering practices. Of several potential sites, Ok Birim was identified as the preferred location for the proposed TSF. The TSF is designed to provide sufficient capacity to accommodate for the projected tailings from the currently approved mine life and planned LOM extensions up to 2050. In 2025, OTML commenced full feasibility studies for the TSF located at Ok Birim, with the feasibility study due for completion in mid-2026.

1.4 PROJECT PROPONENT

The Ok Tedi Mine is wholly owned and operated by OTML, an unlisted PNG majority State Owned Enterprise, with 67% of shares directly owned by the Independent State of PNG and 33% owned by the Provincial Government and people of Western Province (OTML 2024a). OTML's registered office is located in Tabubil, Western Province, PNG, with an additional registered office in Port Moresby, PNG and a logistics facility and offices in Brisbane, Australia.

1.5 STATUTORY CONTEXT

Unlike other mining operations in PNG, the Ok Tedi Mine operates under a project-specific legal regime. The *Mining (Ok Tedi Agreement) Act 1976* sets the legal foundation for OTML's operations, while the OTEMA establishes a revised framework for environmental management specific to the Ok Tedi Mine. OTML currently operates under Environment Permit EP-L3(636) issued in accordance with OTEMA and this permit requires a major amendment for the project.

The project amendment process under OTEMA involves an environmental impact assessment and submission of an environmental impact statement (i.e., this ESIA). Broadly, the process for this involves:

- Submission of an environmental inception report (EIR) setting out the issues to be covered in the EIS
- Submission of an environmental impact statement prepared in accordance with the EIR
- Assessment of the environmental impact statement by the State of PNG, including public review
- Decision by the Minister whether to approve the project in principle
- If approved, CEPA granting an amended Environment Permit EP-L3(636) to OTML.

This ESIA fulfils the requirements of an environmental impact statement for assessment purposes.

1.6 ESIA APPROACH

The ESIA has been prepared using information from the 2024 Pre-Feasibility Study and 2026 Feasibility Study technical reports. Information from the PFS has been updated to reflect key project changes arising from engineering, environmental and social investigations through 2025 and 2026 feasibility studies. The ESIA outlines relevant assumptions, limitations, and identifies further work that will be undertaken to refine this information during the detailed design phase of the project.

1.7 ESIA SCOPE AND OBJECTIVES

This ESIA has been prepared to meet the requirements of the OTEMA, as well as align with the Department of Environment and Conservation (DEC) Guideline for Conduct of Environmental Impact Assessment and Preparation of Environmental Impact Statement (DEC 2004). Attachment A presents a cross-reference of this ESIA against the DEC guidelines. It has also been informed by international benchmarks such as the Equator Principles and International Finance Corporation Performance Standards.

The scope of this ESIA is restricted to the assessment of potential direct, indirect and cumulative impacts associated with the proposed project (Figure 1.2). The ESIA does not consider existing and ongoing environmental and social impacts of the Ok Tedi Mine, except where these are directly relevant to the project. Similarly, possible future expansions or changes to the mine beyond OTML's currently approved mine life to 2050 (as per the Strategic Business Plan) are outside the scope of this ESIA and will be considered separately under OTEMA at the appropriate time.

The ESIA specifically considers proposed activities associated with the construction, operation, and decommissioning, closure and rehabilitation of key project components identified in Section 1.1. In addition, the ESIA also considers relocation of the new Infrastructure Tax Credit Scheme Road, currently under construction, to accommodate the TSF development.

The objectives of this ESIA are to:

- Identify potential environmental and social impacts associated with the project and present the management measures OTML proposes to implement to avoid or mitigate potential adverse impacts.
- Provide a basis for affected communities and interested persons and organisations to understand the project and the outcomes of this ESIA, including potential impacts and their management, and provide feedback regarding this.
- Provide CEPA with the means to assess the project and amend OTML's environment permit.
- Provide a framework for OTML to assist with managing potential impacts of the project, including identifying management measures to be implemented throughout construction, operation and decommissioning of the project.

1.8 STRUCTURE OF THIS ESIA

This ESIA is presented in four volumes:

- Volume A – Executive Summary. A non-technical summary report, prepared in English and Tok Pisin, that provides a summary of the main findings of the impact assessment.
- Volume B – Main report (this report). A stand-alone document that presents the findings of technical studies, including potential environmental (biophysical), social and cultural heritage impacts of the project, the management measures to be implemented and residual impacts and benefits. The main report is prepared in English only.
- Volume C – Attachments. The attachments are reports that inform the ESIA and include a cross-reference of this ESIA against the DEC guidelines and the EIR, the construction environmental and social management plan, and a conceptual TSF closure and rehabilitation plan. Attachments are in English only.
- Volume D – Appendices. Technical reports generated to characterise the existing environmental, social and cultural heritage values, and where relevant, assist with identifying the potential impacts of the project. Appendices are in English only.

Table 1.1 provides the detailed structure of the ESIA.

Table 1.1 Structure of this environmental and social impact assessment

Volume A - Executive summary (English and Tok Pisin)		
Volume B - ESIA main report		
No.	**Chapter**	**Description**
1	Introduction	Provides background information on the proponent, an overview of the project and information on the structure of this ESIA.
2	Purpose and viability of the development	Details the purpose and viability of the development, the proponent's goals and requirements, feasibility investigations and compatibility with PNG Government objectives.
3	Policy, legal and administrative framework	Provides an overview of relevant requirements of PNG legislation, OTML policies, international standards and guidelines.
4	Assessment method framework	Provides an overview of the ESIA methods used in this report to assess potential impacts of the project.
5	Stakeholder engagement	Describes the consultation program undertaken to support the ESIA and project permitting, and the consultation proposed for the project during construction and operations.
6	Description of the proposed development	Describes the components of the project including how it will be constructed, operated and decommissioned.
7	Assessment of project alternatives	Discusses the assessment of alternatives undertaken for the project and its components and why OTML has selected the general arrangement described in Chapter 6.
8	Description of existing biophysical environment	Describes the existing biological and physical environment within and surrounding the project area.
9	Description of existing social environment	Describes the existing social and cultural environment.
10	Environmental impact assessment	Documents the environmental impact assessment undertaken, including potential impacts, proposed management measures and residual impacts.
11	Social impact assessment	Documents the social, ecosystem services, human rights, and cultural heritage impact assessments. Includes potential impacts, management measures and residual impacts.
12	Cumulative impact assessment	Documents the assessment of potential cumulative environmental and social impacts that may result from interaction of the project with other credible future projects.
13	Natural hazards and unplanned events	Outlines potential natural hazards, incidental events and corresponding safeguards.
14	Environmental and social management, monitoring and reporting	Provides a summary of the proposed environmental and social management measures and proposed monitoring, auditing and reporting.
15	Conclusion	Provides concluding remarks for the ESIA.
16	Study team	Outlines the study team involved in preparing this ESIA, including the lead consultant and specialist subconsultants.
17	Acknowledgements	Acknowledgements.
18	References	Lists bibliographic details for each reference used in the main report.
19	Glossary and abbreviations	Defines terms and abbreviations used in the main report.
Volume C – Attachments		
No.	**Name**	
1	DEC guidelines and EIR cross-check	
2	Construction environmental and social management and monitoring plan	
3	Conceptual TSF closure and rehabilitation plan	

Volume D – Appendices		
No.	**Name**	**Author**
A	Geochemical characterisation	Environmental Geochemistry International Pty Ltd
B	Hydrology and sediment transport and riverine particulate geochemistry	Dr G. Pickup
C	Surface water quality	Environmental Geochemistry International Pty Ltd
D	Groundwater assessment and modelling	KCB Australia Pty Ltd
E	Aquatic ecology	SLR Consulting Australia Pty Ltd
F	Terrestrial biodiversity characterisation	Ecomate, S. Richards
G	Terrestrial biodiversity impact assessment	Dr F. Crome
H	Air quality assessment and greenhouse gas emissions	Tetra Tech
I	Noise assessment	Sonus Pty Ltd
J	Climate change risk assessment	Tetra Tech
K	Soils characterisation	KCB Australia Pty Ltd
L	Archaeology and cultural heritage	Indigenous Heritage Management Consultancy Ltd
M	Socio-economic characterisation	Tetra Tech Coffey Pty Ltd