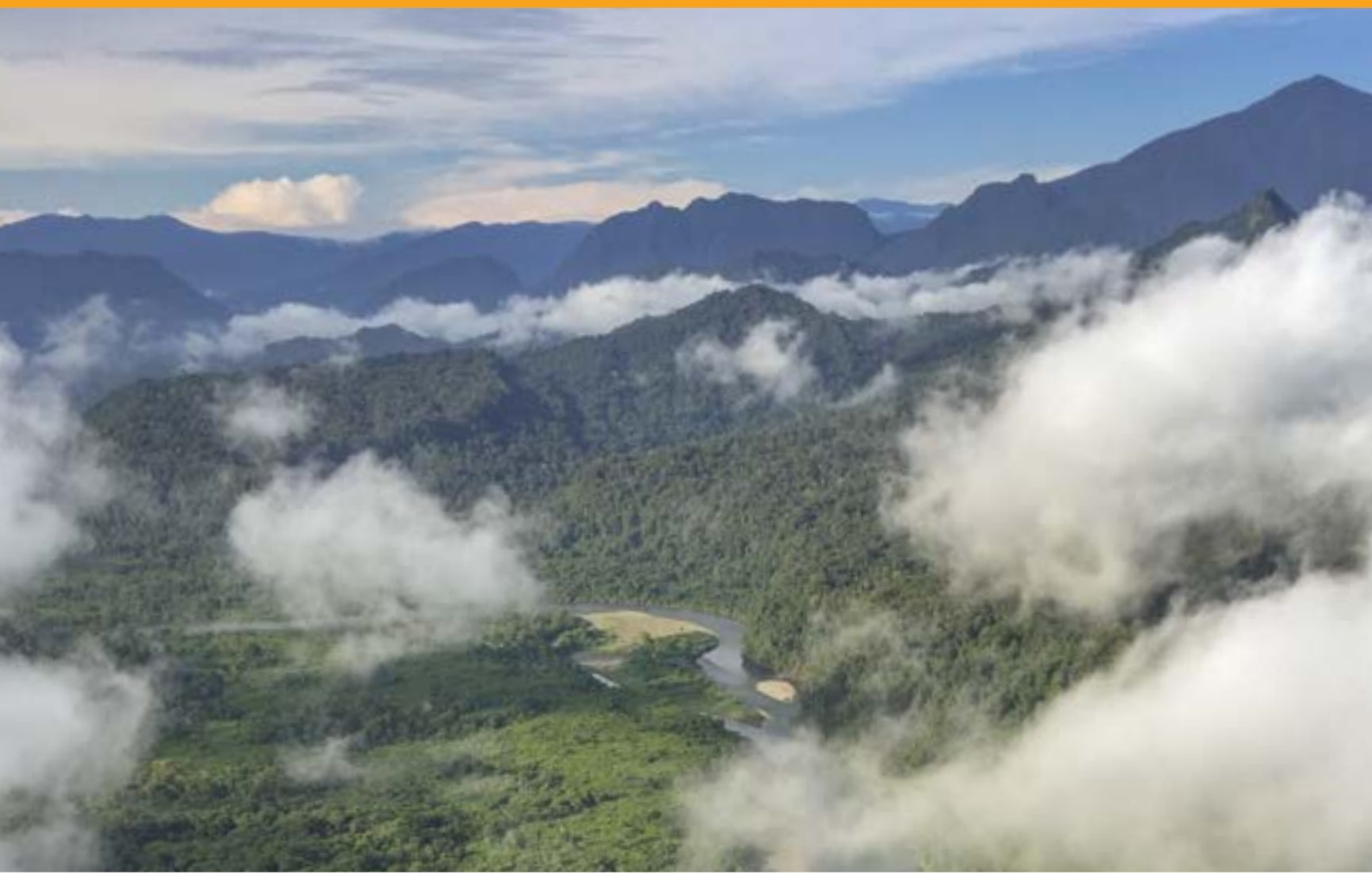
FRIEDA RIVER

Frieda River Limited
Sepik Development Project
Environmental Impact Statement

Attachment 2e – Sepik Infrastructure Project: Green River Airport Environmental Management and Monitoring Plan

SDP-6-G-00-01-T-003-007



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FRIEDA RIVER

Frieda River Limited

Sepik Infrastructure Project: Green River Airport

Environmental Management and Monitoring Plan

Construction

Environmental Management and Monitoring Plan

Sepik Infrastructure Project: Green River Airport Construction

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Table of contents

Tables

Figures

1. Introduction

Coffey has prepared this Environmental Management and Monitoring Plan (EMMP) on behalf of Frieda River Limited (FRL) to set out the environmental management, monitoring, auditing and reporting program that will be implemented by FRL in managing environmental impacts during the construction phase of the Sepik Infrastructure Project Green River Airport.

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 the management and monitoring of potential environmental impacts associated with the construction activities of the Green River Airport (Figure 1-1). The EMMP takes into account the commitments made in the Sepik Development Project Environmental Impact Statement (EIS), and will be updated to incorporate the relevant conditions of the environment permit, once granted.

Construction activities associated with the FRCGP, FRHEP, SPGP, Vanimo Ocean Port and public road from Vanimo to Hotmin are covered in separate EMMPs.

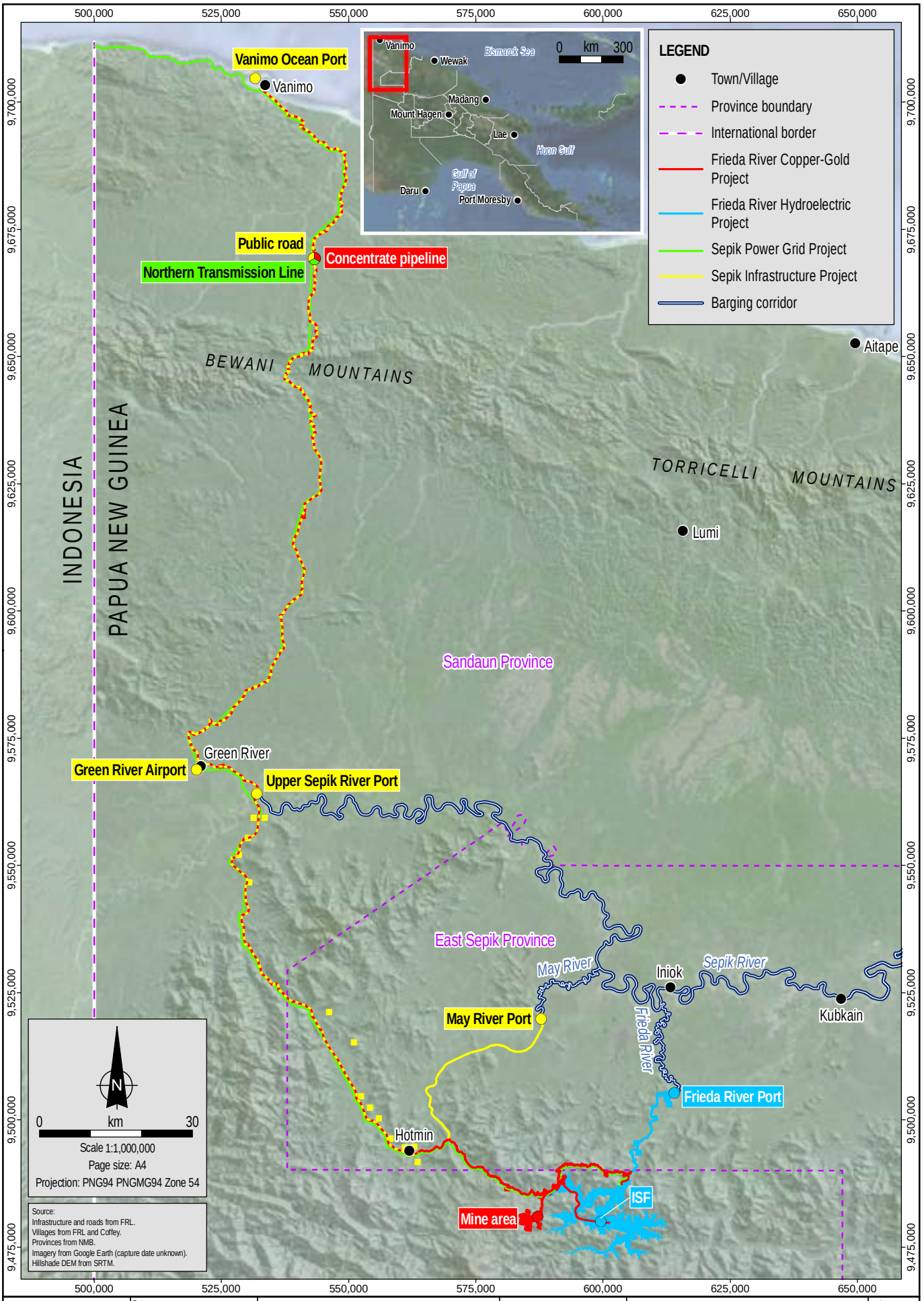
The FRCGP, comprising of an open-pit copper-gold mine, will develop the HITEK porphyry copper-gold orebodies in the northern foothills of the New Guinea Highlands (Central Range) in Sandaun Province. The mine is located in a remote area, approximately 200 kilometres (km) from the northern coast. Key supporting infrastructure, including an infrastructure 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 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 Vanimo Ocean Port and the Green River Airport (the focus of this EMMP).

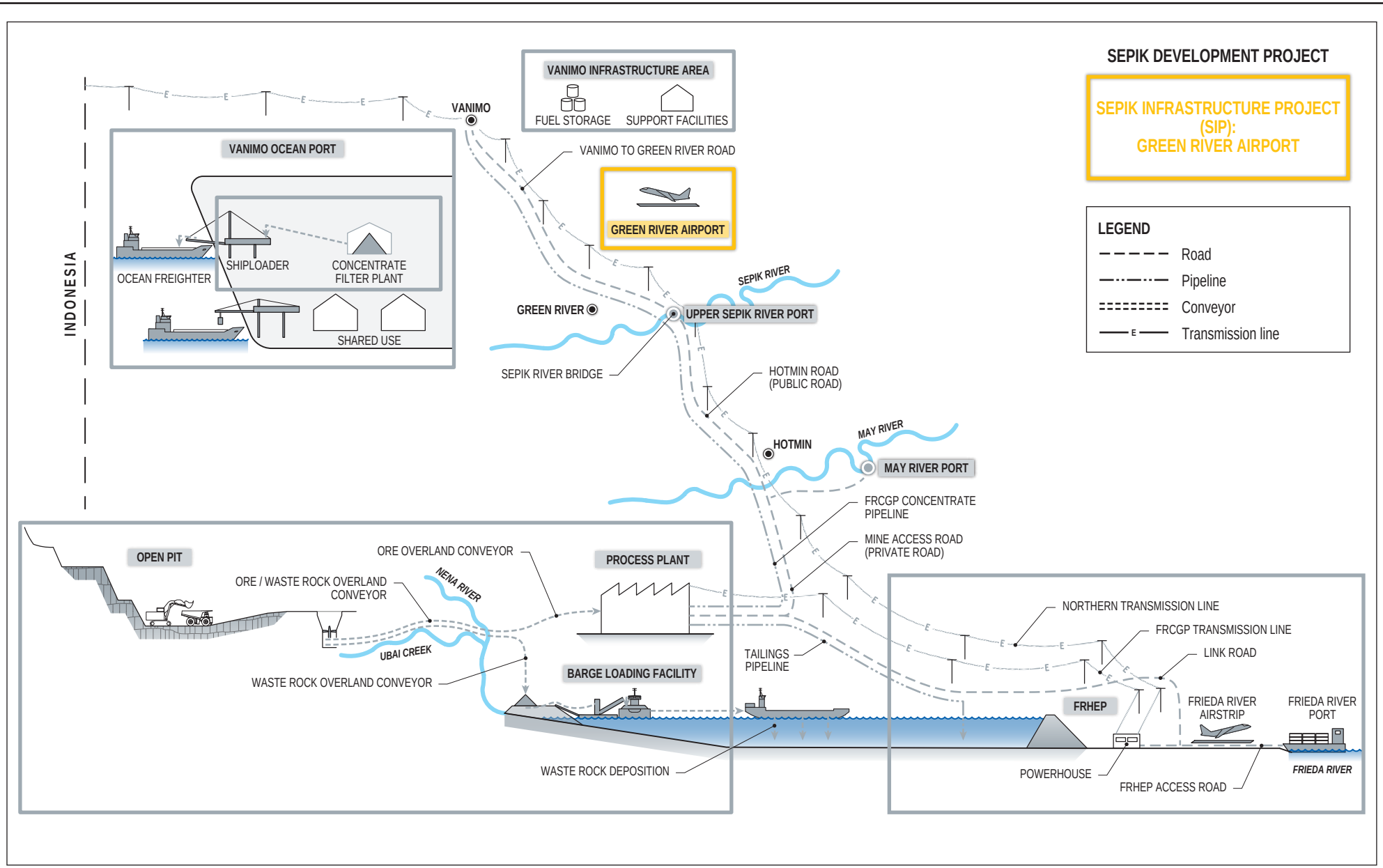
The SPGP consists of a new 370-km long 275 kV transmission line (Northern Transmission Line) from the FRHEP to the Indonesian border via Vanimo. The Northern Transmission Line will be located within the infrastructure corridor and will provide power for FRCGP, including the offsite FRCGP

facilities at Green River and Vanimo. The transmission line will follow the existing Vanimo-Jayapura Highway from Vanimo to the Indonesian border.



MXD Reference: 11575B_11_BM_GIS001_v0_13

coffey A TETRA TECH COMPANY	Date: 07.09.2018 Project: 754-ENAUABTF11575B File Name: 11575_22-6_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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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

1.1.2 Project activity

Upgrade of the Green River Airport will involve improving the well-formed but simple airstrip to an international airport that will cater for larger aircraft and be available for commercial domestic use. It will be made suitable for up to Lockheed C-130 sized aircraft and include a terminal with the capacity for 80 passengers. Included in the design of the airport are the following facilities:

- Baggage handling facilities.
- Immigration and customs.
- Freight handling and storage facilities.
- Offices and other rooms for briefings, inductions, handovers and general operations.
- Vehicle parking.
- Maintenance building.
- Fire and rescue area.
- Refuelling facility.

The construction of the SIP (including the public road, Green River Airport, and ocean and river ports) will require a peak workforce of 660 personnel. Construction of the upgraded airport will occur over a two year period.

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 EIS is be submitted to the Conservation and Environment Protection Authority (CEPA) to gain an environmental permit to construct and operate the project. FRL plans to lodge the EIS with the CEPA in Quarter 4, 2018. The Environment (Amendment) Act 2014 includes amendments to the Environment Act, some of which relate to changes to the environmental impact assessment process, however Part 1 of this act is not yet in operation.

Certain conditions for the granting and setting 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 Environment 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 Green River Airport.

Issue-specific management sub-plans describe the environmental objectives and management measures that will be implemented to mitigate impacts that may occur. These sub-plans are described in Section 1.3.

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 Green River Airport, and describe the proposed organisational structure under which these activities will be carried out. 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 airport. 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 construction of the airport to ensure a framework is in place to achieve the 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.
- Ensure project construction activities comply with environmental permit conditions.
- Provide guidance to on-site staff.

Standard operating procedures to be followed in the day-to-day management of project construction activities will be developed by FRL staff and its contractors. These will set out the roles and responsibilities for FRL staff and contractors, and will be designed to achieve the commitments set out in this EMMP. Furthermore, service agreements for contractors will include environmental and social responsibilities.

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) – Introduction: project overview and an outline of the objectives of the EMMP.
- Section 2 – Regulatory framework: outline of the regulatory framework for environmental and socio-economic management for the project.
- Section 3 – Existing environment: description of the existing environment.
- Section 4 – Construction activities: description of planned construction activities.
- Section 5 – Environmental management framework: description of the environmental management system framework for the project.
- Section 6 – Environmental monitoring: outline of the environmental monitoring program (further detail on monitoring is provided in each individual management sub-plan).
- Section 7 – 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-plans are included in this EMMP (listed in order of arrangement):

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

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 Sepik Development Project are regulated primarily by the Environment Act. 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 Sepik Development Project.

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 environment inception report (EIR) on 20 December 2017 and an EIS and an environment permit application to CEPA for the Level 3 and 2B activities 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, 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 physical and biological setting of the project area 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.

Climatic information for Green River was not obtained during the EIS study as data is limited. Climatic patterns have been inferred from meteorological data from the mine area, on the Sepik River (i.e., Iniok and Moruapie) and Vanimo.

The hill zones, including the northern slopes of the Central Range and the Bewani Mountains, are predicted to have higher rainfall than the lowland zone of the Sepik River floodplain, including Green River. The Sepik River floodplain receives approximately 4,000 mm 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 the Sepik River floodplain compared to the hill zones of the central and the northern coastal range by up to 3°C throughout the year (based on temperature patterns in the mine area and Vanimo).

The other significant difference between the hill and lowland zones of the region is the lowland zone experiences a more pronounced dry period from May to October.

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 Green River Airport is located on the northern portion of the Indo-Australian Plate. The Indo-Australian Plate is moving in a north-easterly direction at approximately 11 centimetres (cm) per year and is colliding with the south-westerly-moving Pacific Plate, which lies to the north and east of the Indo-Australian Plate (Bechtel, 2010).

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 mine area and infrastructure corridor. Five volcanoes are located east of Green River (three

are active, and two are inactive). The closest active volcano to Vanimo 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

Green River is located within the Sepik River floodplains, a landform that extends south of Green River to the village of Idam and north of Green River to the southern side of the Bewani Mountains. Composite alluvial plains dominate the landscape, with sections of back swamps also present. The drainage regime in this area can vary widely depending on the local conditions.

3.1.3.2 Geology

The geology within Green River and the broader Sepik River floodplains is dominated by alluvial geological formations made up of gravel, sand, silt, mud and clay.

3.1.3.3 Soil

The soils within Green River and the surrounding floodplain areas are dominated by poorly draining Fluvaquents.

The probability of acid sulphate soil (ASS) occurring in Green River is high, however, the origin of ASS is still uncertain. A study carried out by Golder Associates (2011), which focussed on lowland areas closer to the mine area, suggests that ASS is unlikely to be from a sulphide source, but more likely to be from acidic soils possibly of volcanic origin, with a lower potential to produce acid drainage. Given the shallow depth of samples used for investigations to date, it cannot be determined whether ASS of a sulphidic nature underlie those areas beneath the one metre depth limit of the investigation.

3.1.4 Groundwater

Groundwater levels in the lowlands are generally close to ground level. These groundwater systems are likely to range from intermediate to regional. The distances between recharge and discharge areas are typically greater than 100 km and the response time between these areas is long and storage capacities are very large.

Active recharge (where surface water, including rainfall and rivers, is added to groundwater) is expected in the foothills, but the lowlands will be evaporative discharge zones, where groundwater is expressed at the surface and is subject to evaporation, particularly in swampy areas.

3.1.5 Terrestrial ecology

Green River, including the airstrip, is located in a valley that is essentially devoid of trees. The vegetation surrounding Green River is made up of Tall Lowland Forest, mostly open forest, with small areas of high quality large crown forest and cleared areas (as described by the PNG Forest Inventory and Mapping System (FIMS)).

The region contains a high diversity of terrestrial fauna, in particular mammals and frogs, in comparison with other remote areas of the PNG highlands. As such, the Sepik River basin rates as a globally significant area of biodiversity, as demonstrated by the nomination and tentative listing of part of the basin as a world heritage area, and the establishment of the Hunstein Range Wildlife Management Area (WMA). Of the flora species recorded during field surveys, 16 IUCN red list flora taxa were documented (IUCN, 2011). Seventeen PNG Forest Inventory System (FIMS) vegetation communities were documented in the Terrestrial Biodiversity Study Area. In addition, a new formation previously undocumented in PNG was recorded.

Sixty-eight fauna species of conservation significance occur and/or are likely to occur within the Sepik Development Project area. This includes, 20 mammals, 42 birds, 4 butterflies, 1 reptile and 1 dragon fly. Of these 68 species, 64 are IUCN red list species and 37 are protected under the PNG Fauna Act.

The presence of introduced and invasive species encountered during the surveys was directly correlated to human presence and infrastructure.

3.1.6 Aquatic ecology

The pH of mid-catchment and lowland rivers is generally in the range of pH 7 to 8. Alkalinity measurements showed there to be a low to moderate amount of buffering capacity available in most of the sampled creeks and rivers.

The dominant major ions are calcium and carbonate, reflecting the influence of limestone within the catchment. Concentrations of metals in streams are generally low. Turbidity and total suspended solids (TSS) levels are highly variable in mid-catchment and lowland rivers, but are generally quite low. Levels of TSS and turbidity in the Sepik River are higher and increase downstream.

The aquatic flora of the clear-water upland rivers and creeks is typically dominated by diatoms, periphyton and benthic algae, with larger submerged macrophytes being limited or absent. In the turbid rivers and streams, there is more limited aquatic flora and no macrophytes. Non-native species have also been observed throughout the lower catchment. Seventeen species of fish that have been reported in the Sepik River are of conservation significance due to being assessed as threatened or potentially threatened, or because they are endemic. A further 15 endemic species of fish have also been recorded that are either endemic to northern New Guinea or locally endemic to the Sepik-Ramu River system. Two New Guinea-endemic species of freshwater turtles are known to occur in the Sepik–Ramu River system, the frog-faced softshell turtle, *Pelochelys signifera*, and the spotted or New Guinea snapping turtle, *Elseya novaeguineae*. Two crocodiles, the freshwater *Crocodylus noveaguineae*, and the saltwater crocodile, *Crocodylus porosus*, occur in the Sepik River

system. While neither species is listed as threatened by the IUCN, both are of local conservation significance.

3.1.7 Air quality and greenhouse gas emissions

The villages within Green River are remote from major industrial sources. Due to the high rainfall, low wind speeds and well-vegetated nature of the area, background concentrations of pollutants such as sulphur dioxide, nitrogen oxides and suspended particulate matter, can be expected to be negligible.

3.2 Socio-economic setting

This section provides an overview of the socio-economic setting of Green River. Village level data for Green River collected in 2017 is limited. Where village level data for Green River was not collected, information obtained during surveys from 13 villages within the infrastructure corridor in 2017, from Vanimo to Hotmin, has been used to provide an indicative socio-economic picture of Green River and its neighbouring villages.

3.2.1 Community layout and amenity

Green River, situated roughly halfway between the mine area and Vanimo along the infrastructure corridor, is a population centre. It is classified as a Level 2 growth centre by the Sandaun Provincial Government, and is the end point of the existing public road from Vanimo.

Almost all houses (over 75%) across the infrastructure corridor are semi-improved, i.e., built from a mix of bush materials and iron roofing. A small portion of houses are made entirely of bush materials and a small portion are built entirely of modern building materials.

3.2.2 Demography and population

The population within the Vanimo/Green River District grew by 2.9% between 2000 and 2011, from 50,751 to 69,052 (NSO, 2000 and NSO, 2014). Age demographics within the Green River Rural Local Level Government (LLG) show 46% of the population are under 15 years old, and 3% of the population is over 60 years old.

3.2.3 Land and water resource use

The population in Green River and nearby villages predominantly live a subsistence based lifestyle, relying on the land and natural water resources for growing crops, hunting and fishing.

The most common crops grown are sago, banana, coconut and taro. Fishing in the Sepik River, as well as hunting are important practices for sourcing dietary protein.

3.2.4 Economy

Green River and nearby villages within the infrastructure corridor are characterised by their remoteness and their low level of participation in the cash economy. Some villages have markets, but restricted access and high transport costs limit participation in the cash economy.

3.2.5 Health

Current health services within Green River is minimal, with inadequate equipment and resources to service the needs of the population. Green River has an aid post, however the lack of health services in nearby villages adds additional strain on the limited resources of the Green River aid post.

The common illnesses experienced by the local population include, malaria, diarrhoea, upper respiratory tract infections, fever and skin and eye infections. Rates of admissions to health care facilities for malaria, malnutrition, anaemia, pneumonia other respiratory illnesses are high within the infrastructure corridor compared to many other parts of PNG.

3.2.6 Education

Education levels within Green River Rural LLG is low, with 56% of the population having received no education, as at 2011. No high schools, tertiary institutions or vocational training centres are present in the infrastructure corridor communities, although some primary schooling is available. As a result of the poor education and training base, only a small proportion of the population in the area could be considered employable for occupations in any roles other than unskilled jobs.

The literacy rate within Green River Rural LLG is 56%, compared to the Provincial average of 65%.

3.2.7 Governance, law and order

No formal police (i.e., police who are trained and paid by the government) are stationed at any of the villages surveyed within the infrastructure corridor. Generally, village magistrates, village councillors, community leaders and, in some cases, church leaders provided authority and administered law and order.

Alcohol was considered a significant contributor to the incidence of crime (including domestic violence, physical abuse and public nuisance) across many of the communities. Villages in the more remote locations along the infrastructure corridor generally experience a safe environment, however, face difficulty when access to services is needed.

3.2.8 Infrastructure

Within the infrastructure corridor, there is little to no government services or public infrastructure. There is a small number of community halls and recreational facilities, which are generally not maintained when present. Access to electricity is rare, and where present, is through diesel generators or solar panels.

3.2.9 Domestic water use and sanitation

Water supply infrastructure is nearly non-existent within the infrastructure corridor, south of the Bewani Mountains, where almost all water is sourced from rivers, lakes, natural springs or bore water, and is untreated prior to consumption.

Sanitation infrastructure is varied along the infrastructure corridor. Some villages have good access to latrines, including Amini, Sumumini, Hotmin, Uramesin 2, Temsapmin and Bisiabru. Other villages primarily use the bush for sanitation purposes.

3.2.10 Culture and customs

Villages within the infrastructure corridor continue to practice traditional cultural activities while also adopting non-traditional practices into their society. Due to their isolation, low population density and the absence of demand for access to their land for industrial agriculture, communities south of the Bewani Mountains through to Hotmin have been able to maintain their cultural identity and traditions.

4. Construction activities

Upgrading the Green River Airport will include extension of the existing runway to cater for Lockheed C-130 sized aircraft, constructing a terminal with capacity for 80 passengers, as well as construction of offices and other rooms, vehicle parking facilities, a maintenance building, a fire and rescue area, and a refuelling facility.

The airport design will comply with Civil Aviation Safety Authority of PNG requirements with respect to navigation equipment, security, maintenance and refuelling.

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

Additional infrastructure associated with construction of the airport includes:

- Laydown yard.
- Sewage treatment.
- Fuel / chemical storage.
- Communications and navigation infrastructure.
- Access roads.
- Powerlines and temporary power generation.
- Water management infrastructure.
- Security facilities.

The requirement for these facilities, as well as their designs, will be determined during the detailed design phase.

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 Environmental Management System (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.

This EMMP will form part of the EMS.

5.2 Policy

Construction of the Green River Airport 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 construction of the public road 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:

- The EMS is being correctly implemented.
- 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 construction of the upgraded airport 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 airport is constructed and operated 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 project 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:
    - Landform and soils.
    - Terrestrial pathogens, weeds and introduced species (flora and fauna).
    - Freshwater environment including water quality.
    - Noise and vibration.
- **Post-construction monitoring.** Conducted to validate and monitor predicted impacts from construction activities.

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: Green River Airport

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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	Role	**Name**
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Table of contents

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 and construction of airport facilities as part of the Sepik Infrastructure Project.

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

- Clearance of vegetation.
- Earthworks.
- Excavation and formation of foundations for new buildings and extension of the runway.
- Loading rock to trucks.
- General vehicle movements over unsealed roads.
- Wind erosion from exposed surfaces (e.g., soil, stockpiles and dumps).
- Combustion of diesel fuel for equipment and vehicles.

The main noise and vibration generating sources will include:

- Construction machinery (e.g., loaders, trucks, excavators, graders, compactors and other ancillary equipment).
- Vehicles (including reversing alarms).
- Generators.

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 300 m of the Green River Airport will be made aware of the times and duration of construction activities.	Stakeholder engagement records.	Engagement with all affected villages.	Community Relations Superintendent
SEM057	Provide access to an effective and transparent Grievance Management Procedure for communities, employees and contractors.	Grievance management procedure.	Communications links defined in grievance management procedure.	Community Relations 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
MM115	Schedule construction works to consider religious and cultural holidays, where these can be avoided.	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

1.5.2 Management of air quality

Management measures to address air 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
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
MM129	Dust emissions from clearing and grading activities will be reduced by: • Limiting cleared areas as far as practicable and retaining existing vegetation where possible. • Stripping areas progressively and only where it is necessary for works to occur. • Retaining root stock in the ground where practicable to reduce erosion and to facilitate rapid rehabilitation, e.g., trimming and retaining trees rather than removing them, where practicable. • Employing stabilisation methods such as matting, grassing or mulch.	Records of regular visual inspections.	Clearance works conducted in accordance with management measures. No clearance of vegetation beyond that approved in site plan and clearance permits. Compliance with documented Rehabilitation and Revegetation Program.	SHE Manager

Table 1-2 Air emissions management measures (cont'd)

No.	Management measures	Performance measures	Target	Responsibility
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.	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
MM130	Additional measures for sensitive receptors located within 300 m from the Green River Airport construction activities include: • Locate fixed and mobile equipment sensitively with respect to local people. • Postpone, limit or relocate dust-generating activities in close proximity to villages in windy (e.g., >5 m/s) conditions (where practicable).	Records of regular visual inspections.	Clearance works conducted in accordance with management measures.	SHE Manager and Community Relations Manager
MM126	During construction, nuisance dust will be managed using water sprays.	Records showing the use of dust suppression. Maintenance of incident register.	Dust suppression implemented during extended dry and windy weather periods. No unresolved complaints from community and residents regarding air quality.	SHE Manager

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
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
MP012	Locate fixed and mobile equipment sensitively with respect to sensitive receptors.	Records of regular visual inspections of work sites.	No unresolved complaints from community and residents regarding noise nuisance.	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
MM121	Limit construction activities associated with the Green River Airport 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
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

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

No.	Management measures	Performance measures	Target	Responsibility
MM133	Construct enclosures, bunds and noise barriers for operation of 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

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.
- Maintenance of calibration records for monitoring equipment.
- Recording of servicing and maintenance of construction equipment in accordance with manufacturer's specifications.

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
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
Conduct noise monitoring at relevant sensitive receptors during construction of the Green River Airport 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
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: Green River Airport

Environmental Management and Monitoring Plan

Cultural Heritage Management Sub-plan

Construction

Environmental Management and Monitoring Plan
Cultural Heritage Management Sub-plan - Construction

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Table of contents

Tables

2. Cultural Heritage Management Sub-plan

2.1 Background

Construction activities have the potential to uncover and damage artefacts and sites of archaeological, cultural or historical significance, primarily as a result of vegetation clearance, earthworks and ground disturbance associated with the upgrade to the existing airstrip at Green River to an international airport.

This sub-plan details management measures and procedures to be followed for construction of the Sepik Infrastructure Project Green River Airport 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 Green River Airport construction area during EIS baseline studies. The proposed airport upgrade is located on previously disturbed land, however pre-construction surveys may be required on the final project footprint to confirm if sites are present.

2.2 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.

2.3 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.

2.4 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.

2.5 Procedures

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

2.5.1 Planning and preparation

The planning and preparation measures to address cultural heritage are detailed in Table 2-1.

Table 2-1 Planning and preparation

No.	Management measure	Performance measure	Target	Responsibility
SEM030	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
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
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
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
MP187	Maintain a cultural heritage site database and update the database as new information becomes available. The database will inform planning and design, and will assist in the implementation of recommended management measures (including the precise locations of all sites, particularly those to be avoided).	Documented and current database.	All cultural heritage sites documented in database.	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

Table 2-1 Planning and preparation (cont'd)

No.	Management measure	Performance measure	Target	Responsibility
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
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
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

2.5.2 Cultural heritage management

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

Table 2-2 Cultural heritage management

No.	Management measure	Performance measure	Target	Responsibility
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
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
MP191	Limit disturbance to cultural sites by confining traffic and machinery to designated tracks, as far as practicable.	Inclusion of cultural heritage details in land clearance permits.	No clearance or disturbance outside of permitted and demarcated areas.	Community Relations 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

2.6 Performance, monitoring and reporting

The FRL Green River Airport 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 2-3.

Compliance by personnel with the procedures in this sub-plan will be verified through both routine and unannounced inspections and monitoring by FRL Community Relations 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 2-3 Cultural heritage monitoring

Monitoring measure	Performance indicator	Target	Frequency
Inspections of known archaeological and cultural heritage sites that are avoided to assess the preservation and integrity of structures and the effectiveness of current management techniques.	Site record in cultural heritage database.	Preservation of known and avoided cultural heritage sites and no significant degradation of structural integrity where relevant.	Quarterly during the first year of construction, with annual inspections thereafter.
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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Frieda River Limited

Sepik Infrastructure Project: Green River Airport

Environmental Management and Monitoring Plan

Emergency Response and Fire Management Sub-plan

Construction

Environmental Management and Monitoring Plan
Emergency Response and Fire Management Sub-plan
Construction

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Table of contents

Tables

3 Emergency Response and Fire Management Sub-plan

3.1 Background

During construction activities for the Sepik Infrastructure Project Green River Airport 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 or earthquakes.

3.1.1 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 during construction include:

- Aircraft or vehicle accident.
- Vessel collision.
- Hazardous material spill or leak.
- Uncontrolled explosion.
- Structure failure.
- Natural disasters, such as earthquake or severe flooding.
- 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.

3.1.2 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, and release of large quantities of air emissions and contaminated runoff from firewater, with subsequent impacts on water 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.

3.2 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.

3.3 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.

3.4 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.

3.5 Procedures

3.5.1 Planning and preparation

Planning and preparation management measures to address emergency response and fire management are detailed in Table 3-1.

Table 3-1 Emergency response and fire planning and preparation measures

No.	Management measures	Performance measure	Target	Responsibility
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
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

Table 3-1 Emergency response and fire planning and preparation measures (cont'd)

No.	Management measures	Performance measure	Target	Responsibility
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

3.5.2 Emergency response

Management measures to address emergency response are detailed in Table 3-2.

Table 3-2 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

3.5.3 Epidemic, pandemic and communicable disease outbreak management

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

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

No.	Management measures	Performance measure	Target	Responsibility
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
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
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
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

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

No.	Management measures	Performance measure	Target	Responsibility
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
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

3.5.4 Civil unrest limitation measures

The measures detailed in Table 3-4 will be undertaken to manage and minimise civil unrest.

Table 3-4 Civil unrest limitation measures

No.	Management measures	Performance measure	Target	Responsibility
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
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 3-4 Civil unrest limitation measures (cont'd)

No.	Management measures	Performance measure	Target	Responsibility
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
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
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
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

3.5.5 Fire management

The measures detailed in Table 3-5 will be undertaken to limit the likelihood of uncontrolled fire and explosion

Table 3-5 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
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
MM074	Develop and implement fire management procedures for the construction phase aimed at reducing the likelihood of fires starting in the disturbance area to very low. The procedures will include observations for weather trends and forecasts and the requirement for a permit for burning of cleared vegetation and other fires, particularly in the hill environment in drought years.	Evidence of established procedures.	Documented and approved procedures prior to the beginning of construction.	SHE Manager

Table 3-5 Fire management and limitation measures (cont'd)

No.	Management measures	Performance measure	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
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

3.6 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 3-6.

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 3-6 Emergency response and fire management monitoring

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

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Sepik Infrastructure Project: Green River Airport

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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Table of contents

Tables

4. Erosion, Sediment and Soils Management Sub-plan

4.1 Background

Construction activities associated with the Sepik Infrastructure Project Green River Airport will include the clearance of vegetation and earthworks. Activities that will involve the excavation and movement of soils and rock on site will include, extension of the runway, and construction of laydown areas, permanent airport infrastructure such as buildings and parking spaces, and temporary infrastructure such as accommodation camps. Exposure, disturbance and stockpiling of soils and spoil all have the potential to contribute significantly to sediment-laden runoff from work sites to the receiving environment, resulting in downstream sedimentation and water quality impacts. 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 watercourses can have significant impacts on downstream beneficial uses[1] resulting from reduced water quality, such as, increased total suspended solids (TSS), bed sediment loading and metals concentrations, including:

- Water extraction for drinking and domestic purposes.
- Aquatic ecosystem health.
- Use of aquatic flora and fauna resources.

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.

4.2 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 in runoff from project areas.
- Manage all soil and spoil stockpiles in order to prevent erosion and downstream sedimentation.
- Limit the mobilisation of particulate-associated metals associated with acid sulphate soils (ASS) in runoff from project areas.
- Protect downstream beneficial uses of surface water 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.

4.3 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 6.5

4.4 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.

Ripping. Deep ripping to break up and aerate compacted soils, typically using ripper tynes on a bulldozer or grader.

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.

Vegetation clearance. Any activity that involves the removal of plants, trees, grass and forested areas (e.g., clear felling, brush cutting and clearing) to provide access to construction sites and facilities.

4.5 Procedures

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

4.5.1 Planning and preparation

Planning and preparation management measures to address erosion and sediment control are detailed in Table 4-1.

Table 4-1 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.	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 4-1 Planning and preparation erosion and sediment control measures (cont'd)

No.	Management measures	Performance measure	Target	Responsibility
MM001	Constructed landforms will be designed to cope with high surface water flows.	Constructed landform design criteria.	Constructed landforms meet design criteria.	Construction Project Manager, SHE Manager
MM002	Appropriate diversion structures will be designed to channel surface water away from constructed landforms.	Constructed landform design criteria.	Constructed landforms meet design criteria.	Construction Project Manager, SHE Manager
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

4.5.2 Soil and stockpile management

Measures for the management of soil and stockpiles to prevent erosion and sedimentation are detailed in Table 4-2.

Table 4-2 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
MM010	Implement control measures to minimise concentrated water flow and to protect the soil surface of disturbed areas, where practicable, which may include: • Applying vegetative debris (e.g., logs) or coarse material (e.g., rock armouring). • Diverting surface water around disturbed areas. • Progressively revegetating disturbed areas. • Applying erosion control matting.	Records of visual inspections.	All major soil and sediment controls function efficiently.	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 4-2 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) 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
MP062	Stockpile and use cut and mulched vegetation as matting on exposed earth surfaces.	Records of visual inspections. Disposal of cleared vegetation approved in vegetation clearance permit.	Cleared vegetation to be cut and mulched in accordance with vegetation clearance permit.	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).	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

4.5.3 Sediment management

Management measures to prevent sedimentation are detailed in Table 4-3.

Table 4-3 Sediment management measures

No.	Management measures	Performance measure	Target	Responsibility
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
MM036	Mark boundaries along cleared areas to limit machinery movement outside the clearance area and ensure that only trees/vegetation within the defined zone are removed.	Clearance does not exceed areas approved in vegetation clearing permits (any clearance beyond permitted areas must be reported as an incident) as demonstrated by regular inspection and monitoring by FRL Environment Department.	Zero non-compliances recorded of clearing beyond the project footprint.	Construction Project Manager
MM007	Restrict vehicles to only those areas that need to be accessed or trafficked.	Clearance does not exceed areas approved in vegetation clearing 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

Table 4-3 Sediment management measures (cont'd)

No.	Management measures	Performance measure	Target	Responsibility
MM038	In areas that will be rehabilitated, use land clearing techniques that preserve the rootstock of removed vegetation in the ground, where practicable.	Evidence of land clearing measures used to preserve rootstock of removed vegetation.	Land clearing techniques developed to preserve rootstock.	Construction Project Manager
MM005	Rehabilitate cleared areas to reduce erosion and runoff as soon as possible after clearance. Store and re-use suitable topsoil wherever practicable.	Records of progressive rehabilitation.	Compliance with documented Rehabilitation and Revegetation Program.	Environment Superintendent
MM039	Divert runoff, to the extent practicable, around disturbed areas including roads.	Records of visual inspections. Non-compliant discharges to be recorded as an environmental incident.	No unresolved incidents.	SHE Manager
MM040	Use rip-rap, gabions and check dams to reduce velocity flow of water in constructed drainage channels where practicable.	Records of visual inspections. Non-compliant discharges to be recorded as an environmental incident.	No unresolved incidents.	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

4.6 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 4-4.

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 4-4 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. 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 4-4 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.	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 downstream surface water 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

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Sepik Infrastructure Project: Green River Airport

Environmental Management and Monitoring Plan

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

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Table of contents

Tables

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

5.1 Background

During construction of the Sepik Infrastructure Project Green River Airport, 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.

5.2 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.

5.3 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.

5.4 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 (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.

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.

5.5 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.

5.5.1 Planning and Preparation

The planning and preparation measures to address hazardous materials and fuel handling are detailed in Table 5-1.

Table 5-1 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 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 5-1 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, vehicles and vessels.	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
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
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 5-1 Planning and preparation hazardous materials and fuel handling (cont'd)

No.	Management measures	Performance Measures	Target	Responsibility
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

5.5.2 Hazardous Materials Storage and Use

The measures detailed in Table 5-2 will be undertaken to ensure the appropriate storage and use of hazardous materials.

Table 5-2 Hazardous materials storage and use

No.	Management measures	Performance Measures	Target	Responsibility
MP077	Use chemical storage containers only for the storage of the chemical labelled.	Records of visual inspections.	No incorrect storage of chemicals.	SHE Manager
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
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

Table 5-2 Hazardous materials storage and use (cont'd)

No.	Management measures	Performance Measures	Target	Responsibility
MP078	Hazardous materials will not be stored or handled within 50 m of a waterbody or a drainage line leading to a waterbody.	Records of visual inspections.	Hazardous materials must be kept in designated areas at all times and at least 50 m from waterbodies.	SHE Manager
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

5.5.3 Hazardous Materials Disposal

Measures to be undertaken to ensure the appropriate disposal of hazardous materials are detailed in Table 5-3.

Table 5-3 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

5.5.4 Hazardous Materials Transport

The measures detailed in Table 5-4 will be undertaken to ensure the appropriate transport of hazardous materials.

Table 5-4 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
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
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

5.5.5 Fuel and Oil Storage

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

Table 5-5 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 5-5 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

5.5.6 Spill Response

The measures detailed in Table 5-6 will be undertaken to ensure the appropriate response and management of spills.

Table 5-6 Spill Response

No.	Management measures	Performance Measures	Target	Responsibility
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
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
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

Table 5-6 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

5.6 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), the Mineral Resources Authority (MRA) 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 5-7.

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 5-7 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.	Water quality results meet required standards and environment permit conditions.	Monthly

FRIEDA RIVER

Frieda River Limited

Sepik Infrastructure Project: Green River Airport

Environmental Management and Monitoring Plan

Traffic and Transport Management Sub-plan

Construction

Environmental Management and Monitoring Plan
Traffic and Transport Management Sub-plan
Construction

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Table of contents

Tables

6. Traffic and Transport Management Sub-plan

6.1 Background

Construction of the Sepik Infrastructure Project (SIP) Green River Airport will require the transport of personnel, equipment and materials to, from and around the airport site, using aircraft, barges and heavy and light vehicles.

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. FRL shall ensure that the contractor appointed is contractually required to meet all safety and regulatory requirements.

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.

6.2 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.

6.3 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).

6.4 Definitions

Barge. A large flat-bottomed vessel, usually moved by towing, used for transporting freight on water.

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.

6.5 Procedures

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

6.5.1 Planning and preparation

The measures detailed in Table 6-1 will be undertaken to reduce the likelihood of traffic and transport accidents.

Table 6-1 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 six 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 6-1 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
MP109	Train relevant personnel and contractors, through site inductions, on project related barge traffic and river transport rules.	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
MP119	Store adequate safety equipment on vessels and vehicles.	Records of visual inspections.	All safety equipment is maintained and meets relevant maritime safety standards.	SHE Manager
MM152	Provide fatigue management training to drivers and vessel operators.	Maintenance of training register.	No unresolved incidents.	Supply and Logistics Manager

6.5.2 Vessel collisions or sinking

The measures detailed in Table 6-2 will be undertaken to reduce the likelihood of vessel collisions or sinking.

Table 6-2 Vessel collisions or sinking

No.	Management measures	Performance measures	Target	Responsibility
MP114	Conduct regular servicing and inspection of vessels to ensure that they are operating in good working order.	Records of servicing and inspection.	All servicing to meet manufacturer's specifications.	Supply and Logistics Manager
SEM044	Develop and implement measures which include vessel crew education, community risk awareness, operational vessel management protocols, and appropriate physical safety measures (such as visual and audible warnings) where required for construction.	Operational protocols established. Records of visual inspections and training.	All vessels to meet relevant maritime safety standards and operational protocols.	Supply and Logistics Manager
MP116	Ensure that operators maintain a safe distance between vessels at all times.	Records of visual observations. Incident register.	No unresolved incidents.	Supply and Logistics Manager
MM147	Suspend vessel transport operation should extreme weather conditions make operations unsafe. During such conditions, vessels will be moored in the nearest safe location until conditions are deemed safe enough to recommence operation.	Incident register.	No unresolved incidents.	Supply and Logistics Manager
MP118	Maintain low speeds of cargo vessels entering and departing the Upper Sepik river Port to reduce the risk of vessel wash swamping small fishing canoes.	Records of visual observations. Number of complaints regarding vessel wash.	No unresolved complaints or incidents.	Supply and Logistics Manager
MP121	Ensure vessel operators do not transport non-project passengers between villages.	Maintenance of incident register.	No unresolved incidents.	SHE Manager
MP122	Ensure vessels are moored at designated areas. In an emergency, vessels may be stopped/moored outside of designated areas but should avoid stopping at villages.	Maintenance of barge movement logs. Maintenance of incident register.	No unresolved incidents.	Supply and Logistics Manager

6.5.3 Vehicle incident

The measures detailed in Table 6-3 will be undertaken to reduce the likelihood of a vehicle incident.

Table 6-3 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, particularly around villages.	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 6-3 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
MM151	Conduct vehicle route risk assessments factoring in the type of vehicle used on the roads and watercourse crossings and install speed limits and signage to advise road users of safe operating speeds and conditions.	Maintenance of risk register.	Risk assessments completed for all vehicle routes.	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

6.5.4 Aircraft incident

The measures detailed in Table 6-4 will be undertaken to reduce the likelihood or consequence of an aircraft incident.

Table 6-4 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
MM148	Design and operate airports to comply with the Civil Aviation Safety Authority of PNG requirements with respect to navigation equipment, security, maintenance and refuelling.	Airport structures designed in accordance with criteria. Maintenance of risk register.	Compliance with the Civil Aviation Safety Authority of PNG requirements and relevant national and international aviation safety regulations.	Construction Manager
MM149	Design and construct airstrips to take topographic constraints and weather conditions into consideration (such as areas prone to flooding and low-lying fog).	Airstrips designed in accordance with relevant design criteria.	Airstrips meet safety requirements of relevant codes and standards.	Construction Manager

6.6 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 6-5.

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 6-5 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 or vessels.	Ongoing
Vehicle and vessel movements.	Vehicle and vessel travel logs.	No unauthorised travel in FRL vehicles or vessels.	Ongoing
Monitoring of traffic accidents, including vessel collisions, 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: Green River Airport

Environmental Management and Monitoring Plan

Waste Management Sub-plan

Construction

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Table of contents

Tables

7. Waste Management Sub-plan

7.1 Background

This sub-plan deals with domestic and industrial wastes generated during construction of the Sepik Infrastructure Project Green River Airport. Management of this waste is required to keep construction sites safe and tidy, and to limit contamination of land and water.

This sub-plan covers all stages of waste management, from generation to collection, transport, storage, treatment, recycling and disposal.

Non-sewage waste from the airport construction and temporary accommodation camps will be stored temporarily and disposed offsite. Sewage will be treated onsite with treated effluent used for construction works or irrigated on vegetated areas.

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.

7.2 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.
- Ensure waste management activities comply with legislative requirements, waste industry standards and company guidelines. Avoid safety risks to communities.

7.3 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.

7.4 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.

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.

7.5 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.

7.5.1 Planning and preparation

Planning and preparation management measures to address waste emissions are detailed in Table 7-1.

Table 7-1 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 camps 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.	Site selection criteria for facility locations.	All waste storage areas located 50 m from watercourses.	Construction Project Manager

7.5.2 Waste management

Management measures to address waste emissions during construction are detailed in Table 7-2.

Table 7-2 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
MP171	Ensure that sewage treatment facilities are designed to meet water quality requirements of sewage treatment plant effluent specified in the environment (waste discharge) permit.	Records of design specifications.	Sewage treatment facilities meet design requirements.	SHE Manager
MM051	Manage sewage in an appropriate manner to limit environmental contamination.	Records of discharge quality monitoring.	Discharge water quality to meet relevant guidelines.	SHE Manager
MP172	Divert kitchen wastewater through grease traps before diverting to sewage treatment plant.	Records of visual inspections.	No discharge of untreated kitchen wastewater.	SHE Manager

7.5.2.1 Segregation of main waste types

The measures detailed in Table 7-3 will be undertaken when segregating main waste types.

Table 7-3 Waste segregation management measures

No.	Management measures	Performance measures	Target	Responsibility
MP140	Segregate and store metal waste into ferrous and non-ferrous metal areas for transportation to Vanimo. 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

7.5.2.2 Disposal of waste

The measures detailed in Table 7-4 will be undertaken to manage the disposal of waste.

Table 7-4 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 a CEPA-approved facility.	Register of waste recording type, weight and destination of wastes produced on site.	No illegal dumping of 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. Monitoring of surface and groundwater.	No uncontrolled discharge to watercourses.	SHE Manager

Table 7-4 Waste disposal management measures (cont'd)

No.	Management measures	Performance measures	Target	Responsibility
MM100	Prohibit disposal of domestic and industrial waste outside of designated waste storage and disposal areas.	Regular visual inspections.	Zero incidents of domestic and industrial waste disposal into forest streams and sinkholes.	Environment Superintendent
MP147	Food and green waste will be segregated and composted or transported to Vanimo for disposal.	Register of waste recording type, weight and destination of wastes produced on site.	All food and green waste segregated and composted.	SHE Manager
MP149	Hydrocarbon impacted soil will be disposed of in a Government approved environmental waste management facility (incinerated or disposed of in landfill).	Register of waste recording type, weight and destination of wastes produced on site.	No incorrect disposal of wastes.	SHE Manager
MP150	Used hydrocarbon clean up material, oily rags and grease will be incinerated at a Government approved environmental waste management facility.	Register of waste recording type, weight and destination of solid wastes produced on site.	No incorrect disposal of wastes.	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
MP152	Chemicals and chemical containers will be disposed to a Government approved waste disposal facility.	Register of waste recording type, weight and destination of solid wastes produced on site. Waste transport certificates.	Waste transport certificates completed for every consignment of waste that leaves the facility.	SHE Manager
MP154	Ensure all construction and domestic waste (solid and wastewater) is removed from work sites or temporary access tracks.	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

Table 7-4 Waste disposal management measures (cont'd)

No.	Management measures	Performance measures	Target	Responsibility
MP153	Tyres will be transferred to Vanimo or the FRCGP tyre disposal area where they will be shredded.	Register of waste recording type, weight and destination of solid wastes produced on site.	No incorrect disposal of wastes.	SHE Manager
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

7.5.2.3 Industrial wastewater from workshop and fuel areas

The measures detailed in Table 7-5 will be undertaken to manage industrial wastewater from workshop and fuel storage areas.

Table 7-5 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, away from watercourses.	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

Table 7-5 Industrial wastewater management measures (cont'd)

No.	Management measures	Performance measures	Target	Responsibility
MP155	Manage all non-sewage 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
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

7.6 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 7-6.

The treatment and release of domestic and industrial wastewater will similarly be monitored by FRL and will include sampling surface and groundwater near fuel storage and equipment refuelling areas for 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.
- Nutrients (specifically) – nitrate, nitrite, ammonia and total phosphorus.
- Biochemical oxygen demand, total organic carbon, chemical oxygen demand, total coliform bacteria, faecal coliform.
- 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 and the discharge of wastewater 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 7-6 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 downstream receiving environments.	Surface and groundwater quality downstream of septic tanks, landfills and fuel storage and refuelling facilities.	Water quality results meet required standards and environment permit conditions.	Monthly

Frieda River Limited

Sepik Infrastructure Project: Green River Airport

Environmental Management and Monitoring Plan

Water Management Sub-plan

Construction

Environmental Management and Monitoring Plan
Water Management Sub-plan
Construction

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Table of contents

11. Tables

8. Water Management Sub-plan

8.1 Background

Construction activities associated with the Sepik Infrastructure Project Green River Airport 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 a source of drinking water through to the maintenance or protection of an aquatic ecosystem. Each beneficial use may have different water quality requirements.

The potential impacts of the Green River Airport construction activities upon surface water and groundwater include:

- Elevated suspended solids concentrations and sedimentation downstream of disturbed areas, with associated physical impacts on aquatic biota, and acceptability of water quality for human consumption or other beneficial values (e.g., use for cooking or washing, navigation, recreation and aesthetic enjoyment).
- Elevated concentrations of dissolved and particulate-associated metals downstream of the airport construction area as a result of disturbance of acid sulphate soils, causing toxic effects on aquatic biota or people who may drink the water or 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.

8.2 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 watercourses downstream of construction activity.
- Limit the volume of surface water becoming contaminated and reaching downstream watercourses.
- Limit the contamination of groundwater resources.

8.3 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 the project Environmental Management and Monitoring Plan (EMMP).

8.4 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.

8.5 Procedures

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

8.5.1 Planning and preparation

Planning and preparation management measures for surface and groundwater are detailed in Table 8-1.

Table 8-1 Planning and preparation

No.	Management measure	Performance measure	Target	Responsibility
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
MM061	Design and construct project facilities to intercept potentially contaminated water.	Final design demonstrates consideration of potentially contaminated water.	Potentially contaminated water is intercepted where practicable.	SHE Manager
MP160	Inform local villagers in areas downstream of construction works of upcoming work that may be affected by water quality degradation (via the Community Relations team).	Stakeholder engagement records	Engagement with affected villages.	SHE Manager, Community Relations Manager
MP171	Ensure that sewage treatment facilities are designed to meet water quality requirements of sewage treatment plant effluent specified in the environment (waste discharge) permit.	Records of design specifications.	Sewage treatment facilities meet design requirements.	SHE Manager

8.5.2 Contamination

Management measures to limit contamination of watercourses (including sedimentation) and groundwater are provided in Table 8-2.

Table 8-2 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.	Records of visual inspections.	Equipment and machinery cleaned, serviced or refuelled in designated bunded areas.	Mobile Plant Manager
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.	All pipeline leaks recorded and rectified.	Construction Manager, Operations Manager, SHE Manager
MP167	Divert water of poor quality to 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
MP163	Place excavated material, cleared vegetation or fill away from gullies, creeks or other 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
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

Table 8-2 Contamination management measures (cont'd)

No.	Management measure	Performance measure	Target	Responsibility
MP169B	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
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
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

8.5.3 Domestic wastewater

Measures for the management of domestic wastewater are provided in Table 8-3.

Table 8-3 Domestic wastewater management measures

No.	Management measure	Performance measure	Target	Responsibility
MM051	Manage sewage in an appropriate manner to limit environmental contamination.	Records of discharge quality monitoring.	Discharge water quality to meet relevant guidelines.	SHE Manager
MP172	Divert kitchen wastewater through grease traps before diverting to sewage treatment plant.	Records of visual inspections.	No discharge of untreated kitchen wastewater.	SHE Manager

8.6 Performance, monitoring and reporting

The Green River Airport 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.
- Monthly monitoring of treated sewage effluent.
- Quarterly monitoring of water quality at representative water sources used by local communities for drinking purposes.
- 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.
- Monitoring of the freshwater 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.
    - Nutrients (specifically) – nitrate, nitrite, ammonia and total phosphorus.
    - Biochemical oxygen demand, total organic carbon, chemical oxygen demand, total coliform bacteria, faecal coliform.
    - 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 8-4.

Table 8-4 Water monitoring

Monitoring measure	Performance indicator	Target	Frequency
Loads and/or concentrations of pollutants (including sediment) entering watercourses 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.	Downstream impact on water quality as predicted in EIS.	Monthly or as required
Monitor downstream water quality	Water quality in watercourses downstream 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 water quality at representative water sources used by local communities for drinking purposes	Monitoring undertaken.	Compliance with criteria.	Quarterly

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Sepik Infrastructure Project: Green River Airport

Environmental Management and Monitoring Plan

Weed, Pest and Quarantine Management Sub-plan

Construction

Environmental Management and Monitoring Plan

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Table of contents

Tables

9. Weed, Pest and Quarantine Management Sub-plan

9.1 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 Green River Airport. 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.

9.2 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.

9.3 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.

9.4 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.

9.5 Procedures

9.5.1 Planning and preparation

Planning and preparation management measures to address weed, pest and pathogens and quarantine management are detailed in Table 9-1.

Table 9-1 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 freshwater 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, and the requirement to minimise disturbance to vegetation.	Maintenance of induction register.	Completion of induction by all employers and contractors where relevant to their role.	SHE Manager

9.5.2 Quarantine

Quarantine measures (Table 9-2) 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 9-2 Quarantine measures

No.	Management measures	Performance measure	Target	Responsibility
MP093	Establish and enforce a project-wide quarantine program. Focus on equipment and supplies 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 9-2 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 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 9-2 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

9.5.3 Pre-construction

Pre-construction management measures to address biodiversity management are detailed in Table 9-3.

Table 9-3 Pre-construction measures

No.	Management measures	Performance measure	Target	Responsibility
MM013	Carry out pre-construction survey of work sites for weeds, exotic fauna and dieback using a risk-based approach to identify areas susceptible to invasion of exotic species. If dieback is recorded, testing for Phytophthora will be completed and if present, procedures for managing the spread of dieback will be developed.	Documentation of completed pre-construction survey.	Understanding of weed, exotic fauna and dieback, type, distribution and abundance.	Environment Superintendent
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.	Regular visual inspection by Environment Department.	Zero non-conformances of washing equipment in watercourses.	SHE Manager

9.6 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 9-4.

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 9-4 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
Monitoring areas along roadsides, recently cleared areas and newly rehabilitated areas for weed invasion.	Presence (or absence) of weeds species.	No new introduced weed species.	Ongoing
Visual inspections and monitoring of 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