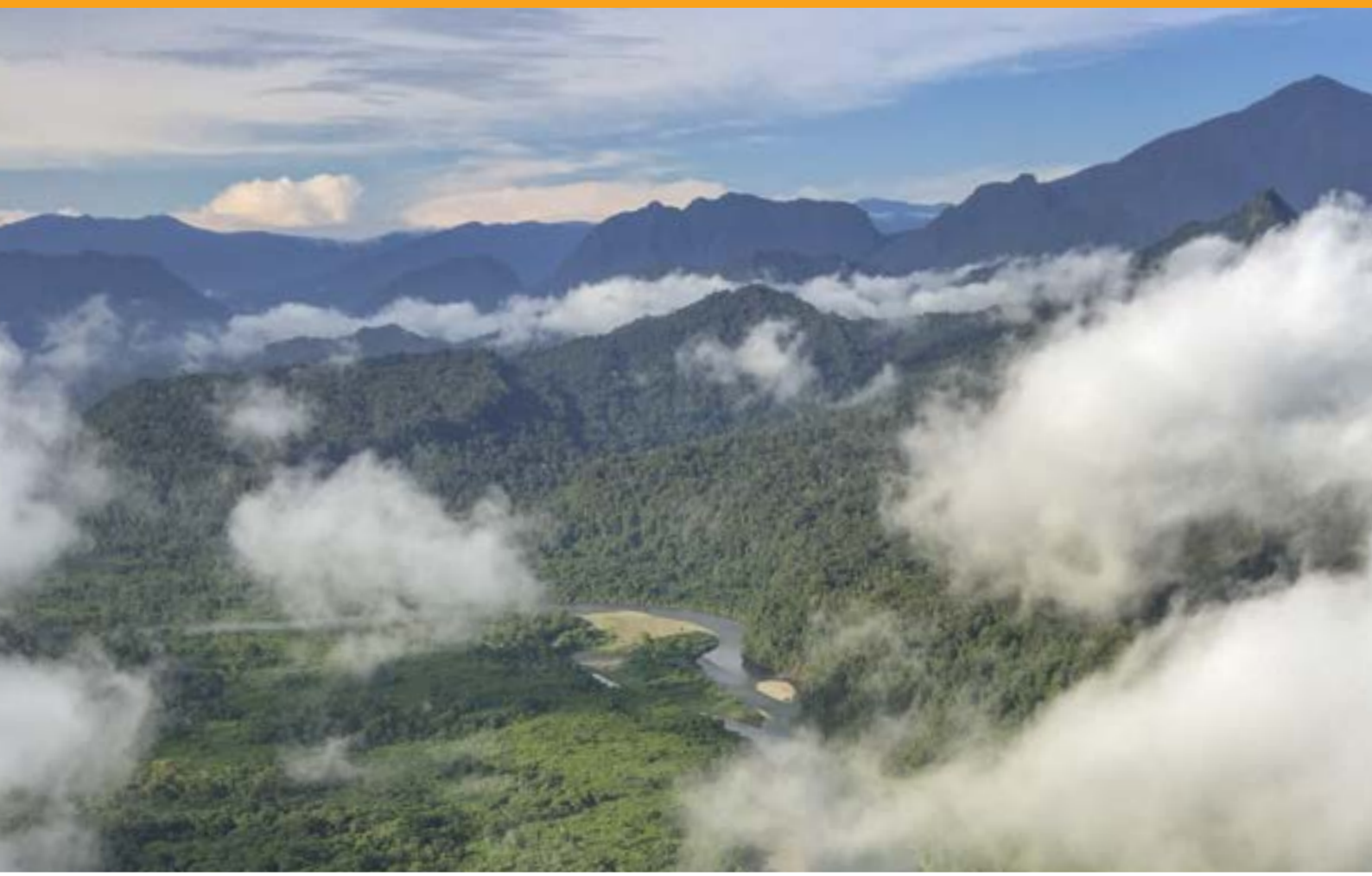
FRIEDA RIVER

Frieda River Limited
Sepik Development Project
Environmental Impact Statement

Attachment 2d – Sepik Infrastructure Project: Vanimo Ocean Port Environmental Management and Monitoring Plan

SDP-6-G-00-01-T-003-008



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Frieda River Limited

Sepik Infrastructure Project:
Vanimo Ocean Port

Environmental Management and Monitoring Plan

Construction

Environmental Management and Monitoring Plan
Sepik Infrastructure Project:
Vanimo Ocean Port - Construction

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1. Introduction

Frieda River Limited (FRL) has prepared this Environmental Management and Monitoring Plan (EMMP) to set out the environmental management program that will be implemented by the proponent in managing environmental impacts during the construction phase of the Sepik Infrastructure Project Vanimo Ocean Port.

1.1 Project overview

1.1.1 Background

Frieda River Limited is proposing to develop the Sepik Development Project, located in the Sandaun and East Sepik provinces, comprising of four interdependent components (Figure 1-2):

- Frieda River Copper-Gold Project (FRCGP).
- Frieda River Hydroelectric Project (FRHEP).
- Sepik Infrastructure Project (SIP).
- Sepik Power Grid Project (SPGP).

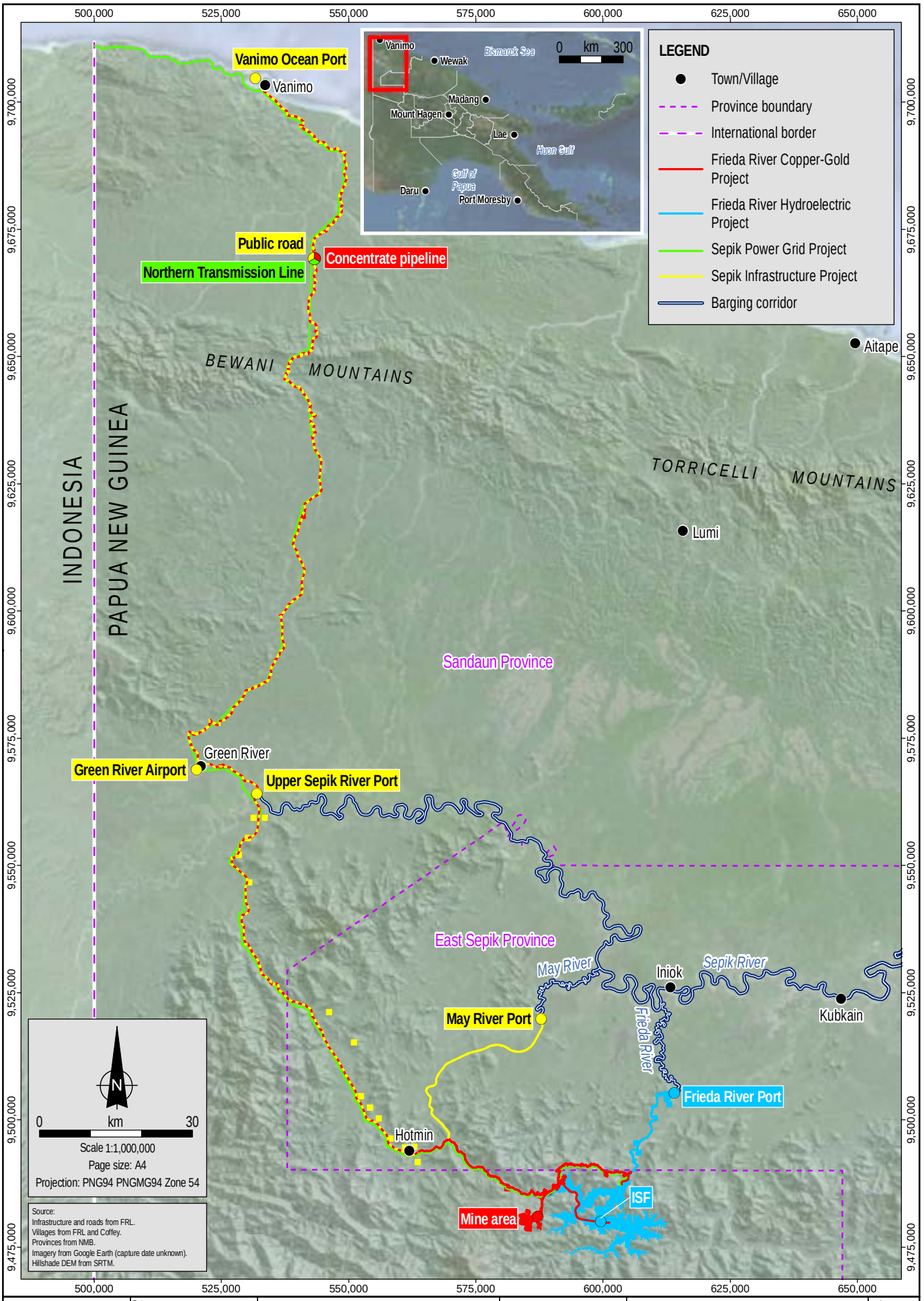
This EMMP covers construction activities associated with the SIP Vanimo Ocean Port (Figure 1-1). Construction activities associated with the FRCGP, FRHEP, SPGP, the public road from Vanimo to Hotmin and Green River Airport are covered in separate EMMPs.

The FRCGP, comprising of an open-pit copper-gold mine, will develop the HITEK porphyry copper-gold orebodies in the northern foothills of the New Guinea Highlands (Central Range) in Sandaun Province. The mine is located in a remote area, approximately 200 kilometres (km) from the northern coast. Key supporting infrastructure, including an export corridor, will run from the mine area through the East Sepik Province, terminating at an export facility in Vanimo.

The FRHEP comprises a 600 MW hydroelectric facility that will use water from the 12,400 ha FRHEP reservoir to generate low-cost power to the FRCGP and supply excess power to other consumers via the SPGP's Northern Transmission Line. The hydroelectric power generation facility will have an annual maximum energy generation of 2,800 gigawatt hours per year (up to 470 MW).

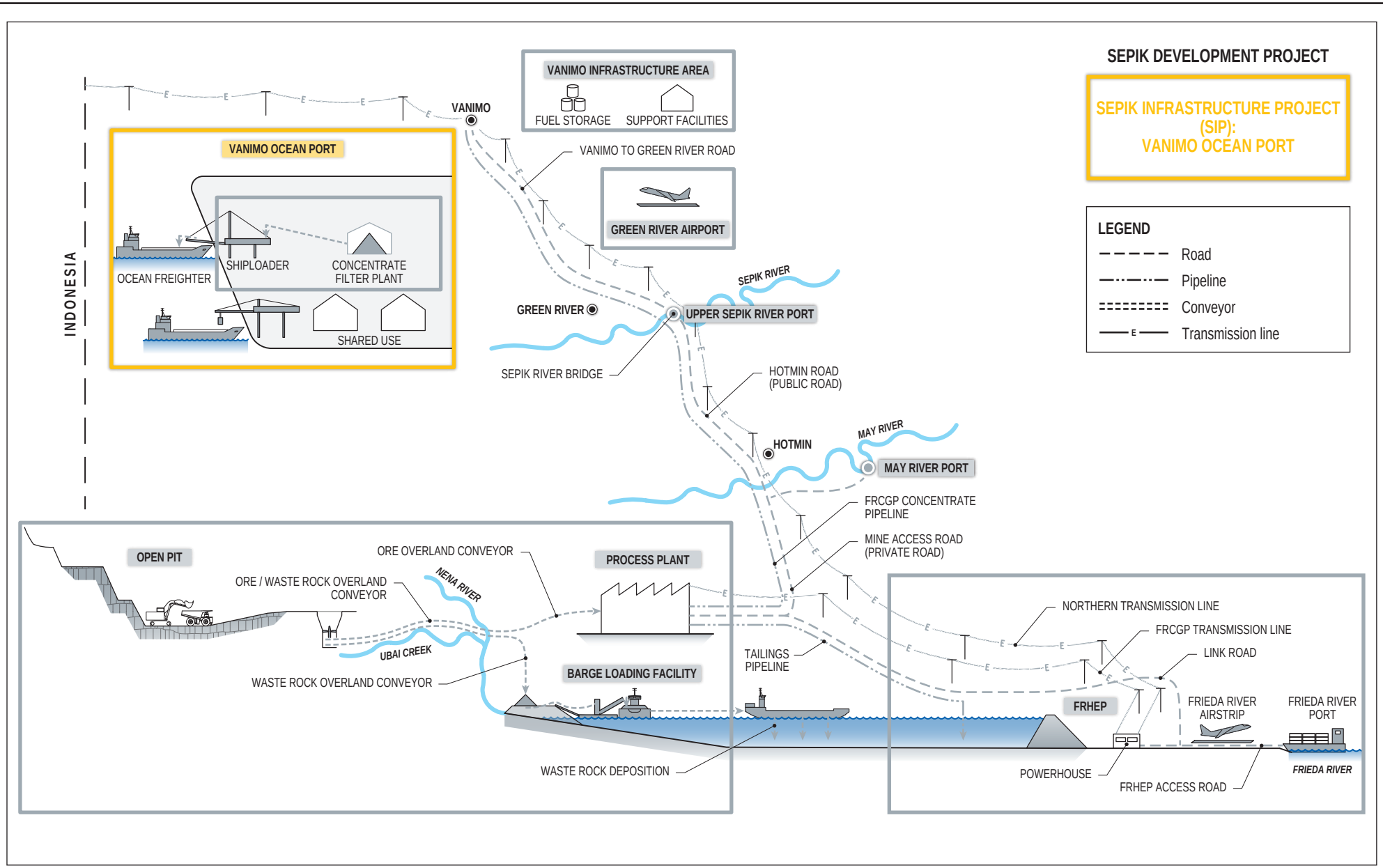
The SPGP consists of a 370-km long 275 kV transmission line (Northern Transmission Line) from the FRHEP to the Indonesian border via Vanimo. The Northern Transmission Line will be located within the infrastructure corridor and will provide power for the FRCGP, including the offsite FRCGP facilities at Green River and Vanimo. The transmission line will follow the existing Vanimo-Jayapura Highway from Vanimo to the Indonesian border.

The mine site will be accessed by an existing upgraded road from Vanimo to Green River and a new road through to Hotmin. The road from Vanimo to Hotmin will be a public road and forms part of the SIP. The SIP also includes an upgraded Green River Airport and Vanimo Ocean Port (the focus of this EMMP).



MXD Reference: 11575B_11_BM_GIS001_v0_13

coffey A TETRA TECH COMPANY	Date: 07.09.2018 Project: 754-ENAUABTF11575B File Name: 11575_22-5_F01-01_GIS	Frieda River Limited Sepik Development Project	FRIEDA RIVER	Sepik Development Project location	Figure No: 1-1



Source: Adapted from Frieda River Project Battery Limit Diagram, FRP-2-A-00-01-T-028-001.dwg, FRL

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Project: 754-ENAUABTF11575B
File Name: 11575_22-5_F01-02_GRA

Frieda River Limited

Sepik Development Project

FRIEDA RIVER

Components of the Sepik Development Project assessed in EIS

Figure No: 1-2

AI Reference: 11575_22_GRA001.ai_5

The upgraded Vanimo Ocean Port, located on the eastern shoreline of Dakriro Bay will support the FRCGP and other regional users. The upgraded port will be developed as a multi-user facility suitable for international vessels up to Handymax size and will cater for export of copper concentrate and import of freight and fuel. Other products will be able to be exported by other users.

1.1.2 Project activity

Upgrade of the Vanimo Ocean Port will require reclamation of approximately 3.4 ha of the bay adjacent to the existing port. The port development will provide an apron for intended users to construct dedicated and shared facilities. The marine structures will be expandable to include additional berths as the region develops and demand increases.

The upgraded Vanimo Ocean Port will have two international berths in the initial development:

- Outbound copper concentrate berth (dedicated for FRCGP).
- General international freight berth (suitable for fuel and freight vessels).

The upgraded port will also have the following multi-user facilities developed:

- Port office building.
- Container laydown.
- Fuel storage.

Figure 1-3 shows the layout of the proposed Vanimo Ocean Port.

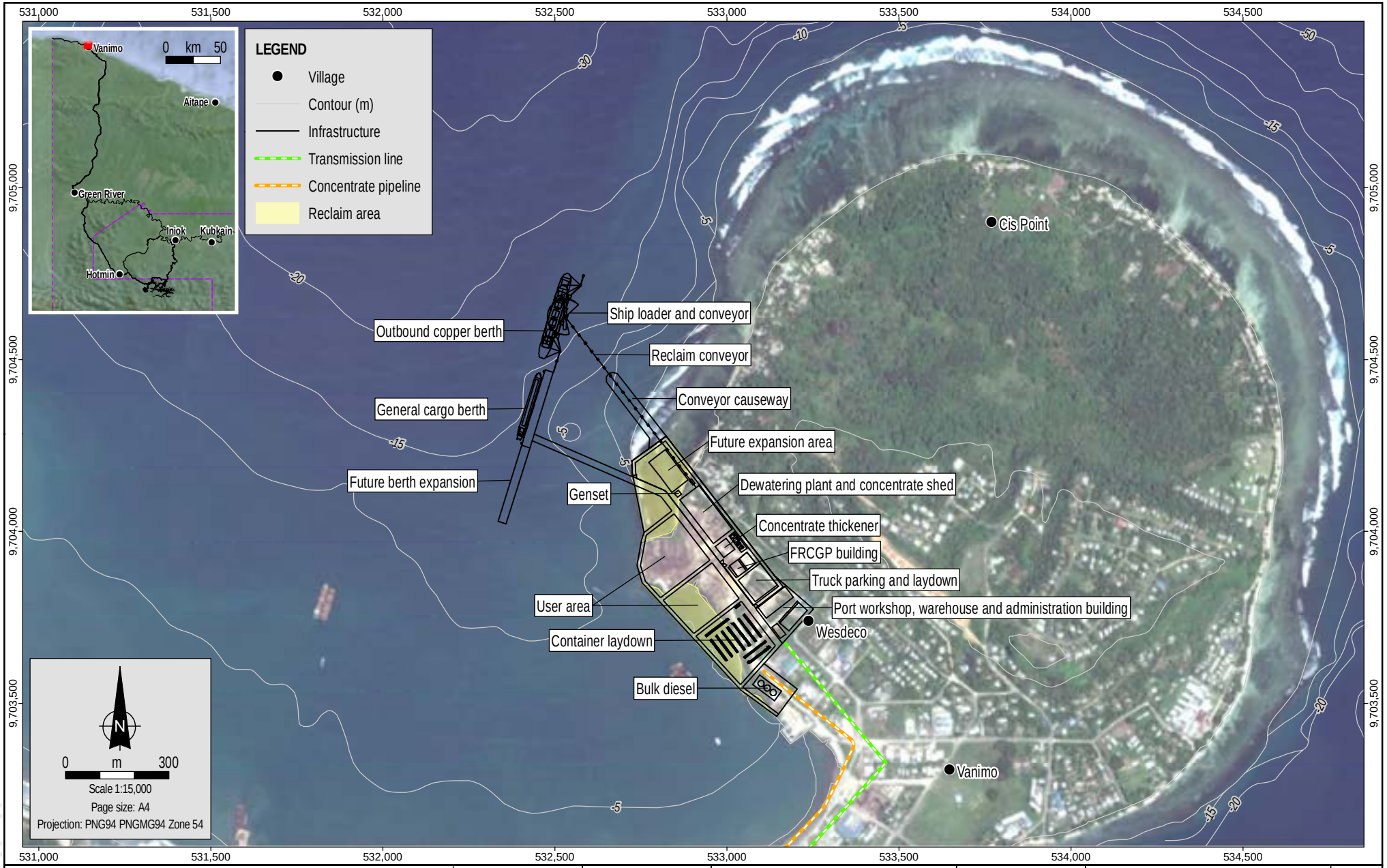
1.2 Rationale for environmental management and monitoring plan

1.2.1 Regulatory requirement

Section 53 of the *Environment Act 2000* (the Environment Act), requires that an Environmental Impact Statement (EIS) is be submitted to the Conservation and Environment Protection Authority (CEPA). FRL plans to lodge the EIS with the CEPA in Quarter 4 2018.

Certain conditions for the granting and setting of conditions of permits are provided in sections 65, 66 and 67 of the Environment Act. The preparation and implementation of an environmental management program is required under Section 66 (1), Condition 4 of the Act. FRL has prepared this EMMP to comply with these requirements in the Environment Act and set out the environmental management program that will be implemented by the proponent in managing environmental impacts during the construction phase of the project.

A subsequent EMMP will be prepared addressing the operations phase of the SIP.



Source:
Transmission line and concentrate pipeline from FRL.
Port layout and reclaim areas from GHD.
Villages from FRL and Coffey.
Contours from BMT WBM.
Imagery from Google Earth (DigitalGlobe captured 14 December 2014).

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Frieda River Limited

Sepik Development Project

FRIEDA RIVER

Vanimo Ocean Port

Figure No: 1-3

MXD Reference: 11575B_11_GIS018_v0_3

1.2.2 Purpose

The objectives of this EMMP are to outline the management and monitoring activities that will be implemented during the construction phase of the SIP. The EMMP aims to:

- Document the more general aspects of FRL's approach to environmental management, such as the schedule for environmental management, and organisational structure and responsibilities.
- Describe how the environmental and social impacts will be addressed for the project. FRL's management measures will be based on a hierarchical approach prioritising avoidance of the impact, and mitigation where avoidance is not possible.
- Outline the proposed environmental and socio-economic management for the project to ensure a framework is in place to achieve the SIP's environmental and socio-economic objectives. This framework will:
  - Validate and monitor impact predictions made in the EIS.
  - Identify unforeseen effects and the need for additional management, mitigation or remedial measures.
- Document auditable commitments made by FRL for reference in future internal and external audits.
- Provide guidance to on-site staff.

Standard operating procedures to be followed in the day-to-day management of the project will be developed by FRL staff and its contractors. These will be designed to achieve the commitments set out in this EMMP.

1.3 Structure of this EMMP

This EMMP has been prepared with two main components: introduction and context; and, management sub-plans. These are described below.

1.3.1 Introduction and Context

This is the main body of the EMMP. The format of the EMMP is:

- Section 1 (this section) – SIP overview and an outline of the objectives of the EMMP.
- Section 2 – Outline of the regulatory framework for environmental and socio-economic management for the SIP.
- Section 3 – Description of the existing environment.
- Section 4 – Description of planned construction activities.
- Section 5 – Description of the environmental management system framework for the SIP.
- Section 6 – Outline of the environmental monitoring program (further detail on monitoring is provided in each individual management sub-plan).
- Section 7 – Provides an introduction to the management sub-plans.
- Section 8 – References.

1.3.2 Management Sub-plans

The management sub-plans describe the environmental objectives and management measures that will be implemented to mitigate impacts as identified in the EIS that may occur during construction activities. The following sub-management plans are included in this EMMP (listed in order of arrangement):

1. Air Quality, Noise and Vibration Management.
2. Biodiversity Management.
3. Cultural Heritage Management.
4. Emergency Response and Fire Management.
5. Erosion, Sediment and Soils Management Sub-plan.
6. Hazardous Materials, Fuel Handling and Spill Response Management.
7. Traffic and Transport Management.
8. Waste Management.
9. Water Management.
10. Weed, Pest and Quarantine Management.

The layout of each of the management sub-plans includes:

- Definition of the element/issue that is being addressed.
- Brief background to the sub-plan.
- Objectives for environmental management for the particular aspect.
- Nominated responsible person(s) for undertaking specific tasks/ actions.
- Outline of the procedures to be undertaken to meet the objectives.
- Details of any reporting requirements of the tasks/ actions and the responsible parties.
- Monitoring to determine the success (or otherwise) of the management measures and compliance (or otherwise) with permit conditions.

2. Regulatory framework

2.1 Statutory context

The environmental and socio-economic aspects of the project are regulated primarily by the *Environment Act 2000*. CEPA is the government agency responsible for administering the Environment Act. The Environment (Amendment) Act 2014 documents amendments to the Environment Act, including some changes to the environmental impact assessment (EIA) process, however Part 1 of this act is not yet in operation. The following sections describe the EIA process for the SIP.

Under the Environment Act, the preparation of an EIA is a three-step process involving:

- Registration of intention to undertake preparatory work on Level 2 and Level 3 activities (Section 48 of the Act).
- Submission of an EIR (Section 52 of the Act).
- Submission of an EIS (Section 53 of the Act).

The Sepik Development Project is comprised of Level 2 and Level 3 activities under the Environment (Prescribed Activities) Regulation 2002, for which an EIS is required to be submitted to CEPA. FRL is in the process of obtaining all approvals and permits required for the commencement of construction for the project. This includes submission of an EIR on 20 December 2017 and an EIS and an environment permit application to CEPA in Quarter 4 2018.

This EMMP has been prepared to cater for the conditions outlined in Section 66 (1) of the Act and covers the full construction activities of the project (as outlined in Section 4).

2.2 National legislation

Other relevant PNG national legislation and regulations associated with the environmental aspects of the project include:

- *Conservation and Environment Protection Authority Act 2014.*
- *Conservation Areas Act 1978 (Chapter 362).*
- *Fauna (Protection and Control) Act 1966* (Chapter 154).
- *International Trade (Fauna and Flora) Act 1979* (Chapter 391).
- *National Cultural Property (Preservation) Act 1965 (Chapter 156).*
- *Marine Pollution Act 2013 (including Ships and Installations Regulations Act 2013, Liability and Cost Recovery Act 2013, Ballast Water Control Act 2013, Sea Dumping Act 2013, Marine Pollution (Preparedness and Response Act) 2013).*
- Environment (Council's Procedure) Regulation 2002.
- Environment (Permits) Regulation 2002.
- Environment (Prescribed Activities) Regulation 2002.
- Environment (Water Quality Criteria) Regulation 2002.
- Environment (Fees and Charges) Regulation 2002.
- Public Health (Drinking Water) Regulation 1984

Other PNG legislation and regulations will be relevant to varying degrees. The most pertinent of these more general acts, regulations and bills cover commercial, professional, land ownership and health issues, and include:

- *Explosives Act 1953.*
- *Fire Service Act 1962 and Fire Service Regulation 1966.*
- *Industrial Safety, Health and Welfare Act 1961 and Industrial Safety, Health and Welfare Regulation 1965.*
- *Inflammable Liquid Act 1953 and Inflammable Liquid Regulations 1968.*
- *Plant Disease Control Act 1953.*
- *Plant Disease and Control Regulation 1956.*
- *Quarantine Regulation 1956.*

During planning of the project other applicable legislation will be determined in consultation with the relevant authorities.

3. Existing environment

3.1 Biophysical setting

This section provides an overview of the biophysical setting of the Vanimo Ocean Port as context for the individual management sub-plans in the EMMP. This section is based on information provided in the EIS and supporting documents.

3.1.1 Climate

The climate of the region is dominated by two main seasons. The northwest monsoon (wet) season occurs annually between November and April (the austral summer), when north-westerly winds bring in low-pressure troughs that result in heavy rainfall. The southeast monsoon (dry) season occurs annually between May and October (the austral winter) and is characterised by south-easterly trade winds.

The northern coast of Vanimo receives approximately 2,500 mm of rain per year. Temperatures show an inverse pattern with elevation, i.e., generally increasing with decreasing elevation. As such, temperatures are generally higher in the lowland zone of northern coast compared to the hill zones of the northern coastal range by up to 3°C throughout the year.

The lowland zones along the northern coast experiences a more pronounced dry period from May to October compared to the hill zones south of the coast.

3.1.2 Regional tectonic setting and seismicity

PNG is bounded by several major tectonic plates and is one of the most seismically active regions in the world (SKM, 2008). The high level of seismic activity is a result of ongoing crustal deformation from collision of the Pacific and Australian tectonic plates initiated 34 to 55 million years ago. The Vanimo Ocean Port is located on the South Bismarck Plate.

Due to the high degree of seismic activity in the region, PNG is subject to earthquakes, volcanos and tsunamis. A total of 12 earthquakes with a magnitude of 7.0 on the Richter scale or greater occurring in PNG since 1998 (USGS National Earthquake Information Centre, 2018). Between 2010 and 2017, there were five earthquakes with magnitudes greater than 6.0 (Richter scale) within a 200-km radius of the project area. Five volcanoes are located east of Vanimo (three are active, and two are inactive). The closest active volcano to the Vanimo Ocean Port is located offshore in the Bismarck Sea approximately 320 km east of Vanimo. Since 1768, 182 tsunamis have been recorded for the PNG region, 120 of which have had wave heights recorded. The average recorded wave height is 3.1 metres (m), with the maximum being 15 m at Arop, approximately 30 km northwest of Aitape in 1998 (NOAA, 2011). In 1970, an earthquake with a magnitude of 7.0 generated a 3-m-high tsunami along the coastline north of Madang and, on 17 July 1998, a series of tsunamis struck the north coast of PNG near Aitape and two near Vanimo; wave heights of approximately 8 m were estimated (NSR, 1999).

3.1.3 Landform, geology, and soils

3.1.3.1 Landform

In the region surrounding Vanimo, the terrain is largely gentle in relief, with a mix of hilly terrain with weak or no structural control to composite alluvial flood plains stretching out towards the northern coastline near Vanimo. Mountains and hills, and composite alluvial plains characterise the terrain along the north-western coastline from Vanimo to the Indonesian border.

3.1.3.2 Geology

The geology along the Vanimo coastline is dominated by alluvial deposits, with smaller areas of limestone and acid to intermediate igneous formations.

3.1.3.3 Soil

Soils in the Vanimo region largely reflect the landform type. Dystropepts, Fluvaquents and Tropofluvents dominate the soil composition between the Bewani Mountains and Vanimo. Large sections of Rendolls are located just south of Vanimo. These soils have a shallow depth generally between 15 and 30 cm, which lie on calcareous parent rock, with low erodibility.

3.1.4 Terrestrial ecology

The landscape of Vanimo Town and surrounding areas has been highly altered from its natural vegetated state. Vegetation formations within the Vanimo area can be categorised as Tall Lowland Forest with Patches of Hill Forest, which has been heavily logged and cleared. A 2017 study conducted by Crome (2018) found more than 75% of a 20 km area between Nemayer River and Vanimo had a vegetation condition of either ‘cleared’ or ‘heavily disturbed or early successional’, with 27% of the 20 km area studied containing intact vegetation in the lowland zone and 12% containing intact vegetation in the hill zone.

In 2017, this 20 km area between Nemayer River and Vanimo had 59 mammal species, 203 land bird species, 69 water species and 43 frog species, either recorded or assessed as having a strong to medium likelihood of occurring. Biodiversity in this area is lower compared to other sections of the Sepik Development Project area, except in regard to water bird species, with the most number of water species occurring in the Vanimo area.

Twelve bird species of conservation significance occur or are likely to occur within or near Vanimo. This includes nine near threatened species and two endangered species.

3.1.5 Surface water

The mouth of the Nemayer River, located 16 km to the east of Vanimo, is the nearest large source of fluvial sediment to Dakriro Bay. While wet-season plumes at the time of the 2017 nearshore marine survey did not visually extend to Vanimo, longshore drift associated with predominantly easterly winds, north-easterly swells and westerly currents offshore are likely to transport some of this

sediment into Dakriro Bay. Dakriro Bay also receives freshwater, sediment, and pollutants from several small tributaries and open drains from Vanimo town centre.

3.1.6 Noise and Air quality

The air quality in the villages adjacent to the Vanimo Ocean Port (Wesdeco and Cis Point) has not been monitored, however, it is expected to be influenced by the proximity to existing sources of air emissions within Vanimo. These sources include, vehicle emissions, port and airport operations, commercial/industry operations, power generation and domestic sources (e.g., rubbish and cooking fires and generators). Air emissions from nearby agricultural activity may also contribute to the local air quality.

The background noise levels in the villages adjacent to the proposed Vanimo Ocean Port (Wesdeco and Cis Point) has not been monitored but is expected to be influenced by the proximity to Vanimo town, and existing industrial and commercial activities including logging barge loading and existing port operations.

3.1.7 Nearshore marine

The nearshore marine environment includes the nearshore marine and coastal areas surrounding the proposed Vanimo Ocean Port, including Lido Village, the inner harbour of Vanimo (known as Dakriro Bay), the area surrounding Cis Point, the shoreline near Wesdeco and the logging port, and the east shoreline close to the hospital, within Daumlinge Bay. These areas contain intertidal, tidal, shallow marine and reef zones.

Surface water quality of the marine environment is typical of marine waters, characterised by warm (approximately 30°C), alkaline (pH 8.2) waters and low concentrations of suspended sediments, nutrients and metals/metalloids.

Sediment is comprised mainly of unconsolidated sediments of sands and muds, with clays found in the middle of Dakriro Bay and on the coastal foreshore. During the characterisation study (BMT WBM, 2018) metal and metalloid concentrations were below Australian and New Zealand Interim Sediment Quality Guidelines described in ANZECC/ARMCANZ (2000) and updated in Simpson et al (2013), with the exception of nickel.

Marine habitats consist of sandy beaches, subtidal sands, fringing coral reefs, and seagrass meadows. Reefs throughout the nearshore marine environment appear to be heavily affected by anthropogenic activities, with stressors including thermal bleaching, sea-level rise, over-fishing, physical damage, rubbish and low water quality as a result of stormwater and deforestation.

Thirty-one IUCN red list aquatic fauna species may occur in the nearshore marine environment. These include 14 whales, 7 dolphins, 6 turtles, 2 clams, 1 dugong, and 1 shark. Two green sea turtles, *Chelonia mydas* (classified as Endangered in the IUCN Red List) were observed during the EIS characterisation survey; one was observed 12 m offshore in Daumlinge Bay, south of the hospital; and the other was seen directly in front of the logging port.

3.2 Socio-economic setting

This section provides an overview of the socio-economic setting of Vanimo, the capital of Sandaun Province, and the settlements of Wesdeco and Cis Point, as recorded during the 2017 village survey, and derived from third party sources.

3.2.1 Community layout and amenity

The Vanimo township is located on the north coast of Sandaun Province, approximately 30 km east of the Indonesian border. Wesdeco is a settlement located less than 0.5 km due east of the existing Port of Vanimo. Cis Point is a peri-urban settlement located approximately 1 km from Vanimo town centre.

Housing density is higher in Vanimo compared with other parts of the Sepik Development Project area, with 2,370 households recorded in Vanimo Town in 2011 (NSO, 2014). The numbers of households in Cis Point in 2000 was 11, while in Wesdeco, there were 82 households in 2000 (NSO, 2000).

Residents of Vanimo and surrounding areas have better access to public infrastructure and basic amenities compared to other parts of the Sepik Development Project area, such as a police station and general hospital.

3.2.2 Demography and population

The population within the Vanimo/Green River District grew by 2.9% between 2000 and 2011. The highest growth rate was observed in the Bewani/Wutung Onei Rural LLG, the closest LLG to Vanimo. In 2011, the township of Vanimo had a population of 13,970 (NSO, 2014), while Cis Point had a population of 144 in 2000, and Wesdeco had a population of 507 in 2000 (NSO, 2000).

3.2.3 Land and water resource use

For communities situated on the coastal plains of Vanimo, fishing is conducted for subsistence, selling at the local market and commercial purposes. Marine resources, such as invertebrates, are typically harvested daily. Communities in the Vanimo area also cultivate low intensity, mixed staple gardens, such as sago and coconut crops (Hanson et al., 2001).

3.2.4 Economy

The economy is more developed in and around Vanimo and Aitape (compared to other Sepik Development Project areas), where logging operations provide employment and royalty opportunities. In Vanimo, cash income is generated through work in forestry and oil palm plantations. Income is also gained through selling fresh food such as garden produce, fish, seafood and betel nut at market places in Vanimo town Centre, and the settlements of Wesdeco and Cis Point.

3.2.5 Health

Health services in Vanimo are more prevalent compared to other parts of the Sepik Development Project area and include Vanimo General Hospital and Dapu Urban Clinic. These services often lack adequate supplies and labour.

The main illness experienced by people living within Vanimo is malaria (Coffey, 2017). Other illnesses such as fever and skin infections are also prevalent in the nearby settlement of Wesdeco.

3.2.6 Education

Within Vanimo, all seven wards have elementary and primary schools, and there is one high school. There are no tertiary or vocational training centres in Vanimo. School attendance levels in Vanimo are not surprisingly highest in elementary and primary schools, compared to high school attendance. Literacy rates within the Vanimo Urban LLG population is estimated at 78% based on 2011 NSO census data. The highest level of education achieved within Vanimo Town was reported as Grade 10 (Coffey, 2017).

3.2.7 Governance, law and order

Vanimo has a police station, court house and corrections service near Cis Point.

Increasing law and order issues reportedly being experienced within Vanimo relate to unsettled youth, rising drug and alcohol abuse, gambling and stealing (Coffey, 2017).

3.2.8 Infrastructure

Infrastructure and public services in Vanimo include an airport, ocean port, a general hospital, educational institutions, banks, postal services, recreation areas and supermarkets.

Most road infrastructure in the Vanimo is in poor condition, and road connections to other main towns are limited. Mobile phone systems were installed in Vanimo in 2006 yet respondents to social surveys (Coffey, 2017) had mixed views on the level of mobile phone coverage.

3.2.9 Domestic water use and sanitation

Key sources of water for residents of Vanimo Urban LLG are rainwater tanks, local creeks and rivers (Vanimo Urban LLG, 2014). In the nearby settlements of Cis Point and Wesdeco, domestic water supply is obtained from dug wells or tanks, which vary in condition (Coffey, 2017).

3.2.10 Culture and customs

Within Vanimo, cultural identity and traditions in communities are challenged by pressures such as an increasing population and commercial activities. Customary practices still take place on a daily basis for families in the settlements of Wesdeco and Cis Point (Coffey, 2017; Si and Lahe-Deklin, 2015), such as catching seafood in traditional ways. However, as the economic hub of Sandaun

Province, Vanimo is exposed to culturally diverse practices and people, which impact on residents' ability to maintain cultural traditions.

4. Construction activities

Construction activities associated with the Vanimo Ocean Port will require reclamation of approximately 3.4 ha of the bay adjacent to the existing port.

The upgraded port facilities will include the development of the following features:

- Two international berths:
  - Outbound copper concentrate berth (dedicated to the FRCGP).
  - General international freight berth (suitable for fuel and freight vessels).
- Multi-user facilities, including:
  - Port office building including a maintenance workshop.
  - Container laydown including:
    - Container wash.
    - Customs/duty quarantine laydown area.
    - Hazardous stores.
    - Truck parking area.
  - Fuel storage.
    - Fuel pipeline to transfer point.

The general use facilities at the port will source power and water from the town supply.

A peak construction workforce of approximately 660 personnel will be required for the entire SIP project (which includes the construction of the Green River Airport and the public road from Vanimo to Hotmin, not covered by this EMMP).

4.1.1 General cargo birth

The general cargo wharf has been designed for international tanker and cargo vessels up to Handymax size. The wharf will be constructed using prefabricated concrete slabs to form a continuous concrete deck supported by piled foundations. Two mobile harbour cranes will operate at the port to manage the handling of empty and full containers to the container laydown area and vice-versa. Each mobile harbour crane will have a capacity of 180 t to allow for the lifting and handling of 40 foot containers with an outreach of 25 m.

The wharf will be fitted with a pipeline to allow for the offloading of diesel.

4.1.2 Port office building

The port office building will provide office workspace for the port operator personnel and quarantine functions.

4.1.3 Container laydown

The container laydown at the Vanimo Ocean Port has been designed to cater for storage of full and empty standard and refrigerated containers for other port users and temporary storage while vessels are being loaded or unloaded.

The container laydown area on the port apron will be limited to 1 ha total storage area including container wash, customs, duty, quarantine and hazardous stores.

The container laydown area will include provision of space for parking of mobile equipment servicing the Vanimo Ocean Port such as container handlers, forklifts and shuttle trucks.

4.1.4 Diesel Tank Farm

The existing diesel tank farm at the port will be upgraded to cater for the predicted increased demand for diesel in the region and the existing footprint for diesel will be increased to 400 m^2. Tanks will be located on a concrete pad foundation with a concrete containment bund. Refuelling facilities located adjacent to the tank farm will be included within the containment bund.

5. Environmental management framework

5.1 Environmental management system

FRL is committed to compliance with the requirements of AS/NZS ISO 14001:2016. These standards provide FRL with the elements of an effective EMS:

- A procedure for planning, implementing, reviewing and improving FRL's sustainability policy.
- Achieve compliance with regulatory requirements.
- Achieve performance levels/control requirements specified in the EIS.
- Achieve good mining industry practice to minimise any adverse effects on the environment.
- Reduce waste generation and emissions and usage of resources.
- Satisfy the public with the company's responses to concerns or enquiries.

5.2 Policy

The Vanimo Ocean Port will be managed by FRL under the governance of the PanAust Group Sustainability Policy (PanAust, 2016). The Sustainability Policy is supported by established Sustainability Management Standards (PanAust, 2013) that integrate the management of health, safety, environment and social aspects.

5.3 Implementation

5.3.1 Procedures

Procedures to be followed to ensure effective environmental management of the Vanimo Ocean Port are detailed in the management sub-plans.

5.3.2 Responsibility

All FRL and contractor personnel are responsible for the environmental performance of their activities and for complying with the 'general environmental duty', as outlined in Section 7(1) of the Environment Act that states:

> A person shall not carry out an activity that causes, or is likely to cause an environmental harm unless the person takes all reasonable and practicable measures to prevent or minimise the environmental harm.

Specific responsibilities for the key personnel who will oversee management of environmental aspects of the project are detailed in the subsections below. Site-based implementation of the EMMP will be the responsibility of the Safety, Health and Environment (SHE) Manager. Position descriptions and conditions of contracts of employment will define individual responsibilities and accountability. Furthermore, service agreements for contractors will include environmental and social responsibilities.

5.3.2.1 Safety, health and environment manager

The FRL SHE Manager will be responsible for ensuring that all construction activities are undertaken in full compliance with statutory regulations, and will also be responsible for this document and its implementation.

5.3.2.2 Environment superintendent

The Environment Superintendent is the FRL representative on site during construction and will:

- Report to the SHE Manager on compliance of the EMMP and issue any necessary instruction to the construction contractors.
- Ensure that all site personnel have relevant site environmental inductions, training and awareness so that they have a clear understanding of FRL environmental requirements and procedures including their responsibilities within their areas of work.
- Ensure that weekly and monthly monitoring and inspections are undertaken, environmental reporting is compiled and submitted to CEPA and any follow up actions are closed out. The Environment Superintendent will also ensure that non-conformances and any environmental incidents are recorded, and appropriate actions taken to address these.

5.3.2.3 Environment supervisor

The Environment Supervisor will provide support to the Environment Superintendent. The Environment Supervisor will be supported by Environment Officers, Environment Assistants or Environment Labourers. With this support the Environment Supervisor will:

- Report to the Environment Superintendent on any site environmental and compliance issues with regards to implementation of the EMMP.
- Ensure that weekly inspections are conducted, and internal audits are performed.
- Ensure that all necessary inductions, training and awareness is conducted appropriately and implemented on site.
- Ensure appropriate environmental control measures are put in place and maintained.
- Ensure that all site personnel are aware of appropriate environmental control measures and how to implement such measures.

5.3.2.4 Contractors

The major contractors and their sub-contractors, and any party regarded as contractors, will:

- Ensure that a contractors' environmental representative is part of its personnel.
- Ensure that all employees comply with acceptable safe environmental practices.
- Ensure that, prior to start of employment on site, all its employees go through an environmental awareness/ induction on the appropriate environmental requirements and procedures.
- Report to the FRL Environment Superintendent and senior management on environmental performance and non-conformances.

Contractors will be contractually bound to comply with the project environment permit conditions and this EMMP.

5.4 Checking and corrective action

To monitor compliance with the requirements of the EMS and this EMMP, FRL will conduct periodic and ad-hoc audits. This is to ensure that impacts are accurately measured, the effectiveness of mitigation measures are assessed, and meaningful reports are provided to stakeholders and government regulators with the overall purpose to confirm impact predictions and demonstrate compliance with regulatory permits and licences. Corrective action will be taken, where necessary, should monitoring and auditing indicate that management measures are not effective or are not being effectively implemented. The following sections describe these inspections and audits and how the results will be recorded and reported.

5.4.1 Inspections

The SHE Manager (or their delegate) will undertake regular supervision and inspections of activities to ensure that environmental management procedures are being implemented satisfactorily. The frequency of inspection will be consistent with the magnitude of risk associated with the particular hazard. Inspection results will be reported to the Operations Manager.

5.4.2 Audits

Audits will be undertaken by the Environment Superintendent (or their delegate) on a regular basis against relevant standards and criteria to ensure compliance with the environmental management procedures and environment permit conditions and continual improvement of the management systems and processes for the project.

The purpose of the audits is to ensure:

- Correct implementation of the EMS.
- Compliance with the EMMP procedures.
- Effective management of the predicted environmental impacts of the project is provided by the implementation of the EMMP procedures.
- Implementation of PanAust Sustainability Management Standards and procedures.
- Awareness of responsibilities by all personnel.

5.4.3 Recording

The EMS and EMMP will become part of an auditable record system maintained by FRL. The record system will also include the following:

- EIS and associated documents.
- Approval documents, including the environment permit.
- Commitments register.
- Compliance inspection and audit reports.
- Incidents register.

- Grievance register, including FRL's responses to grievances.
- Consultation register and records including meeting notes.
- Training and induction records.
- Environmental monitoring data and reports.

In accordance with the principles of AS/NZS ISO 14001:2016, the above EMS documentation will be:

- Easily located and logically filed in hard copy and electronic copy form, including date of issue.
- Managed using a document control system.
- Available for all FRL personnel, contractors and consultants.
- Periodically reviewed and revised as necessary (and clearly dated) by authorised personnel.
- Removed from all points of issue when obsolete.

The Environment Superintendent will be responsible for ensuring that feedback is assessed and implications for the EMS are acted upon for continuing sustainability.

Environmental monitoring will be undertaken by the project's SHE Department and monitoring results will be presented in regular internal reports. The results will also be summarised and reported to government regulators on a regular basis, as required by applicable legislation and/or the environment permit.

5.4.4 Reporting

5.4.4.1 Environmental incidents

Based on an assessment of severity and capacity to remedy, FRL will implement a practical approach to the reporting and management of incidents. This approach will ensure all incidents, including near misses, are reported. The level of reporting and response will be based on the escalation procedure set out in Table 5-1.

Table 5-1 Escalation procedure for reporting incidents

Type of incident	Capacity to remedy incident	Reporting and remedial action requirements
Minor incident: minor temporary harm to the environment or an incident that has the potential to cause harm to the environment.	Immediate: incident is easily contained with resources available on-site; corrective action can be taken immediately.	Department manager or site Environment Supervisor to prepare an Incident Report and record incident in Incident Register noting action required to remedy situation and timeframe in which it is to occur.
Significant incident: serious environmental harm has occurred or is occurring.	Limited: additional resources required to contain damage, planning required to define most effective response.	Department manager to immediately notify SHE Manager, Environment Superintendent and relevant regulatory authorities.

5.4.4.2 Internal reporting

Results from monitoring activities will be recorded and regular reports (e.g., quarterly or annually) prepared by in-house staff or suitably qualified and experienced third parties. These reports will be distributed internally as required to report on compliance of activities with conditions of approval and performance against monitoring criteria. Reports will contain data to assess the effectiveness of mitigation measures, and will assist in identifying areas where environmental management measures need to be improved. Monitoring and audit reports will generally contain:

- Introduction.
- Legislative framework and standards.
- Compliance criteria.
- Methods.
- Results.
- Recommendations and corrective action.
- Results from monitoring activities will also feed into formal environmental and sustainability reporting to various corporate entities.

5.4.4.3 External reporting

Monitoring reports will be submitted to CEPA and other regulatory authorities, depending on the environment permit conditions. Compliance with the EMMPs will be described in these reports as well as recommendations for corrective action. In PNG, this is typically in the form of an Annual Environment Report.

FRL will disclose the results of any additional assessments and monitoring activities to relevant stakeholders on a regular basis. This communication will take place through formal channels as determined in the FRL stakeholder engagement plan. The report will include:

- A summary of inspection, audits, complaints and incidents.
- Actions taken to correct or remedy non-conformances.
- An outline of planned activities for the forthcoming six months.
- Any revision or update to the EMS or the EMMP.

5.4.5 **Review**

This EMMP will be reviewed annually or as needed to ensure it remains valid. Sub-plan procedures will also be reviewed after any relevant incidents to ensure the management measures are effective and to identify where improvements can be made.

Reviews will be conducted to ensure that:

- Project activities are undertaken in compliance with statutory obligations.
- The environmental objectives of the project are achieved.
- The management measures are effectively implemented.
- A system of continuous improvement is established.
- Further information is incorporated into the plan as it is obtained and evaluated.

6. Environmental monitoring

6.1 Approach

An environmental monitoring program will be undertaken to monitor the impacts of the SIP: Vanimo Ocean Port and adapt management and mitigation measures as required.

The validity of the predicted effects of the project, set out in the EIS, depends on two conditions:

- In all relevant environmental respects, the SIP: Vanimo Ocean Port is constructed in the manner described in the EIS.
- The understanding of the relevant environmental dynamics (and hence the derived predictions of the impacts) presented in the EIS was reasonably correct.

With regard to the first condition, FRL will notify the Government should significant changes be made to the SIP: Vanimo Ocean Port subsequent to the preparation of this EMMP, particularly regarding methods for construction. The second condition will be met by the monitoring program, which is designed to allow periodic reassessment of the project's effects and subsequent review of mitigating measures and safeguards.

6.2 Program

The monitoring program will involve the following sequential steps:

- **Baseline monitoring.** Establishes a baseline for a range of aspects (e.g., physical, biological and social) requiring information which is additional to that gathered in the EIS. This will be finalised prior to construction.
- **Construction monitoring.** Ensures effective implementation of environmental management measures and ensures that construction is completed in accordance with the environment permit and other commitments outlined within the construction EMMPs. Environmental aspects to be monitored are detailed in each management sub-plan and include:
    - Air quality.
    - Noise.
    - Marine resource use.
    - Marine environment including water and bed sediment quality and ecology.
- **Post-construction monitoring.** Conducted to validate and monitor predicted impacts from construction activities.

The operations monitoring program will be covered in the operations EMMP that will be developed by FRL and submitted to CEPA at least six months prior to commencement of operations.

6.3 Quality control

The instrumentation, sampling methods, analytical procedures and data analyses used in the monitoring program will be consistent with accepted good practice. Results will be made available to government in an agreed reporting format. Laboratory sample analyses will be performed by

National Association of Testing Laboratories (NATA) or Papua New Guinea Laboratory Accreditation Scheme (PNGLAS) registered laboratories, or other laboratories approved by CEPA that have recognised quality control systems in place.

All monitoring will be carried out to a high level of scientific rigour to allow future comparison of the data. The design of the monitoring program will incorporate statistical considerations related to the end use of the data. Sampling methods will be objective, repeatable and standardised to minimise differences attributable to different or successive operators. A quality assurance/quality control (QA/QC) program will be designed and implemented prior to commencement of construction, this will continue to be implemented in association with monitoring that is undertaken during the operations and closure phases of the project. The major components will include:

- Definition of the roles to be filled by each of the parties involved in sampling, transportation, analysis and reporting, and the preparation of task objectives.
- Preparation of detailed protocols addressing all aspects of the sampling/analytical program, i.e., obtaining the samples, sample analysis, data interpretation and report preparation.
- Preparation of detailed manuals/procedures addressing the use and operation of all sampling/analytical instrumentation, including calibration.
- Details of an analytical QA/QC program that includes requirements such as the analysis of field blanks, laboratory blanks, duplicate samples, spiked samples and reference samples. Duplicates and blanks will be collected at the time of sampling.

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FRIEDA RIVER

Frieda River Limited

Sepik Infrastructure Project: Vanimo Ocean Port

Environmental Management and Monitoring Plan

Air Quality, Noise and Vibration Management Sub-plan

Construction

Environmental Management and Monitoring Program
Air Quality, Noise and Vibration Management Sub-Plan
Construction

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Tables

1. Air Quality, Noise and Vibration Management Sub-plan

1.1 Background

Sensitive receptors (i.e., places where people live and/or congregate) may be affected by air, noise and vibration emissions from clear and grade, earthworks, vehicles, vessels and construction of buildings, the wharf and ancillary facilities during construction of the Sepik Infrastructure Project Vanimo Ocean Port.

Activities that will result in airborne dust and the release of combustion emissions into the atmosphere include:

- Clearance of vegetation.
- Drilling rock.
- Excavation and formation of foundations for new buildings.
- Loading rock to trucks.
- General vehicle movements over potentially unsealed areas.
- Combustion of diesel fuel for equipment and vehicles.

The main noise and vibration generating sources will include:

- Machinery (e.g., drills, loaders, trucks, excavators, graders, compactors, pile drivers and other ancillary equipment).
- Vehicles and vessels (including reversing alarms).
- Hauling and dumping of rock.

This sub-plan provides procedures that should be followed during construction to limit the potential impacts to human health and the environment caused by dust, combustion emissions, noise and vibration.

1.2 Objectives

The objectives of the Air Quality, Noise and Vibration Management Sub-plan are to:

- Limit dust emissions and dust nuisance to sensitive receptors.
- Limit combustion emissions.
- Limit noise and vibration nuisance to sensitive receptors.

1.3 Responsibility

Implementation of the Air Quality, Noise and Vibration Management Sub-plan will be the responsibility of the Environment Superintendent and Safety, Health and Environment (SHE) Manager, who is also responsible for ensuring that activities associated with the project are undertaken in compliance with relevant statutory environmental regulations and the Frieda River Limited (FRL) sustainability policy and the project Construction Environmental Management and Monitoring Plan (EMMP).

1.4 Definitions

Combustion. The process of burning something – rapid oxidation accompanied by heat and usually light. Chemical combination attended by heat and light.

Dispersion. The spreading and dilution of substances emitted in a medium (e.g., air or water) through turbulence and mixing effects.

Emission. That which is emitted; a discharge; an emanation. The production and discharge of something, especially gas or radiation.

Greenhouse Gas. Gases found in the atmosphere that contribute to the greenhouse effect by absorbing infrared radiation (e.g., carbon dioxide).

Particulate. A substance consisting of separate particles.

Sensitive receptor. Villages where people live and/or congregate in the vicinity of project infrastructure.

1.5 Procedures

Performance will be measured through audits and inspections conducted by the FRL Environment Department. Performance indicators for air quality, noise and vibration management are outlined below.

1.5.1 Planning and preparation

Planning and preparation management measures to address air quality, noise and vibration emissions are detailed in Table 1-1.

Table 1-1 Planning and preparation management measures

No.	Management measures	Performance measure	Target	Responsibility
MM112	Sensitive receptors within 550 m of the Vanimo Ocean Port will be made aware of the times and duration of construction activities.	Stakeholder engagement records.	Engagement with all affected villages.	Community Relations Superintendent
MM115	Schedule construction works to avoid working in proximity of villages on religious and cultural holidays, where practicable.	Dates of religious and cultural holidays included in construction schedule. Stakeholder engagement records.	No unresolved complaints from community and residents regarding air or noise emissions during religious and cultural holidays.	Construction Project Manager
MM118	Consider noise impacts in the design of the final alignment of the Vanimo Ocean Port and associated facilities.	Final design demonstrates consideration of noise impacts.	Project design limits noise impacts to nearby residents.	SHE Manager
MM119	Train personnel and contractors, through site inductions, on potential noise and vibration impacts and appropriate management procedures (e.g., vehicle and truck drivers, earthwork machinery operators, dust suppression), including techniques to reduce noise emission.	Maintenance of induction register.	Completion of induction by all employees and contractors where relevant to their role.	SHE Manager
SEM057	Provide access to an effective and transparent Grievance Management Procedure for communities, employees and contractors.	Grievance management procedure.	Grievance management procedure established.	Community Relations Manager

1.5.2 Management of air quality

1.5.2.1 Dust emissions

Management measures to address dust emissions are detailed in Table 1-2.

Table 1-2 Air emissions management measures

No.	Management measures	Performance measures	Target	Responsibility
MM127	General measures will be applied to the construction works, including: • Limiting burning of vegetation or other waste materials on site. • Limiting dust generating activities in windy conditions where practicable. • Limiting the use of material stockpiles and minimising open stockpiles in areas prone to elevated erosion or close to sensitive receptors.	Records of on-site burning events. Records of regular visual inspections.	No unscheduled burning events. Erosion control measures implemented and control structures maintained.	SHE Manager
MM128	Dust and exhaust emissions from trucks and other vehicles will be controlled by: • Maintaining vehicles and machinery in accordance with the manufacturer's specifications. • Establishing vehicle speed limits. • Ensuring vehicles keep to marked trafficable areas. • Covering trucks carrying dusty or erodible materials when travelling on public roads. • Covering the ROM stockpile at the mine, and the product stockpile at the Vanimo Ocean Port.	Maintenance records. Routine inspections of transport routes.	Servicing and maintenance carried out in accordance with manufacturer's specifications. Drivers follow project related driving and road rules.	Environment Supervisor
MM131	Proceed with clean up and restoration as soon as is practicable after works are completed to minimise the duration of exposure of disturbed areas.	Records of regular visual inspections.	Compliance with documented Rehabilitation and Revegetation Program.	Environment Superintendent

1.5.3 Management of noise and vibration

The measures detailed in Table 1-3 will be undertaken to manage noise and vibration.

Table 1-3 Noise and vibration management measures

No.	Management measures	Performance measures	Target	Responsibility
MM113	When a grievance has been received, investigate and conduct noise and/or vibration monitoring, if required.	Maintenance of incident register.	No unresolved complaints from community and residents regarding noise nuisance.	Community Relations Manager
MM114	Communicate the findings of a grievance investigation to construction site personnel.	Maintenance of incident register.	All relevant findings communicated to construction personnel.	Community Relations Manager
MM116	Equipment and vehicles will be maintained regularly in accordance with manufacturers' specifications.	Maintenance records.	Servicing and maintenance carried out in accordance with manufacturer's specifications.	Environment Superintendent
MM117	Construct enclosures, bunds and noise barriers for operation of equipment and fixed infrastructure that may result in an exceedance of the adopted project noise guidelines, where practicable.	Records of installation and visual inspections.	Installation of enclosures prior to use of equipment and fixed infrastructure.	SHE Manager
MM120	Vehicle speed, the use of compression brakes and horn signals will be limited on roads close to villages.	Maintenance of incident register.	No unresolved complaints from community and residents regarding noise nuisance.	SHE Manager

Table 1-3 Noise and vibration management measures (cont'd)

No.	Management measures	Performance measures	Target	Responsibility
MM121	Limit construction activities associated with the Vanimo Ocean Port to daytime hours, or schedule significant noise generating activities during the daytime where possible. Should night-time works or noise generating activities be required in exceedance of the project noise limits, alternative arrangements would be made with relevant sensitive receptors. Schedule aircraft movements during the daytime period to minimise sleep disturbance and annoyance when practicable.	Maintenance of incident register.	No unresolved complaints from community and residents regarding noise nuisance.	SHE Manager
MP012	Locate fixed and mobile equipment sensitively with respect to sensitive receptors.	Maintenance of incident register.	No unresolved complaints from community and residents regarding noise nuisance.	SHE Manager

1.6 Performance, monitoring and reporting

This FRL Air Quality, Noise and Vibration Sub-plan, and any other associated procedures will be reviewed annually to ensure that they remain valid.

Applicable plans and procedures will be reviewed after any air quality, noise or vibration incident or complaint to review their effectiveness and determine whether improvements are required.

General monitoring and reporting relevant to air quality, noise and vibration will include:

- Maintenance of induction and training records.
- Documenting of incidents and community complaints in incident reports.
- Monthly monitoring of weather conditions (wind speed, wind direction, temperature, humidity and rainfall) at the existing meteorological monitoring stations.
- Recording the use of dust suppression techniques in log books to gauge the effectiveness of suppression techniques against monitoring data.
- Recording of energy production, energy consumption and greenhouse gas emissions (by calculation).
- Maintenance of calibration records for monitoring equipment.
- Recording of servicing and maintenance of construction equipment in accordance with manufacturer's specifications.
- Visual monitoring of dust emissions from construction.

Baseline monitoring of particulate emissions (PM_{10} and total suspended particles) will be conducted using low volume samplers or beta-attenuation monitors to determine background air quality.

Baseline noise monitoring will be conducted to establish background noise levels prior to construction commencing. In the event that measured background noise levels exceed the WHO Guidelines for community noise shown in Table 1-4, then these measured noise levels will be used to develop site-specific criteria for monitoring purposes.

Complaints concerning air quality, noise or vibration will be recorded as incidents in the incident register. This register will record the complaint and actions taken to address the complaint and show that all reasonable complaints are addressed. Portable samplers will be used to monitor impacts downwind from activities upon receipt of the complaint.

Compliance by all personnel with the procedures in this plan will be verified through both routine and unannounced inspections and monitoring by the SHE Manager (or their delegate).

Results from monitoring activities will be recorded and annual reports prepared by in-house staff or suitably qualified and experienced third parties. Environmental performance reports will be submitted to the Conservation and Environment Protection Authority and other regulatory authorities, as part of routine environmental reporting as per the conditions of the environmental permit and other project approvals.

Table 1-4 outlines the monitoring required to demonstrate performance in air quality, noise and vibration management.

Table 1-4 Air quality, noise and vibration monitoring

Monitoring measure	Performance indicator	Target	Frequency
Air quality			
In response to a complaint; conduct dust monitoring at or between the receptor and the source.	Total suspended particulate (TSP) and PM_{10} using portable monitors (i.e., low volume sampler or beta-attenuation monitor).	TSP 150 µg/m^3 PM_{10} 50 µg/m^3 24-hour averaging period.	In response to complaints
Noise			
Conduct noise monitoring at relevant sensitive receptors during construction of the Vanimo Ocean Port in response to complaints and/or to verify construction noise levels.	$L_{Aeq, 1hr.}$	55 dBA $L_{Aeq, 1hr.}$	In response to complaints or as required
Vibration			
Conduct vibration monitoring where vibration generating construction activities are carried out within 55 m of sensitive receptors.	Peak vibration level for continuous vibration (vertical) during the daytime.	0.6 mm/s	As required

FRIEDA RIVER

Frieda River Limited

Sepik Infrastructure Project: Vanimo Ocean

Environmental Management and Monitoring Plan

Biodiversity Management Sub-plan

Construction

Environmental Management and Monitoring Plan
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2. Biodiversity Management Sub-plan

2.1 Background

This sub-plan has been developed to manage the potential impacts on the nearshore marine biodiversity and natural habitats that may occur, during the construction phase of the Vanimo Ocean Port.

Construction activities and their associated effects that this sub-plan addresses include:

- Physical disturbance involving:
  - Placement of rock and soil in marine habitat for construction of reclamation area, increased suspended sediment, turbidity and sediment deposition.
  - Pile driving of pylons for the new shipping births, disturbing the seabed.
  - Movement of marine vessels to and from Vanimo Ocean Port, potentially disturbing the seabed, increasing suspended sediments and turbidity.
- Noise and vibration emissions from marine vessels and pile driving of pylons.
- Accidental spills, leaks and incorrect disposal of waste (including diesel).

Potential impacts that may arise as a result of Vanimo Ocean Port construction activities that this sub-plan addresses include:

- Nearshore marine habitat loss and deterioration from land reclamation for the port and installation of pylons, including the disturbance and loss of some reef and seagrass habitat and other areas of potential benthic habitat for infauna.
- Nearshore marine habitat loss and deterioration from the movement of marine vessels, potentially causing seabed disturbance, leading to an increase in suspended sediments and turbidity, in turn resulting in suspended sediment deposition on benthic habitats.
- Disturbance of nearshore marine fauna from noise emission from marine vessel movements and pile driving of pylons.

To manage potential impacts, where land reclamation is unavoidable, the extent of reclamation will be limited, and disturbance undertaken in a manner that reduces the impacts on environmental, social and resource use values, and provides opportunities for future regeneration of the nearshore marine environment.

Further measures that will limit impacts on the marine biodiversity are outlined in the:

- Air Quality, Noise and Vibration Management Sub-plan.
- Emergency Response and Fire Management Sub-plan.
- Erosion and Sediment Control Management Sub-plan.
- Hazardous Materials, Fuel Handling and Spill Response Management Sub-plan.
- Traffic and Transport Management Sub-plan.
- Waste Management Sub-plan.
- Water Management Sub-plan.
- Weed, Pest and Quarantine Management Sub-plan.

The quarantine measures are located within the Weed, Pest and Quarantine Management Sub-plan to ensure that personnel and freight movements are controlled in and out of the Vanimo Ocean Port area.

2.2 Objectives

The objectives of biodiversity management are to:

- Reduce the impacts of the Vanimo Ocean Port construction on nearshore marine habitats and specific ecological aspects arising from construction activities.
- Reduce habitat degradation.
- Reduce disturbance to nearshore marine fauna from Vanimo Ocean Port activities.
- Conduct monitoring of the marine environment to allow identification of any unexpected impacts of port's construction.

2.3 Responsibility

Implementation of the Biodiversity Management Sub-plan will be the responsibility of the Safety, Health and Environment (SHE) Manager. The SHE Manager is responsible for ensuring that activities associated with the project are undertaken in compliance with relevant statutory regulations, the FRL environment policy and SIP Vanimo Ocean Port Construction Environmental Management and Monitoring Plan (EMMP). All staff, including contractors, are responsible for compliance with this sub-plan.

2.4 Definitions

Land clearance permit. Internal permit for the clearing of new areas before construction commences. This process includes the submission of a plan to identify the extent of the area to be cleared of vegetation and approval from the Environment Superintendent.

2.5 Procedures

2.5.1 Planning and preparation

Planning and preparation management measures to address biodiversity management are detailed in Table 2-1.

Table 2-1 Planning and preparation

No.	Management measures	Performance measure	Target	Responsibility
Inductions, training and awareness				
MM089	Implement appropriate inductions and education to ensure staff comply with hunting and collecting regulations.	Maintenance of induction register.	Completion of induction by all employees and contractors where relevant to their role.	SHE Manager
MP014	Ensure that personnel are familiar with this sub-plan and the importance of controlling impacts on nearshore environments during construction.	Maintenance of induction register.	Completion of induction by all employees and contractors where relevant to their role.	SHE Manager
Further management planning				
MM135	Limit, where practicable, disturbance of fringing reefs and seagrass during construction of the Vanimo Ocean Port.	Incorporate this requirement into detailed engineering design.	Minimal disturbance to fringing reefs and seagrass.	SHE Manager
Design of infrastructure				
MP016	Ensure that sensitive features that are to be avoided are identified on maps and work plans.	All sensitive features are mapped prior to construction. Audit of project GIS contains layers for sensitive features.	Inclusion of all recorded sensitive features on maps. Project GIS regularly updated.	SHE Manager

2.5.2 Construction

Construction measures to address biodiversity management are detailed in Table 2-2.

Table 2-2 Construction measures

No.	Management measures	Performance measure	Target	Responsibility
MM136	Minimise startling nearby marine fauna (e.g., larger fauna such as dolphins and turtles) by employing 'soft start' procedures (i.e., gradual increase from lower noise emissions to higher noise emissions) for pile driving during construction of the Vanimo Ocean Port.	Inspection of 'soft start' procedures and their implementation.	Zero non-compliances recorded of starting procedures during construction.	Environment Superintendent
MM137	Ad hoc marine fauna observation will be reported to the Vanimo Ocean Port environment team and subsequent avoidance actions (e.g., wait or reduce thruster power), as practicable, until large fauna have moved from the area.	Inspection of reporting large fauna observation and avoidance action taken.	Zero incidents of fauna strikes.	Environment Superintendent
MP018	Restrict construction activities to the project footprint.	Clearance does not exceed areas approved in land clearance permits (clearance beyond permitted areas must be reported as an incident). Clearing supported by a land clearance permit.	Zero non-compliances recorded of clearing beyond project footprint.	Environment Superintendent

2.6 Performance, monitoring and reporting

This FRL Biodiversity Management Sub-plan, and any other associated procedures will be reviewed annually to ensure that they remain valid.

Applicable plans and procedures will be reviewed after any non-conformance with a measure in this sub-plan to ensure that they were effective and to identify where improvements can be made.

General monitoring relevant to biodiversity will include documenting of incidents in incident reports and maintenance of induction and training records. Incident reports will be completed, and appropriate measures will be taken to ensure that similar incidents will not occur in the future. Specific biodiversity monitoring is outlined in Table 2-3.

Ongoing monitoring of construction activities will be undertaken to assess the success of management measures and identify areas where changes to management measures will limit risks to biodiversity. Where monitoring identifies deficiencies in the control methods described above, the procedures in this sub-plan will be reviewed.

Compliance by personnel with the procedures in this sub-plan will be verified through both routine and unannounced inspections and monitoring by the SHE Manager (or their delegate).

Monitoring activities will be recorded, and annual reports prepared by in-house staff or suitably qualified and experienced third parties. Environmental performance reports will be submitted to the Conservation Environment Protection Authority and other regulatory authorities as part of routine environmental reporting as per the conditions of the environmental permit and other project approvals.

Table 2-3 Biodiversity monitoring

Monitoring measure	Performance indicator	Target	Frequency
Sediment deposition around the Vanimo Ocean Port.	Sediment deposition rate on marine habitats.	Within predictions of the EIS (i.e., little effect to ecosystem function; impacts restricted to Dakriro Bay; and return to baseline levels following cessation of construction activities).	Quarterly
Monitoring of abundance and diversity of marine biota including the presence/abundance of introduced species in nearshore marine environment near Vanimo Ocean Port, as well as at reference sites.	Diversity and abundance of macroinvertebrate and fish taxa.	No significant change from baseline.	Annual
Catches per unit effort of key fish species important from a resource use perspective.	Departure of biomass of key fish in comparison to baseline.	No significant change from baseline.	Annual

Table 2-3 Biodiversity monitoring (cont'd)

Monitoring measure	Performance indicator	Target	Frequency
Marine ecosystem condition near Vanimo Ocean Port and at reference sites away from Project influences.	Broad-scale marine vegetation or community changes.	No significant change from baseline.	Annual
Fauna injury and mortality.	Records kept of animal deaths, injuries or entrapments as a result of project activities.	No increase in rate of fauna injury and mortality during project construction.	Ongoing

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Frieda River Limited

Sepik Infrastructure Project: Vanimo Ocean Port

Environmental Management and Monitoring Plan

Cultural Heritage Management Sub-plan

Construction

Environmental Management and Monitoring Plan
Cultural Heritage Management Sub-plan
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3. Cultural Heritage Management Sub-plan

3.1 Background

Construction activities have the potential to uncover and damage artefacts and sites of archaeological, cultural or historical significance, primarily as a result of earthworks and ground disturbance associated with the upgrade to the existing port of Vanimo.

This sub-plan details procedures to be followed for the Sepik Infrastructure Project Vanimo Ocean Port upgrade to ensure that sites and artefacts of cultural, historical and archaeological significance are identified, protected and managed in accordance with statutory requirements. It also provides procedures that should be followed before work can commence in an undisturbed area.

No known cultural heritage sites were identified within the proposed Vanimo Ocean Port construction area during EIS baseline studies and the proposed port is located on previously disturbed land.

3.2 Objectives

The objectives for managing cultural, heritage and archaeological artefacts and sites are to:

- Identify sites and artefacts of historical, cultural and archaeological significance (registered and non-registered) that may be disturbed by project construction activities.
- Avoid or limit disturbance to registered and unregistered sites of historical, cultural and archaeological significance.
- Manage all found historical, cultural and archaeological artefacts and sites in accordance with relevant legislation.

3.3 Responsibility

The FRL Community Relations Manager is responsible for the implementation of this sub-plan, and for ensuring others within the company comply with procedures found within this document.

3.4 Definitions

Archaeological site. A site where traces of past human use occur, including settlement or burial sites, that have research potential for reconstructing the prehistory of a site or region using scientific or systematic methods.

Artefact. An item made or given shape by a person, such as a tool or a work of art; especially an object of archaeological interest.

Cultural site. A site that is considered significant by the local community. These sites are generally further classified as sacred, mythical or historical. In some cases, settlement or burial sites are considered to be cultural sites.

Disturbance. Any direct or indirect physical destruction, movement, relocation, burying or flooding of archaeological or cultural heritage sites.

Exhumation. To dig or recover an archaeological or cultural find that has been buried.

Salvage. To recover or save archaeological and cultural heritage artefacts or sites.

Land clearance permit. Internal permit for the clearing of new areas before construction commences. This process includes the submission of a plan to identify the extent of the area to be cleared and approval from the Environment Superintendent.

3.5 Procedures

FRL will implement avoidance, mitigation and management measures to address the potential impacts on archaeology, cultural and historical artefacts and sites.

3.5.1 Planning and preparation

The planning and preparation measures to address cultural heritage are detailed in Table 3-1.

Table 3-1 Planning and preparation

No.	Management measure	Performance measure	Target	Responsibility
MP022	Develop and implement a 'Chance Finds Protocol' with clear processes for reporting, investigation and management of cultural heritage chance finds discovered during project-related activities.	Records of chance finds.	100% compliance with the Chance Finds Protocol.	Community Relations Manager
MP023	Ensure that a Cultural Heritage Site Card is completed for all newly discovered sites and artefacts that have been confirmed to be of cultural, historical or archaeological significance.	Documented Cultural Heritage Site Card.	100% completion for newly discovered sites.	Community Relations Manager
MP188	Conduct pre-construction cultural heritage clearance surveys within the disturbance footprints of previously unsurveyed areas, to identify any new cultural heritage sites requiring management or impact mitigation.	Completion of survey, if required.	Documentation of survey results.	Community Relations Manager
MP189	Ensure that archaeology and cultural site information is considered by infrastructure design teams when making siting decisions to avoid disturbance to the extent practicable.	Cultural heritage included in site selection criteria.	Align cultural heritage values with the infrastructure design.	Construction Project Manager Community Relations Manager
MP193	Specify salvage activities (whether it be surface artefact collections or subsurface archaeological excavations) where required, including but not limited to: • Having a suitably qualified professional archaeologist develop an appropriate salvage method and lead the salvage investigations • Development of an appropriate salvage methodology to be implemented prior to ground disturbing project activities taking place. • Establishing specific procedures for the exhumation of any human remains that may be unearthed as chance finds or during cultural heritage salvage investigations.	Documented and approved salvage activities for all sites to be disturbed. Records of National Museum and Art Gallery of Papua New Guinea (NMAG) issued permits for archaeological and cultural investigations prior to disturbance activities.	Documented salvage activities.	Community Relations Manager

Table 3-1 Planning and preparation (cont'd)

No.	Management measure	Performance measure	Target	Responsibility
MP024	Where the recording of oral traditions is recommended, engage a suitably qualified professional to complete the fieldwork prior to ground disturbing project activities taking place.	Documented interview with relevant landowners. Records of NMAG issued permits for archaeological and cultural investigations prior to disturbance activities.	100% completion for recommended sites.	Community Relations Manager
SEM030	If cultural heritage sites are identified, include cultural heritage awareness briefings in workforce inductions, including briefing on individual obligations to protect cultural heritage in accordance with PNG law.	Maintenance of induction register.	Induction completed by all employees and contractors where relevant to their role.	Community Relations Manager
SEM033	Conduct engagement with local communities regarding: • The content of the Cultural Heritage Management Sub-plan. • The development of culturally appropriate methods for the practical management of cultural heritage sites that are to be protected from impacts. • The development of appropriate management measures in relation to their oral tradition sites. Culturally appropriate responses to the management of sites and places that will be unavoidably impacted by project activities may include avoidance, exhumation/relocation of the value and traditional ceremonies (that should precede the commencement of project-related activities in that location).	Documented engagement activities with relevant communities.	Engagement with all relevant communities.	Community Relations Manager

3.5.2 Cultural heritage management

General management measures to ensure the appropriate management of cultural heritage sites are detailed in Table 3-2.

Table 3-2 Cultural heritage management

No.	Management measure	Performance measure	Target	Responsibility
MP190	Implement standard operating procedures and permits for ground disturbance that require approval by Community Relations officers to ensure boundaries of cultural heritage sites identified are avoided or authorised disturbance is kept to a minimum, prior to disturbance.	Documented approval of land clearance permits by Community Relations officers. Inclusion of cultural heritage site boundaries in land clearance permits. Records of NMAG issued permits for archaeological and cultural investigations prior to disturbance activities.	Zero non-conformances of clearing.	Construction Project Manager SHE Manager
MP192	Prohibit the disturbance of cultural heritage sites by project workers or contractors while working, travelling in project vehicles, and residing in project accommodation.	Prohibition of disturbance of cultural heritage sites included in employee and contractor agreements.	No unpermitted disturbance of cultural heritage sites	Community Relations Manager SHE Manager
SEM031	Disseminate information derived from chance finds acquired during the project to the custodians of cultural heritage and/or the public and National Museum and Gallery, where relevant.	Documented communications with relevant stakeholders.	All information from chance finds communicated within 72 hours of close out of finding.	Community Affairs Manager

3.6 Performance, monitoring and reporting

The FRL SIP Vanimo Ocean Port Cultural Heritage Management Sub-plan, and any other associated procedures will be reviewed annually to ensure that they remain valid.

Applicable plans and procedures will be reviewed after any non-conformance with a measure in this sub-plan to ensure that they were effective and to identify where improvements can be made.

General monitoring relevant to cultural heritage will include documenting of incidents in incident reports and maintenance of induction and training records. Incident reports will be completed and appropriate measures will be taken to ensure that similar incidents or accidents will not occur in the future. Specific monitoring of disturbance to cultural heritage sites is outlined in Table 3-3.

Compliance by personnel with the procedures in this sub-plan will be verified through both routine and unannounced inspections and monitoring by FRL Community Affairs Department personnel.

Monitoring activities will be recorded and annual reports prepared by in-house staff or suitably qualified and experienced third parties. Environmental performance reports will be submitted to the Conservation and Environment Protection Authority and other regulatory authorities, as part of routine environmental reporting as per the conditions of the environmental permit and other project approvals.

Table 3-3 Cultural heritage monitoring

Monitoring measure	Performance indicator	Target	Frequency
Inspections of all newly discovered historical, cultural and archaeological artefacts and sites in accordance with the Chance Finds Protocol.	Artefact or site record in cultural heritage database.	All new artefacts and sites documented in cultural heritage database and managed in accordance with the Chance Finds Protocol.	Once after completion of Chance Finds Protocol process to verify process and then inspect as per known sites inspection frequency.

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Sepik Infrastructure Project: Vanimo Ocean Port

Environmental Management and Monitoring Plan

Emergency Response and Fire Management Sub-plan

Construction

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4 Emergency Response and Fire Management Sub-plan

4.1 Background

During construction activities for the Sepik Infrastructure Project Vanimo Ocean Port upgrade there is the potential for a range of emergency situations to occur either as a result of construction activities, such as incidental events causing explosions or uncontrolled fire or due to natural hazards such as severe flooding, earthquakes. and tsunamis.

4.1.1 Emergency response management

Examples of the types of emergencies that could occur during the project are covered within this sub-plan. It is not the intention of this document to provide the detail of these emergency situations, procedures and response plans. A detailed project emergency response management procedure will be developed prior to commencing construction to address these areas. As a part of this, a risk assessment will be undertaken for each of the potential emergency situations and the scenarios under which they could eventuate will be described. Specific management measures will then be developed for each of these situations.

Examples of accidental events and natural hazards that could occur on-site during construction include:

- Aircraft or vehicle accident.
- Vessel collision.
- Hazardous material spill or leak.
- Uncontrolled explosion.
- Structure failure.
- Natural disasters, such as earthquake, severe flooding or tsunamis (inundation of Vanimo).
- Fire.
- Epidemic, pandemic or communicable disease outbreak.
- Local unrest, demonstrations and riots.

Prevention and management measures have only been included in this sub-plan if they are not covered elsewhere. For example, prevention of civil unrest, epidemic, pandemic or communicable disease outbreak is covered in this sub-plan but prevention of vehicle, vessel and aircraft collisions is covered in the Traffic and Transport Sub-plan. Likewise, prevention of uncontrolled explosion or hazardous material spills are covered in the Hazardous Materials and Fuel Handling, and Spill Response Management Sub-plan.

4.1.2 Fire management

The project area typically has wet conditions. Climate events such as El Niño – Southern Oscillation have occasionally led to drought conditions in PNG, which leaves the landscape unusually dry. During these variations in weather, the dry conditions and increased fuel load associated with vegetation drying out provides an increased risk of fire.

The environmental impacts associated with uncontrolled fire may include fire spreading into surrounding vegetation or buildings, and release of large quantities of air emissions and contaminated runoff from firewater, with subsequent impacts on both marine and freshwater quality, biota and potentially human health. The magnitude of this will be heavily dependent the extent of the fire driven by the climatic conditions at the time.

4.2 Objectives

The objectives of the Emergency Response and Fire Management Sub-plan are to:

- Provide the framework for the preparation, management and recovery from emergency situations.
- Provide the framework for the development and implementation of the detailed emergency response and fire management procedures.
- Limit the occurrence of civil unrest among the workforce and as a result of in-migration.
- Limit the spread of disease in the event of an outbreak among the workforce and/or communities.
- Limit uncontrolled fire and explosions.

4.3 Responsibility

Implementation of the Emergency Response and Fire Management Sub-plan will be the responsibility of the Safety, Health and Environment (SHE) Manager. The SHE Manager is responsible for ensuring that activities associated with the project are undertaken in compliance with FRL's detailed emergency response management procedure, relevant statutory regulations and other safety policies, and the FRL environment policy and project Construction Environmental Management and Monitoring Plan (EMMP). All staff, including contractors, are responsible for compliance with this sub-plan.

4.4 Definitions

Emergency. A present or imminent event that requires prompt coordination of actions or special regulation of persons or property to protect the health, safety, or welfare of people, or to limit damage to property and the environment.

Hazardous material. A hazardous material is any substance, mixture or article that satisfies the criteria of one or more *Globally Harmonised System of Classification and Labelling of Chemicals* (GHS) hazard classes (United Nations, 2011).

In relation to chemicals, a hazard is a set of inherent properties of the substance, mixture, article or process that may cause adverse effects to organisms or the environment.

Hot works. Any activity likely to produce a source of ignition. It includes but is not limited to:

- All forms of welding: Any process designed to fuse, weld, build up or line materials, which generates heat in the process.

- Cutting: Any activity designed to remove or separate materials using an energy source which generates a flame or a spark.
- Grinding: Any activity utilising mechanical, electrical or pneumatic energy to rotate a grinding wheel or disc which generates heat in the process.
- Soldering: Using an open flame.
- Belt cutting: Using a friction saw.

Natural hazard. The threat of a naturally occurring event that will have negative consequences on people and/or the environment.

Response plan. A concise, logical document that details the steps that should be followed by all personnel in the event of an emergency situation occurring.

4.5 Procedures

4.5.1 Planning and preparation

Planning and preparation management measures to address emergency response and fire management are detailed in Table 4-1.

Table 4-1 Emergency response and fire planning and preparation measures

No.	Management measures	Performance measure	Target	Responsibility
MM146	Engineering and design controls at Vanimo Ocean Port facilities include: • Locate the export facilities area above storm surge levels, with consideration for potential tsunamis. • Emergency containment of the concentrate facilities at Vanimo Ocean Port in accordance with the *Marine Pollution (Preparedness and Response) Act 2013*. • Emergency containment of the concentrate facilities at Vanimo Ocean Port in accordance with the *Marine Pollution (Preparedness and Response) Act 2013*.	Maintenance of incident register. Documented emergency response debriefs.	No unresolved incidents. Emergency response procedures followed.	Safety and ERT Superintendent
MP035	Train FRL workers and contractors to provide initial response to an emergency or fire incident.	Proportion of personnel trained in emergency and fire response.	Completion of training by all employees and contractors where relevant to their role.	Safety and Emergency Response Team (ERT) Superintendent
MP036	Conduct regular emergency preparedness and response drills.	Records of emergency preparedness and response drills.	Emergency preparedness and response drills conducted in accordance with emergency response plan.	ERT Superintendent

Table 4-1 Emergency response and fire planning and preparation measures (cont'd)

No.	Management measures	Performance measure	Target	Responsibility
MP040	Prepare a general emergency response procedure that clearly identifies: • Lines of responsibility within management should the emergency occur. • Response and evacuation procedures. • Alert and communication system and procedures (authorities, population, shipping and media). • Close-out actions following an emergency situation, including treatment/disposal of material, rehabilitation, incident reporting and review and preventative actions to be instituted.	Documented and approved procedures.	Emergency response and fire management procedure finalised prior to the beginning of construction.	Safety and ERT Superintendent
MP186	Prepare an emergency response and evacuation plan that details: • Potential emergency situations and possible scenarios under which they may eventuate. • Risk assessment for each situation including scenario-specific management measures. • Triggers for the escalation of emergency response procedures. • Provision of essential services to affected communities regarding the supply of food, water, accommodation and essential services such as medical support and water for ablutions specifying the means, frequency and duration of the supply.	Documented and approved plan.	Emergency response and evacuation plan prepared prior to the beginning of construction.	ERT Superintendent

4.5.2 Emergency response

Management measures to address emergency response are detailed in Table 4-2.

Table 4-2 Emergency response management measures

No.	Management measures	Performance measure	Target	Responsibility
MP042	In the event of a potential emergency situation, personnel should: • Identify the emergency. • Follow all alert and communications procedures as detailed in the emergency response management procedure for that particular emergency. • Respond as detailed in the emergency response and fire management procedure for that emergency. • Identify the potential impacts of the emergency (e.g., loss or injury to human life, material or environmental harm and economic impacts). • During the subsequent debrief, assess the response of personnel to the emergency and provide further training on the relevant emergency procedure and response plan if required.	Maintenance of incident register. Documented emergency response debriefs.	No unresolved incidents. Emergency response procedures followed.	Safety and ERT Superintendent

4.5.3 Epidemic, pandemic and communicable disease outbreak management

The measures detailed in Table 4-3 will be undertaken to manage epidemic, pandemic and communicable disease outbreak.

Table 4-3 Epidemic, pandemic and communicable disease outbreak management measures

No.	Management measures	Performance measure	Target	Responsibility
MP045	Develop and implement a vector management procedure to limit the contraction of vector-borne illnesses on-site, if deemed necessary.	Documented and approved procedure.	Vector management procedure finalised prior to the beginning of construction.	SHE Manager

Table 4-3 Epidemic, pandemic and communicable disease outbreak management measures (cont'd)

No.	Management measures	Performance measure	Target	Responsibility
MP046	Implement strategies to manage the impact of diseases through assessment, surveillance, action plans and monitoring.	Documented and approved strategies to manage the impact of diseases.	Disease management strategies finalised prior to the beginning of construction.	Chief Medical Officer
MP047	Develop a workplace program aimed at preventing new human immunodeficiency virus (HIV) infections and provide care and support for infected and affected employees.	Documented and approved workplace HIV prevention program.	Workplace HIV prevention program to be finalised prior to beginning of construction.	Chief Medical Officer
SEM046	Implement workforce health screening during the recruitment process; on-going workforce health education and awareness programs; and comprehensive employee health service provision in compliance with legislative requirements and company workplace health and safety policies.	Records of health screenings. Training records. Record of health service provisions.	All employees receive pre-employment health screening, periodical follow up health screenings and health services. Delivery of health education and awareness programs to workforce.	Chief Medical Officer
SEM047	Construct and operate workforce accommodation and messing facilities in accordance with recognised standards for hygiene and safety.	Records of visual inspections of camp and worksite amenities.	Amenities maintained in clean, working order that meet international standards.	Construction Project Manager
SEM048	Educate workers on disease prevention and health promotion, and encourage workers to share their learnings with the community.	Training records.	Delivery of health education and awareness programs to workforce.	Chief Medical Officer
SEM051	Implement infectious disease management programs for workers, incorporating worker education, to reduce potential for disease occurrence.	Program and training records.	Delivery of disease management programs.	Chief Medical Officer

4.5.4 Civil unrest limitation measures

The measures detailed in Table 4-4 will be undertaken to manage and minimise civil unrest.

Table 4-4 Civil unrest limitation measures

No.	Management measures	Performance measure	Target	Responsibility
MM153	Implement In-Migration Plan and Human Resources and Localisation Plan to minimise opportunistic migration into local areas.	Documented and approved in-migration, human resources and localisation plans.	Reduction of in-migration.	Community Relations Manager
MM154	Develop and implement a project security plan.	Documented and approved security plan.	Security plan to be finalised prior to the beginning of construction.	Safety and ERT Superintendent
SEM042	Develop and implement (commencing with workforce induction training) a workforce code of conduct to guide workplace behaviour and respectful interaction with host communities. As a minimum, this code of conduct will cover: ethics; health; environment; safety; alcohol and drug use; workforce diversity; harassment; and cultural and social sensitivities of workers and communities.	Developed and approved code of conduct.	Completion of training by all personnel.	Training Superintendent
SEM016	Notify communities about proposed employment and commercial participation (business development, supply, procurement) policies and systems, including the designated preferential zones, and ensure that stakeholders have clear and regularly updated information on how to access employment and procurement opportunities.	Documented and approved commercial participation plan.	Commercial participation plan finalised prior to the beginning of construction.	Procurement Superintendent
SEM050	Conduct background checks on security personnel and train them in the Voluntary Principles on Security and Human Rights.	Maintenance of training records.	Completion of training by all security personnel.	Training Superintendent

Table 4-4 Civil unrest limitation measures (cont'd)

No.	Management measures	Performance measure	Target	Responsibility
SEMO49	Implement a Project-wide induction process that covers, as a minimum: ethics; health; environment; safety; alcohol and drug use; workforce diversity; harassment; and cultural and social sensitivities of workers and communities.	Program and training records.	Delivery of health and safety management programs.	Chief Medical Officer
SEM057	Provide access to an effective and transparent Grievance Management Procedure for communities, employees and contractors.	Documented and approved Grievance Management Procedure.	Grievance Management Procedure finalised and established prior to the beginning of construction.	Community Relations Manager

4.5.5 Fire management

The measures detailed in Table 4-5 will be undertaken to limit the likelihood of uncontrolled fire and explosion

Table 4-5 Fire management and limitation measures

No.	Management measures	Performance measure	Target	Responsibility
MP053	Store and handle all flammable and combustible substances, including waste, under conditions that limit the risk of fire and toxic emissions.	Records of visual inspections of storage facilities.	Storage and handling of flammable and combustible substances in accordance with AS 1940:2017 The storage and handling of flammable and combustible liquids.	Construction Project Manager
MP054	Ensure that 'hot works' do not take place in the vicinity of flammable or combustible materials.	Records of visual inspections of hot works. Hot works permit records.	No hot works conducted in the vicinity of flammable or combustible materials.	Safety and ERT Superintendent

Table 4-5 Fire management and limitation measures (cont'd)

No.	Management measures	Performance measure	Target	Responsibility
MP055	Identify and have available firefighting equipment suitable for the level of risk at hand and conduct regular maintenance and testing to ensure that this equipment remains in good working order.	Records of visual inspections and maintenance.	Firefighting equipment tested and maintained in good working order.	Safety and ERT Superintendent
MP056	Train all personnel in fire risk management during the induction process, the risks that could be present at the site and their personal responsibility in terms of fire prevention.	Maintenance of induction records.	Completion of induction by all employees and contractors where relevant to their role.	Safety and ERT Superintendent
MM075	Store, handle and transport hazardous substances in accordance with Australian Standards AS1940:2017 and AS3780:2008, and the PNG Environmental Code of Practice for Vehicle/Machinery Workshops and Petroleum Storage/Resale/Usage Sites.	Evidence of established procedures.	Follow the Hazardous Materials, Fuel Handling and Spill Response Management Sub-plan in the case of an emergency.	Construction Project Manager

4.6 Performance, monitoring and reporting

Applicable plans and procedures will be reviewed routinely, after any emergency or annually to ensure that they were effective and to identify where improvements can be made. The results of reviews will be available to all personnel to which the emergency procedure is relevant.

General monitoring relevant to emergency response and fire management will include documenting incidents in incident reports and maintenance of induction and training records. Incident reports will be completed and appropriate measures will be taken, aimed at preventing similar incidents or accidents from occurring in the future.

Weekly inspection of construction activities will be undertaken to assess the success of management measures and identify areas where changes to management measures will further limit the risk of uncontrolled fire and explosion. Where monitoring identifies deficiencies in the control methods described above, the procedures in this plan will be reviewed.

Monitoring of weather conditions will be conducted to help predict, prepare for and manage the occurrence of weather-related natural hazards. Monitoring is detailed in Table 4-6.

Compliance by all personnel with the procedures in this plan will be verified through both routine and unannounced inspections and monitoring by the SHE Manager and Loss Prevention and ERT Manager (or their delegates). Inspection results will be reported to the Safety and ERT Superintendent.

Results from monitoring activities will be recorded and annual reports prepared by in-house staff or suitably qualified and experienced third parties. Environmental performance reports will be submitted to the Conservation Environment Protection Authority and other regulatory authorities as part of routine environmental reporting as per the conditions of the environmental permit and other project approvals.

Table 4-6 Emergency response and fire management monitoring

Objective	Performance indicator	Target	Frequency
Conduct weather monitoring to detect increased rainfall, dry conditions and wind directions and stay well informed of earthquake activity	Records of weather monitoring data.	Weather data recorded and reported to relevant departments.	Daily

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Sepik Infrastructure Project: Vanimo Ocean Port

Environmental Management and Monitoring Plan

Erosion, Sediment and Soils Management Sub-plan

Construction

Environmental Management and Monitoring Plan

Erosion, Sediment and Soils Management Sub-plan Construction

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5. Erosion, Sediment and Soils Management Sub-plan

5.1 Background

Construction activities associated with the Sepik Infrastructure Project Vanimo Ocean Port will include the clearance of vegetation and earthworks. Activities that will involve the excavation and movement of soils and rock on site will include removal and storage of topsoil, land reclamation and construction of permanent infrastructure such as buildings, the wharf and ancillary facilities.

Exposure, disturbance and stockpiling of soils and spoil, placement of reclamation material and disturbance of marine sediments, all have the potential to contribute significantly to sediment-laden runoff and increased sediment deposition on the local marine environment of Dakriro Bay. These project activities also have the potential to disturb acid sulphate soils (ASS), which can result in low pH and mobilisation of metals upon exposure to atmospheric conditions.

Sedimentation and changes to water quality in the local marine environment, can have significant impacts on beneficial uses[1] resulting from reduced water quality, such as, increased total suspended solids (TSS), bed sediment loading and metals concentrations, including:

- Marine aquatic ecosystem health.
- Use of marine aquatic flora and fauna resources.

Movement of vessels in Dakriro Bay has the potential to disturb the seabed causing an increase in sediments and turbidity disrupting the local marine ecosystem of Dakriro Bay. Prevention and management measures for this impact on local marine fauna and flora have been covered in the Biodiversity Management Sub-plan and not covered in this sub-plan.

This Erosion, Sediment and Soils Management Sub-plan details measures to manage potential soil erosion, sedimentation and mobilisation of particulate-associated metals that may result from project construction activities.

5.2 Objectives

The objectives of soil erosion and sediment control are to:

- Limit soil erosion from areas disturbed by project activities.
- Limit the transport of sediment from project areas.
- Manage all soil and spoil stockpiles in order to prevent erosion and downstream sedimentation.
- Limit the mobilisation of particulate-associated metals in runoff from project areas.
- Protect beneficial uses of the marine environment and water resources.

[1] A beneficial value is defined in the PNG *Environment Act 2000* as a quality or characteristic of the environment or any element or segment of the environment, which –
(a) is conducive to ecological health, public benefit, welfare, safety, health or aesthetic enjoyment and which requires protection from environmental harm; or
(b) is declared in an Environment Policy or permit to be a beneficial value.

5.3 Responsibility

Implementation of this Erosion, Sediment and Soils Management Sub-plan will be the responsibility of the Safety, Health and Environment (SHE) Manager, who is also responsible for ensuring that activities associated with the project are undertaken in compliance with relevant statutory environmental regulations and FRL's environment policy and the project Construction Environmental Management and Monitoring Plan (EMMP).

While the environment team is responsible for monitoring, compliance, and follow up on corrective actions, other teams are also responsible for implementing measures to manage erosion, sediment and soils. For example, the construction team is responsible for construction-related activities, such as installation of erosion control measures and management of stockpiles. These responsibilities are listed in the management measure tables in Section 5.5

5.4 Definitions

Acid sulphate soils (ASS). Soils and sediments containing iron sulphides, the most common being pyrite. When exposed to air due to drainage or disturbance, these soils can generate sulphuric acid, often with elevated concentrations of iron, aluminium and heavy metals.

Potentially acid sulphate soils (PASS). Soils and sediments that have the potential to generate acid and elevated concentrations metals if exposed to atmospheric conditions.

Erosion and sediment control structures. Structures of various types and construction (e.g., cut-off drains, berms, sediment ponds, rock rip-rap on drains, reno mattresses, geotextile netting) used to intersect and/or impede the flow of surface water to reduce scouring of soils and to cause the settling of suspended material.

Rehabilitation. The process of reinstating and revegetating land to restore it to a stable landform.

Sedimentation. The deposition or accumulation of sediment.

Topsoil. The surface layer of the soil profile, which usually contains more organic matter, is more fertile, darker in colour, better structured and supports greater biological activity than underlying layers. The surface layer may vary in depth depending on soil forming factors, including parent material, location and slope.

5.5 Procedures

The following procedures detail FRL's erosion and sediment control measures that will be implemented for the project's construction phase.

5.5.1 Planning and preparation

Planning and preparation management measures to address erosion and sediment control are detailed in Table 5-1.

Table 5-1 Planning and preparation erosion and sediment control measures

No.	Management measures	Performance measure	Target	Responsibility
MM006	Limit the project footprint during the design phase.	Final design demonstrates consideration of project footprint.	Disturbance area limited where practical.	Detailed Design Manager
MM011	Implement a risk based soil survey for individual disturbance areas prior to disturbance to identify potentially problematic surface and subsurface soils (i.e., ASS, PASS, dispersive soils). Where problematic soils are encountered, develop appropriate management controls. See MP002.	Records of soil surveys and mapping. Results of soils surveys to be included in site clearance permit.	100% completion of soil surveys prior to disturbance in areas of high risk.	SHE Manager
MP001	Undertake training to ensure that personnel are aware of the importance of controlling erosion from areas disturbed during construction.	Maintenance of induction register.	Induction completed by all employees and contractors where relevant to their role.	SHE Manager
MP002	Ensure that potential 'high risk' (i.e., ASS, PASS, dispersive soils) areas for soil erosion are identified on maps and work plans. These areas are likely to include: • Land adjacent to watercourses and the marine environment of Dakriro Bay.	Maintenance of maps and work plans. Maps and work plans to be included in site clearance permits.	'High risk' soil erosion areas identified and mapped.	SHE Manager
MP185	Identify the location of sediment control structures on maps and work plans.	Maintenance of maps and work plans.	Sediment control structures identified and included on maps and work plans.	Construction Manager, SHE Manager

Table 5-1 Planning and preparation erosion and sediment control measures (cont'd)

No.	Management measures	Performance measure	Target	Responsibility
MM035	Develop and implement site-specific erosion and sediment control plans for disturbance works.	Evidence of site-specific erosion and sediment control plans. Records of visual inspection.	No disturbance works conducted without site-specific erosion and sediment control plan.	Construction Project Manager

5.5.2 Soil and stockpile management

Measures for the management of soil and stockpiles to prevent erosion and sedimentation are detailed in Table 5-2.

Table 5-2 Soil and stockpile management

No.	Management measures	Performance measure	Target	Responsibility
MP058	Avoid compaction of topsoil stockpiles, where collected and stored, and restrict vehicle, plant and equipment movement over topsoil stockpiles.	Records of visual inspection.	No unnecessary compaction.	Construction Project Manager, SHE Manager
MP032	Avoid locating soil stockpiles in low-lying areas that will impede the natural drainage patterns. If unavoidable, use earthworks to redirect the natural surface water flow.	Records of visual inspections. Location of stockpiles detailed and approved in site clearance permit.	No stockpiles located in low-lying areas without prior approval.	Construction Project Manager, SHE Manager
MP061	Install erosion and sediment control structures around the base of stockpiles to limit the amount of topsoil able to be eroded from stockpiles.	Records of visual inspections.	No stockpiles without sediment control structures established and maintained.	Construction Project Manager, SHE Manager

Table 5-2 Soil and stockpile management (cont'd)

No.	Management measures	Performance measure	Target	Responsibility
MP060	Topsoil stockpiles, where collected and stored, will not be situated in areas identified as high risk to erode (e.g., on the side of a hill or close to the beach shoreline where waves break) as identified on maps and work plans.	Records of visual inspections. Location of stockpiles detailed and approved in site clearance permit.	No stockpiles located in areas identified as high risk of erosion.	Construction Project Manager, SHE Manager
MM015	Manage encountered ASS by: • Mixing the ASS material with a neutralising agent such as fine-ground lime that inhibits oxidation and increases pH. • Burying excavated ASS material at least 1 m below the permanent water table at a disposal site without prior treatment. • Stockpiling ASS material in a bunded area with a very low permeability base (e.g. acid-resistant liner or clay layer) and at a protected distance from the beach shoreline.	Records of soil surveys and mapping. Results of soils surveys to be included in site clearance permit.	Soil surveys and mapping to be completed prior to disturbance.	SHE Manager

5.5.3 Sediment management

Management measures to prevent sedimentation are detailed in Table 5-3.

Table 5-3 Sediment management measures

No.	Management measures	Performance measure	Target	Responsibility
MM007	Restrict vehicles to only those areas that need to be accessed or trafficked.	Clearance does not exceed areas approved in land clearance permits (any clearance beyond permitted areas must be reported as an incident). All clearing supported by a clearing permit.	Zero non-compliances recorded of clearing beyond Project footprint.	Environment Superintendent
MM034	During the construction phase, where practicable, construct sediment ponds downstream of major sediment sources.	Sediment control structure design criteria. Records of visual inspection.	Construction of sediment control structures in accordance with design criteria.	SHE Manager
MP063	Limit the area of soil disturbed and exposed to erosion.	Area of disturbed and exposed soil. Length of time that disturbed soils are exposed.	Impact of fugitive sediment release is within EIS predictions.	Construction Project Manager, Environment Superintendent
MP162	If required, use a silt curtain when placing reclamation material to minimise increased sediment deposition on adjacent fringing reef and seagrass.	TSS concentrations in marine environment.	Impact of fugitive sediment release is within EIS predictions.	SHE Manager

5.6 Performance, monitoring and reporting

The project Erosion and Sediment Control Sub-plan, and any other associated procedures will be reviewed annually to ensure that they remain valid.

Applicable plans and procedures will be reviewed after any erosion or sediment related incident to review their effectiveness and determine whether improvements are required.

FRL Environment Department personnel will monitor the effectiveness of erosion and sedimentation control methods. Where monitoring identifies deficiencies in the control methods, the procedures in this plan will be reviewed. Compliance by personnel with the procedures in this plan will be verified through routine and unannounced inspections and monitoring by FRL Environment Department personnel. Monitoring of surface water is detailed in the Water Management Sub-plan.

FRL will ensure erosion control structures are maintained in good working order and that monitoring of sediment accumulation is undertaken. There will also be regular liaison with Community Relations personnel to determine whether villagers are reporting increased rates of sediment accumulation outside the predictions of the EIS and whether this is potentially due to construction activity.

Monitoring of soils, erosion and sediment control is outlined in Table 5-4.

Monitoring activities will be recorded and annual reports prepared by in-house staff or suitably qualified and experienced third parties. Environmental performance reports will be submitted to the Conservation Environment Protection Authority and other regulatory authorities as part of routine environmental reporting as per the conditions of the environmental permit and other project approvals.

Table 5-4 Erosion and sediment control monitoring

Monitoring measure	Performance indicator	Target	Frequency
Pre-construction soil surveys	Soils data and mapping of high-risk areas (i.e., ASS, PASS and dispersive soils) with respect to work plans	Project site soils mapped in project footprint areas prior to construction.	Prior to construction
Soil erosion from areas disturbed by project activities. Transport of sediment in runoff from project areas, particularly in the local marine environment. Monitor construction and effectiveness of control devices.	Erosion and sediment controls installed and maintained correctly.	100% compliance with approved site clearance plans and this management plan.	Weekly during disturbance activities
	Failures of control devices.	Failures reported as an environmental incident. No unresolved incidents.	In response to incidents

Table 5-4 Erosion and sediment control monitoring (cont'd)

Monitoring measure	Performance indicator	Target	Frequency
Monitoring of ASS soil disposal sites and ASS spoil stockpiles (bunded areas).	Stockpiles and soil disposal sites located in accordance with this management plan	100% compliance with approved site clearance plans and this management plan.	Weekly during disturbance activities
	Records of a very low permeability base (e.g. acid-resistant liner or clay layer) have been installed correctly and at a protected distance from the beach shoreline.	Failures reported as an environmental incident.	In response to incidents
	Records of soil tests within bunded areas and surrounds.	No unresolved incidents.	In response to incidents
Management of soil and spoil stockpiles in order to prevent erosion and downstream sedimentation.	Stockpiles located in accordance with this management plan and site clearance plans.	100% compliance with approved site clearance permits and this management plan.	Weekly during disturbance activities
	Segregation of topsoils from subsoils.	100% compliance with approved site clearance permits and this management plan.	Weekly during disturbance activities
	Topsoil and subsoil stockpile height.	Not exceeding 2 m.	Weekly during disturbance activities
Beneficial uses of surface water, marine environment and water resources.	Sediment concentrations/turbidity in watercourses downstream of project activities.	Monitoring results comply with project environment permit conditions.	Monthly
	Number of complaints about project related sedimentation.	Any complaints recorded and investigated in compliance with project procedures.	In response to complaints

FRIEDA RIVER

Frieda River Limited

Sepik Infrastructure Project: Vanimo Ocean Port

Environmental Management and Monitoring Plan

Hazardous Materials, Fuel Handling and Spill Response Management Sub-plan - Construction

Environmental Management and Monitoring Plan
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6 Hazardous Materials, Fuel Handling and Spill Response Management Sub-plan

6.1 Background

During construction of the Sepik Infrastructure Project Vanimo Ocean Port, there is the potential for workers and community members to be injured by or exposed to hazardous materials. In addition, there is the potential for hazardous material to enter the environment through spills or incorrect handling. The Hazardous Materials, Fuel Handling and Spill Response Management Sub-plan has been developed to provide procedures for the management of hazardous materials including: handling; storing; transporting; preventing and responding to spills; and disposing of chemicals and other hazardous materials during construction activities.

The classification, packaging, labelling and safe transport of dangerous goods to PNG will be the responsibility of manufacturers, suppliers and transport contractors. These contractors will be required to comply with FRL's standards, which will be defined in their contracts. Where FRL has these responsibilities, it will comply with the relevant statutory requirements (typically the Australian Dangerous Goods Code 2008 (NTC, 2018)) and FRL will seek the advice of the appropriate authority, where necessary.

Storage and handling of hazardous materials will be in accordance with Australian Standards 1940:2017 and 3780:2008, PNG Environmental Code of Practice for Vehicle/Machinery Workshops and Petroleum Storage/Resale/Usage Sites and any other relevant standards as required.

To manage a hazardous spill, FRL acknowledges that all incidents necessitate a multi-disciplinary approach with staff members participating in a coordinated effort, as well having an emergency response team onsite. The emergency response management plan will include information for dealing with accidental hazardous material releases and should be consulted in conjunction with this Hazardous Materials, Fuel Handling and Spill Response Management Sub-plan. In addition, the Waste Management Sub-plan contains a detailed outline of on and off-site waste generation, handling and disposal and should be used in conjunction with this sub-plan.

6.2 Objectives

The objectives of the Hazardous Materials, Fuel Handling and Spill Response Management Sub-plan are to:

- Ensure hazardous materials required for construction activities are identified, stored, transported, handled and disposed of safely and in an environmentally responsible manner.
- Prevent accidental hazardous material release that may cause injury and/or exposure to people and the environment.
- Provide procedures for the control of leaks, containment of spillages and recovery in the event of an accidental hazardous material release.

6.3 Responsibility

Responsibility for each aspect of hazardous material spills, storage, handling and transport will be clearly established before the commencement of construction activities. Implementation of the Hazardous Material, Fuel Handling and Spill Response Management Sub-plan will be the responsibility of the Safety, Health and Environment (SHE) Manager, who is responsible for ensuring that activities associated with the project are undertaken in full compliance with FRL's hazardous material and fuel handling management procedure and other safety policies. All staff, including contractors, are responsible for compliance with this sub-plan.

6.4 Definitions

Bunded. Enclosed by a bund of sufficient capacity to contain all the stored liquid.

Emergency. A present or imminent event that requires prompt co-ordination of actions or special regulation of persons or property to protect the health, safety, or welfare of people, or to limit damage to property and the environment.

Emergency Response Team. Employees of FRL who have been trained to respond to hazardous materials spills and other emergencies.

Hazardous material. A hazardous material is any substance, mixture or article that satisfies the criteria of one or more *Globally Harmonised System of Classification and Labelling of Chemicals* (GHS) hazard classes.

In relation to chemicals, a hazard is a set of inherent properties of the substance, mixture, article or process that may cause adverse effects to organisms or the environment.

Major spill. A spill, which if not acted upon properly, will contaminate the natural environment and may have potential significant human health and safety risks.

Safety data sheet. A detailed information printout provided by the supplier outlining the hazards associated with a chemical.

Minor spill. A spill which can be easily and safely handled by those person(s) initiating the spill and which has minimal health and safety risks.

Personal protective equipment (PPE). Anything worn or used by a person to reduce a risk to the person's health or safety.

6.5 Procedures

The procedures outlined in this section will be established for the construction phase and details hazardous materials handling measures (i.e., storage, transport and disposal) and management measures to reduce the risks of an accidental hazardous material release. Staff responsibilities, and the facilities and equipment that will be in place to prevent emergencies associated with mismanagement of hazardous materials are also detailed. In the event of a hazardous material spill

or leak, FRL will ensure that appropriate procedures are in place for the control of spills and notifying potentially affected parties.

6.5.1 Planning and Preparation

The planning and preparation measures to address hazardous materials and fuel handling are detailed in Table 6-1.

Table 6-1 Planning and preparation hazardous materials and fuel handling

No.	Management measures	Performance Measures	Target	Responsibility
MP066	Train and induct all personnel in procedures for the safe handling, transport, storage, transfer and disposal of hazardous materials as well as emergency response measures for spills and leaks.	Number of personnel inducted. Personnel training records.	Completion by all employees and contractors where relevant to their role.	Environment Superintendent
MP067	Ensure hazardous materials transfer and storage facilities are designed in accordance with AS1940:2017 and PNG Environmental Code of Practice for Vehicle/Machinery Workshops and Petroleum Storage/Resale/Usage Sites.	Records of visual inspection of transfer and storage facilities.	Transfer and storage facilities meet Australian and PNG standards.	SHE Manager
MM053	Design and construct project facilities involving the storage, handling, or use of hazardous materials to intercept potentially contaminated water for treatment if required prior to discharge.	Final design of facilities shows consideration of contaminated water interception, including potential hazardous material spills.	All potentially contaminated water is managed to avoid environmental pollution.	SHE Manager
MP068	Safety data sheets (SDS) and regulatory authority guidelines for the safe handling, transport and storage of all hazardous materials should be located in an accessible place and regularly maintained.	Records of SDS'.	All SDS' are accessible and up to date.	SHE Manager
MP069	An emergency response team will be trained and provided with appropriate resources to contain and control major spills of hazardous materials.	Personnel training records. Emergency response resource register.	All emergency response team training records and resources are up to date.	SHE Manager
MP070	Vehicle and vessel refuelling to be conducted only at designated sites.	Records of visual inspections of refuelling areas.	No refuelling at unauthorised locations.	SHE Manager
MM054	Develop and implement oil spill prevention and response plans.	Plans developed.	All oil spill prevention and response conducted in accordance with plans.	SHE Manager

Table 6-1 Planning and preparation hazardous materials and fuel handling (cont'd)

No.	Management measures	Performance Measures	Target	Responsibility
MP071	All construction personnel will be provided with and trained in the use of appropriate personal protective equipment (PPE).	Records confirming that all personnel have appropriate PPE to perform the work.	All personnel provided with appropriate PPE and training.	SHE Manager
MM052	Provide appropriate spill response equipment for Project facilities and vehicles.	Records of visual inspections of spill response kits.	Spill response kits are available and maintained in all designated areas.	SHE Manager
MM116	Equipment and vehicles will be maintained regularly in accordance with manufacturers' specifications.	Records of maintenance and servicing.	All vehicles and machinery serviced and maintained regularly in accordance with manufacturer's specifications.	Mobile Maintenance Manager
MP072	Maintain spill response kits and equipment to ensure that appropriate supply quantities are on hand at all times.	Maintenance records of spill response kits (including portable spill containment and clean-up equipment). Records of regular inspections.	All spill response kits inspected and replenished every six months or after an incident.	SHE Manager
MP073	Maintain an inventory of spill control materials and equipment.	Records of inventory register.	Inventory register must be available and current.	SHE Manager
MP075	Undertake a risk assessment of all hazardous materials to be stored and used on site. Rank the hazardous materials by level of severity and identify any specific management measures.	Records of risk assessment.	Assessment to be conducted prior to beginning of construction.	SHE Manager
MP021	Develop a hazardous materials management plan that: • Identifies the hazardous materials that will used during construction. • Documents the risk assessment for all hazardous materials. • Describes the specific management measures for all hazardous materials.	Hazardous materials management plan developed.	Manage hazardous materials in accordance with plan.	SHE Manager

Table 6-1 Planning and preparation hazardous materials and fuel handling (cont'd)

No.	Management measures	Performance Measures	Target	Responsibility
MP074	Maintain a register that will include information cards (which will be displayed as required in Tok Pisin as well as English) and SDS' prepared by manufacturers or suppliers for all hazardous materials on site. Containers of hazardous substances will be labelled in both English and Tok Pisin.	Maintenance of SDS' and information card register.	Register is current and up to date. SDS' are current and up to date.	SHE Manager

6.5.2 Hazardous Materials Storage and Use

The measures detailed in Table 6-2 will be undertaken to ensure the appropriate storage and use of hazardous materials.

Table 6-2 Hazardous materials storage and use

No.	Management measures	Performance Measures	Target	Responsibility
MM050	Store, handle and transport hazardous substances in accordance with Australian Standards AS1940:2017 and AS3780:2008, and the PNG Environmental Code of Practice for Vehicle/Machinery Workshops and Petroleum Storage/Resale/Usage Sites.	Records of visual inspections.	Storage and handling of hazardous materials and hydrocarbon products to meet specifications in relevant Australian and PNG standards.	SHE Manager
MP076	Store corrosive and toxic materials separately in a designated HAZCHEM storage area and label in accordance with AS3780:2008 and PNG Environmental Code of Practice for Vehicle/Machinery Workshops and Petroleum Storage/Resale/Usage Sites.	Records of visual inspections.	Storage of corrosive and toxic materials must meet specifications in relevant specifications in relevant Australian and PNG standards.	SHE Manager
MP077	Use chemical storage containers only for the storage of the chemical labelled.	Records of visual inspections.	No incorrect storage of chemicals.	SHE Manager
MP078	Hazardous materials will not be stored or handled within 50 m of a waterbody or a drainage line leading to a waterbody, where practicable.	Records of visual inspections.	Hazardous materials must be kept in designated areas at all times and at least 50 m from waterbodies.	SHE Manager

Table 6-2 Hazardous materials storage and use (cont'd)

No.	Management measures	Performance Measures	Target	Responsibility
MP079	Display appropriate warning signs when storing, handling or using hazardous materials.	Records of visual inspections.	Hazardous materials signposting must meet specifications in AS1940:2017 and PNG Environmental Code of Practice for Vehicle/Machinery Workshops and Petroleum Storage/Resale/Usage Sites.	SHE Manager
MP080	Maintain a hazardous materials inventory that tracks types and volumes of hazardous materials used.	Maintenance of inventory.	Inventory current and up to date.	SHE Manager

6.5.3 Hazardous Materials Disposal

Measures to be undertaken to ensure the appropriate disposal of hazardous materials are detailed in Table 6-3.

Table 6-3 Hazardous Materials Disposal

No.	Management measures	Performance Measures	Target	Responsibility
MP081	Collect and dispose of all waste hazardous materials and their containers to FRL approved disposal facilities in accordance with the Waste Management Sub-plan.	Register of waste recording type, weight and destination (including reuse) of all wastes produced on site.	No unauthorised disposal of hazardous materials.	SHE Manager
MP165	Manage water used to clean down vehicles, plant and equipment to ensure against uncontained release to watercourses.	Records of visual inspections.	No uncontrolled release of wash water to watercourses.	SHE Manager

6.5.4 Hazardous Materials Transport

The measures detailed in Table 6-4 will be undertaken to ensure the appropriate transport of hazardous materials.

Table 6-4 Hazardous Materials Transport

No.	Management measures	Performance Measures	Target	Responsibility
MP082	Ensure an appropriately licensed contractor is used to transport and dispose of hazardous materials.	Records of licensed waste providers. Waste transport certificates.	Waste transport contractors hold relevant licences.	SHE Manager
MP083	Transport dangerous goods in accordance with the Australian Dangerous Goods Code.	Records of visual inspections of transportation.	Transportation of dangerous goods must meet specifications in relevant Australian standards.	SHE Manager
MP084	Document the transport and disposal of all hazardous material and wastes appropriately.	Waste transport certificates. Register of waste, recording type, weight and destination (including reuse) of all wastes produced on site.	Waste transport certificates completed for every consignment of waste that leaves the facility.	SHE Manager

6.5.5 Fuel and Oil Storage

The measures detailed in Table 6-5 will be undertaken to ensure the appropriate storage of fuel and oil.

Table 6-5 Fuel and Oil Storage

No.	Management measures	Performance Measures	Target	Responsibility
MP086	Fuel and oil pumps, and storage areas will be located within impermeable containment bunds at a minimum of 50 m from any waterbody or watercourse.	Records of visual inspections of depots.	All fuel and oil materials kept in designated areas at all times, at least 50 m from any waterbody.	SHE Manager

Table 6-5 Fuel and Oil Storage (cont'd)

No.	Management measures	Performance Measures	Target	Responsibility
MP085	Maintain a fuel and oil storage log, including the following information: • Types and volumes of fuel and oils in use. • Locations and type of storage facilities. • Containment methods (both primary and secondary) and volumes.	Records of fuel and oil storage and maintenance of storage facilities.	Fuel and oil storage log is maintained and up to date.	SHE Manager

6.5.6 Spill Response

The measures detailed in Table 6-6 will be undertaken to ensure the appropriate response and management of spills.

Table 6-6 Spill Response

No.	Management measures	Performance Measures	Target	Responsibility
MP091	Emergency preparedness (spill response) drills will be conducted regularly.	Records of emergency spill response drills.	Emergency spill response drills conducted in accordance with emergency response plan.	ERT
MP087	If a minor spill occurs (including contaminated water), immediately contain and clean up the spill in accordance with the relevant SDS or specific spill response plan.	Maintenance of incident register.	All spill containment/clean up to be actioned within 2 hours of detection. No unresolved incidents. Spill response to meet SDS specifications.	SHE Manager
MP089	Appropriate PPE should be used by all persons completing spill clean-up.	Use of PPE recorded in incident report.	Appropriate PPE used during spill clean-up.	SHE Manager

Table 6-6 Spill Response (cont'd)

No.	Management measures	Performance Measures	Target	Responsibility
MP088	If a major spill occurs: • Immediately halt the associated activity and contain the spill in accordance with the relevant SDS or specific spill response plan. • Conduct clean-up and remediation in accordance with SDS or specific spill response plan, any relevant guidelines and the instructions of responsible authorities.	Maintenance of incident register.	All spills containment/clean up to be actioned within 2 hours of detection. No unresolved incidents. Spill response to meet SDS specifications.	SHE Manager
MP090	Remediation will be undertaken to limit impacts to the environment from any spill, where required.	Records of remediation procedures in corrective actions report.	Identification of need and completion of remediation of spills.	SHE Manager

6.6 Performance, monitoring and reporting

The FRL Hazardous Materials, Fuel Handling and Spill Response Management Sub-plan, and any other associated procedures will be reviewed annually to ensure that they remain valid.

Applicable plans and procedures will be reviewed after any non-conformance with a measure in this plan to ensure that they were effective and to identify where improvements can be made.

General monitoring relevant to hazardous materials, fuel handling and spill response will include, documenting of incidents in incident reports, and maintenance of induction and training records. Spills will be reported to the SHE Manager as follows:

- In the event of a minor spill, those individuals at the site will report the spill to the SHE Manager.
- In the event of a major spill, the Emergency Response Team shall be contacted. The Emergency Response Team will report the spill to the SHE Manager who will, in turn, report to the General Manager.
- Spills causing off-site environmental impacts will be reported to the Conservation Environment Protection Authority (CEPA) and local communities, as appropriate.

The SHE Manager is accountable for submission of the preliminary incident report, which will be prepared using the appropriate FRL form in accordance with the Incident Reporting Procedure. All reported incidents will be investigated, and reports distributed in accordance with the FRL “Incident Management” standard.

Regular inspections of all on-site workshops, hazardous materials storages and fuel and oil depots will occur to ensure that such sites are being managed and maintained in accordance with the appropriate PNG Environmental Code of Practice for Vehicle and Machinery Workshops, Petroleum Storage, Resale and Usage Sites (1997) and Australian Standards 1940:2017 and 3780:2008.

Monitoring of the receiving environment will be conducted in accordance with the Water Management Sub-plan. Additional monitoring may be required in the event of a leak or spill, the requirements of which will be determined in response to the incident and documented in the incident report.

Compliance by personnel with the procedures in this plan will be verified through both routine and unannounced inspections and monitoring by the SHE Manager (or their delegate). Inspection results will be reported to the Emergency Response Team (ERT) Superintendent. Specific hazardous materials, fuel handling and spill response monitoring is outlined in Table 6-7.

Monitoring activities will be recorded, and annual reports prepared by in-house staff or suitably qualified and experienced third parties. Environmental performance reports will be submitted to the CEPA and other regulatory authorities as part of routine environmental reporting as per the conditions of the environment permit and other project approvals.

Table 6-7 Hazardous materials, fuel handling and spill response monitoring

Objective	Performance indicator	Target	Frequency
Conduct regular integrity testing and maintenance of hazardous materials storage tanks, pipe, transfer hosing and couplings.	Records of testing and maintenance.	No spills or leaks left undetected. No unresolved hazardous material transfer incidents.	Monthly or as required
Inspection and replenishment of spill response kits and equipment.	Records of visual inspections. Record in inventory register.	Spill response kits and equipment stocked and maintained.	Weekly
Monitoring of pipe and hose pressure during fuel transfers to enable early detection of spills or leaks.	Records of pressure monitoring.	No spills or leaks left undetected. No unresolved fuel transfer spill or leak incidents.	Ongoing
Monitor downstream receiving environments.	Surface and groundwater quality, downstream of hazardous materials, fuel storage and refuelling facilities, including marine environments.	Water quality results meet required standards and environment permit conditions.	Monthly

FRIEDA RIVER

Frieda River Limited

Sepik Infrastructure Project: Vanimo Ocean Port

Environmental Management and Monitoring Plan

Traffic and Transport Management Sub-plan

Construction

Environmental Management and Monitoring Plan
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7. Traffic and Transport Management Sub-plan

7.1 Background

Construction of the Sepik Infrastructure Project Vanimo Ocean Port upgrade will require the transport of personnel, equipment and materials to, from and around the Vanimo Ocean Port site, using aircraft, vessels and heavy and light vehicles. The project will use commercial flights to the Vanimo Airport. All freight will be imported via the existing port at Vanimo.

The transport of personnel, equipment and materials via aircraft, vessels and vehicles gives rise to the potential for an incident to occur, such as a collision or crash. Vessel or vehicle incidents may occur due to factors such as operator error, equipment malfunction or extreme weather. Maintenance and operation of aircraft is not included in this sub-plan as it will be the responsibility of the appointed aircraft contractor.

Potential consequences from an aircraft, vessel or vehicle incident include:

- Loss of life or severe injury.
- Lost time injuries.
- Damage to infrastructure and property (SIP and non-SIP owned).
- Social tension, particularly if local villagers are involved.
- Environmental contamination via the release of hazardous materials and potential fire, depending on the vehicles and cargo involved in the incident.

Procedures for transportation of chemicals and other hazardous substances are described in the Hazardous Materials and Fuel Handling Management Sub-plan.

7.2 Objectives

The objective of the traffic and transport management sub-plan is to limit the potential for traffic accidents, including vessel collisions, aircraft and vehicle incidents.

7.3 Responsibility

Implementation of the Traffic and Transport Management Sub-plan will be responsibility of the Safety, Health and Environment (SHE) Manager. The SHE Manager is responsible for ensuring the implementation of this sub-plan and all the activities associated with the project in full compliance with relevant statutory environmental regulations, the FRL environment policy and the project Construction Environmental Management and Monitoring Plan (EMMP).

7.4 Definitions

Emergency. A present or imminent event that requires prompt co-ordination of actions or special regulation of persons or property to protect the health, safety, or welfare of people, or to limit damage to property and the environment.

Stevedore. A firm or individual engaged in the loading or unloading of a vessel.

Vehicle. Any receptacle, or means of transport, in which something is carried or conveyed, or travels.

Vessel. A craft for travelling on water, one larger than an ordinary rowing boat; a ship or boat.

7.5 Procedures

The following procedures provide measures to limit the likelihood of traffic accidents and are separated into the following categories: general planning and preparation; vehicle incident and aircraft incident.

7.5.1 Planning and preparation

The measures detailed in Table 7-1 will be undertaken to reduce the likelihood of traffic and transport accidents.

Table 7-1 Planning and preparation management measures

No.	Management measures	Performance Measures	Target	Responsibility
MP105	Appoint procurement, supply and logistics coordinators responsible for the transportation of materials to the project.	Appointment of procurement, supply and logistics coordinators.	Relevant positions to be appointed prior to the beginning of construction.	General Manager
MP106	The following procedures will be prepared: • Loading and unloading procedures. • Control of emissions and spills procedures. • Clean-up and contingency procedures. • Vehicle cleaning procedures. • Operator training and audit procedures.	Preparation of transport related procedures.	All procedures to be finalised and approved at least three months prior to the beginning of construction.	Logistics Coordinator
MP107	Written agreements between FRL and the originator of the goods, PNG Ports Corporation, stevedores and transporters will address the following: • Packaging as per the relevant authority (United Nations (for international sector) and PNG). • Labelling in both English and Tok Pisin languages. • Transport to and from PNG. • Safety of transportation vehicle and security during transportation. • Training of handlers during transportation and unloading. • Emergency response for the duration of the transportation.	Records of written agreements that address packing, labelling and safe transportation.	Compliance with relevant national and international import/export regulations.	Logistics Coordinator

Table 7-1 Planning and preparation management measures (cont'd)

No.	Management measures	Performance Measures	Target	Responsibility
MP108	Train personnel and contractors, through site inductions, on project related traffic and road rules.	Percentage of personnel inducted on transport and traffic management procedures. Maintenance of induction register.	Completion of induction by all employees and contractors relevant to their role.	SHE Manager
MP111	Provide inductions for passengers travelling in vehicles, detailing specific response procedures to emergency situations and potential incidents.	Percentage of personnel inducted in vehicle incident response. Personnel induction records.	All personnel inducted in vehicle incident response.	SHE Manager
MP112	Train and licence vehicle operators appropriately for the machinery they are operating.	Percentage of personnel inducted and licensed. Personnel induction records.	All operators hold relevant licensing for machinery operation.	SHE Manager
MP113a	Induct vehicle operators to ensure they are aware of site traffic procedures.	Percentage of personnel inducted and licensed. Personnel induction records.	All operators hold relevant licensing for machinery operation.	SHE Manager
MP113b	Develop and implement a community road and water safety management plan including driver education, community risk awareness, operational road and water traffic management protocols, and appropriate physical safety measures (including vehicle-pedestrian separation) where required.	Records of stakeholder engagement. Development of management plan	Plan to be finalised and approved prior to construction works beginning. Engagement with all affected villages	Community Relations Manager
MP119	Store adequate safety equipment on vehicles.	Records of visual inspections.	All safety equipment is maintained and meets relevant safety standards.	SHE Manager
MM152	Provide fatigue management training to drivers.	Maintenance of training register.	No unresolved incidents.	Supply and Logistics Manager

7.5.2 Vehicle incident

The measures detailed in Table 7-2 will be undertaken to reduce the likelihood of a vehicle incident.

Table 7-2 Vehicle incident

No.	Management measures	Performance measures	Target	Responsibility
MP123	Control dust and exhaust emissions from trucks and other vehicles in accordance with the Air Quality, Noise and Vibration Management Sub-plan.	Records of inspections.	No unresolved incidents.	Mobile Maintenance Manager
MP124	Regularly service and inspect vehicles to ensure that they remain in good working order.	Records confirming that appropriate servicing and maintenance has been carried out in accordance with manufacturer's specifications.	All vehicles maintained accordingly and up to date.	Mobile Maintenance Manager
MP125	Service and inspection of vehicles to be conducted by a qualified mechanic.	Records confirming regular mechanic service.	All vehicles maintained accordingly and up to date.	Mobile Maintenance Manager
MP127	Enforce speed limits and install signage to advise road users of safe operating speeds and conditions.	Records of visual inspections. Number of incidents of reported speeding and unsafe operation. Number of complaints regarding speeding and unsafe vehicle operation.	No unresolved incidents or complaints.	Supply and Logistics Manager
MP128	Equip special purpose vehicles such as fuel trucks with equipment necessary to respond to an accident that may result in a spill.	Records of visual inspections.	All special purpose vehicles are equipped with appropriate spill response kits.	Mobile Maintenance Manager
MP129	Fit all construction machinery with appropriate warning equipment such as reversing alarms and night lighting.	Records confirming that appropriate warning equipment has been installed on construction machinery. Records of visual inspections.	All equipment to be fitted prior to arrival on site.	Mobile Maintenance Manager

Table 7-2 Vehicle incident (cont'd)

No.	Management measures	Performance measures	Target	Responsibility
MP130	Fit light vehicles with flashing lights and hazard flags to warn larger vehicles of their presence.	Records confirming that appropriate warning equipment has been installed on light vehicles. Records of visual inspections.	All equipment to be fitted prior to arrival on site.	Mobile Maintenance Manager
MP181	Restrict all site vehicles to immediate construction areas, constructed roads and authorised access tracks; travel outside of these areas will only be allowed with prior clearance and the appropriate driver training.	Maintenance of vehicle travel log.	No unauthorised use of non-project access roads and tracks.	Supply and Logistics Manager
MP180	Ensure drivers do not stop for, pick up and/or transport non-project personnel in project vehicles.	Maintenance of incident register.	No unresolved incidents.	Supply and Logistics Manager
SEM043	Develop and implement measures including driver education, community risk awareness, operational road traffic management protocols, and appropriate physical safety measures (including vehicle-pedestrian separation) where required.	Maintenance of driver training and risk awareness register.	No unresolved incidents.	Supply and Logistics Manager

7.5.3 Aircraft incident

The measures detailed in Table 7-3 will be undertaken to reduce the likelihood or consequence of an aircraft incident.

Table 7-3 Aircraft incident

No.	Management measures	Performance Measures	Target	Responsibility
MP131	Ensure that all project personnel use reputable airlines for air travel.	Maintenance of air travel log.	All air travel by project personnel used reputable airlines.	SHE Manager
MP135	Ensure that airstrips used by the project have appropriate emergency response equipment and trained personnel to deal with an aircraft incident.	Records of visual inspections. Training records.	Completion of training by all employees and contractors where relevant to role.	Safety and Emergency Response Team (ERT) Superintendent

7.6 Performance, Monitoring and Reporting

The Traffic and Transport Management Sub-plan will be reviewed annually or as needed to ensure it remains valid. Procedures in the sub-plan will also be reviewed after any traffic incident to ensure the response is effective and to identify where improvements can be made.

General monitoring relevant to traffic incidents will include documenting incidents in incident reports and maintenance of induction and training records. Incident reports will be completed and appropriate measures will be taken to ensure that similar incidents or accidents will not occur in the future. Specific monitoring requirements relating to traffic and transport are outlined in Table 7-4.

Compliance by all personnel will be verified through both routine and unannounced inspections and monitoring by occupational, health and safety personnel.

Monitoring activities will be recorded and annual reports prepared by in-house staff or suitably qualified and experienced third parties. Environmental performance reports will be submitted to the Conservation Environment Protection Authority and other regulatory authorities as part of routine environmental reporting as per the conditions of the environmental permit and other project approvals.

Table 7-4 Traffic and transport monitoring

Monitoring measure	Performance indicator	Target	Frequency
Training and licensing.	Records of training and licensing.	All operators are trained and hold necessary licences to operate vehicles.	Ongoing
Vehicle movements.	Vehicle travel logs.	No unauthorised travel in FRL vehicles.	Ongoing
Monitoring of traffic accidents, including aircraft and vehicle incidents.	Number of traffic related incidents and/or complaints.	No unresolved incidents and complaints.	Ongoing
Conduct hydrometeorology monitoring to detect unsafe weather conditions.	Records of hydrometeorology data.	Hydrometeorology data recorded and reported to relevant departments.	Daily

Frieda River Limited

Sepik Infrastructure Project: Vanimo Ocean Port

Environmental Management and Monitoring Plan

Waste Management Sub-plan

Construction

Environmental Management and Monitoring Plan
Waste Management Sub-plan
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8. Waste Management Sub-plan

8.1 Background

This sub-plan deals with domestic and industrial wastes generated during construction of the Sepik Infrastructure Project Vanimo Ocean Port upgrade. Disposal of this waste is required to keep construction sites safe and tidy, and to limit contamination of land and water.

This sub-plan has been developed to limit waste generation and to ensure appropriate methods for handling and disposal of domestic and industrial wastes (including waste water) are implemented in accordance with FRL's policies and procedures. This sub-plan covers all stages of waste management, from generation to collection, transport, storage, treatment, recycling and disposal.

Waste from port construction and accommodation facilities will be disposed of in Vanimo. Waste water from sewage facilities will be discharged to the town sewage system.

Handling, storage and disposal of hazardous material waste and any spills of hazardous materials are addressed in the Hazardous Materials, Fuel Handling and Spill Response Management Sub-plan.

8.2 Objectives

The objectives of the Waste Management Sub-plan are to:

- Limit waste generation.
- Maximise the reuse of waste products in a safe and effective manner.
- Maximise recycling of waste where reuse is not practicable.
- Limit the adverse effects of waste management on the environment, particularly in the local marine environment of Dakriro Bay.
- Ensure waste management activities comply with legislative requirements, waste industry standards and company guidelines.
- Prevent the attraction or foraging of feral and/or native animals.
- Avoid safety risks to communities.

8.3 Responsibility

Accountability for waste movement and disposal will be the responsibility of the Environment Superintendent and FRL Safety, Health and Environment (SHE) Manager. Individual accountabilities will be defined through conditions of contracts of employment.

8.4 Definitions

Domestic waste. Waste resulting from household rubbish (i.e., food scraps, clothing, cloths and packaging), paper and wood.

Industrial waste. Non-domestic waste produced by construction activities that may require regulated storage, collection and/or disposal.

8.5 Procedures

The following procedures detail FRL's waste handling and disposal measures that will be implemented for the project's construction phase. Waste disposal will only occur at off-site facilities.

8.5.1 Planning and preparation

Planning and preparation management measures to address waste emissions are detailed in Table 8-1.

Table 8-1 Planning and preparation waste management measures

No.	Management measures	Performance measures	Target	Responsibility
MP136	Train personnel in the waste management hierarchy (in order of preference): • avoid, • reduce, • reuse, • recycle, and • appropriate disposal of domestic and industrial waste.	Proportion of personnel inducted on domestic and industrial waste management procedures. Personnel induction records.	All personnel inducted on domestic and industrial waste management procedures.	SHE Manager
MP137	Provide appropriate domestic and industrial waste disposal and collection facilities at construction offices, accommodation facilities and construction activity sites. These will include rubbish bins and toilet facilities. Facilities to be based on the following hierarchy of principles: • Limit waste generation. • Segregate main waste types (dedicated containers assist separation of waste). • Reuse materials or equipment. • Recycle materials or equipment. • Appropriate disposal in accordance with regulatory requirements.	Register of waste recording type, weight and destination of wastes produced on site.	All waste collection areas are well designed and clearly labelled for waste collection and segregation.	SHE Manager
MP144	Waste storage areas will be located at least 50 m from watercourses or the marine environment.	Site selection criteria for facility locations.	All waste storage areas located 50 m from watercourses.	Construction Project Manager

8.5.2 Waste management

Management measures to address waste emissions during construction are detailed in Table 8-2.

Table 8-2 Waste emissions management measures

No.	Management measures	Performance measures	Target	Responsibility
MP138	Keep sites clean and tidy as follows: • No litter present. • Spills, including minor spills, are to be cleaned up immediately. • Wastes segregated and stored according to classification.	Records of visual inspections demonstrating that the facilities are kept clean and tidy.	No unresolved incidents of untidy practices.	SHE Manager
MP139	Document types, volumes and destinations of wastes generated during construction activities using a waste tracking system.	Register of waste recording type, weight and destination of wastes produced on site.	Develop and successfully implement register.	SHE Manager
MM140	Implement a waste management plan (including hazardous and non-hazardous waste).	Register of waste recording type, weight and destination of wastes produced specific to the Vanimo Ocean Port site.	No unresolved incidents of untidy practices.	SHE Manager

8.5.2.1 Segregation of main waste types

The measures detailed in Table 8-3 will be undertaken when segregating main waste types.

Table 8-3 Waste segregation management measures

No.	Management measures	Performance measures	Target	Responsibility
MP140	Segregate and store metal waste into ferrous and non-ferrous metal areas. Metal waste to be collected at Vanimo by a scrap metal recycling contractor.	Register of waste recording type, weight and destination of wastes produced on site. Waste transport certificates.	Waste transport certificates completed for every consignment of waste that leaves the facility.	SHE Manager
MP141	Construction aggregate, waste concrete, sand and other waste from site works that are not chemically or biologically reactive and will not decompose, will be stored until they can be reused in construction projects, where practical.	Register of waste recording type, weight and destination (including reuse) of wastes produced on site.	Waste storage areas are well designed and clearly labelled for waste segregation.	SHE Manager

8.5.2.2 Disposal of waste

The measures detailed in Table 8-4 will be undertaken to manage the disposal of waste.

Table 8-4 Waste disposal management measures

No.	Management measures	Performance measures	Target	Responsibility
MP142	Domestic and industrial waste from the site that cannot be reused or recycled will be disposed of in the CEPA-approved environmental waste management facility.	Register of waste recording type, weight and destination of wastes produced on site.	No illegal dumping of waste.	SHE Manager
MM100	Prohibit disposal of domestic and industrial waste outside of designated waste storage and disposal areas.	Register of waste recording type, weight and destination of wastes produced on site.	All food and green waste segregated and composted.	SHEER Manager

Table 8-4 Waste disposal management measures (cont'd)

No.	Management measures	Performance measures	Target	Responsibility
MP148	Sharps and biological waste will be incinerated at a Government approved environmental waste management facility.	Register of waste recording type, weight and destination of wastes produced on site.	No unregulated disposal of sharps, biological and medical waste.	SHE Manager
MP146	No solid or liquid waste will be disposed of in a manner where it can directly enter surface water through runoff.	Register of waste recording type, weight and destination of wastes produced on site. Bunding present where solid or liquid waste could directly enter surface water through runoff.	No uncontrolled discharge to watercourses.	SHE Manager
MP147	Food and green waste will be segregated and composted or disposed in Vanimo.	Register of waste recording type, weight and destination of wastes produced on site.	All food and green waste segregated and composted.	SHE Manager
MP151	Workshop wastes, plastic type materials, scrap metal and miscellaneous wastes will be segregated and, where possible, recycled.	Register of waste recording type, weight and destination of solid wastes produced on site.	Recyclable waste is reused for project activities wherever possible.	SHE Manager
MP154	Ensure all construction and domestic waste (solid and wastewater) is removed from work sites.	Records of visual inspections. Register of waste recording type, weight and destination of all wastes produced on site.	No construction waste left at work sites.	SHE Manager

8.5.2.3 Industrial wastewater from workshop and fuel areas

The measures detailed in Table 8-5 will be undertaken to manage industrial wastewater from workshop and fuel storage areas.

Table 8-5 Industrial wastewater management measures

No.	Management measures	Performance measures	Target	Responsibility
MM096	Conduct washing, servicing and refuelling of equipment, vehicles or machinery at designated, appropriately designed facilities, at a safe distance from the beach shoreline.	Records of visual inspections.	Zero non-conformances of washing equipment in watercourses.	Construction Project Manager
MP156	Oil-water separator traps will be installed and maintained for the separation of oil-film from wastewater from the workshop and fuel storage areas.	Records of visual inspections.	All workshop water captured and directed through trap prior to discharge.	SHE Manager
MP086	Fuel and oil pumps and storage areas will be located within impermeable containment bunds a minimum of 50 m from any waterbody or watercourse.	Site selection criteria for facility locations.	Facilities to meet PNG Environmental Code of Practice for Vehicle/ Machinery Workshops and Petroleum Storage/ Resale/ Usage sites specifications.	SHE Manager
MP157	Rainfall runoff from workshops and fuel storage areas will be segregated by diversion of clean runoff in order to avoid cross-contamination with hydrocarbon waste. Oil contaminated runoff will be diverted to the oil-water separator trap.	Records of visual inspections.	Facilities to meet PNG Environmental Code of Practice for Vehicle/ Machinery Workshops and Petroleum Storage/ Resale/ Usage sites specifications. All oil contaminated water captured and directed through trap prior to discharge.	SHE Manager

Table 8-5 Industrial wastewater management measures (cont'd)

No.	Management measures	Performance measures	Target	Responsibility
MP155	Manage all wastewater from plant, oil and fuel storage area runoff by: • Containing and treating wastewater to remove sediment and hydrocarbons before discharge. • Installing and maintaining oil-water separator traps in appropriate areas. • Divert clean rainwater away from fuel storage areas and segregate runoff from plant maintenance and fuel storage areas for separation/treatment prior to release.	Records of visual inspections.	No uncontrolled discharge. No unresolved incidents.	SHE Manager

8.6 Performance, monitoring and reporting

This FRL Waste Management Sub-plan, and any other associated procedures will be reviewed annually to ensure that they remain valid.

Applicable plans and procedures will be reviewed after any non-conformance with a measure in this plan to ensure that they were effective and to identify where improvements can be made.

General monitoring relevant to waste management will include documenting of incidents in incident reports and maintenance of induction and training records. Incident reports will be completed, and appropriate measures will be taken to ensure that similar incidents or accidents will not occur in the future.

Regular inspections and monitoring of workshops, and fuel and oil storage areas will occur to ensure that such sites are being maintained in accordance with the appropriate Code of Practice for Vehicle and Machinery Workshops, Petroleum Storage, Resale and Usage Sites (1997). Specific waste management monitoring is outlined in Table 8-6.

The treatment and release of industrial wastewater will similarly be monitored by FRL and, if required, will include sampling surface and groundwater near fuel storage and equipment refuelling areas. Parameters to be monitored will be determined using a risk based approach and may include the following aspects:

- Field physicochemical parameters – temperature, pH, electrical conductivity, total dissolved solids, redox, dissolved oxygen.
- Laboratory total dissolved solids, electrical conductivity, pH, total suspended solids.
- Major ions.
- Total and dissolved metals.
- Petroleum hydrocarbons.

Water sampling analyses will be conducted by a certified laboratory to ensure reliability in results and QA/QC procedures. In addition, the laboratory reporting limits for the prescribed suite will be considered to ensure results are comparable to the regulatory framework including environment permit conditions.

Baseline monitoring will start prior to the commencement of construction to enable determination of background values. Baseline monitoring is detailed in the Water Management Sub-plan.

Compliance by personnel with the procedures in this plan will be verified through both quarterly and spontaneous audits by FRL Environment Department personnel. Performance measured through monitoring, audits and inspections will be conducted by the FRL Environment Department.

Monitoring activities will be recorded, and annual reports prepared by in-house staff or suitably qualified and experienced third parties. Environmental performance reports will be submitted to the Conservation Environment Protection Authority and other regulatory authorities as part of routine environmental reporting as per the conditions of the environmental permit and other Project approvals.

Table 8-6 Waste management monitoring

Monitoring measure	Performance indicator	Target	Frequency
Review of waste register.	Reuse of waste products in a safe and effective manner.	Waste is reused for project activities wherever possible.	Annual
	Appropriate segregation of waste.	Waste is reused for project activities wherever possible.	Annual
	Appropriate disposal of waste.	Disposal of waste meets the requirements of this plan and environment permit.	Annual
Monitor water quality.	Surface and groundwater quality downstream of fuel storage and refuelling facilities.	Water quality results meet required standards and environment permit conditions.	Monthly

Frieda River Limited

Sepik Infrastructure Project: Vanimo Ocean Port

Environmental Management and Monitoring Plan

Water Management Sub-plan

Construction

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9. Water Management Sub-plan

9.1 Background

Construction activities associated with the Sepik Infrastructure Project Vanimo Ocean Port have the potential to impact on surface water and groundwater quality.

Water is used for a range of 'beneficial uses' (also known as environmental values) in the project area. The beneficial uses of a water resource may range from recreational use, a source of aquatic resources or the maintenance or protection of an aquatic ecosystem. Each beneficial use may have different water quality requirements.

The potential impacts of the project construction activities upon surface water and groundwater include:

- Elevated suspended solids concentrations and sedimentation surrounding disturbed areas, with associated physical impacts on aquatic biota or other beneficial values.
- Elevated concentrations of dissolved and particulate-associated metals, causing toxic effects on aquatic biota or people who may consume the aquatic biota.
- Contamination of surface and/or groundwater resources due to leaks or spills of fuels, oils, chemicals, hydrocarbons, landfill leachate and sewage.

9.2 Objectives

The objectives of surface water and groundwater management are to:

- Limit the increase in the loads and/or concentrations of pollutants (including sediment) entering surface water downstream of construction activity.
- Limit the volume of surface water becoming contaminated and reaching the marine environment.
- Limit the contamination of groundwater resources.

9.3 Responsibility

Implementation of the Water Management Sub-plan will be the responsibility of the Safety, Health and Environment (SHE) Manager, who is also responsible for ensuring that activities associated with the project are undertaken in compliance with relevant statutory environmental regulations and FRL's environment policy and project Construction Environmental Management and Monitoring Plan (EMMP).

9.4 Definitions

Beneficial use. An identified use of water that is of social, environmental and/or economic use.

Bund. An impermeable barrier constructed of earth, rock or concrete to prevent the inflow or outflow of liquids.

Runoff. The draining away of water (or substances carried in it) from the surface of an area of land, a building or structure, etc.

Watercourse. A river, creek or stream in which water flows permanently or intermittently in a visibly defined channel with:

- Continuous bed and banks.
- An adequacy of flow that sustains basic ecological processes and maintains biodiversity.

9.5 Procedures

The following procedures detail FRL's water management measures that will be implemented prior to and during the construction phase.

9.5.1 Planning and preparation

Planning and preparation management measures for surface and groundwater are detailed in Table 9-1

Table 9-1 Planning and preparation

No.	Management measure	Performance measure	Target	Responsibility
MM053	Design and construct project facilities involving the storage, handling, or use of hazardous materials to intercept potentially contaminated water for treatment if required prior to discharge.	Final design demonstrates consideration of potentially contaminated water.	Potentially contaminated water is intercepted where practicable.	SHE Manager
MP004	Train and induct personnel and contractors in potential project impacts to water quality and the management measures detailed in this management plan.	Maintenance of induction register.	Completion of induction by all employees and contractors where relevant to their role.	SHE Manager
MP158	Train and induct personnel and contractors in spill prevention and response procedures, in accordance with the Hazardous Materials, Fuel Handling and Spill Response Management Sub-plan.	Maintenance of induction register.	Completion of induction by all employees and contractors where relevant to their role.	SHE Manager

9.5.2 Contamination

Management measures to limit contamination of surface water (including sedimentation) and groundwater are provided in Table 9-2.

Table 9-2 Contamination management measures

No.	Management measure	Performance measure	Target	Responsibility
MM096	Conduct washing, servicing and refuelling of equipment, vehicles or machinery at designated, appropriately designed facilities, away from watercourses or the marine environment.	Records of visual inspections.	Equipment and machinery cleaned, serviced or refuelled in designated bunded areas.	Mobile Plant Manager

Table 9-2 Contamination management measures (cont'd)

No.	Management measure	Performance measure	Target	Responsibility
MM020	Limit potential impacts to groundwater during all project phases including: • Comply with the relevant statutory requirements and Australian standard AS 2243.10 (Standards Australia, 2004) for hazardous materials transportation, storage, handling and disposal. • Conduct leak detection during commissioning of pipelines and manage hydrotest water appropriately. • Develop and implement a waste minimisation, waste handling and disposal strategy.	Compliance with design criteria. Water quality monitoring. Fuel and oil storage log.	No unrecorded fuel and oil. All pipeline leaks recorded and rectified.	Construction Manager, Operations Manager, SHE Manager
MP006	Visually monitor runoff from construction sites. Uncontained surface water contamination from oil or sediment must be recorded. Where practicable and where required, appropriate steps will be taken to remediate the problem.	Records of visual inspections for large rainfall events	Large runoff events monitored.	SHE Manager
MP007	Document and investigate all complaints about water quality and work with local communities to resolve any issues via the project grievance mechanism.	Maintenance of grievance register.	No unresolved complaints.	Community Relations Manager SHE Manager
MP163	Place excavated material, cleared vegetation or fill away from natural drainage lines.	Records of visual inspections	No excavated material is stockpiled in gullies, creeks or other natural drainage lines.	Construction Manager
MP164	Pass any water used in workshops through an oil-water separator trap prior to discharge.	Records of visual inspections.	Workshop water captured and directed through trap before discharge.	Mobile Maintenance Manager
MP167	Divert water of poor quality to the sedimentation ponds and/or use this water as make-up water during construction (e.g., vehicle washdown).	Records of visual inspections.	Poor quality water reports to a sedimentation pond or is reused prior to discharge.	SHE Manager

No.	Management measure	Performance measure	Target	Responsibility
MP169	Check the quality of ponded water prior to discharge near a waterbody, treating to remove sediment, hydrocarbons and chemicals if necessary. Discharge ponded water away from cleared areas to stable (vegetated) areas.	Records of water quality checks before discharge.	No discharge of unchecked ponded water.	SHE Manager
MP182	Management of hazardous materials to prevent negative impacts on water quality will be conducted in accordance with the Hazardous Materials, Fuel Handling and Spill Response Management Sub-plan.	Visual inspections and maintenance or incident register.	Management of hazardous materials conducted in accordance with sub-plan.	SHE Manager

9.6 Performance, monitoring and reporting

The Vanimo Ocean Port Water Management Sub-plan and any other associated procedures will be reviewed annually to ensure that they remain valid.

Applicable plans and procedures will be reviewed after any non-conformance with a measure in this plan to ensure that they were effective and to identify where improvements can be made.

Monitoring relevant to water quality and management will include:

- Daily visual monitoring of water runoff from work sites to identify signs of water contamination from unexpected sediment release, rubbish or hydrocarbons.
- Surface water quality baseline monitoring program to establish the ambient water quality of the receiving environment to validate the initial water quality results provided in the EIS.
- Groundwater baseline monitoring program to provide the basis for the assessment of impacts during operation of the Vanimo Ocean Port.
- Monitoring of the marine environment will be conducted monthly. Parameters to be monitored will be determined using a risk based approach and may include the following aspects:
    - Field physicochemical parameters – temperature, pH, electrical conductivity, total dissolved solids, redox, dissolved oxygen.
    - Laboratory total dissolved solids, electrical conductivity, pH, total suspended solids.
    - Major ions.
    - Petroleum hydrocarbons.
    - Filtered (<0.45 µm) and unfiltered metals: Al, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Ni, Pb, V, Zn, Fe, Hg.

Monitoring activities will be recorded and annual reports prepared by in-house staff or suitably qualified and experienced third parties. Environmental performance reports will be submitted to the Conservation Environment Protection Authority and other regulatory authorities as part of routine environmental reporting as per the conditions of the environmental permit and other project approvals. Water quality results will also be routinely reported to local communities.

Monitoring is detailed in Table 9-3.

Table 9-3 Water monitoring

Monitoring measure	Performance indicator	Target	Frequency
Loads and/or concentrations of pollutants (including sediment) entering marine environment downstream of construction activity.	Monitoring the quality of water discharged from the sedimentation dams and comparison against baseline water quality data to confirm the performance of sediment control structures and the prediction of marine impacts.	Impact on marine water quality as predicted in EIS.	Monthly or as required
Monitor marine water quality	Water quality in Dakriro Bay downgradient of project activities.	Monitoring results comply with environment permit conditions.	Monthly (ambient water quality sites) or as required
	Number of complaints about project-related water quality.	Complaints recorded and investigated in compliance with grievance procedure.	As required
Monitor groundwater quality.	Monitoring undertaken.	Monitoring results comply with environment permit conditions.	Monthly to annually (depending on parameter)

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Sepik Infrastructure Project: Vanimo Ocean Port

Environmental Management and Monitoring Plan

Weed, Pest and Quarantine Management Sub-plan

Construction

Environmental Management and Monitoring Plan

Weed, Pest and Quarantine Management Sub-plan

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10. Weed, Pest and Quarantine Management Sub-plan

10.1 Background

This sub-plan has been developed to manage the potential for the introduction and spread of weeds, pests, and pathogens as a result of the construction of the Sepik Infrastructure Project Vanimo Ocean Port. The sub-plan will ensure the most appropriate methods for the management of weeds, pests, and diseases during construction activities are implemented.

This sub-plan has been developed to address the following:

- Introduction of new weed species.
- Spread of existing weed species.
- Introduction of new pest species and the diseases they may carry.
- Spread of existing pest species and the diseases they may carry.

10.2 Objectives

The objectives of this Weed, Pest and Quarantine Management Sub-plan are to:

- Ensure personnel are aware of prohibited activities relating to the import or movement of exotic plants and animals during construction of the project.
- Prevent exotic weeds, pests and diseases from entering, spreading or becoming established in the project area during construction works.
- Identify and contain, suppress or manage significant weeds, pests and diseases already in the project area to limit their spread by project activities.
- Limit the potential for the project to cause a significant reduction in the abundance of native species.

10.3 Responsibility

Implementation of the Weed, Pest and Quarantine Management Sub-plan will be the responsibility of the Safety, Health and Environment (SHE) Manager. The SHE Manager is responsible for ensuring that activities associated with the project are undertaken in compliance with relevant statutory regulations, and the FRL environment policy and the project Construction Environmental Management and Monitoring Plan (EMMP). All staff, including contractors, are responsible for compliance with this sub-plan.

10.4 Definitions

Weed or pest. A weed or pest is defined as an invasive (native or introduced) species that causes an adverse impact on the ecology and/or communities.

10.5 Procedures

10.5.1 Planning and preparation

Planning and preparation management measures to address weed, pest and pathogens and quarantine management are detailed in Table 10-1.

Table 10-1 Planning and preparation

No.	Management measures	Performance measure	Target	Responsibility
MP014	Ensure that personnel are familiar with this sub-plan and the importance of controlling impacts on terrestrial and marine environments during construction.	Maintenance of induction register.	Completion of induction by all employers and contractors where relevant to their role.	SHE Manager
MP092	Ensure site personnel are inducted regarding pest and weed control in and around the project area.	Maintenance of induction register.	Completion of induction by all employers and contractors where relevant to their role.	SHE Manager

10.5.2 Quarantine

Quarantine measures (Table 10-2) will establish and enforce project wide systems that will encompass personnel and freight movements in and out of the project area, and establish inspection and treatment standards and procedures for all freight types, including imported bulk materials.

Table 10-2 Quarantine measures

No.	Management measures	Performance measure	Target	Responsibility
MP093	Establish and enforce a project-wide quarantine program. Focus on sites where equipment and supplies will be imported into PNG or brought into the project area from elsewhere in PNG.	Documented, updated and audited quarantine program, with input from relevant stakeholders.	Documentation of program and 100% success of regular audits.	SHE Manager
MM083	Prohibit keeping or temporary housing of pets or wild fauna at project facilities other than trained animals under the control of a handler.	Regular inspections of accommodation and facilities for pets.	Zero reported incidences.	SHE Manager

Table 10-2 Quarantine measures (cont'd)

No.	Management measures	Performance measure	Target	Responsibility
MM077	Prohibit hunting, collecting, or harassing of wildlife, keeping wildlife as pets and/or the possession and/or transport of wildlife products by project employees and contractors at project sites.	Regular inspections of employees and contractors for wildlife or wildlife products.	Zero reported incidences.	SHE Manager
MM071	Establish procedures to prohibit project workers/contractors from establishing gardens or introducing plants, seeds or animals, including fish species, within the project area.	Regular inspections of accommodation and facilities for pets.	Zero reported incidences.	SHE Manager
MP094	Cargo must meet PNG Quarantine guidelines before being packed into containers at origin to ensure compliance with regulatory quarantine requirements.	Quarantine audits of cargo for each importation.	Zero reported incidence of failure to meet PNG guidelines.	Supply & Logistics Manager
MM070	Establish and implement procedures to ensure soil and weed seeds are cleaned from plant and machinery brought into the project area from overseas, logging areas or agricultural areas elsewhere in PNG prior to reaching the project site (applies to Company and Contractors).	Inspections of vehicles and equipment arriving on the project site for all new deliveries.	Inspection of project vehicles and equipment that arrive on the mine site.	Supply & Logistics Manager
MM073	Establish permanent chemical wash down point(s) to prevent weeds and pathogens being transported to work sites, where appropriate.	Evidence of constructed wash downs points and registers of their use.	Wash down points included in detailed engineering design based on consultation with weed expert as to their locations.	Supply & Logistics Manager
MP095	Contain the material washed from machinery/equipment for appropriate disposal.	Inspection of wash down points for containment of washed material within wash down point for disposal.	90% success of completion.	Supply & Logistics Manager

Table 10-2 Quarantine measures (cont'd)

No.	Management measures	Performance measure	Target	Responsibility
MP096	Ensure shipping contractors, comply with International Maritime Organization requirements and industry good practice with respect to ballast water discharge.	Records of ballast discharge. Quarantine audits of cargo for each importation.	Zero reported incidence of failure to meet International Maritime Organization requirements.	Supply & Logistics Manager
MM138	Implement a quarantine management plan which will include requirements for project vessels to comply with PNG and relevant International Maritime Organization guidelines and standards including ballast discharge, hull cleaning and antifouling requirements.	Records of quarantine measures implemented.	Zero reported incidence of failure to meet International Maritime Organization requirements in regard to marine pest management.	Environment Superintendent
MM139	Store on board any wastes produced by vessels that cannot be discharged under PNG and relevant International Maritime Organization guidelines and standards and transfer to an approved onshore facility for treatment, reuse, recycling or disposal.	Documentation of correct disposal of wastes.	Zero reported incidence of failure to meet International Maritime Organization requirements in regard to marine pest management.	Supply & Logistics Manager Environment Superintendent

10.5.3 Pre-construction

Pre-construction management measures to address biodiversity management are detailed in Table 10-3.

Table 10-3 Pre-construction measures

No.	Management measures	Performance measure	Target	Responsibility
MM072	Control infestations of high priority weeds prior to commencement of construction.	Records of treatment and eradication within a weed treatment register.	All high priority weeds outbreaks controlled.	Environment Superintendent
MM096	Conduct washing, servicing and refuelling of equipment, vehicles or machinery at designated, appropriately designed facilities, away from watercourses and the local marine environment of Dakriro Bay.	Regular visual inspection by Environment Department.	Zero non-conformances of washing equipment in watercourses.	SHE Manager

10.6 Performance, monitoring and reporting

This FRL Weed, Pest and Quarantine Management Sub-plan, and any other associated procedures will be reviewed annually to ensure that they remain valid.

Applicable plans and procedures will be reviewed periodically to ensure they remain effective and to identify where improvements can be made.

General monitoring relevant to weeds, pest, pathogens and quarantine will include documenting any incidents, maintenance works and training records. Pathogens and quarantine reports will be completed, and appropriate measures will be taken to ensure the management of goods will be control and monitored to limit any incidents. Specific monitoring of weeds and pests are outlined in Table 10-4.

Ongoing monitoring of construction activities will be undertaken to assess the success of management measures and identify areas where changes to management measures will minimise the risk of spreading uncontrolled weeds, pest and pathogens. Where monitoring identifies deficiencies in the control methods described above, the procedures in this plan will be reviewed and updated as required.

Compliance by personnel with the procedures in this plan will be verified through both routine and unannounced inspections and monitoring by the SHE Manager (or their delegate).

Monitoring activities will be recorded, and annual reports prepared by in-house staff or suitably qualified and experienced third parties. Environmental performance reports will be submitted to the Conservation Environment Protection Authority and other regulatory authorities as part of routine environmental reporting as per the conditions of the environmental permit and other project approvals.

Table 10-4 Weed, pest and quarantine monitoring

Monitoring measure	Performance Indicator	Target	Frequency
Weed and pest control techniques.	Comparison of weed and pest control techniques against monitoring data.	Successful controls demonstrated.	Ongoing
Visual inspections and monitoring on the existing weeds and pests already present in the project area.	Abundance and cover of weeds species that are known to occur.	Weeds and pest must be contained at all times.	Ongoing