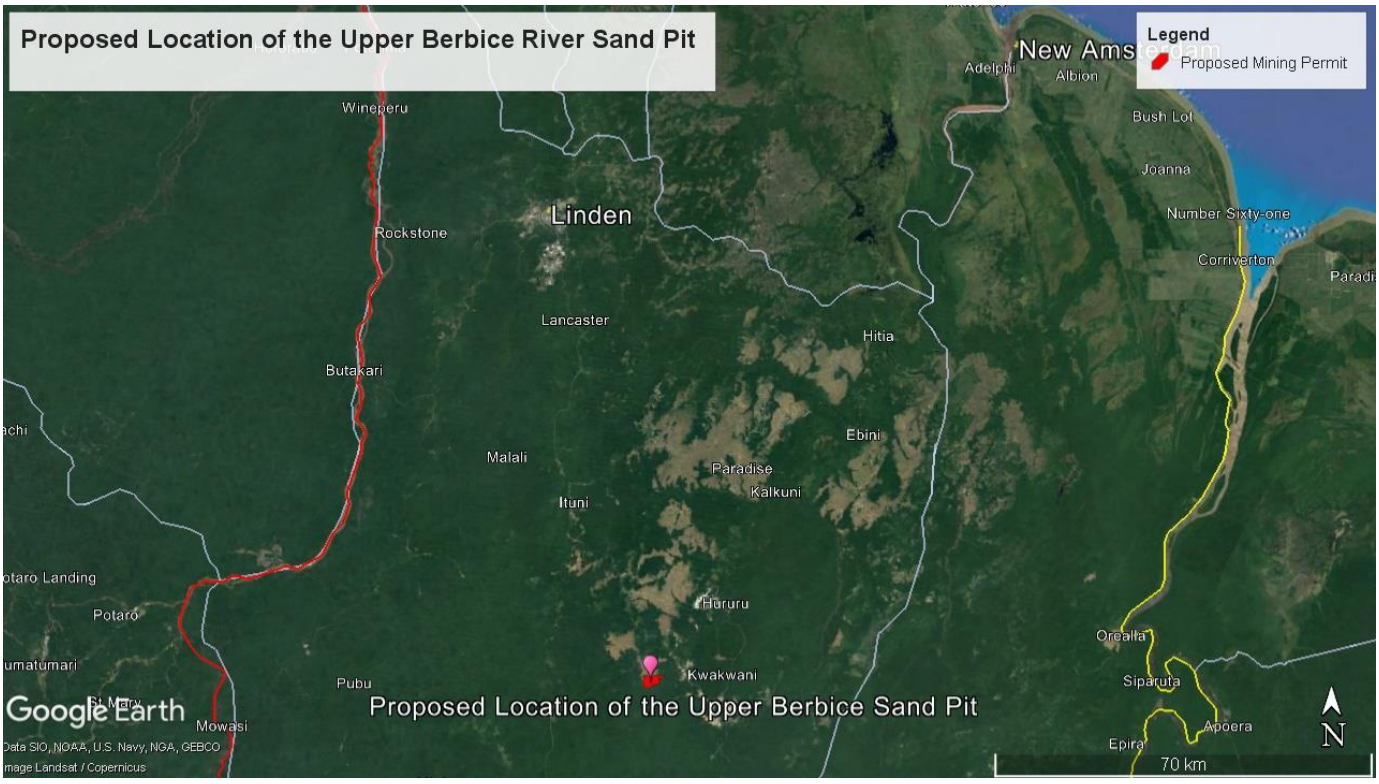
Upper Berbice River Sand Pit
(Project Summary)



Proposed Project Site at

Left Bank, Berbice River, Region 10

Prepared for:

Ms. Khalouti Rampher

Lot 48 Barrack Street, Kingston, Georgetown,
Demerara, Guyana

Prepared By:

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1.0 Executive Summary

- Ms. Khalouti Rampher (the developer) recognizes the demand for Sand, Loam & Laterite (fill materials) in the Berbice district. There are currently limitations of supply within the district, and an increase in demand is anticipated from the expanding construction sector.
- As such the developer seeks to obtain from the Guyana Geology and Mines Commission (GGMC) a Mining Permit (MP) to develop a modern, open pit mine to meet the existing and projected demand for these fill materials.
- The Mining Permit applied for has been designated as file numbers R-1104/MP/000.
- There exists some small, informal sand, loam and laterite pits on the Berbice River in the vicinity of this proposed new open pit mine development.
- The proposed project site is located on the left bank of the Berbice River, ~190 km south of New Amsterdam, and ~300 km from Georgetown.
- The potential for occurrences of fill materials which may become exploitable is very good. The region is part of the Trans-Amazonian Craton and the underlying rocks are collectively known as the Barama – Mazaruni Supergroup (BMS) and the project site, more specifically, lies on the younger intrusions within the Kwitaro Group. The general area is covered by young alluvium, fluviatile materials as well as saprolitic and lateritic materials.
- The Project lies on an area that is classified as sandy red – yellow latosols and is perfectly placed to host significant reserves of fill materials.
- The proposed project site encompasses approximately ~1,200 acres of land. This covers an unnamed, large topographic high that is over 120 feet in elevation. The elevation at the bank of the Berbice River is less than 40 feet.
- This topographic high will be the initial focus for the development of the open pit mine, where initial reconnaissance has shown the presence of fill materials at and close to the surface.
- The main operational center will be closer to the eastern sector of the project site for shorter transit to the Berbice river for transshipment.
- The proposed project is on the left bank of the Berbice River, just upstream of the Kwakwani settlement, at this point the Berbice river is easily navigated by sizable vessels.
- This investment is being made to meet the growing demand for fill material in the county as the economy continues to be boosted by increasing construction, infrastructure, and sea defense works, with further expansion anticipated with the increasing Oil & Gas sector related activities.
- The initial output of this mine is expected to be at least 1000 tons per week of fill materials.
- The developer is committed to being a responsible corporate partner to the Government of Guyana and is currently assembling a team of experienced and professional persons to manage this project.

1.1 Fact Sheet of Project

Table 1-1: Summary of Main Parameters of the Project

Project Developer	Ms. Khalouti Rampher
Project Name	Upper Berbice River Sand Pit
Project Type	Open Pit Mine for Sand, Loam and Laterite
Location:	Region 10
Name of River:	Berbice River
Locality	Sand Hills, Berbice
Size of Project Area	~1,200 acres
FAO Soil Type Classification	Sandy Red – Yellow Latosols
Reserves	~500,000 metric tons
Production (initial)	~50,000 metric tons/year
Products:	• Sand • Loam • Laterite
Project Components	Open Pit Mine Area Haul Roads and Service Roads Stockpile Area and Dumps Support Facilities • Admin Office Complex • Accommodation and Facilities • Mechanical Service Bay • Power Generation • Mine Drainage • Settling Pond
Power Requirement (Generators)	15 KVA
Overall Utilization	~75%
Life Span of Mine	~10 years
Employment/Staff	~20
Current Status of Project	Application and Permitting
Nearest Habitation	~12 km towards the North East
Nearest Towns	New Amsterdam
Nearest Airstrip	Ebini, ~15 km South East
Nearest Police Station	New Amsterdam, ~7 km North
Nearest Fire Station	New Amsterdam, ~7 km North
Telecommunications Tower	New Amsterdam, ~7 km North
Ecologically Sensitive Zone	None in or around project area

2.0 Introduction

The project is presently in the permitting stage at all necessary state agencies to obtain the permissions necessary to secure the Mining Permit for the area identified and the resources thereon. The project is being developed by Ms. Khalouti Rampher. The area being applied for is approximately 1,189 acres of state land in the county of Berbice.

Applicants Details:

Developer: Ms. Khalouti Rampher

Address: Lot 48 Barrack Street, Georgetown, Demerara Guyana

Tel#: +592-

2.1 Nature of the Project

The project is being designed to produce a combined 50,000 metric tons of sand, loam and laterite per year in its initial capacity. This may increase when the project recovers capital expenditure and if the demand justifies further investment in expanding production capacity. The mine output will be transported by barge down the Berbice river to New Amsterdam. The mine will produce sand, loam and laterite to be used primarily as fill materials in the construction sector. The main objective of the project is to carry the business of prospecting, exploring and extracting fill materials from the project site for the supply of these products to the market in and around New Amsterdam.

2.2 Project Rationale

Open Pit Mining is linked to many other industries and other sectors in the economy, including transportation, construction, and environmental management. The proposed project site is a good source of sand, loam and laterite. This development will create significant positive impacts for the Government and GGMC, both of which will benefit through government taxes, fees, and duties. This project will also play a significant role in the economic growth of the country by generating revenues and promoting employment while supplying the materials needed to support the construction industry. The key beneficiaries will include the local workforce and businesses allied to the mining operations.

2.3 Demand – Supply Gap

The potential for sand, loam and laterite in this area is well known as there are several, small, informal operations in the vicinity which are extracting these types of fill materials. Presently the Government of Guyana is developing several major infrastructural projects in the county of Berbice, including several roads. There are also numerous private sector developments related to the Oil and Gas sector,

such as the CGX shore base being developed on crab island. Presently there are no formal, organized, reliable open pit mines in Berbice to supply the necessary fill material for these various construction projects. The developer estimates the current demand for fill material to be approximately 50,000 metric tons per year. This is a conservative estimate and it is expected that demand will be increasing consistently over the next few years as the oil and gas sector expands and drives national development.

Presently fill materials are being sourced from up the Essequibo and Demerara Rivers to supply the demand in Berbice. This has not only delayed works but has driven up the cost of construction in Berbice significantly.

Given the planned development in Berbice, i.e. several shore bases, the Guyana – Suriname bridge, etc., there is a definite need for the establishment of adequate mines in Berbice to support these construction projects with fill material. The area selected has several favorable factors for development, such as accessibility by sizeable vessels and adequate resources for extraction.

2.4 Domestic and Export Markets

The developer will not pursue or engage in the export of fill material given the large demand which exists in the local market. 100% of the product from this operation will be supplied to the local projects here in Guyana, particularly in Berbice.

2.5 Employment

The project is expected to generate approximately 30 jobs during construction and 20 jobs during operation. The following are the some of the possible areas for employment:

Construction
Laborers
Electricians
Engineers
Masons
Carpenters
Surveyors
Security
Drivers
Cleaners
Supervisors
Managers
H&S Officer
Logistics Personnel
Accountant
Cooks

Operation
Maintenance Personnel
Heavy Equipment Operators
Engineers
Cleaners
Security
Electrician
Drivers
Foreman
Accountant
Cooks
Managers
H&S Officer

The developer will hire local persons, including women, based on their experience and skills to support the construction, operational, and closure phases of the project.

3.0 Project Description

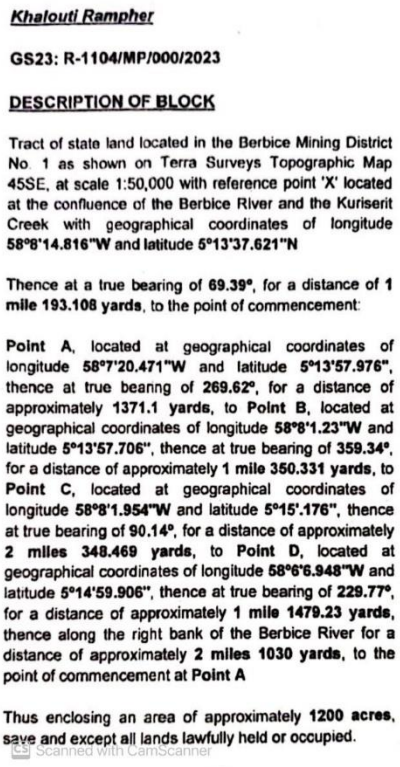
This will be designed and set up as a modern open pit mining project with a mechanized excavation, loading and hauling operations. There will be an on-site complex where accommodation, administration, storage, maintenance, and other necessary infrastructure will be established.

3.1 Location

The project is located in Administrative Region 10: Upper Demerara – Upper Berbice. The project area is centered on N 5° 46.9' W 57° 49.9' in the county of Berbice, central-eastern Guyana (See Map 3.1). The area is on the left bank of the Berbice River, approximately 115 km south of New Amsterdam. The closest settlement is Sand Hills some 10 km to the north-east.

The project area is located in the Amazon rainforest of Guyana. It is bracketed to the north and west by the Matara River. To the east and south are forested areas. The location of the project site is shown in Map 3.1 below.

DESCRIPTION OF BLOCK



Khalouti Rampher

GS23: R-1104/MP/000/2023

DESCRIPTION OF BLOCK

Tract of state land located in the Berbice Mining District No. 1 as shown on Terra Surveys Topographic Map 45SE, at scale 1:50,000 with reference point 'X' located at the confluence of the Berbice River and the Kuriserit Creek with geographical coordinates of longitude **58°8'14.816"W** and latitude **5°13'37.621"N**

Thence at a true bearing of **69.39°**, for a distance of **1 mile 193.108 yards**, to the point of commencement:

Point A, located at geographical coordinates of longitude **58°7'20.471"W** and latitude **5°13'57.976"**, thence at true bearing of **269.62°**, for a distance of approximately **1371.1 yards**, to **Point B**, located at geographical coordinates of longitude **58°8'1.23"W** and latitude **5°13'57.706"**, thence at true bearing of **359.34°**, for a distance of approximately **1 mile 350.331 yards**, to **Point C**, located at geographical coordinates of longitude **58°8'1.954"W** and latitude **5°15'.176"**, thence at true bearing of **90.14°**, for a distance of approximately **2 miles 348.469 yards**, to **Point D**, located at geographical coordinates of longitude **58°6'6.948"W** and latitude **5°14'59.906"**, thence at true bearing of **229.77°**, for a distance of approximately **1 mile 1479.23 yards**, thence along the right bank of the Berbice River for a distance of approximately **2 miles 1030 yards**, to the point of commencement at **Point A**

Thus enclosing an area of approximately **1200 acres**, save and except all lands lawfully held or occupied.

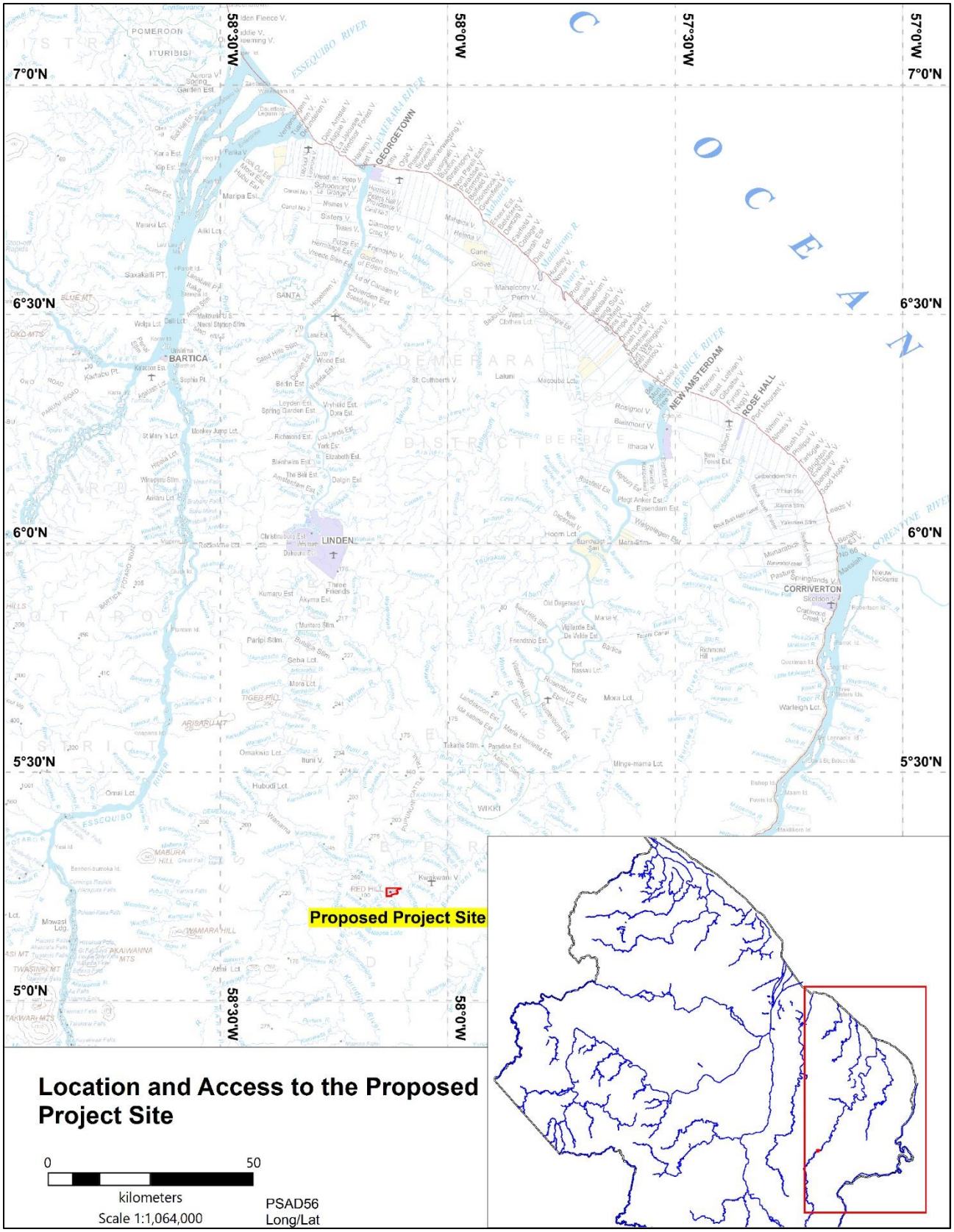
3.2 Project Life and Sustainability

The mine is being developed with an expected economic life span of at least 10 years. This life span is based on the extraction of reserves both above and below nominal elevation. The developer will be the owner and operator of all aspects of the operation within the Mining Permits, under the supervision of the Guyana Geology and Mines Commission and other regulatory agencies. It is estimated that the project will have a payback period of 3 years. The fill material produced by this operation will help to improve supply to the local market demand and reduce the cost being borne by the various construction projects.

3.3 Process Details

The proposed mining operations will be carried out by open cast semi-mechanized methods. The process flow diagram is given below to depict the expected mining process:

1. Cutting & Clearing of Vegetation
2. Removal of Top Soil and Overburden
3. Excavation by Hydraulic Excavators
4. Haulage & Dispatch to End User by Transshipment



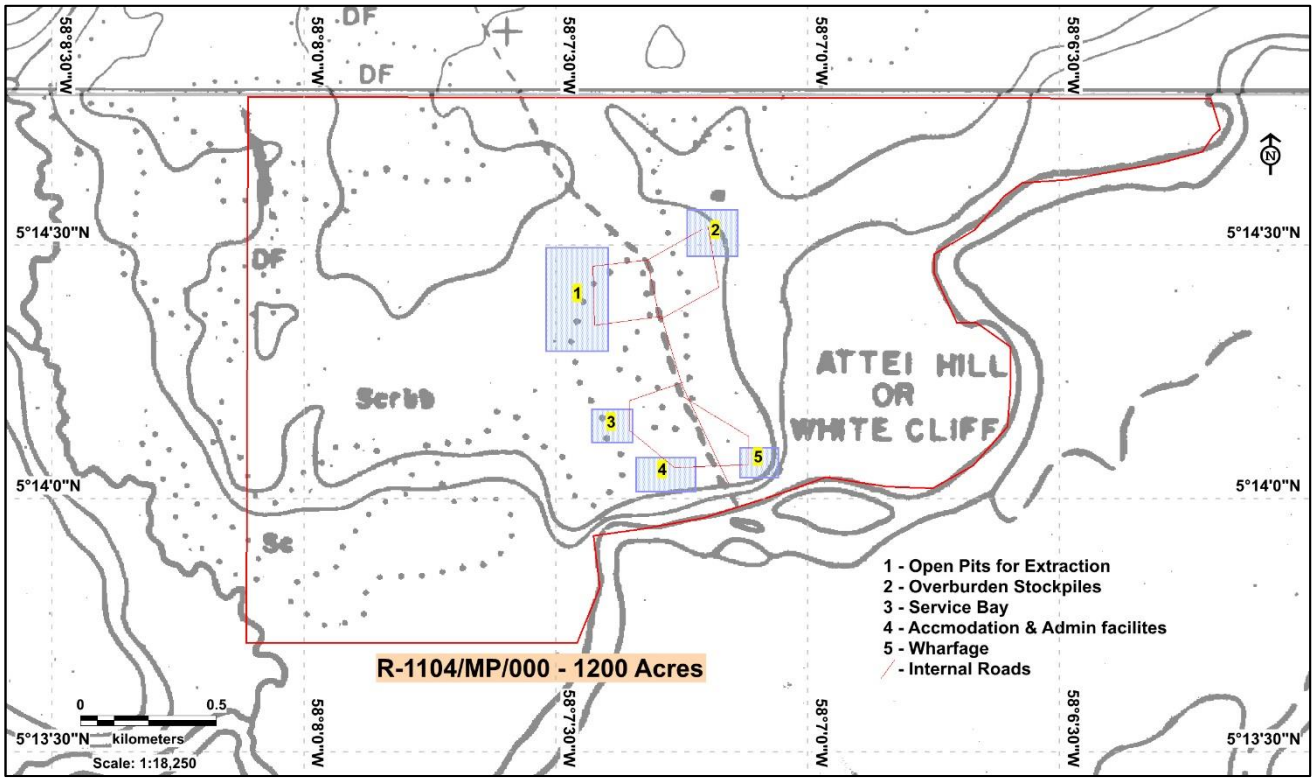
Map 3.1: Location of the Proposed Project Site

3.4 Project Components

The project infrastructure is expected to comprise the following major components:

- Open Pit Mines
- Siltation / Settling Ponds
- Haulage Roads and Service Roads
- Stockpiles and Dumps for ore and overburden
- Power Generation Unit of 15 KVA
- A fleet of heavy-duty earthmoving equipment
- Mechanical support/service bay
- Admin and accommodation facilities

Map 2, below, shows the proposed layout of the project components at the project site.



Map 3.2: Proposed Layout and Site plan for development.

3.5 Proposed Method of Mining

It is proposed to undertake Open Cast Semi-Mechanized Mining which includes stripping overburden, excavating fill material, loading and haulage. The surface plan showing the mining steps will be developed in detail after the permit is issued and initial exploration works are carried out to inform the preparation of the finalized mining plan.

Open Pit Mining

In the open cast mining, the bench height and width will be maintained at 2 to 5 m respectively. The pits will not exceed 10m in depth. Slopes and wall will be designed with a 1.5 safety factor. Excavated material is transported to the Berbice river by trucks for transshipment to New Amsterdam or other locations of demand by barge.

Salient Features of the Mining Method

The salient features of the proposed mining method are given below.

• The height and width of the bench will be maintained at 2 m and 5 m respectively.

• The mining will be done from top to bottom by slicing of 2 m thick.

• The exploitation of fill material will be done to maximum depth of 10 m.

• Considering the respective stability of the various materials final slope or say ultimate pit slope will be designed with a 1.5 safety factor based on the angle of repose.

• Haul road will be developed up to point of loading.

• Transportation of the extracted material to the Berbice river will be by 25 Ton haul trucks and then to the destination/market will be by barges of 1000-ton capacity.

3.6 Equipment to be Utilized

The following list of equipment is proposed to be used in the mining operations:

Category	Equipment	# Units
Mine Transportation	Trucks (25-ton)	3
Material Handling	Excavators (CAT345)	2
	Bulldozers (CAT D8)	1
	Frontend Loaders (CAT 966)	1
River Transportation	Tug & Barges (1000-Ton)	1

Table 3.1: Primary Heavy-Duty Equipment to be Utilized.

3.7 Description of Project Components

Figure 3-1, below, indicates the locations of the key project components and the plant site. At this stage, these are indicative since the detailed design phase will entail geotechnical and other analyses which will then influence the final location, specifications, design, and layout of project components.

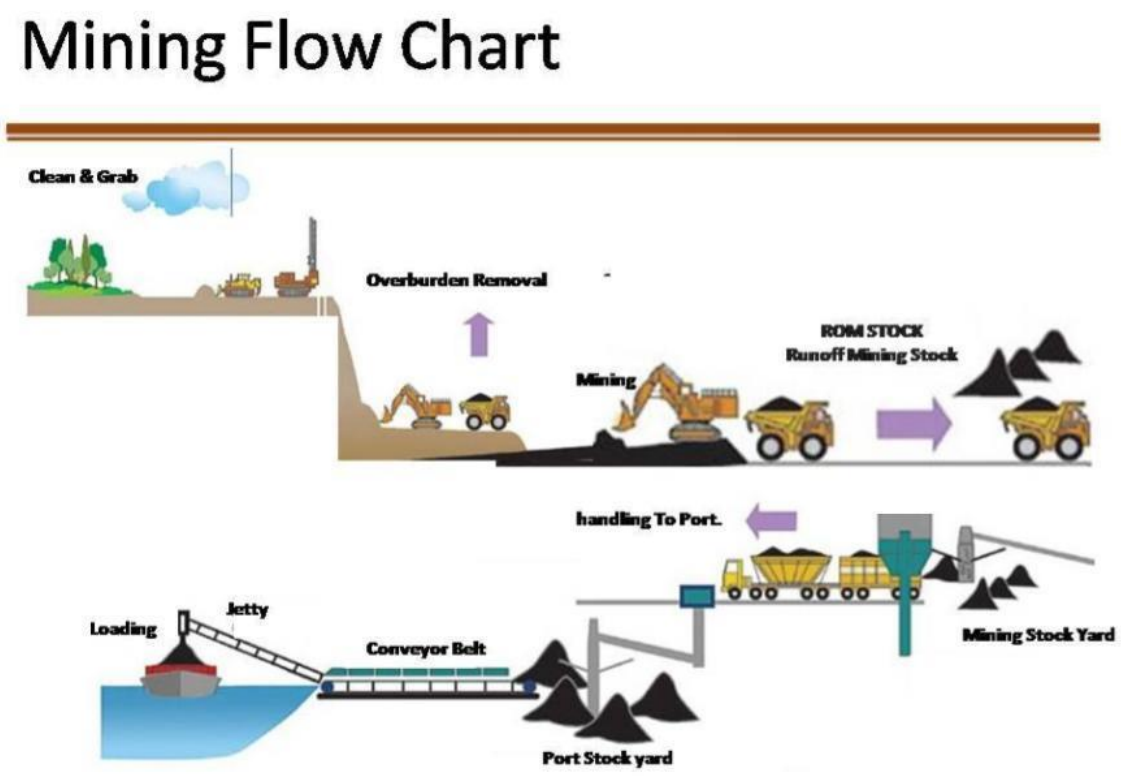


Figure 3-1: Generic open pit mine process flow

Settling Ponds

- The presence of silt, clay, sand, sandy soils, laterite and latosols are all susceptible to scouring by surface flows. As such run off from precipitation and dewatering of the mine will have to be directed into settling ponds to prevent turbid discharge.
- The settling pond will be located to receive flow from the dewatering of the mine as well as from the run off around the pit limits and overburden stockpiles. This pond will have a capacity to hold approximately 5000 cubic meters and will be cellular in construction. It will operate on an overflow principle where water will fill one cell before overtopping to the next. Settlement of suspended particles will take place as the water is held in these cells before discharge. There will be strict control of the water quality at the discharge point. The released mine effluent will be directed to a suitable naturally wet area which will act as a final settlement area and soakaway.
- The settlement pond will periodically be desilted as necessary, the removed material will be taken to the waste dumps where the overburden is being stored.

Haulage Roads and Service Roads

There will be several roads within the project site to facilitate the movement of vehicles and equipment as they carry out the mining process and supporting activities. The main haul roads will be designed to accommodate the passage of two 25 ton trucks simultaneously in opposite directions. Within the mine, the haul roads will be circular so that trucks enter from one side to be loaded and then exit from the other side.

Service roads will be designed to accommodate the passage of smaller vehicles and support equipment such as fuel trucks and personnel transport vehicles. Main haul roads will be approximately 35 feet in width, service roads will be approximately 20 feet in width. All roads will have grades not exceeding 15% and will be capped with laterite to provide an all-weather surface.

Stockpiles and Dumps for ore and overburden

There will be several stockpiles associated with the mine development and operations. These being stockpiles for top-soil, overburden, sand, loam and laterite. Topsoil will be dumped and stored separately for use in reclamation activities. Overburden will be dumped in a flat area away from the working face and not in the direction of advancement of the pit face. Overburden will be piled to heights of 20 meters with slopes not exceeding 30 degrees. Sand, Loam and Laterite will be in smaller, transient stockpiles for loading and haulage. These piles will not exceed 5 m in height.

Power Generation Units of 15 KVA

The accommodations, administrative and support facilities, will be run on electricity generated on-site by diesel generators. There will be 2 generators, each rated at 15 KVA, these will be used alternatingly so that one is always on standby in the event that the other develops a fault.

Fleet of heavy-duty equipment

There will be a number of hydraulic excavators, bulldozers, trucks, front-end loaders, fuel trucks, service trucks, and other heavy-duty equipment on-site to carry out the mining and other supporting activities. These will all be diesel-powered equipment. As per the list in table 3.1 above.

Mechanical support/service bay

There will be a fully equipped mechanical service bay on-site to maintain, service, and repair all of the equipment on site. This service bay will be a modern facility with all necessary facilities in place to adequately service the fleet of equipment on site.

Fuel Storage

It is estimated that the project will require approximately 750 gallons of fuel per month. As such there will have to be storage facilities on-site to accommodate the holding of roughly 1000 gallons of fuel to support operations. Permission from the Guyana Energy Agency and other relevant authorities for this fuel storage facility will be sought by the developer after the Mining Permits are obtained from the GGMC.

Admin and accommodation facilities

There will be the construction of adequate housing, offices, administrative, and support buildings on the project site to allow personnel on-site to have hospitable and safe accommodations. There will also be the construction of storerooms and other necessary facilities. These will all be designed and built in keeping with the relevant codes and regulations. These facilities will all be adequately sited so as to be well away from the open pit mines.

Loading facilities for transshipment

The main mode of transportation for the extracted materials will be by tug and barge down the Berbice River. As such the developer will have to seek permission to construct a wharf facility to allow these vessels to dock so that they can be loaded. Loading will be done either by trucks or by a pivoting jump conveyor that will take material from the desired stockpile onto the barge. Barges will be in the range of 1000 tons capacity.

3.8 Mineral Reserves

To be determined quantitively by augering after the issuance of all permits to the developer. A rough estimate based on available surface models and other indicative data places the reserves at approximately 500,000 tons.

3.9 Planned Production

The applicant is proposing to develop a production line that will output approximately 50,000 tons combined of loam, sand and laterite per year for the first 10 years of the project's life span. During that time detailed documents about the further expansion will be prepared for submission to the relevant authorities.

3.10 Estimate of Waste to be Generated and treatment

Top Soil

Topsoil will be removed and stored appropriately according to mining regulations and accepted best practices for use in the rehabilitation of the mine. Volumes are to be determined by a detailed mine plan after geotechnical works are carried out on-site when the Mining Permits are obtained.

Overburden

Overburden will be removed from above the desired material for extraction and sock piled in accordance with mining regulations and best practices. Volumes to be determined upon completion of detailed mine plan.

Solid Waste

Domestic solid waste may be around 100-150 kg per month. This will be put into compost and layered dumpsite as appropriate in accordance with the respective regulations.

Hazardous Waste

Such as used engine oil and old batteries will be appropriately stored until removed by a service provider. Waste oil generation to be approximately 50 gals per month. Batteries have a life span generally of 2 years, the total number expected to be in use is approximately 14 units.

Liquid Waste

Water from the process will be directed to multi-stage settlement ponds before being directed for release to the environment. Domestic effluent is expected to be in the range of 200 gals per day.

Sewage

Sewage will be dealt with through the construction of septic tanks in accordance with the regulations of Guyana Water Incorporated. Septic systems will be sized based on 30 person occupancy at a rate of 1.5 liter/person/day or as recommended by the GWI regulations.

4.0 Site Analysis

4.1 Proximity

Particulars	Distance & Direction
Nearest Town	New Amsterdam, ~200 km, North
Connecting Roads	4m wide, Laterite & Sand surface
Nearest Airport	Kwakwani Airstrip, ~15 km, South East
Nearest Major Road	Linden, ~115 km, North
Nearest Major Waterway	Berbice River, 0.5 km, East
Nearest Settlement	Kwakwani, 7 km, North East

Table 4.1: Proximity to Major Infrastructure

4.2 Land Form and Land Use

Extent

The proposed project site would cover an area of 1,200 acres. The Mine would be developed incrementally, initial infrastructure and the first open-pits mines would occupy approximately 10% of the total area.

Land Use

The land is devoid of any development or current use, presently the lands are forested with only a few historic logging tails leading from the Berbice river into the areas west of the proposed project area.

Land Ownership

Presently the land being applied for is designated state lands and is under the control of the Government of Guyana through its statutory bodies, for this project in the mining sector the Guyana Geology and Mines Commission is the relevant authority to whom the application was made to obtain a Mining Permit for the area.

Topography

The area in the northern sector of the project area is dominated by hills reaching up to 120 feet in elevation. These hills are in elongated ridges oriented to in an E-W direction. The elevation at the Berbice river bank is below 40 feet. Relief is therefore approximately 80 feet. The area is drained by a dendritic network of streams that flow into the River, which then flows east into the Berbice River.

Map 4.1, below, shows the topography of the project site.

Sensitive Areas

There are no environmentally, culturally, ecologically, historically, or otherwise sensitive areas within or nearby the project site.

Existing Infrastructure

There is no existing infrastructure on the project site.

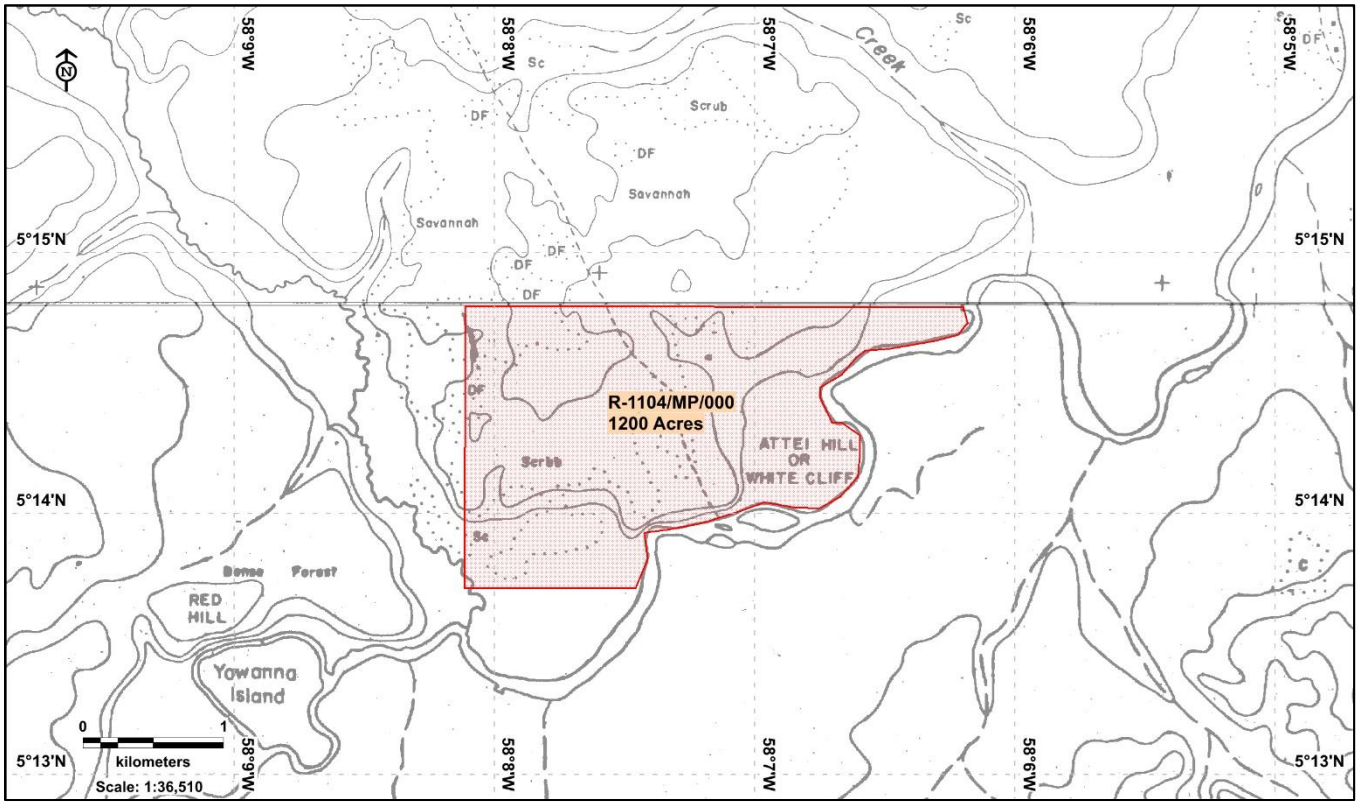
Soil Classification

Soils are defines as sandy red – yellow latosols by the FAO and NAREI.

Climatic Conditions

The climate in Guyana is strongly influenced by the Inter-tropical Convergence Zone (ICZ). Due to the movement of the ICZ, most climate variables show bimodality throughout the year. There are generally two rainy seasons and two dry seasons in Guyana. The longer rainy season being from May to June

and the shorter is from December to January. The project is located in the tropical rainforests of the Amazon jungle, regular showers are experienced as a normal occurrence. Temperatures range from 26 – 33 degrees Celsius within the project area.



Map 4.1: Topography of the Project Site

5.0 Planning Brief

Operational Method

Surface Mining Methods, particularly, open pit mining will be employed for the whole project operation. The operation will be divided into two stages: the mine development and the mine production stages. The operation of the mine will require that clearing, grubbing and stripping of overburden be done in advance of production as to maintain supply of required sand, loam and laterite materials. These will be full-time ongoing activities. The aim being to stockpile 'run of the mine' ore at the transshipment point for fast loading of the barges. The operations will focus initially on the material in the elevations above that of the riverbank. These hills will be mined using multi bench approach along the operational faces. The mines will operate for 8 hours daily with a 1-hour break for physical inspection and maintenance.

Transshipment Operations

The main demand for the supply of fill materials is to New Amsterdam and its environs. As such the mined products will be trucked to the loading site on the Berbice river and then loaded on barges to be shipped down the Berbice River. These services will initially be contracted to service providers until the developer develops the capacity to operate its own vessels. Approval for the construction of the wharf which is required on the Berbice river will have to be sought from the relevant regulatory bodies. The route is from the loading site on the Berbice River, downstream to New Amsterdam, near its confluence with the Atlantic. The discharge point will be at the various wharf facilities in and in proximity to New Amsterdam.

Production Costs and Consumer Benefits

Data taken from the informal mines operating in the area has placed production costs between 40 – 60 % and is heavily dependent on the rate of production. Presently consumers are paying between G$5,000 – G$7,000 / metric ton of fill material. Based on the developer's business model the expected cost of production should be reduced and the benefit of lower retail prices be passed on to consumers. The majority of customers for the materials would be in central Berbice and its environs.

Construction Phase

The construction of the necessary infrastructure is expected to cover a period of 4-6 months and employ approximately 30 persons as detailed in section 2.5. Construction materials are readily available from New Amsterdam and surrounding areas where there are existing hardware stores, and lumberyards. This developmental phase is the stage in the mine preparation for full operations to be carried out and it will involve removal and grubbing of vegetative covers, stripping of overburden, and establishment of production benches, drainage canals, settling ponds, and access roads to the deposit.

The pits will have production benches of 2 meters high with a 30° bench slope during the development and production stage. Development work will generally start from the uppermost portion of the permit area and progresses downward. A portion of the area will be developed until a production bench with a slope of 30° and a loading area of 30 meters, will be formed well enough to sustain the safe movement of mining equipment. Once a bench is formed, a new working level will be worked out to form another set of benches. Should safety and economy warrant, the cycle of creating a new working level (benches) at lower elevation will continue until the desired target is reached.

Operation Phase

The extraction of the sand, loam and laterite is the actual production phase and is the removal of the deposit from the cleared benches. The major activities in this stage are mechanical excavation of the desired materials followed by loading and hauling of these materials. Materials from the bench will be loaded by either a wheel loader or hydraulic excavator into 25-ton trucks and will be transported to the stockpile and transshipment facility. The operational phase of the mine is expected to be approximately 10 years, during the operational phase approximately 20 jobs will be created initially, as detailed in section 2.5.

Once commissioned, the mine is expected to work 8 hours, every day of the year, except national and major religious holidays, unless subject to unscheduled maintenance or other operational constraints. On an annual basis, at least 50,000 tons combined of fill material is expected to be produced. Output is expected to be relatively constant throughout the year since the operation is designed to stockpile at least two weeks of material for transshipment.

Closure Phase

Consistently with the policy and regulations of the Government to assure the availability, sustainability, and equitable distribution of the country's natural resources, the GGMC adopts the policy that mining activities shall be managed in a technically, financially, socially, culturally, and environmentally responsible manner to promote the general welfare of the county. One of the objectives of this policy is the establishment of a functional post-disturbance land use capability.

Moreover, remediation and rehabilitation of abandoned mines shall be accorded top priority to address the negative impacts of mining activities. This is through protection and conservation of the environment by identification of appropriate rehabilitation and mitigating measures per project component to inhibit and/or prevent any possible risks or adverse impacts that could endanger humans and the environment.

During the life of the mine, there will be continuous mine rehabilitation carried out with supervision and input from the GGMC and EPA. The developer will work with these agencies and other stakeholders towards the development of an approved mine rehabilitation and closure plan. The closure phase will take approximately 6 months and will require approximately 10 persons.

Support and Supplies

The project will be supported at all stages by the sourcing and supply of all necessary industrial inputs from Georgetown, New Amsterdam, and Rose Hall based on the cost and availability of the required

products and services. Other supplies, such as vegetables, will be taken from the surrounding subsistence farmers to support the local economy.

Environmental Benefits

This mining operation will seek to minimize its carbon footprint by carefully planning and controlling its development while utilizing methods and equipment that are eco-friendly.

Socio-Economic Benefits

The project is expected to have positive socio-economic benefits through the provision of an affordable and reliable supply of fill material throughout the year to the local market. The project will also create employment and allow employees to be trained in various vocations.

As is outlined in Section 5.1 below the cost of fill material produced by the project will be cheaper than the current cost, and with this mine in operation the cost can be stabilized. The project is estimated to produce approximately 20-30% of the anticipated demand.

Once the project is operational there may be other benefits, such as having a tourism value whereby visitors can visit the project site to access the surrounding eco-tourism attractions.

Advantages of Selected Project

In the consideration of this open pit mine development several considerations were made, including;

- the projected demand (2020-2035)
- the quantity and quality of the material available
- the logistics and site accessibility
- the projected life span of the project
- the reduced cost of aggregate on the local market
- the high yield of material per surface area cleared

5.1 Economic Analysis

Particular	**Details (GUY$)**
Mining Cost	600 / ton
Transportation Cost	1200 / ton
Royalty and Other Expenses	500 / ton
Total Cost of Production	2300 / ton
Selling Price	3500 / ton
Gross Profit	1200 / ton
Current Market Price	~5000 / ton

Table 5.1 Proposed Economic Model of the Project

Present demand as presented by the GGMC and Ministry of Public Works is in excess of 0.5 million tons per year nationally.

5.2 Environmental Considerations

Upon obtaining the Mining Permits the developer will engage a team of professional consultants, approved by the Environmental Protection Agency, to prepare a detailed Environmental Management Plan for the project site. However, at this stage the developer is cognizant of the main/common anticipated environmental impacts associated with open pit mining activities, which are listed as follows:

- Air pollution
- Noise pollution
- Ground vibration
- Water quality
- Erosion and sedimentation
- Slope stability
- Overburden material management
- Waste disposal
- Ecology
- Traffic and transportation
- Social-economic
- Visual impact
- Cultural heritage
- Closure or potential abandonment
- Residual Impacts

Impact : Air Pollution

Air pollution during open pit mining activities is caused by dust nuisance. Dust can be defined as finely divided solid matter and is a concern due to its harmful physiological effects. The dust becomes a nuisance when it is in the form of clouds, reducing visibility, creating an uncomfortable environment (irritation of eyes, ears, nose, throat, and skin). In addition, dust nuisance may also increase equipment maintenance costs due to excessive wear and premature failure of components.

A wide variety of open pit mining activities produce dust. These include:

- Site clearing;
- Excavating;
- Filling;
- Dust from overburden disposal area;
- Transportation of materials; and
- Vehicle movements on unsealed surfaces.

Dust particles are transported by wind. Wind-borne dust can settle on neighboring, or distant, properties, resulting in particle deposition on surfaces, which may affect operations or simply represent a nuisance for others. Dust deposition on vegetation can affect the photosynthesis process, thus impacting the growth of vegetation. In addition, excessive dust emissions may cause site health and safety concerns due to the higher risk of accidents and downtime. High levels of dust concentration in the environment may represent a health hazard to local residents.

Key Mitigation Measures - Air Pollution

The mitigation measures that can be considered for air pollution control include (but are not limited to):

- **Air quality compliance** - Air pollution and dust need to be managed in compliance with the recommended limits for air quality.

- **Location of stockpiles** - At the planning stage, there should be an assessment of prevailing winds, and this should guide the location of stockpiles, spoil mounds, conveyors, and others to minimize dust being blown outside the site boundary.

- **Vegetation barriers** - These consist of dense stands of mature trees, can act as windbreaks to help alleviate dust generation.

- **Dust control for crusher plan**t - Conveyors and transfer points can be major sources of dust generation. Acceptable mitigation measures for these can be any or all the following:

- Enclosures,
- Mist sprays,
- Dust extraction equipment.

• **Minimising distance** - Minimising the distance between the discharge point and the top of the stockpile can reduce dust generation.

• **Cease operations** - During periods of high wind speeds operations may be ceased or curtailed to prevent excessive dust leaving the site.

• **Water spraying** – Grounds of the mine sites and stockpiles including overburden areas and access roads may be regularly sprayed with water to reduce dust generation. The frequency should be determined based on site conditions.

• **Wheel washing facility** - Provide a wheel washing facility at site exit points to avoid dirt being carried out of the project area. Water from the washing facility should be changed regularly to ensure clean water (without silt) at all times. The facilities should be connected to the sedimentation basin to treat dirty water, prior to final discharge.

• **Speed limit** - Speed limits should be applied to unsealed roads to limit dust generation (as well as noise, and maintenance requirements).

• **Material cover** - Dust can also be reduced during the transportation of materials by covering loads on trucks. Less effective, but still useful is to limit the fill height of material in the tray to the level of the top of the tray.

• **Site Entrance** - Mine entrance can be sealed/ layered with aggregates to minimize dirt carried offsite on vehicle tyres.

Impact :Noise Pollution

Noise can cause annoyance; nuisance; sleep disturbance and can affect wildlife and domesticated animals.

Open pit mines can have many activities that generate noise:

• Earthworks;
• Excavation;
• Transport of materials.

Noise can affect humans psychologically as well as physically. It can potentially lead to hearing damage and affect the quality and precision of work.

Key Mitigation Measures - Noise Pollution

The mitigation measures that can be considered for noise pollution control include (but are not limited to):

• **Noise quality compliance** - Noise generated from the site needs to be kept within the national standards. This may require restrictions to operating hours.

• **Vehicles/Equipment** - Avoid deployment of poorly maintained, or old transport vehicles and equipment.

• **Physical Barriers** - Noise attenuation may be achieved to some degree by barriers. These may be bund walls installed at the site, zinc hoardings, vegetation barriers, or natural topographic features.

• **Vegetation barriers** - If trees are being considered as effective noise attenuation means, the trees need to be mature, the plantings relatively dense, and the width of the barrier greater than 20 meters. The stand of trees also needs to extend to well above the point source of the noise.

• Silencers - Machinery such as compressors, engines, generators, and exhausts may be fitted with silencers to reduce their impact, if necessary.

• Speed limit - Truck noise on access roads and haulage roads can be reduced by maintaining low speeds and through regular vehicle maintenance. Proper selection of access roads can also reduce noise impacts.

Impact : Ground Vibration

Ground vibration is similar to a seismic event, in that it causes the ground to shake. It does have the capacity to cause damage to structures at very high readings. The concern is commonly raised about

the vibration level of single events and the cumulative effects of low-level vibration from multiple events. A person can normally feel vibration levels in excess of 1 mm/sec. Vibrations in open pit mines can result from:

• Operation of Heavy Machinery; and

• Movement of Trucks and heavy equipment traffic.

Vibration Caused by Machinery

Typically, open pit mine activities involve the use of hydraulic machinery which generally has ground vibration effects. There are a number of strategies for reducing the effect of vibration from machinery:

i. Distance. The vibration value decreases rapidly with distance from the source. The actual rate of reduction is dependent on the geology of the site and on the surrounding terrain.

ii. Machinery supports. Machines can be mounted on footings that use rubber bearing pads or springs to isolate the vibrations from the ground.

iii. Machinery enhancement. Inertia blocks can be used to add system mass and therefore reduces vibration

Vibration Caused by Road Traffic

The most severe vibrations associated with road traffic result from heavy vehicles with stiff suspension moving rapidly along roads with irregular surfaces.

Key Mitigation Measures - Ground Vibration

The mitigation measures that can be considered for ground vibration include (but are not limited to):

• **Safe Distances** - For any sites subject to influence of vibrations there should be a minimum buffer of as prescribed in the appropriate regulations within which there should be no structure or activity.

• **Permit requirements** - There are regulations and permits for any excavation, machinery operations and pit development. Noise and vibrations associated with mining activities must fall within standards specified in the permit and regulations.

Impact : Deterioration of Water Quality

Open pit mining activities will change the topography of the site, with consequent changes in drainage pattern. Vegetation removal also increases the rate of rainfall runoff. It is often necessary to manage

surface drainage with the provision of drainage interception bunds (e.g. at the top of the excavation) to redirect flows, and with the installation of drainage channels to cater for concentration of flow. Where the open pit mining excavation intercepts the groundwater table, it may necessitate separate measures to drain the pit, often involving pumping. The interception of groundwater and its diversion to surface drainage may also result in an interruption of groundwater flows, a lowering of the water table in the local area, and potentially dewatering of adjacent watercourses.

Any runoff from cleared surfaces, or discharges from the pit or floor, is likely to have elevated levels of sediment (both suspended and dissolved). In addition, there may be other contaminants depending on the nature of the soils that are exposed in the mining process, and any leakages from machinery at the site. The quality of the water discharged from the site can have impacts on downstream ecological communities and water users.

Key Mitigation Measures - Deterioration of Water Quality

The key objective of the mitigation measures is to protect existing waterways and groundwater resources from impacts from the mining activities. The mitigation measures that can be considered for water quality deterioration include (but are not limited to):

• **Drainage flow** - As far as possible, drainage should follow existing drainage lines with vegetation along the drainage lines retained.

• **Cut-off drainage** - Cut-off drains or diversion banks can prevent surface flows from entering the open pit areas. These should discharge into vegetated natural drainage lines, or as distributed flow across an area stabilized against erosion.

• **Sedimentation ponds** - Run-off from work areas should be routed towards sedimentation ponds. These trap sediment and reduce suspended sediment loads before runoff is discharged from the mine site. Sedimentation ponds should be designed based on runoff, retention times, and soil characteristics. There may be a need to provide a series of sedimentation ponds to achieve the desired outcome.

• **Flow barriers** - Additional methods for trapping sediments include using barriers to flow such as silt fences, crushed rock filters, hay bales, logs, or sandbags.

• **Vegetation buffer** - A vegetated buffer strip around the perimeter of the site where surface water flow passes through can be effective, and should be provided along any significant waterways passing through the site.

• **Groundwater** - Where groundwater may be impacted (i.e. excavations below the water table) a detailed study may be required to determine potential impacts and appropriate mitigation.

Impact : Soil Erosion and Sedimentation

Soil erosion and excessive sedimentation problems arising out of open pit development activities can pose a threat to the environment if not systematically controlled. Soil erosion can also lead to the cumulative effects of siltation and sedimentation in streams and rivers downstream as well as reduced depth of riverbeds and watercourses, which inhibits navigation and leads to flash floods in low-lying areas. Any disturbance of the in-situ soil will elevate the potential for increased soil erosion and run-off - in particular steep faces that are typical of open pit operations and are very prone to erosion. Eroded material is carried downstream to areas of flatter terrain where it is deposited as sediment.

Open pit mining activities at a site will result in some, or all, of the following occurring:

• Removal of protective vegetation cover;

• Exposure of underlying soil horizons that may be less pervious, or more erodible than the surface layers;

• Reduced capacity of soils to absorb rainfall;

• Shortened time of concentration of surface runoff due to altered steepness, distance and/ or surface roughness characteristics (including removing vegetation and top-soil);

• Increased energy in storm-water runoff due to concentration and velocity;

• Alteration of ground-water regime, with potential impacts on drainage and slope stability; and

• Exposure of subsurface materials which are unsuitable for vegetation establishment. The potential for erosion relates to the characteristics of the soil, the vegetative cover, exposure of the site to storm-water runoff, steepness of the site, slope length, and concentration of storm-water flows.

Key Mitigation Measures - Soil Erosion and Sedimentation

The mitigation measures that can be considered for soil erosion and sedimentation include (but are not limited to):

• Sedimentation ponds - Provision of sedimentation ponds based on the finalized mine plan to capture material eroded at the site before discharge.

• Ground cover - Design of surface ground cover to minimize soil exposure to intense rainstorm. Adequate soil compaction works should be conducted at the end of each working day to reduce soil erosion.

• Retain vegetation - Retain existing or re-plant the vegetation at the site wherever possible.

• Run-off diversion - Minimize or divert high velocity runoff away from sensitive/ easily prone to erosion areas through provision of proper drainage systems.

• Drainage - Construction of high-volume drainage systems conforming to site conditions to handle concentrated or increased runoff from intense rainstorms.

• Monitoring and maintenance - Regular monitoring and maintenance of erosion control systems so that they perform as specified.

Impact : Slope Stability

Landforms are the products of the local balance between weathering, erosion and deposition, and are continuously evolving. Slopes that are too steep for weathered material to remain stable are subject to periodic failure. Instability may be associated with moderate to steeply sloping terrain or with land which has been disturbed by man. Natural slopes that have been stable for years may fail during the open pit mining activities, which may bring about (a) changes in the slope topography; (b) changes in groundwater conditions; (c) stress changes in the soil underlying the slope and (d); acceleration of the rate of weathering. Excavation activities during open pit mining operations change the slope topography and release residual horizontal stresses allowing expansion of the slope. Joints or weak zones may be exposed along which sliding may occur. Over steepening of the slope gradient to create a platform can also induce instability. The change in groundwater flow patterns may cause detrimental changes to the stability of the newly constructed slope or the existing in-situ slopes that were stable prior to mining operations.

Key Mitigation Measures - Slope Stability

Applying appropriate slope design and protection can prevent slope failure, thus minimize soil erosion as well as improving safety. The mitigation measures that can be considered for slope stability include (but are not limited to):

• **Benching** - Provision for slope benching system at the mine face.

• **Turfing** - Turfing should be carried out to establish vegetation on the slope making it more stable.

• **Weather condition** - Blasting activities and related earthworks should not be carried out during wet and rainy weather conditions.

• **Retain vegetation** - Existing vegetation on hill slopes especially on undeveloped areas are to be retained as much as possible to act as natural buffers.

• **Checking slope areas** - Regular checking of the slope surface and surrounding areas for signs of possible slope failure and soil erosion should be carried out.

Impact : Overburden Management

Overburden or topsoil is removed prior to extraction. Methods of overburden disposal vary for each operation. Overburden removal from the open pit area and disposal within or outside the open pit area can be a major source of erosion and sediment discharges, particularly if the disposal site is not properly located and managed.

Key Mitigation Measures - Overburden Management

The mitigation measures that can be considered for overburden management include (but are not limited to):

• **Sediment barriers** - Overburden which mainly consists of topsoil should be protected from stormwater runoff using temporary perimeter sediment barriers such as gravel bag berm, silt fence, sand bay, sedimentation pond or rock filter. Suitable slope gradients should be provided together with proper perimeter drainage system to ensure proper runoff flow.

• **Compaction** - Proper earth compaction to an appropriate density should be conducted immediately to stabilize the soil materials, thus reducing the amount of surface runoff.

• **Turfing** - Close turfing should be conducted on the ground of the overburden disposal site if it is not immediately used for other uses.

• **Drainage maintenance** - Regular maintenance on the drainage system around the overburden disposal sites.

• **Overburden management** - Overburden materials can also be sold to sites nearby and the environmental consultants need to take into consideration the environmental impacts caused during the transportation from the overburden disposal site to the destination site as well as its suitability for disposal. Else, the overburden materials can also be utilised to construct earth bunds for internal roads.

Impact - Waste Management

Wastes generated by open pit mining activities include:

• Sludge (usually clay/ silt) materials collected in sedimentation ponds;

• Waste oils or chemicals from vehicle, machinery, or other uses;

• Domestic wastes (sewage, drainage) from on-site sanitary or kitchen facilities;

• Vegetative waste from site clearing activities; and

• General waste. If these wastes are not properly managed they can result in pollution of surface or groundwater, soil contamination, health impacts, and visual unsightliness.

Key Mitigation Measures - Waste Management

The mitigation measures that can be considered for waste management include (but are not limited to).

• **Minimize waste** - All efforts must be made to minimise the amount of waste generated through recycling and prudent procurement and operation. Where feasible, waste should be removed to public waste disposal sites. Where this is not feasible, pits may be dug at safe distances from water bodies and to a depth that does not pose any instability to slopes or offer opportunities to wildlife or pests to dig it up. It is imperative that groundwater is not impacted by the disposal of wastes in these pits.

• **Zero burning** - Biomass waste from site clearing may not be burned but can be left for natural decomposition. The environmental consultant should emphasise options for better utilisation of smaller dimensions of woody biomass (such as small trees and branches) from site clearing.

• **Provision of waste bins** - Provision for sufficient waste bins for collection of solid waste generated onsite. These bins should be emptied on a regular basis and the waste collected should be disposed off at the local authority's approved disposal sites.

• **Housekeeping** - Good housekeeping practice onsite (wastes should be properly disposed off at designated containers/ areas).

• **Location of facilities** – The location of workshops and fuel/ lubricant storage facilities (if any) should be at least 50 metre distance from the nearest natural waterway and installed with proper oil traps and spill containment.

• **Oily/ scheduled waste** - Collect used oil and oily wastes from machinery and transportation vehicles and store and label in proper containers for disposal. A temporary storage facility should be constructed within the project site, and should be fenced, covered, bunded, sign posted, have impervious flooring, and be provided with spill containment, proper drainage and oil trap. The facility should be sited more than 50 m away from any river, stream or sensitive area.

Impact - Ecology

Open pit mine establishment will necessitate the removal of vegetation. Depending on the area affected, this may represent impacts on native flora species, or removal of important habitat for native fauna. Particular focus should be placed on the assessment of potential impacts on unique or rare plants, or species of major conservation or scientific interest.

Key Mitigation Measures - Ecology

The mitigation measures that can be considered for ecological impacts include (but are not limited to):

• **Protection** - Identify and protect sites deemed as valuable habitats or containing threatened species.

• **Relocation** - Where important habitats or species cannot be protected at the site the following should be considered:

- Relocation of fauna species, nesting sites and others to a suitable nearby location.

- Multiple replanting, or conservation activities at an alternative site, as an offset strategy for mature vegetation that has to be removed.

• **Buffers** - Provide vegetative buffers to protected areas.

• **Vegetation linkages** - Retain vegetation linkages to intact ecological communities on the boundary of the site as far as possible.

• **Wetlands** - Incorporate wetlands into sedimentation pond designs to provide additional or alternative habitat for wetland flora and fauna species.

Impact : Traffic and Transportation

Transportation of finished products - i.e. fill material to contractors - can cause dust and noise nuisance as well as affecting the traffic volume, flow and density in the surrounding area. In some circumstances, this increased traffic volume may impact other road users, as well as the public amenities associated with residential users and nearby areas. Increased truck traffic may lead to increased road maintenance costs.

Key Mitigation Measures - Traffic and Transportation

The mitigation measures that can be considered for traffic and transportation impacts include (but are not limited to):

• Road upgrading - Upgrading and/ or widening of local roads used to access the site.

• Planned routes - Using specified routes to and from the site that avoid sensitive areas such as residential or settlements.

Impact - Socio- Economic

Open pit mining activities generally provide significant economic and social benefits such as: long term economic and employment benefits; enhancement of surrounding infrastructure; stimulation of secondary industry and services, as well as enhancement of technical skills and educational levels. However, if they are conducted without proper planning and operation, open pit activities also have the potential for significant impact on the environment, including disruption to the ground surface and ecosystem and changes to the existing social patterns/ community livelihood

Key Mitigation Measures - Socio-Economic

Consideration should be given to the affected local population by protecting sources of local water supply, fishing and recreation areas. In addition, effective public relations exercise is important in ensuring social acceptability of the project. The mitigation measures that can be considered for socioeconomic impacts include (but are not limited to):

a) Employment

• **Employment and Business Opportunities** - Preference for employment and business should be given to local population. This will provide some opportunities to the local people to participate in the operation of the project, as well as providing them with an opportunity to earn extra income. In addition, their employment and business participation will prevent social resentment and conflicts, increase their

positive feelings towards the project, and create a sense of pride towards the development of their area.

b) Consultation

• **Public Relations** - Conduct a proper public relations exercise involving the local authorities. Two-way communications through dialogue helps both parties to understand each other, sets a forum for understanding, and establishes rapport. Information about the numerous benefits of the project and environmental impacts should be made readily available to the public.

• **Dialogue** - Hold regular meetings/ dialogues with the surrounding population and their community leaders, both prior to, and during the operation of the project. The Project Proponent should explain to the villagers the nature of the project, the extent to which it will affect their villages, and the mitigation measures undertaken to eliminate or minimize environmental, social and economic problems.

Impact : Visual Impact

Open pit mines can cause visual impact through:

• Removal of existing landscape features such as hills; and

• Introduction of intrusive features such as open pits or overburden mounds. The features of a open pit that can visually affect the landscape depend very much on the specific location and surrounding environment of the project. These include:

• Size, form and colour of plant and machinery;

• Exposure of the ground surface or mine face;

• Location, size, and shape of bund walls, stockpiles, waste disposal areas, fences; and

• Location of access roads.

Key Mitigation Measures - Visual Impact

The visual impact of the open pit mine needs to be considered at the planning stage. Careful location decisions regarding angle of approach to the pit, location of access roads, plant, machinery and stockpiles, retention of vegetation and others can make a big difference to the visual impact.

The mitigation measures that can be considered for visual impacts include (but are not limited to):

• Retain vegetation - Retain existing vegetation where effective for screening of the site.

• Vegetation screens - Provide screens in the form of grass, bushes, vegetated or earthen bunds.

• Plant vegetation - Plant additional vegetation in areas facing the surrounding settlements to minimise visual intrusion.

• Site layout - Where practical, working faces and plant locations should be oriented away from vantage points.

• Rehabilitation - Where feasible, uppermost benches should be worked out and rehabilitated as soon as possible.

• Painting - Machinery, plant, fences, and exterior faces of buildings can be painted to blend in with, rather than contrast with, the surrounding environment

Impact - Cultural Heritage

The establishment of a open pit mine may impinge on existing archaeological assets, whether known prior, or discovered during the course of the project. The developer needs to check on ground and consult with the relevant government agencies to verify whether there is any known cultural significance at the proposed project area.

Key Mitigation Measures - Cultural Heritage

The discovery of any cultural or archeological sites must be immediately preserved and reported to the relevant government agencies.

Impact - Site Closure/ Abandonment

When the resource within the site boundary has been exhausted, the project site will be closed down. The closure will be in accordance with a conceptual project closure plan that has been established prior to closure in collaboration with the relevant stakeholders and state agencies. The manner in which the mine is managed for the post-operation phase will define its long-term environmental implications. Globally, there are examples of open pit areas being reestablished for productive use including housing and commercial development and recreational facilities.

Key Mitigation Measures - Abandonment/ Closure

In the event that the mining operations are abandoned, every attempt should be made to reinstate the condition of the site to that which existed prior to commencing mining activities. Whilst this will not be feasible where large scale excavation works have taken place, as a minimum, the cleared area should be re-vegetated. This will involve breaking up compacted ground, covering with topsoil, and planting/ seeding with selected local tree species and/ or cover crops.

Where a structure is partly erected, this should be demolished and removed from the site. All drainage provisions, including sedimentation ponds should be retained. All equipment, machinery and waste materials should be removed from the site.

Impact - Residual Impacts

It is unavoidable that there will be some adverse impacts from the earthwork activities even if these are carried out with every intention of avoiding or minimizing such impacts.

There will be a loss of ecological features, in terms of natural wildlife habitat together with surface runoff which pollutes the waterway as a result of land clearing. For such impacts, the risk and the magnitude should be assessed as part of the assessment procedure.

Key Mitigation Measures - Residual Impacts

Residual impacts are already minimized through the choice of technologies or methodologies. Mitigation is therefore only possible through compensation or substitution. Compensatory measures in terms of replacement of habitat loss, re-vegetation, alternative access to livelihoods and others are among the available options for mitigation of residual impacts.

Monitoring

Environmental monitoring provides feedback on the actual environmental impacts of a project. Monitoring results will assist in the judgement of whether the environmental mitigation measures proposed are successful in reducing or eliminating negative environmental impacts. An environmental monitoring programme is also used to ensure compliance to the recommended mitigation measures and environmental standards stipulated by the EPA and other relevant agencies.

Generally, an environmental monitoring programme will involve collecting data for one or more of the following purposes:

i. To establish a baseline, that is, gathering information on the basic site characteristics prior to development or to establish current conditions;
ii. To establish long term trends in natural undisturbed systems to establish natural baselines;
iii. To estimate inherent variation within the environment, which can be compared with the variation observed in another specific area;
iv. To make comparison between different situations (for example, predevelopment and post development; upstream and downstream) to detect changes; and
v. To make comparisons against a standard or target level.

Without a monitoring system, there is no mechanism for ensuring that the specified mitigation measures are being implemented and for evaluating the success of the mitigation measures undertaken. The environmental monitoring programme will generally comprise compliance and impacts monitoring. Compliance monitoring aims to ensure compliance to the recommended mitigation measures and environmental standards stipulated by the EPA, and other relevant agencies whereas impacts monitoring provides feedback on the actual environmental impacts of a project in order to confirm that a project is meeting the agreed level of impact and that the predictions of impacts made during the environmental assessment have been accurate.

An appropriate mentoring system will be set out in the Environmental Management Plan which will be conducted upon the issuance of the Mining Permits.