The Frieda River

Measures to Protect the Environment

Frieda River Limited (FRL) understands that some mining projects in PNG have caused widespread environmental damage. FRL is determined not repeat the mistakes of the past.

FRL has proposed a development plan which is specifically designed to ensure the protection of the environment for current and future generations.

At each decision point in the Project design process, the following four requirements were considered—the Project must be:

- Environmentally sound
- Socially responsible
- Technically appropriate
- Financially profitable.

Options that failed any of the four requirements were discarded in favour of alternatives that meet these requirements.

In addition to complying with PNG laws, FRL is committed to developing the Project in accordance with its Sustainability Policy[1], which requires FRL to adhere to best practice international standards, including the:

- Mineral Council of Australia's Enduring Value Framework;
- International Council on Mining and Metals Sustainable Development Framework;
- Equator Principles; and
- International Finance Corporation (IFC) Environmental and Social Standards.

FRL's and PanAust's strong commitment to these standards is evidenced by the many awards that PanAust's mining operations in Laos PDR have received[2].

ENVIRONMENTAL APPROVAL PROCESS

The Project is currently the subject of an environmental impact assessment process being undertaken by the Conservation and Environment Protection Authority (CEPA).

In 2018, FRL submitted an Environmental Impact Statement (EIS) to CEPA, which is currently being assessed. In undertaking its assessment, CEPA consults with affected communities and engages independent experts to undertake peer reviews of the EIS.

If granted by CEPA, the environmental approval will be subject to strict environmental conditions, which will include water monitoring to ensure that the Sepik River and its tributaries are not polluted.

A failure to comply with such conditions could result in the mine being shut down to protect the environment and the communities it sustains.

Over the decades-long history of the Project, it has been the subject of a wide range of studies designed to identify, assess and propose measures to minimise and, where possible, eliminate the environmental risks of the project. These studies form the basis of the EIS that is currently being assessed by CEPA. The EIS provides a detailed description of the environmental risks of the Project and the specific measures that FRL will employ to mitigate those risks. A full copy of the EIS can be viewed here.

The EIS is a lengthy and technical document. The purpose of this fact sheet is to summarise the main environmental risks of the Project and the steps FRL is taking to mitigate those risks, as identified by the EIS.

KEY ENVIRONMENTAL IMPACTS DURING DAM LIFE-CYCLE

Stages: Construction and post-closure

There will be some minor environmental impacts during construction of the dam embankment, which can be summarised as follows:

- There will be a slight, imperceptible increase in sediment in the Sepik River that is only noticeable to high sensitivity measuring equipment.
- There will be reduced downstream flows into the Frieda River while the dam fills.
- However, the Frieda River will continue to flow at 50 m^3/s with no detectable change to flow in the Sepik River while the dam fills.

At the end of the 33+ year mine life, the Hydroelectric Project will remain in place and continue to produce power for the region for another 67+ years. After decommissioning, Frieda River flow volumes are predicted to be similar to those during operations. The water quality in the Frieda River and Sepik River is likely to be as good as, or better than, current conditions.

Stages: Operation and post-closure—Sepik River impacts

One of the primary concerns from our community stakeholders is the impact the Project may have on the Sepik River. A large number of villages rely upon the Sepik River for drinking water, water for washing, cleaning and cooking, and as a source of income and food. The protection of the Sepik River and the communities who rely upon it was a primary focus of FRL in the design of the Project.

Some key facts to note are:

- The Hydroelectric Project dam will be situated in the Frieda River, which only accounts for approximately 5% of the total water flow into the Sepik River.
- Unlike other existing mines in PNG (e.g., the Ok Tedi, Porgera and Lihir mines), there will be no disposal of mine waste or tailings directly into the Frieda or Sepik Rivers, or into the ocean;
- All mine waste rock and tailings will be deposited into the Hydroelectric Project dam, where it will remain under at least 40m of water in all weather conditions. The water cover inhibits the formation of acid from waste rock and tailings and prevents pollutants flowing into the Frieda and Sepik Rivers. The dam will ensure that tailings are safely stored and mitigate any environmental damage.
- 9% of sediment inflow and tailings and waste rock deposited from the mine to the Hydroelectric Project dam will be retained and not transported further downstream.
- Underwater storage of tailings and waste rock in dams is a proven, best-practice methodology used by the mining industry to prevent the pollution of downstream waterways.
- The dam design is much stronger and safer than mine tailings dams that have failed in the past and takes into account the high rainfall and earthquake prone nature of the Project location. A fact sheet regarding the safety of the dam can be viewed here.
- These measures will avoid the environmental damage caused by riverine or marine disposal of tailings or mine waste that has occurred in the past.
- At all times during construction, operation and post-closure of the Project, World Health Organisation Guidelines for Drinking Water Quality and the IFC discharge criteria for metals will be met in the Frieda and Sepik Rivers, except for iron and lead, which are naturally elevated in the current environment and will not be impacted by the Project (as identified from baseline environmental studies conducted over many years).

Stages: Operation—Key environmental risks and mitigants

While the impact on the Sepik River is a major concern, the Project poses a variety of additional environmental risks that must be effectively managed to ensure the environment is protected. Some of the main environmental risks and the measures that will be taken to protect the environment are summarised in the adjacent table (as identified by the EIS and related studies).

RISK	MITIGANTS
Acid-forming mine waste	
The waste rock and tailings produced from the mine pose a risk of generating acid which could affect downstream waterways if such waste is not effectively managed.	By placing the waste rock and tailings permanently underwater in the Hydroelectric Project dam, the production of acid will be minimised and sufficiently diluted so that pollution downstream of the dam will be prevented.
Increase of sediment and metallic substances	
The mountainous, high-rainfall environment of the project area will generate additional sediment and metallic substances, which may negatively impact the environment and surrounding waterways if not effectively managed.	The Hydroelectric Project dam will act as the primary sediment and metallic substance management facility, downstream of the mine. This will allow excess sediment to settle-out prior to water discharge from the dam, so that they will not pollute waterways or communities downstream. 99% of all sediment and waste will be retained in the dam. Other measures include: • the use of clean water diversion channels and multiple sediment ponds; and • treatment of water transferred from the open-pit to neutralise acidity and precipitate metals.
Soil erosion	
Erosion will occur in the areas that are disturbed by the Project. The effects of erosion will be enhanced by the mountainous terrain.	The areas of disturbance will be limited to the maximum extent practicable. Disturbed areas will be managed through the implementation of an erosion and sediment control management plan and the implementation of measures including diverting surface water away from areas of disturbance, and progressively rehabilitating disturbed areas.
Landscape and visual impacts	
The large open pit mine will affect the visual amenity of this pristine wilderness area.	Among other measures, progressive rehabilitation will be undertaken where possible, particularly for areas that will be viewed from nearby villages. The rehabilitation and revegetation will, to a large degree, act to mitigate the visual impact of construction activities.

RISK	MITIGANTS
Groundwater impacts	
During construction, potential impacts include seepage from the landfill affecting the quality of the groundwater, and spills and leaks from chemicals and fuel causing contamination of shallow groundwater. During operation, potential impacts include infiltration of lower quality water from the Hydroelectric Project affecting the quality of groundwater.	A number of management measures will be adopted to limit the potential impacts on groundwater, as summarised in the EIS. These include: · Impacted water collection and treatment; · Contact water management; · Adoption of a landfill code of practice; · A groundwater monitoring program; · At closure, the open-pit void will be allowed to fill to reduce the potential for acid generation; and · Contaminated water will be collected downstream of the void and will be treated treatment until water quality criteria are met. By adopting these measures, the residual groundwater risks have been assessed as minor or negligible.
Surface water impacts	
There is a risk that water quality in the Sepik River basin downstream of the Project may be impacted if surface water impacts from the Project are not effectively managed.	This is a key project risk, which is effectively managed through storage of tailings and waste rock in the Hydroelectric Project dam, and the following measures: · Clean water diversions will be constructed upstream of the open-pit to divert water from around the mining area. · Open-pit wall runoff will be channelled to sumps within the open-pits. Open-pit sumps will be used to store water prior to being transferred to the water treatment plant. · Water transferred from the open-pit sumps will be treated with quicklime or hydrated lime to neutralise acidity and precipitate metals. Treated water will then flow into the Hydroelectric Project dam and be subject to further dilution to enable it to be reintroduced into the downstream environment.

RISK	MITIGANTS
Reduction of biodiversity	
The clearing of land for use by the Project will reduce the biodiversity of the Project area.	The impact on terrestrial biodiversity will be minimised by a number of measures, including the following: • Restricting vegetation clearance; • establishing a conservation program for fauna at risk; • developing a fauna relocation program for species of conservation concern; • cultivating species of plants that are new to science and using them in revegetation where practicable; and • specific measures to deal with pests, weeds and diseases.
Greenhouse gas emissions	
The Project will generate greenhouse gas (GHG) emissions during its construction and operation, which are harmful to the environment.	The aim of the Project is to have one of the lowest GHG emission profiles of any modern mining project. Measures to limit GHG emissions from the project include: • the use of the Hydroelectric Project to generate renewable electricity to power mine operations; • the use of electric vehicles will be preferred; • limiting the use of diesel fuel through the optimisation of on-site driving and measures, such as speed limits and reducing gradients; and • implement a GHG management system that accurately quantifies emissions to allow emissions to be continually identified, measured and limited.
Vanimo Port marine environment impacts	
The upgrade of the port of Vanimo will include disturbance of the nearshore marine environment.	The following measures will be undertaken to limit the environmental impact of the construction and operation of the upgraded port facilities: • limiting disturbance of fringing reefs and seagrass during construction; • using 'soft start' procedures for pile driving during construction to minimise startling nearby marine fauna; • implementing a quarantine management plan; • storing on board any wastes produced by vessels that cannot be discharged under Papua New Guinea and IMO guidelines and standards and transfer to an approved onshore facility for treatment, reuse, recycling or disposal; • implementing a waste management plan; and • implementing an emergency response plan for spills.

RISK	MITIGANTS
Dam failure	
The failure of the dam wall would result in widespread environmental damage and potentially loss of life.	The dam is being built as a water retention dam, which will be much stronger more stable than mine tailings dams that have failed in the past. The dam is specifically designed to withstand the high rainfall and earthquake-prone conditions of the Project location, in accordance with best practice international standards. Emergency response measures and evacuation plans will be implemented for downstream communities in the unlikely event of a dam wall failure. For more detail, see our Dam Safety Factsheet **here**.
Open-pit wall failure	
This is the risk that after mine closure, when the open pit will be filled with water, the failure of the open-pit wall causes temporary or partial flooding and contamination of downstream environments.	The likelihood of post-mining, open-pit wall failure will be limited by engineering and design controls such as: · The Hydroelectric Project dam downstream of the open-pit is designed to mitigate the effects of such an event. · Slope designs which incorporate the results of slope-stability modelling and testing based on ongoing geotechnical and hydrological data collection throughout the life of mine. · Quality control and peer review of the open-pit mine design and post-mining open-pit lake. · Designing and installing an open-pit lake spillway, passive release points, or containment bank(s) to adequately control open-pit lake levels, and confine releases post mining.
Pipeline failures	
The Project will include: · a tailings pipeline that transports tailings from the processing plant to the dam; and · a concentrate pipeline that transports copper concentrate from the processing plant to the Port of Vanimo. The failure of either of those pipelines will likely cause environmental damage.	The risk of pipeline failures will be managed through the following measures: · rapid spill response plans; · appropriate pipeline design and quality control, including peer review; · testwork prior to pipeline installation; · hydrostatic testing prior to commissioning; · establishing a preventative maintenance regime; · conservative operating procedures; · careful selection of pipeline route; · submerging the pipelines below the surface; · establishing an emergency tailings pipeline to be used during maintenance or in the event of tailings pipeline failure; and · additional downstream monitoring in the event of a pipeline rupture.

RISK	MITIGANTS
Hazardous materials	
The project will require the transportation and use of materials that will harm the environment if released. Hazardous materials include, diesel and other fuels used by vehicles and plant, chemicals used in the processing plant, tailings and concentrate and waste oils and solvents.	The safe transportation and use of hazardous materials is a common requirement for modern mining operations and measures have been developed to minimise the risk of environmental damage from such materials, including: • classification, packaging, labelling and safe transport of dangerous goods; • hazardous materials management plans, including emergency response plans to minimise the impacts accidental spills; • safe storage, handling and transport procedures; • waste oils, solvents and other hazardous materials will be collected in drums and stored in bounded areas until safely disposed in the waste disposal facility or at another approved location; • environmental waste management facilities, located in the mine area, have been designed to manage the waste streams produced by the mine; and • waste management facilities will also be located at the Hydroelectric Project during construction and at the Vanimo Port infrastructure area.

Further, more detailed information regarding each of these risks is provided in the EIS.

Endnotes

1 See: https://panaust.com.au/wp-content/uploads/2022/02/PanAust-Sustainability-Policy-English-Nov21.pdf

2 See: https://panaust.com.au/external-recognition/

FRIEDA RIVER