GUYANA ALPHA CONSTRUCTION INC

POTERIMA 3 PROJECT SUMMARY

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EXECUTIVE SUMMARY

The Guyana Alpha Construction Inc project is located approximately 7 miles from Bartica and 60 miles from Georgetown; the prospective quarry is adjoining Toolsie Persaud's St Mary's Quarry. The intention is to develop this quarry using modernized techniques while adhering to all mining, environmental and other laws and regulations developed by the government of the Cooperative Republic of Guyana.

A rough estimate proves over 5,400,000 tons (above water) visible from 2.3 kilometres the river, but much more is indicated in the adjoining ridge extending north-west direction of the quarry license block. It has the potential to supply our present market demand and after initial stripping and debushing a reserve calculation will be executed on the adjoining ridges.

The presence of joints trending from West to East is of significance; the "throw" of the rock from blasting must therefore be from North to South to preclude the excessive formation of boulders.

For the five (5) years operation plan, 2021-2026 it is estimated that 1,062,000 tons of rock will be extracted assuming that initial works and production starts by July 1, 2021. The annual production will be 250,700 tons of which 50,140 tons will be "Rip-Rap" and 200,560 tons will be aggregate.

The quarry will have a work force of 98 local employees, and two (2) expatriates. Development of the Poterima facilities for this quarrying complex will be completed by June of 2021. It is anticipated that all the necessary/additional authorization are received by April 2021

1.0 INTRODUCTION

The quarrying industry's role is to provide a reliable supply of construction materials for road making, building construction, and the maintenance of road networks on which other industries depend.

As observed in other industries, successful market leaders are those who provide an efficient and effective service and are mindful of all aspects of their public image. The modern community demands that these premises be managed carefully with consideration of the needs of the environment, neighbours, and employees.

The general objective in planning for the provision of these materials is to ensure that the supply is managed in a sustainable way, so the best balance is obtained between environmental, economic, and social considerations.

The primary reason for the opening of this quarry was to satisfy the Ministry of Public Works with boulders for sea defence maintenance and aggregates for road maintenance and other construction works.

Information garnered

Establishing the **minimum land requirement**- limits of recoverable mineral resources and areas required for associated activities such as processing, stocks of finished pro ducts. Access and on-site disposal of quarry and process waste

Establishing the **legal context**-ownership of the land etc.

Site description- ground service contours, geological, geochemical, geochemical, hydrological, hydrological information.

Identification of **environmental drivers**-matters that will have a major effect on design such space needed for construction of anti-pollution measures e.g. settling ponds, the presence of ecology or archaeology on which there might be an impact or proximity of sensitive receptors (residents) who may be affected by noise, dust visual impacts or other nuisance

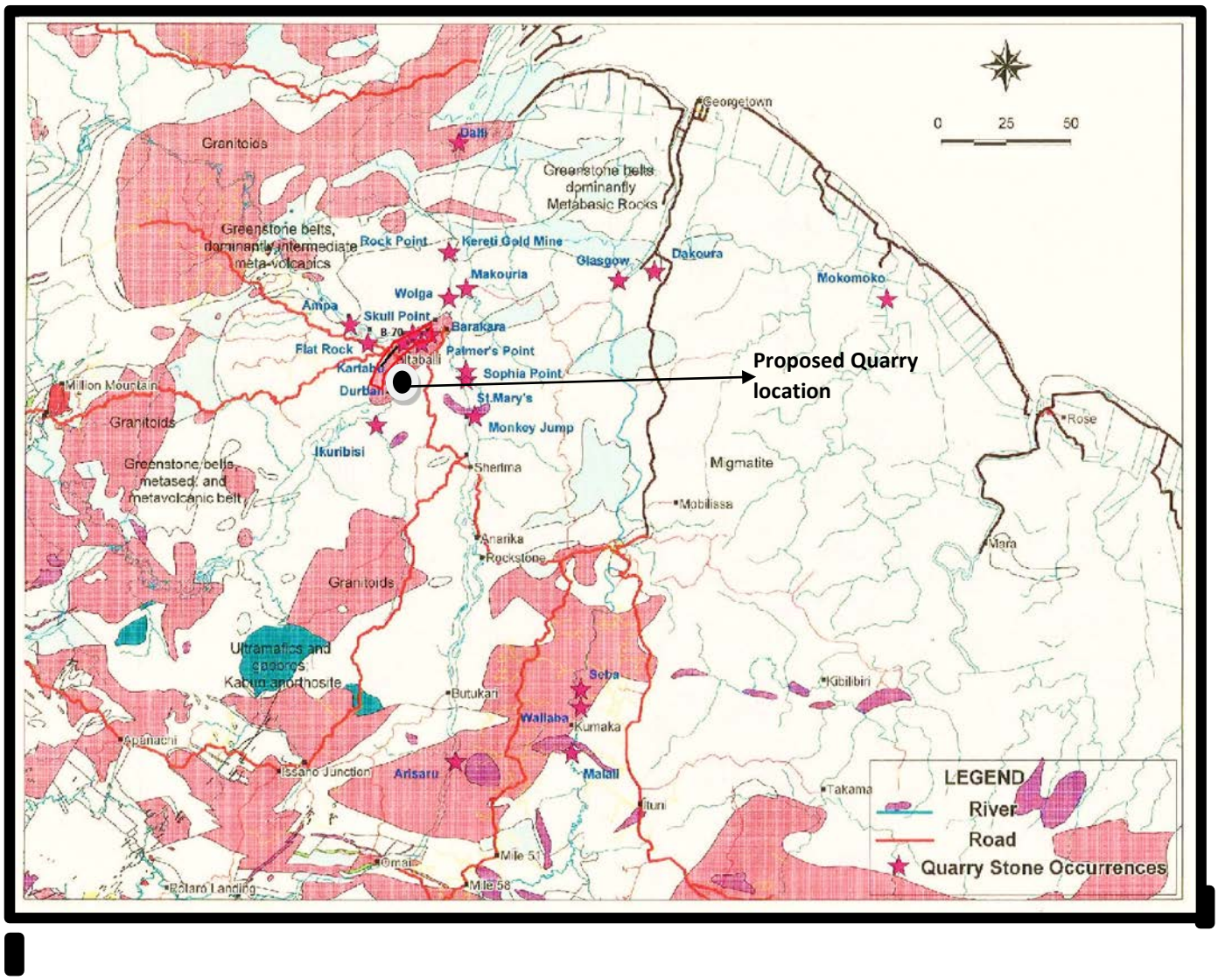
Identification of **safety drivers**-identification of geotechnical operation settings relevant to the deposit or its location that influences the creation of inherently safe designs for the workforce and third parties

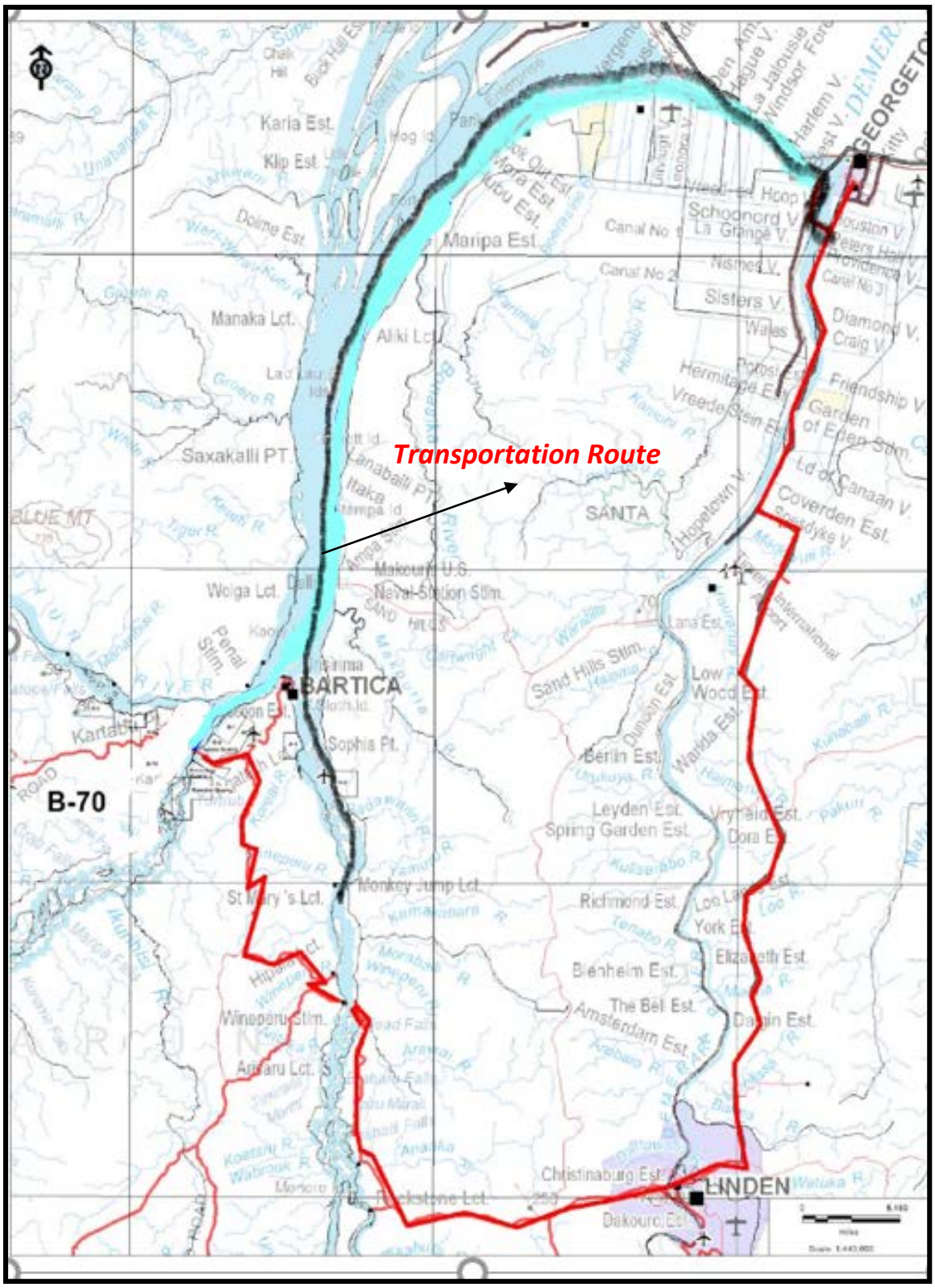
Establishing the **commercial/financial** context-the market competition, establishment costs etc.

Site selection

The quarry design process commenced with the selection of a site as a prelude to its promotion through planning and the licensing process. The starting point for site selection was through the establishment of “land bank” of sites where there is a presumption in favour of exploitation of aggregate or other construction materials were appropriate. The criteria used to select the specific area were, reserves, accessibility to river transport for material and products and the availability of the area for quarry development (supply/demand).

MAP 1 Geographic Location of Quarries in Guyana





MAP 2 Location and Accessibility of Proposed Quarry

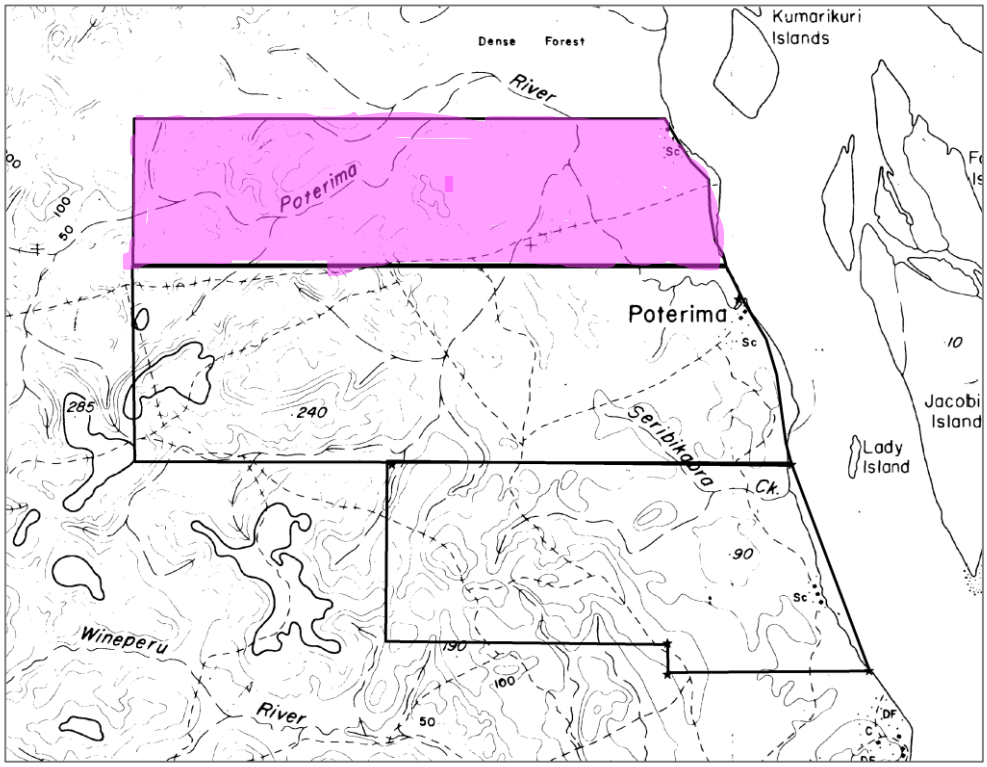
2.0 DESCRIPTION OF BLOCK

Tract of state land located in the Cuyuni Mining District No. 4 as shown on Terra Surveys Topographic Map 27NE, at scale 1: 50,000 with reference point 'X' located at the confluence of the Seribikabra Creek and Essequibo River located with geographical co-ordinates of longitude *-58° 34' 46"W and* ***latitude*** *6° 16' 26"N****.***

Thence at true bearing of **343°**, for a distance of approximately **one-mile 1549 yards**, to point of commencement

Point A, located at geographical coordinates of longitude **58° 35' 17"W** and latitude **6° 18' 0.4"N**, thence at true bearing of **270°**, for a distance of approximately 2 miles **894 yards**, to **Point B**, located at geographical coordinates of longitude **58° 37' 29"W** and latitude **6° 18' 0.0."N**, thence at true bearing of **180°**, for a distance of approximately **1272 yards**, to **Point C**, located at geographical coordinates of longitude **58° 37' 29"W** and latitude **6° 17' 22.4"N**, thence at true bearing of **90°**, for a distance of approximately **2 miles 1409 yards**, to **Point D**, located at geographical coordinates of longitude **58° 35' 2.5"W** and latitude **6° 17' 23"N**, thence down along the left bank of the Essequibo River, for a distance of approximately **1425 yards** to the point of commencement at **Point A**.

Thus, enclosing an area of approximately **1194 acres,** save and except all lands lawfully held or occupied.



MAP 3 Location and Property Description

3.0 ORE GEOLOGY

The geology at has been described by H.Schielly as uniformly massive leucocratic muscovite granite which contains a few angular, black xenoliths of Biotite hornblende hornfels (less that 1%). R.T. Cannon (1964) in his very detailed study of “the Geology of the “BARTICA ASSEMBLAGE” has covered the deposit also in some detail. Cannon described the granite as a Muscovite-Biotite Granite. The map shows that the Geology of the Teperu/Itabu granite extends Westward across the Mazaruni river to Kartabu point. The Poterima and Kartabu Granite therefore can be classified into two distinct facies (Cannon1961a):

This classification is true from visual inspection of the granite and also that the grey granite is more fine grained and uniform in texture than the leucocratic granite which has larger crystals of quartz visible – this supports the theory that the granite is Igneous in origin with Leucocratic granite later than the grey granite which obviously crystallized closer to the surface.

Important, however, from a Mining Geology point of view is the presence of joints within the rock matrix. The drilling and blasting plan will give a direction of throw to preclude a sliding along the joint planes.

4.0 MAIN EQUIPMENT OPERATING PARAMETERS

TRUCKS (773 Caterpillar.)

Fleets Size	-	2
Mechanical Avail. (%)	-	75
Operating Efficiency (%)	-	80
Overall Utilisation (%)	-	60
Operating System	-	(2*8*6)
Number of Operating Days	-	313
Av. Truck Production (tons)	-	75

Cycle time (Mins.)	-	20
Av. Total Production (Tons)	-	250,720
Av. Production losses (2.5%) (tons)	-	6,268
Av. Annual Crude rock supply (tons)	-	244,452
Av. Number of Operating hours	-	6,010

235 & 215 EXCAVATOR (Caterpillar)

Fleet Size	-	2
Mechanical Avail . (%)	-	80
Operating Efficency	-	50
Overall Utilisation	-	40
Operating System	-	(2*8*6)
Number of Operating Days	-	313
Number of Operating hours	-	3,005

980B & 980C FRONTED LOADER (Caterpillar)

Fleet Size	-	2
Mechanical Avail. (%)	-	75
Operating Efficiency	-	80
Overall Utilisation (%)	-	60
Operating System	-	(2*8*6)
Number of Operating Days	-	313
Number of Operating hours	-	6,010

DOZER (Caterpillar. D6C) and D9 DOZER

Fleet Size	-	2
Mechanical Avail. (%)	-	75
Operating Efficiency (%)	-	80
Overall Utilisation (%)	-	60
Operating System	-	(2*8*6)
Number of Operating Days	-	313
Dozer Productivity (yd/hr)	-	200

Av. Number of Operating hours	-	6,010

CRUSHING PLANT

Mechanical Avail. (%)	-	75
Operating Efficiency	-	80
Overall Utilisation (%)	-	60
Operating System	-	(2*8*6)
Av. Crusher Productivity (Ton/hr.)	-	150
Number of Operating Days	-	306
Crude Ore Supply (Tons)	-	244,452
5% losses (Tons)	-	12,222
Av. Annual Final Product (Tons)	-	232,229

GARDENER DENVER ROTARY DRILL

Fleet Size	-	1
Mechanical Avail. (%)	-	80
Operating Efficiency (%)	-	50
Overall Utilisation (%)	-	40
Operating System	-	(1*10*50)
Number of Operating Days	-	240
Number of Operating hours	-	960

GENERATOR (250Kv.) Caterpillar

Fleet Size	-	1
Mechanical Avail. (%)	-	75
Operating Efficiency (%)	-	80
Overall Utilisation (%)	-	60
Operating System	-	(2*8*6)
Number of Operating Days	-	313
Dozer Productivity (yd/hr)	-	200
Av. Number of Operating hours	-	6,010

5.0 STRIPPING PLAN (General)

The Poterima 2 location has approximately 1,500,000 b.c.m of overburden to be removed; the Cat. D9 dozer will spend 1,040 hours removing this overburden and clearing the slit and shrub that have resurfaced some parts of the exposed granite. Dumping of overburden will take place outside the Northern and Eastern stripping limits into valleys; adequate dumping room is available. All stripping (overburden) will be completed in 2021 a total of 6,010 dozer hours will be available annually. The dozer will work an operating system of (2*86) with Sundays being reserved for General Servicing.

6.0 QUARRYING (General)

Quarrying will be done with a fleet of two (2) 769 Cat. Trucks being loaded by two 235 Cat. Backhoe; the 980 or 988 Front-end loader (Caterpillar) can serve as a standby loading machine. Quarrying of stone will be done using an operating system (2*8*6) with Sundays being reserved for general servicing. A truck productivity of 100 tons per hour is estimated with average cycle time of 20 minutes and effective truck capacity of 80 tons. The annual production (estimated) is 250,700 tons and with an estimated ore, loss of 2.5% or 6,268 tons the Crude ore supply to Crusher will be 244,432 tons.

7.0 DRILLING AND BLASTING

A Gardener Denver Rotary percussive Blast hole Drill will be utilized at the quarry location to drill 8 cm diameter holes. Tovex will be used as the primary explosive, initiated by primer cord and 25 millisecond delay detonators. From writer's experience, angular rock fragment should be used as stemming instead of drill cuttings. A.N.F.O. can be utilized as secondary explosive during dry season but will not be used during the rainy season.

A programme for dry season drilling and blasting only will not be possible at this or any other location in Guyana since the rainy season is now indefinite therefore drilling and blasting will also have to be done during the rainy season.

Drilling and Blasting is a field science, and it is difficult to arrive at a blast design until some trial and error tests are carried out in the field. From the writers experience the Crater Test can be a useful start

to arrive at an “optimum depth, grid, spacing, and burden and power factor”-this may have to be adjusted after first production blast design.

For this quarry operation, the spacing, burden and Powder Factor previously used at the Teperu quarry is reused- a grid system of 2.5 m by 2.5 m and Powder factor of three (3) tons per pound of explosive – with the proviso again that this blast design will have to be modified for “effective” fragmentation.1

With the face, being approximately 20 m high it will be important that drilling and blasting be done in two (2) lifts of approximately 10 m each.

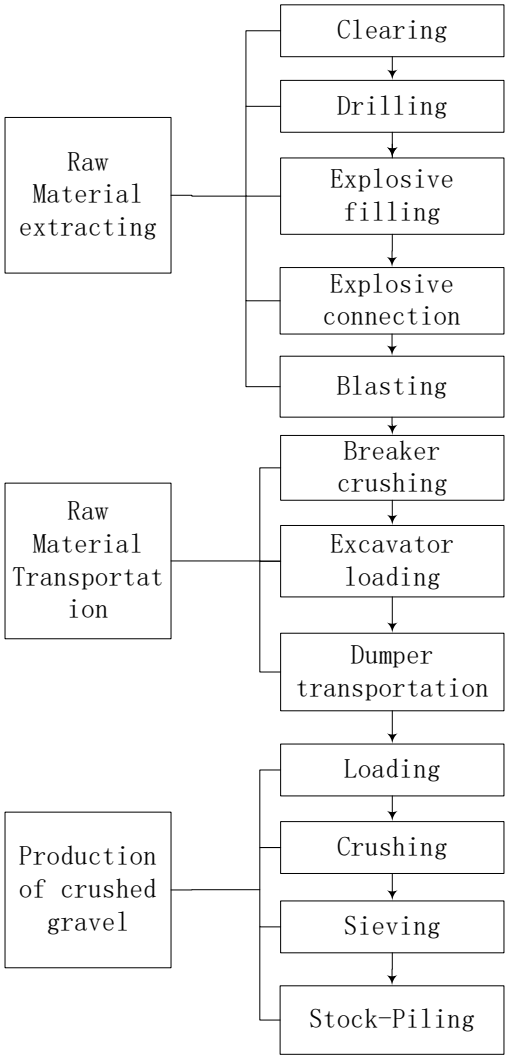
8.0 GENERAL DRAINAGE PLAN

An effective drainage system is necessary for the Poterima 2 Quarry. The 235 Hymac and D9 Dozer will have to be utilized to establish both top level and quarry floor level drainage. Dikes and drains will be established on top of the quarry face and drains will be drilled and blasted around the quarry face and drains will be drilled and culvert to the Essequibo River. A 6” diameter pump and sump may be necessary to facilitate the initial drainage of the quarry floor.

Priority will be given to the maintenance of these drainage systems for a clean/ dewatered quarry

9.0 CRUSHING AND OUT LOADING

The ROM material will be transported to a portable crushing plant) consisting of a fixed grizzly screen to separate 100 cm material. The +100 cm material will be transported to the coarse ore stockpile for primary crushing.



PLANT EQUIPMENT

No.	Name	Type	Qty	Unit	Capacity (kw)
1	Feeder	GZT1148	1	No.	2x5.5
2	Jaw crusher	PE750x1060	1	No.	110
3	Cone crusher	SMH250	1	No.	200
5	Small feeder	GZG125-4	1	No.	2x1.1
6	Heavy vibrate sieve	2YKRH1860	1	No.	18.5
7	Vibrate sieve	3YK2160	1	No.	30
9	De-ironing separator	RCYD-10	1	set	3
10	Belt conveyor		12	No.	
11	Integrated circuit control system		1	set	
12	Non-standard part and leg of belt conveyor		1	set	

Crushing operating will start with a mobile crusher being used to crush first 10,900 tons of Boulders that remained on the quarry floor. This mobile Crushing Plant is rated at 150 tons/ operating hour. This size specification for both crushers is as follows:

Siftings

¼”minus	)	
3/8 “	)	
½ “	)	Aggregate
¾ “	)	
1 “	)	
Rip-Rap		
Boulders		

Out-loading will be done with a 1800 h.p tug and six (6) 2000 ton barges (one equipped with extremely heavy metal decking for rip-rap).

The estimated barge turnaround time is 72 hours-24 hrs on the river, 24 hrs at Poterima (on-loading) and 24 for offloading; efforts will be made to reduce on this barge turnaround time by reducing on the on – loading and off-loading times.

It is estimated that 800,000 tons of product will be transported down river per annum.

No immediate river dredging will be required at Poterima for continuous river transport (for all Tides). However, before the end of this five (5) Years period, it may be necessary to dredge the out-loading area at least once.

10.0 PROJECT DEVELOPMENT (in Quarry)

Guyana Alpha Construction Inc will emphasize on the general appearance of the quarry and to render the operation more efficient, the following development works are necessary:

Ramp to Top of exposed granite

A ramp will be developed within the stripping and quarry limit, this limits the southern extension of the face. It is proposed that this ramp be relocated outside the Southern stripping limit to facilitate the Southern stripping extension of the quarry face.

Two (2) face Quarrying

A two (2) face quarrying operation will be implemented (a Western and Northern face) in quarry limits to a length of (400) m.

The two (2) face quarrying operation will have the advantage of being continuous, unaffected by drilling and blasting. Blasting will be done during change of shift of at lunch break/interval. The cuts will be numbered North and South for easy reference.

Establishment of trucking ramp

The ramp will developed in two (2) lift of approximately 10 m each. The ramp should have a slope angle of approximately 6% extending a horizontal distance of 50 m from the toe to the crest (plan distance of). The ramp width would be approximately 15 m for truck manoeuvrability and two-way traffic.

Quarrying of long face (400 m)

A two (2) face quarrying operation will be maintained with the face being split in two to give North and Western Cuts

Ramps (15 m) wide will be retained at the northern and Southern quarry limits as well a 15 m ledge from the previous bottom lift to serve as an initial road reserve for the quarrying of the long face/cut.
In all cases, the entire top lift will be required before the bottom lift.

11.0 INFRASTRUCTURE DEVELOPMENT

Guyana Alpha Construction Inc intends that the Poterima quarrying complex will be a model complex with facilities that are comparable with the quarrying operations in United Kingdom. The topography is ideal for housing etc. overlooking the operation.

If operation starts by July 2021, it is expected that improvements most of the infrastructural facilities will be completed if not on its completion stage.
The quarry will have a fulltime sanitation crew and a medex or sick nurse will always be on site with adequate medical supplies.

Because of the threat of Malaria in the area, Guyana Alpha Construction Inc will work closely with the Ministry of Health to maintain a malaria free environment at the quarry and nearby communities.

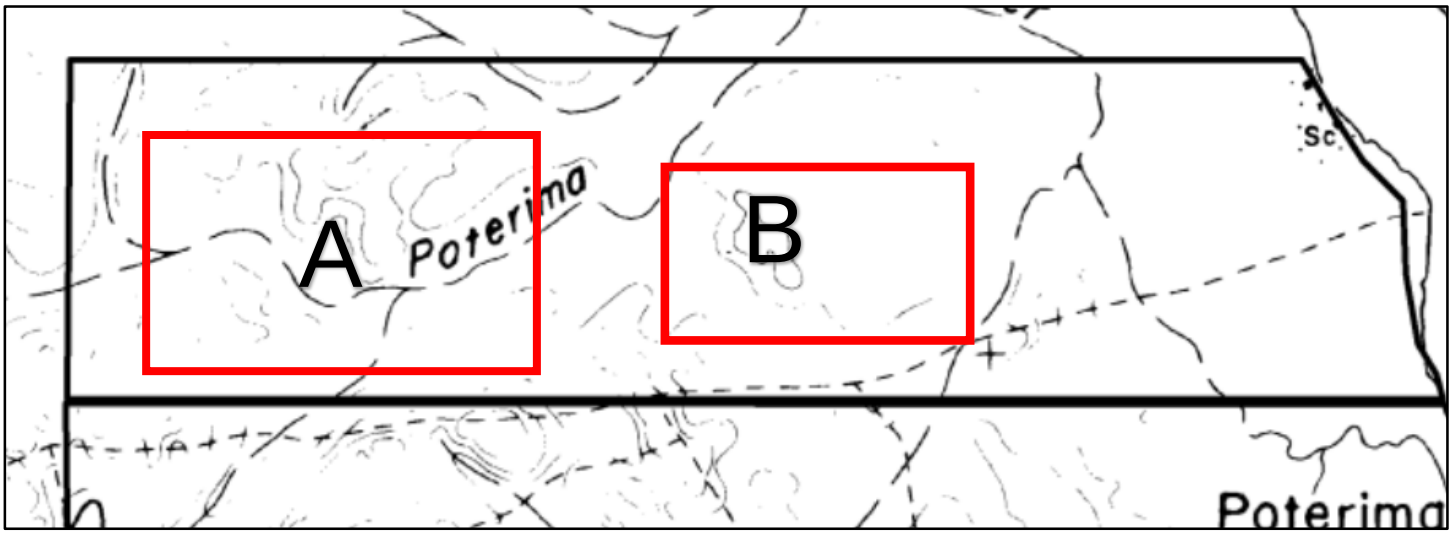
A small water treatment Plant for Potable water supply will be constructed near to the Essequibo River and water will be supplied from the treatment plant to the facilities around the quarry.

12.0 PROJECT MANAGEMENT (General)

The project initialization stage assumed a “starting date” of July 1, 2021 and finishing date of December 1, 2021; Major development works will be completed at Poterima during this period and some pre-production works will start at the project site.

The true purpose of the Network analysis is to show the precedent relationship between the various activities. Guyana Alpha Construction Inc. will have every stage of the production computerized for maximum utilization of resource and overall greater effectiveness – this will be a dynamic model.

13.0 ORE RESERVE ESTIMATION



Map 4 Proposed development

Section A

Av. Length	=	420 m
Av. Width	=	210 m
Av. Depth	=	15 m
Av. Volume	=	1,323,000 Cu. m
Av. Density	=	1.90 tons/cu. m
Ore Reserve	=	2,513,700 tons

Section B

Av. Length	=	300 m
Av. Width	=	190 m’
Av. Depth	=	15 m
Av. Volume	=	855,000
Av. Density	=	1.90 tons/cu. m
Ore Reserve	=	1,623,500 tons

Total Ore Reserve	=	(2,513,700+1,623,000) tons
	=	4,138,200 tons

Overburden

Section A

Av. Length	=	330 m
Av. Width	=	225 m
Av. Depth	=	5 m
Av. Volume	=	346,500 cu. yds

Section B

Av. Length	=	280 m
Av. Width	=	180 m
Av. Depth	=	6 m
Av. Volume	=	302,400 cu. m

Total Overburden	=	346,500 +302,400
		648,900 bcm.

The Life of the Quarry

Assuming an annual crude ore supply of 250,000 tons to satisfy a minimum annual out loading of 200,000 tons plus 50,000 tons (buffer stock) on stockpile annually to cater for any slight increase in the demand for product. The quarry is expected to have a life of 25 years

14.0 QUARRY PLAN

The ultimate extent of the pit is based on long-range price forecasts for aggregates and boulders, as well as engineering estimates of operating costs, transportation and payment terms. The design of the open pit and internal mining phases incorporates geotechnical recommendations for safe slope angles, internal ramp development for access to all working areas, and pit wall smoothing to enhance stability and operator safety.

Pit slope angles will vary according to soil strength, lithology and structural controls, but are expected to range between 28° and 48°.

The basis for mine planning was the US$60/ton with the area containing an estimated 4.2 Mt of rock and 650,000 t of waste material.

At the rim, the initial open pit will be 300 m across east to west, 300 m across north south, and will be about 20 m deep. The pit area totals about 350 hectares, and an additional 150 hectares will be disturbed for access/haul roads, ore stockpiles, the primary crusher and secondary crusher, screens and truck shop, and storage of fuel and lubricants etc

Quarry Schedule

Crushing` and screening is scheduled for 24 hours per day, 6 days per week, and 312 days per year at a processing rate of 3,200 tpd, or 1,000,000 Mt per annum. The Project will use two rotating crews, each working 12-hour shifts, to provide continuous operator coverage.

The Project's production schedule is presented in Table 1. Preproduction stripping will require 3 months to prepare for full-scale mine operations, training work crews, constructing access and haul roads, and clearing and grubbing the pit and waste rock storage areas that will be disturbed during the initial years of operation.

It is expected that Quarrying Operation will commence between and July 1, 2021. It is therefore estimated that for 2021, 62,000 tons being aggregate. From 2021 to 2025, the estimated production (finial Product) will be 250,000 tons annually with 50,000 tons being Rip-Rap and 200,000 tons being aggregate. The table below gives a proposed breakdown.

Product	**2021 (Months)**			**Years**				**TOTAL**
(1,000 tons * 103	**Sept**	**Oct**	**Nov**	**2022**	**2023**	**2024**	**2025**	
Rip-Rap	**4**	**4**	**4.4**	**50**	**50**	**50**	**50**	**212.4**
Aggregates	**16**	**16**	**17.6**	**200**	**200**	**200**	**200**	**849.6**
TOTAL	**20**	**20**	**22**	**250**	**250**	**250**	**250**	**1,062**

TABLE 1 PROJECTION SCHEDULE

Material Transport

The quarry material will be transported via large (40-T) Caterpillar 770 off-highway haul trucks (PLATE 1) from the quarry to the stockpile which will be located near to the primary crusher. After crushing, the aggregate will travel by overland conveyor to a covered crushed ore stockpile. The material will then pass-through screens and onto another conveyor that will discharge into the various screens to achieve the required classification.

40 T OFF HIGHWAY TRUCKS

A run-of-mine (ROM) coarse ore stockpile will be located near the primary crusher to temporarily hold material before plant start-up. The stockpile will also provide equipment utilization flexibility and short-term ore storage in case of interruptions in crusher operation. The ROM stockpile will hold 8,000 to 10,000 T of material but will reach a projected maximum size of about 20,000T at the end of pre-production stripping.

15.0 OVERBURDEN AND TOPSOIL MANAGEMENT STRATEGY

Waste material will be managed in areas located to the south of the initial open pit. The placement of the overburden is strategic to allow progressive reclamation. After replacement the topsoil will be spread and re-vegetated.

Haul trucks will back up to the dumping face, which is protected by a safety berm, and dump overburden over the side. Loads may occasionally be dumped atop the current lift, particularly when another overriding lift or surface re-grading is planned for the area. Dozers will be used to maintain safety berms along all waste storage facility crests, pushing excess material over the face and maintaining proper surface gradients for drainage.

Previously undisturbed areas affected by advancing waste storage facilities will be cleared and grubbed prior to the deposition of pit-run. Any growth media encountered will be stored for use in future reclamation activities or placed directly into active reclamation areas.

Growth media will be spread across the surface, seeded, fertilized and managed as necessary to promote re-vegetation of the waste storage area. Reclamation of these areas will be conducted as soon as the ultimate waste facility limits have been reached, which is anticipated to be concurrent with waste disposal operations in other parts of the storage facility.

Topsoil

Adequate topsoil management was considered the most important factor in successful rehabilitation of the project since the objective is to restore the native ecosystem of the project area. The topsoil from all areas being cleared would be retained for subsequent rehabilitation. The topsoil contains the majority of the seeds and other plant propagules (such as rhizomes, lignotubers, roots etc), soil micro-

organisms, organic matter and much of the more labile (more readily cycled) plant nutrients. Research data now available from other quarry sites demonstrate that in some areas, waste rock weathers rapidly to form suitable materials for re-vegetation.

The topsoil commonly referred to as the A1 horizon in Poterima 3 is usually darker than the underlying soil because of the accumulation of organic matter. The complete Al horizon would be removed. Special attempt would be made to avoid stripping deeper soil horizons with the topsoil since they may have poor structure or high clay contents. In areas where the Al horizon is not obvious, the top 100-300 mm of soil would be recovered.

Double stripping the topsoil, where the top 50-100 mm of soil is removed, and returned separately and on top of the remaining topsoil, may be warranted, particularly since the aim is to restore the native flora. Most of the seeds are stored in this top layer of soil, and its removal and return as a thin layer on the surface will maximize the contribution of these seeds to the post-mining flora.

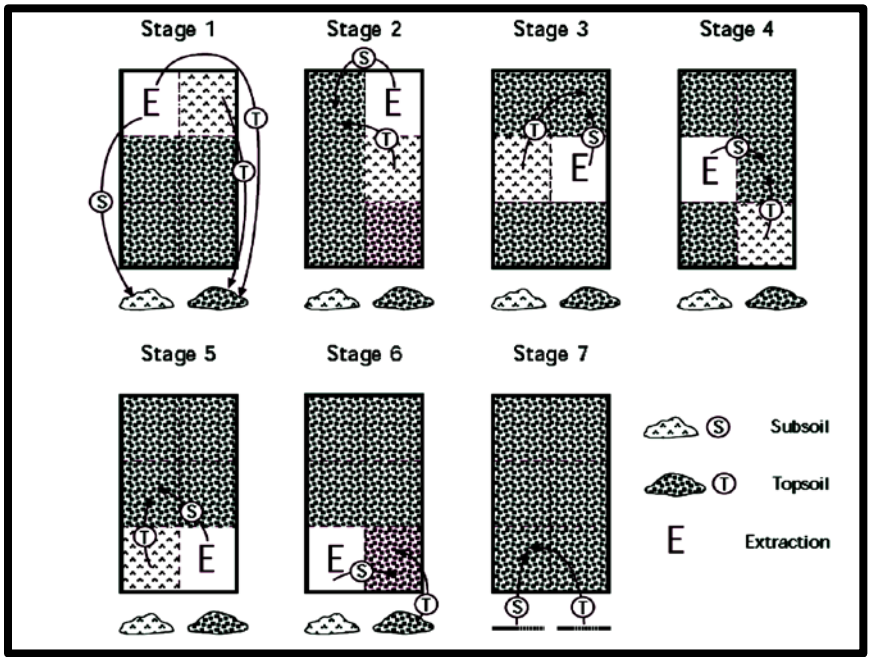
The topsoil will be removed by bulldozers, loaded by front-end loaders to haul trucks and transported to areas to be specified for topsoil storage

Overburden Characterization

No geochemical testing program has been conducted to characterize the tailings and waste materials and to develop a preliminary approach for ARD classification of the waste material. The results of the geological program indicate that the majority of the waste rock sampled will be non-acid generating NAG), though ARD potential has been factored into the design.

Overburden Management Strategy

General



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Foundation Preparation and Stability

Portions of the waste areas may be required to be cleared and grubbed of organic materials. Suitable foundation materials will be stockpiled for later use in reclamation. The remaining alluvial and overburden soils and rocks following clearing and grubbing (and any foundation stripping) will be considered suitable foundation materials.

There is no need for detailed stability analyses since the project will be backfilling as quarrying progresses and the waste area will remain relatively small waste rock piles will be stable during and after placement.

16.0 ANCILLARY FACILITIES

The ancillary facilities necessary to support the quarry and plant operations include an administration building, change house, camps, warehouse with lay down yards, light vehicle and process maintenance building, mine truck shop, mine truck wash and lube facility and a main guard shack with truck scale. Also included are fuel and lubricant storage and dispensing facilities for mine and process equipment.

Administration Building

The administration building will be a single-story wooden building with corrugated metal roofing and siding located at the 1000 ft from the plant. Visitor parking will also be provided outside the fence. This configuration will allow many of the site’s vendors and other visitors to access management and operating personnel without entering the process plant area.

The administration building will be approximately 60 square yards and will house all the administrative and management personnel. It will include a health and safety office, employee training room, and medical facility.

Warehouse

The warehouse for mine and plant operations will be located next to the administrative building. The warehouse will be a single-story pre-engineered steel building with corrugated metal roofing and siding. It will be approximately 100 square metres and includes an office, lunchroom and restrooms.

All materials and supplies will be received and stored at this warehouse. Satellite warehouse space will be provided in the mine truck shop and light vehicle repair shop for common and high use items. Delivery from the main warehouse to the satellite warehouse will be by the quarry and maintenance personnel. This will minimize traffic near the administrative office.

Light Vehicle Repair Building and Fuel Storage

The light vehicle repair and process maintenance facility will be a single-story pre-engineered steel building located south of the warehouse. The light vehicle repair building will be approximately 100 yds^2 with a 6 yds heave height. Two bays of the building will have floor hoists for light vehicle repairs, and two open bays will be used for plant maintenance. A fifth bay, separating the light vehicle repair and plant maintenance facilities, will contain offices, a lunchroom, tool room, and restrooms. A contained concrete pad at the north end of the building will contain storage tanks for used oil and antifreeze recovered from the maintenance operation. Bulk grease and lubricant storage and an air compressor will be located in the contained area.

A small vehicle fuel station will be located south of the light vehicle repair building. The light fuel station will contain a 40,000-litres diesel storage tank and a 40,000-litres gasoline storage tank and would be fitted with berms to contain 110% of the fuel contained 9. They will be located inside a concrete structure for secondary containment. Gasoline and diesel dispensing pumps will be provided on the west side of the storage tanks.

A receiving station for fuel delivery trucks will be located on the east side of the storage tanks. Both the dispensing pumps and the receiving station will be on concrete pads, with any spills collected in a sump within the containment area. The fuel delivery trucks will travel on the east perimeter plant road only when delivering fuels and will not have to enter the plant area.

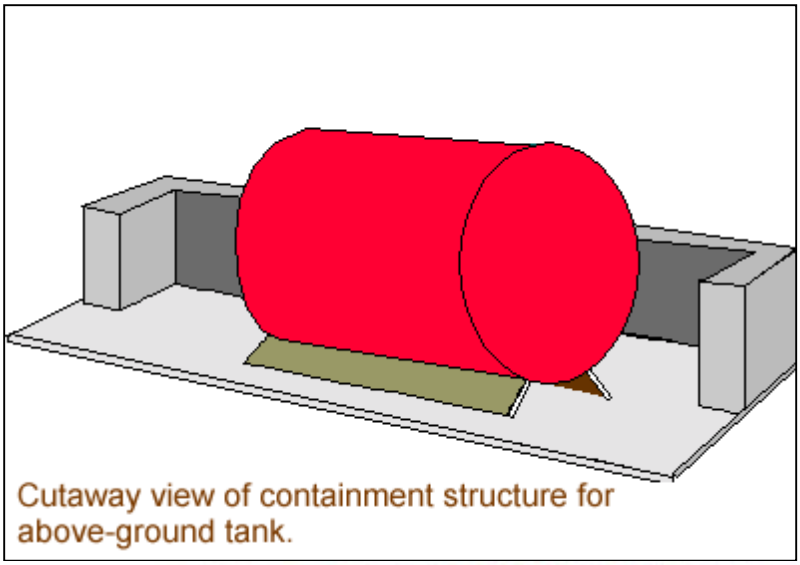


FIGURE 4.1 Diagram showing propose set up for fuel tank

Mine Truck Shop and Fuel Storage

The mine truck shop will be located about 200 m south of the light vehicle and fuel storage facilities. The operators will maintain left-hand traffic in the mine, the primary crusher dump pocket, on ore and waste haul roads, and to the mine truck shop.

The mine truck shop will be approximately 250 m^2. It will contain three bays to accommodate up to four haul trucks and two bays for miscellaneous equipment such as front end loaders, dozers and excavators and water trucks.
The mine truck bays will have an eave height of 10 m, and the bays for miscellaneous mine equipment will have an eave height of 12 m. A 30-T service crane will be used to service the mine truck bays, and a 25-T service crane will be used to service the light equipment bays. The mine truck shop building will

be an engineered steel building with corrugated steel roofing and siding because of the heavier loads from the service cranes.

Offices, restrooms, a mechanical/ electrical room, and a tool room will be positioned across one side of the equipment bays in a building extension of approximately 100 m^2.

A truck fuel storage and dispensing facility will be located adjacent and to the west of the truck shop. The facility will consist of two 144,000-litres diesel storage tanks located within a concrete containment structure. Delivery trucks will unload on the west side of the storage tanks, and fuel dispensing stations for the mine trucks will be on the east side of the tanks. The west perimeter plant road will extend to the mine truck shop area to allow the fuel delivery trucks to access the tanks. Right hand traffic will extend to the west side of the fuel oil storage tanks and left hand mine traffic will remain on the east side. There will be no need for the fuel delivery trucks to enter left-hand traffic lanes to deliver fuel to the mine area.

Mine Truck Wash and Lube Facilities

A mine truck wash and lube facility will be located to the east of the mine truck shop. The facility will consist of an open concrete pad with four high pressure spray monitors to wash the undercarriage of the mine trucks. The concrete pad will drain to a concrete settling pit to recover solids and re-circulate the wash water back to a recycled-water tank. Water from the collection pit will overflow to an oil-skimming basin for oil recovery, then will be pumped to treatment equipment to remove residual oil and solids before returning to the recycled-water storage tank. The wash-water settling pit will contain an access ramp for a front-end loader to periodically reclaim the settled solids for disposal on the waste storage areas.

An enclosed lube bay will be located opposite of the wash-water collection pit. The lube bay will be an engineered steel structure with corrugated metal roofing and siding, and will be open on the two ends for drive-through access. The eave height for this structure will be 15 m to accommodate the haul trucks. The lube pad will contain embedded steel for track equipment and will also drain to the wash-water collection pit. A tank farm for the various lubrication oils, as well as used oil, will be located to the west of the lube oil bay. These tanks will be in a concrete containment structure for spill control. Used oil and antifreeze will be collected and returned to the suppliers for recycling

Main Guard House

A main guard building will be located at the entrance to the mine site. The fence line will run to the guard building with the administration and parking outside the gate and the remaining facilities inside the gate. The main guard will monitor the incoming and outgoing trucks as well as other traffic. The guard building will be approximately 3 m by 4 m with a 1 m roof overhang all around. Any visitors requiring entry to the plant will park in the visitor parking area and enter the administration building to get the necessary clearance.

Staffing

The estimated staffing requirement for the quarry is 100 employees, which is considered average staffing level for the mine life.

The respective roles of the employees break down as follows:

- ✓ General & Administrative 10
- ✓ Quarry Operations 30
- ✓ Plant Operations 30
- ✓ Camp support staff 14
- ✓ Security 16

These employees are for the most part salary and will be working on a 40-hour per week work schedule, Monday through Friday.

On average, the quarry and plant operation will employ 45 hourly employees and 15 salaried employees. The shift supervisors will work 12-hour shifts on a four-days-on/four-days-off schedule.

The quarry hourly employees consist of operations employees such as excavator operators, haul truck drivers, drill operators, blasters and other quarry operating support, while the maintenance crews will consist of electricians, mechanics, and welders. The schedule for the operation crews will be two 12-hour shifts per day, seven days a week. A maintenance crew will work one 12-hour shift per day, seven days a week on day shift. In addition, there will be a small night shift maintenance crew that will work one 12-hour shift per day on a seven-day work week.

The security will consist of 16 persons working on 12-hour shifts, seven days per week and 52 weeks per year.

Camps and Associated Facilities

The living accommodation will be constructed with logs form the project site. Ten bungalows will be constructed to accommodate eight persons each. Each one will have two toilets and bath facilities and will have cupboards for each occupant. Each will have a table for dining and reading. There will be special quarters for management and senior personnel.

A kitchen/restaurant will be built to prepare meals and for dining. Breakfast will be served between 4.00 am and 7.00 am, lunch between 11.00 am and 1.00 pm at the various locations and dinner between 5.00 pm and 8.00 pm. Light snack swill be available throughout the day up to 10.00 pm.

The Company will cater for all the laundry requirements of the staff and will employ six persons to execute these tasks along with cleaning the camps. A small truck will be used to transport garbage from the camp site to the dump.

A recreation building will also be established and will have a table tennis table, pool table, tables for dominoes, cards etc. There will also be a mini bar for refreshments and other toiletries. A large screen TV and DVD player will be available with cable television. There are plans to develop an area for cricket, football and other outdoor activities.

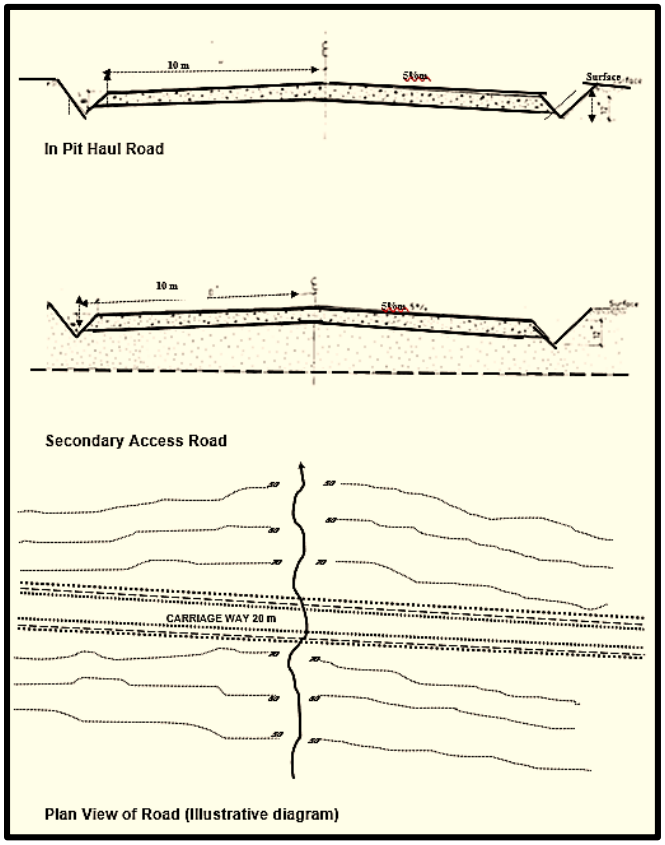
A guest house will be built for visitors and university students wishing to conduct research in any aspect of geology, mining and processing engineering or environmental sciences.

Haul and other Roads

In-site roads will generally measure 10-m wide with 0.5-m wide drainage channels, as required, along both sides of the road.

Haul roads will generally be 20 m wide inclusive of safety berms and ditches. Haul trucks will have the right-of-way and all other traffic crossing the haul roads must yield to the haul trucks.

Illustrative road design



Electrical Power Supply

The company will generate all the electrical power to operate the crushing plant, jig plant, centrifuge plant, administrative and other offices, security lighting, camps, etc. The company will use solar technologies to provide the required power for non-production units such as camps and administrative offices. The company will use Two Caterpillar generating sets for the required electrical power and will have two on standby to ensure continuous power.

Water Supply

For domestic water requirements the company plans to drill a well in the project area.
.

Surface Water Management

The Site Water Management Program (SWMP) for the Quarry Project will be developed to allow for the management of storm flows and sediment yield during the active mine life, as well as long-term for closure and reclamation. The SWMP includes storm water management will make provisions for the open pit, washing plant facilities, tailings facility, jig plant area, waste storage facility, access roads, diversions, and Process Water Temporary Storage (PWTS) pond.

Many of the proposed site facilities will change with time as mining progresses. In order to account for the changes that occur over time, the SWMP will consider the progression of the facilities at baseline conditions, Year 0 (pre-production), through to Year 5, and ultimate mine conditions.

The Project water management facilities are intended to have sufficient capacity to handle runoff generated throughout the life of the Project for the 100-year, 24-hour storm events. Sediment control facilities are designed to reduce the total suspended solids (TSS) loads to the minimum practical level for the 10-year, 24-hour storm event, defined as TSS concentrations equal to existing conditions.

Surface water and sediment yield management concepts and features are discussed below.

Closed Systems

For the purposes of the SWMP, the open pit, the washing facility, and the plant site are considered closed systems, with all direct rainfall and local runoff contained on site. In the open pit, rainfall will be collected in a sump and incorporated into the process circuit during active operations.

Storm-water flows from the plant site will be collected in the lined PWTS Pond, located immediately down gradient of the plant site. The PWTS Pond is designed to provide lined storage for the equivalent of three days of process flows (15 thousand gallons) plus the 100-year, 24-hour storm event. The three days is to allow some flexibility and emergency storage in case of a service interruption at the plant facilities.

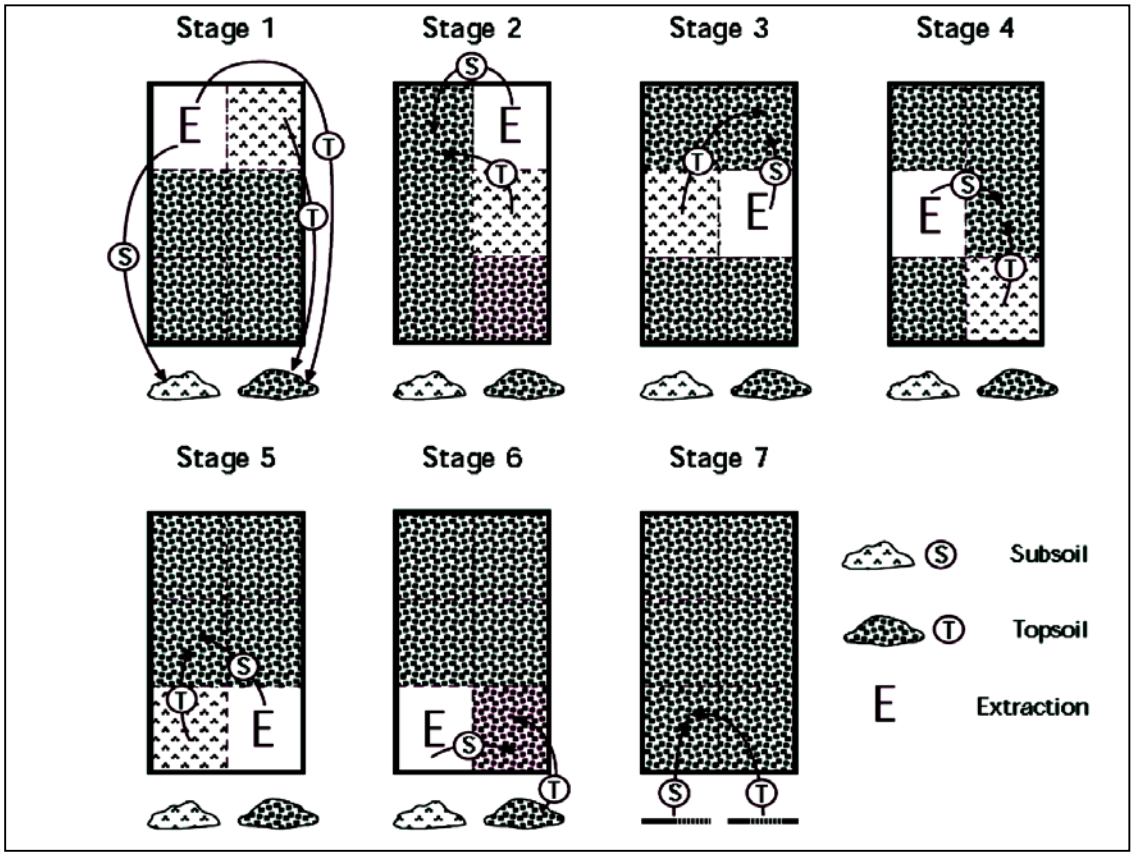
The PTWS Pond functions as a closed system with all water that is directed to the pond from the plant, and collected storm-water runoff, incorporated into the process water flows. It is anticipated that the pond will typically be at very low levels. Two vertical turbine pumps on barges in the pond will lift the water to a nearby tank, and from there it will be distributed as appropriate.

The ponds will be below ground with low berms to prevent overflow and a spillway to discharge water once the pond reaches capacity and the water quality is in accordance with the legal requirement.

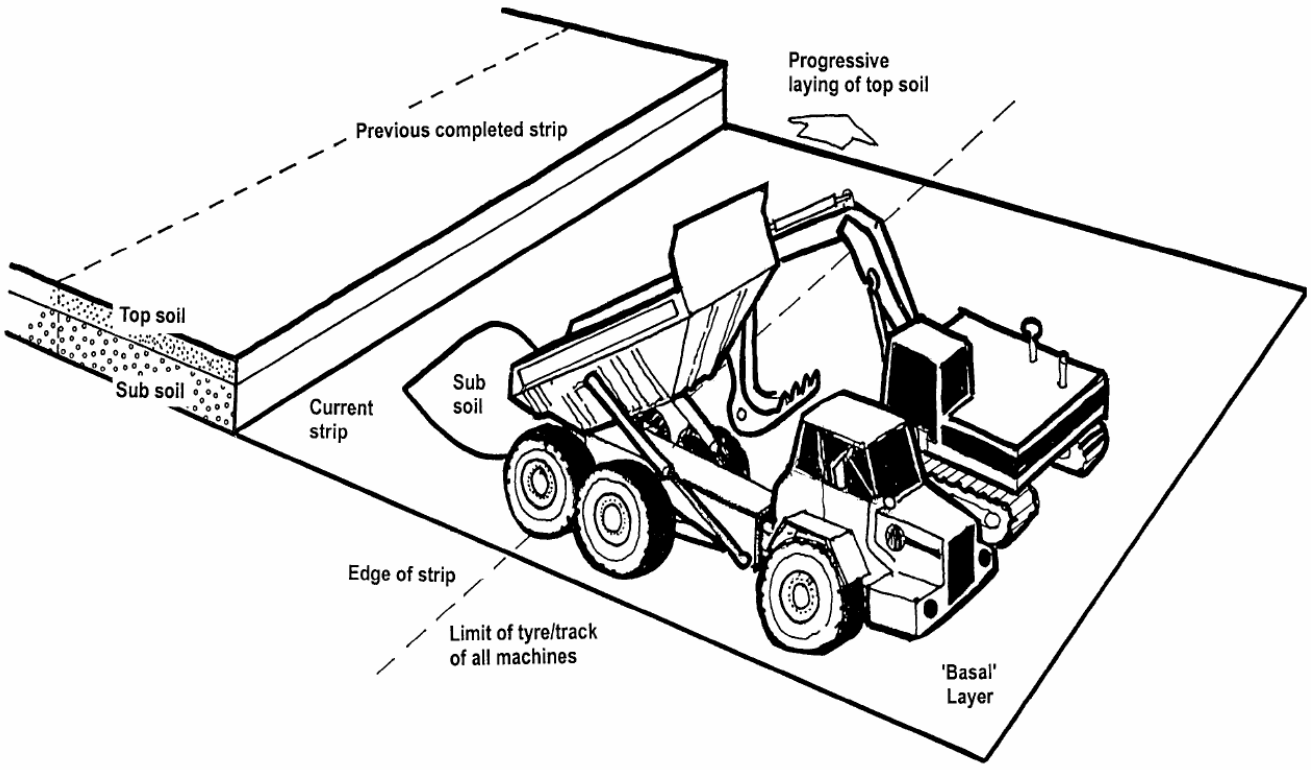
17.0 RECLAMATION AND CLOSURE

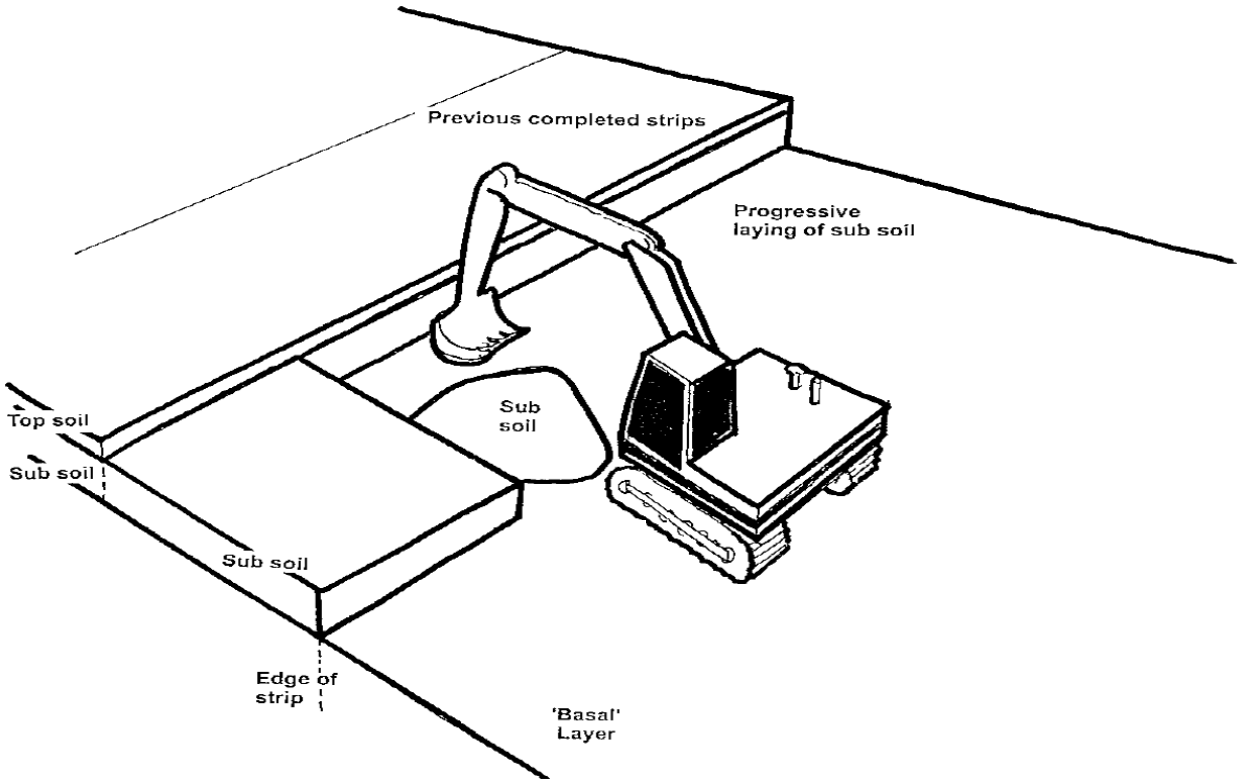
General

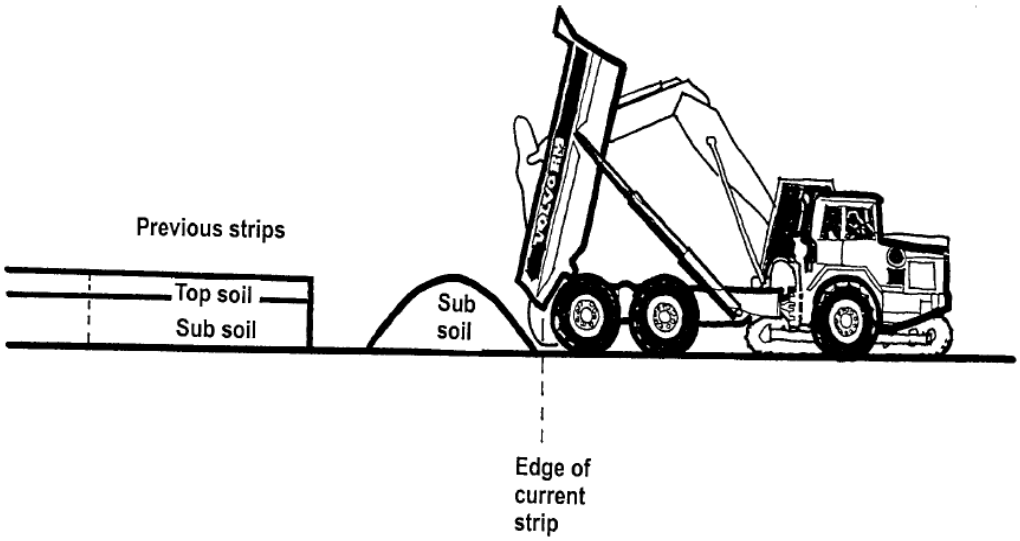
The entire concept of closure will be taken into consideration from the initial stages of pit development as shown in FIGURE below.

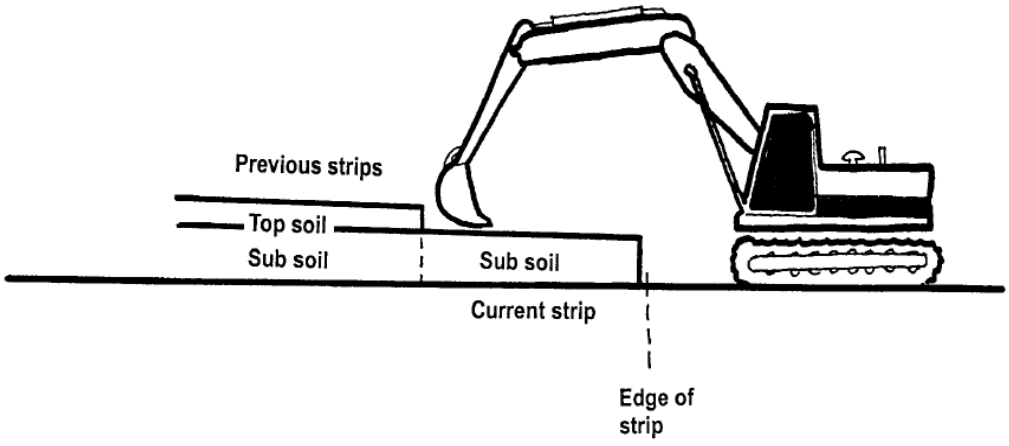


PROGRESSIVE RESTORATION SCHEMATIC PLAN FOR REPLACEMENT OF SOIL

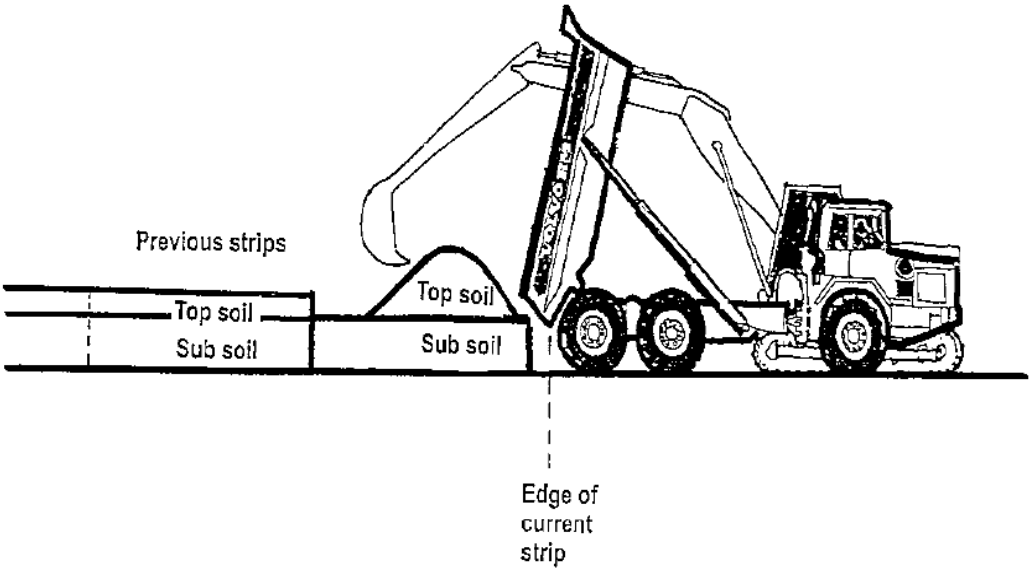

Progressive
laying of top soil
Previous completed strip
Top soil
Sub soil
Current
strip
Sub
soil
Edge of strip
Limit of tyre/track
of all machines
'Basal'
Layer

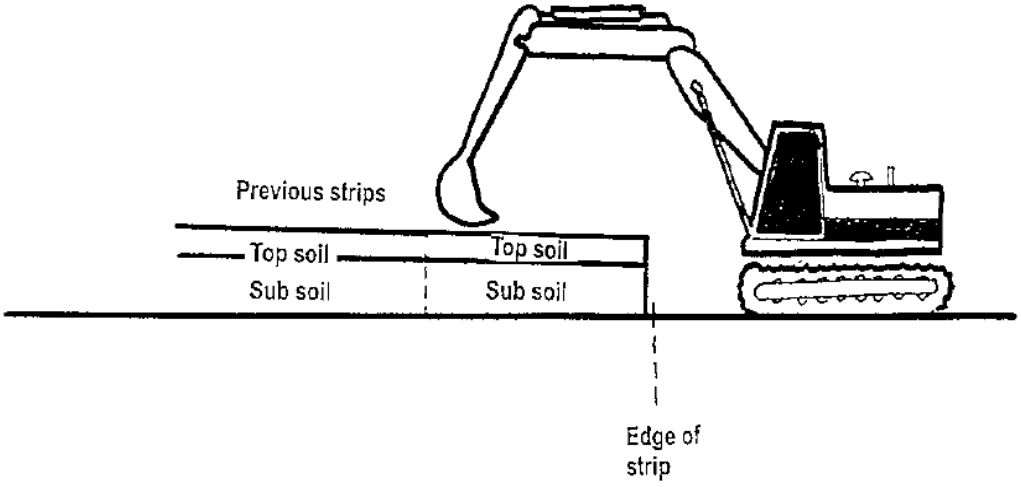

Previous completed strips
Progressive
laying of sub soil
Sub
soil
Top soil
Sub soil
Sub soil
Edge of
strip
'Basal'
Layer





SOIL REPLACEMENT WITH/EXCAVATOR/DUMP TRUCKS





TOPSOIL REPLACEMENT WITH/EXCAVATOR/DUMP TRUCKS

Closure Concepts

The reclamation plan proposed for the quarry site has several key components, referred to as initiatives. These initiatives provide the physical and philosophical foundation for the reclamation plan and will remain constant throughout the operational life of the facility. These initiatives include: design of the facilities with closure goals in mind; concurrent reclamation practices; constraining disturbances to a single drainage; minimizing downstream hydrologic disturbances; preparing a comprehensive drainage plan; using modern technology to minimize the generation of impacted water; managing operations to minimize environmental impacts; reclaiming the facilities to blend with surrounding topography; constructing an outer facility shell to reduce visual impacts of the mining operations; salvaging soil resources; performing selective vegetation removal; re-vegetating reclaimed surfaces; and, preparing an estimated closure cost. One of the major initiatives of the Plan will be to facilitate concurrent reclamation of the outer shell of the waste and tailings storage areas and to provide a perimeter buttress to mitigate the visual impact of the Project. It is envisioned that the selection of seedbed preparation, species, and site re-vegetation will be on a research agreement with the University of Guyana where the Project will provide a research grant to the faculty of technology.

The Closure Planning Process

Ideally a mineral operation, as a temporary use of land, should not impose any permanent constraints on the options for future beneficial use of the site, nor have any permanent effects on the local water resources, biodiversity and overall landscape quality or associated socio-economic development.

This conceptual Closure and Decommissioning Plan (CDP) will be developed for the future operations of GACI. The CDP details in conceptual form the measures that will be employed at closure, to ensure that the sites are rehabilitated to an appropriate level, and outlines preliminary performance criteria and monitoring requirements. This plan will be developed and finalized in consultation with relevant authorities and stakeholders in advance of closure.

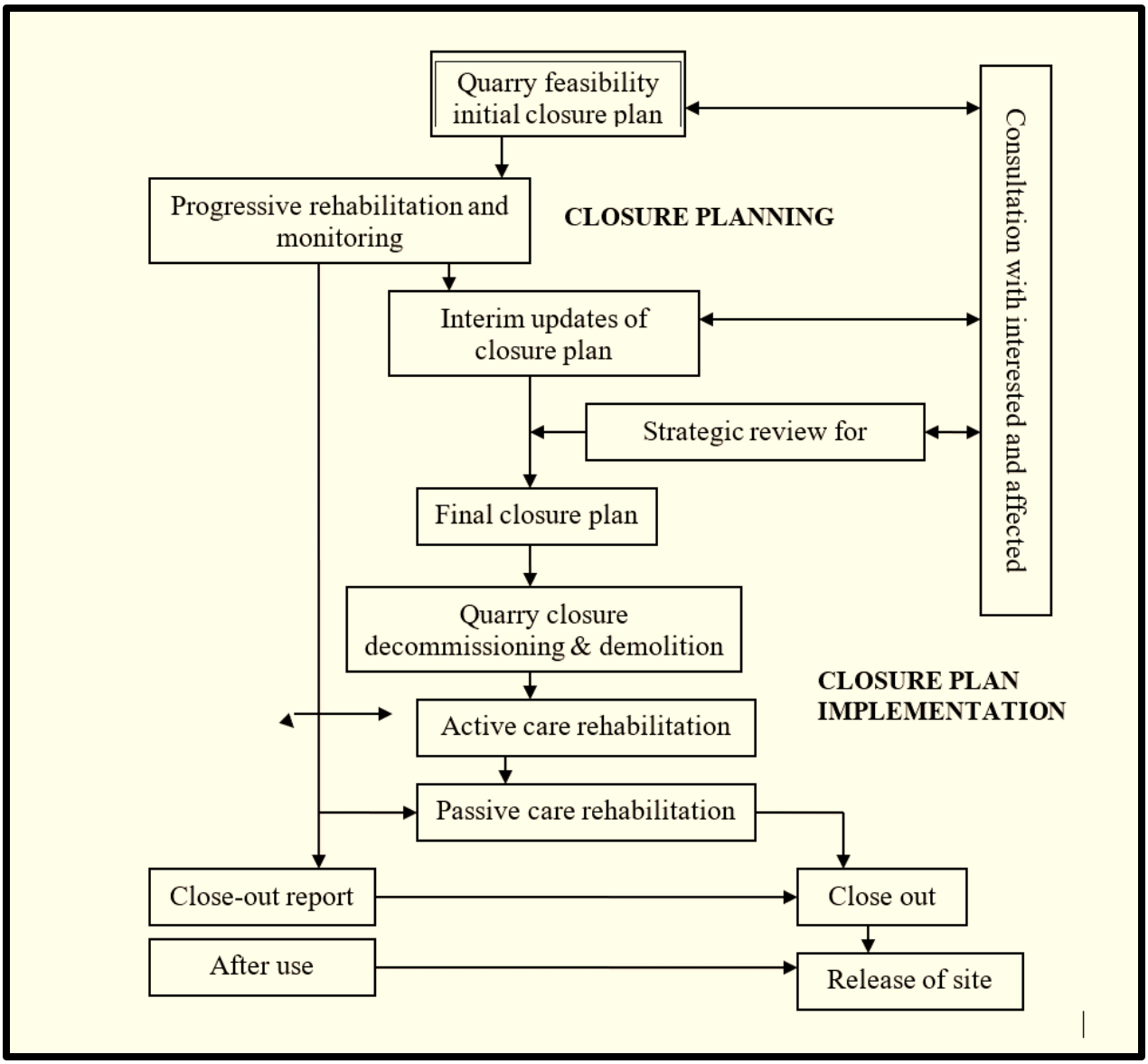
In the context of this Plan, the term ‘closure’ is taken to encompass decommissioning, demolition and rehabilitation activities prior to close out of the site. References to ‘post closure’ relate to the period following termination of closure activities (for example, ongoing monitoring, and after-care

As a part of the legal requirement of Guyana, the company will identify suitable closure and decommissioning methods for the project. The widely accepted ‘de facto’ standards of the World Bank Group and the corporate standards were used in compiling this preliminary. The minimum standard will dictate that all operations have closure plans that are regularly reviewed and updated and which identify, mitigate where possible, and manage both current and future health, safety, environment, community, and other business risks associated with closure.

Compiling of the CDP is the first stage of closure process. The CDP will address individual closure issues and action required, including details of performance criteria and monitoring so that the company can prepare financial provisions for the process. A general overview is shown in Figure

More specifically, the objectives of the overall closure planning process, and the specific provisions within that process, are to:

- Contribute to the management of environmental issues during planning and operational phases as a means of facilitating the effective closure;
- identify post-closure land use objectives through a process of consultation with stakeholders, communities and land owners;
- identify suitable best practice measures that are appropriate to the project context and that are able to:
    - satisfy the requirements of existing Guyana legislation, specifically the Environmental Protection Act and the Mining Act;
    - meet the corporate requirements of GACI;
    - satisfy the standards set out in relevant World Bank documentation;
    - through consultation, obtain stakeholder acceptance of closure proposals;
    - return land and water resources to pre-quarrying or otherwise agreed conditions;
    - minimize the potential for any negative post-closure impacts and liabilities;
    - minimize the requirement for active management of the post-closure environment; and;
    - maximize the potential for post-closure environmental and socio-economic benefit



21.0 CLOSURE PLANNING PROCESS

Principal Closure and Decommissioning Issues

The principal closure related issues relate to existing operations have been identified as**:**

- Final voids (pits) arising from the material extraction;
- Waste dumps and disposal areas;
- Surface water management
- Infrastructure (general, haul roads, plant, buildings, tank farms etc.); and
- Retrenchment of employees.

Subsequent refinements of the closure plan will be influenced by consultations and will address in more details specific to closure issues and proposed options. It is anticipated that these will address, amongst other items, the following areas:

- ***Pits***: details for the rehabilitation of the mined-out areas including the manner in which the actual site of the pit will be restored for future use.
- ***Water quality management***: details for post-closure prevention and control of erosion, sedimentation, siltation and leaching to ensure appropriate water quality standards are achieved.
- ***Waste management***: description of the type, quantity and quality of overburden and other waste, their disposal, and detailed proposals for utilization and/or stabilization to prevent siltation, erosion, dust generation and maximize integration with surrounding land.
- ***Infrastructure***: facilities such as roads, power lines, buildings and structures and their future utilization will be evaluated and where relevant the measures for their maintenance will be described. If decommissioning is proposed, the dismantling and disposal of building structures, support facilities and other infrastructure (such as electric power lines, water pipelines, fuel tanks, transformers etc.) will be discussed in detail.
- ***Retrenchment***: description of the socio-economic opportunities in the area, inventory of employees and associated skills, formation of a plan to retrain and re-skill employees and facilitate re-employment to minimize impacts of retrenchment and to ensure facilities and services provided by TRI are supported.

In the specific environmental and socio-economical context of the existing site, options for post-closure land use with respect to these issues will be limited due to the potential for long term quarrying activities in the surrounding areas. The first priority therefore will be to protect the environment and public health and safety by using safe and responsible closure practices. For each principal component of the project design, a base case for post-closure land use has been identified, taking into account technical designs, the views of the stakeholders and emphasizing productive end use of each project area following appropriate rehabilitation. The base case for post-closure land use objectives is illustrated in TABLE below:

Project Item	Base Case Post-Closure Land Use Objectives
Quarry pits	Backfill and revegetate
Tailings ponds	Backfill and revegetate
Borrow pits	No feasible use, promote revegetation
Overburden dumps	No feasible use, promote revegetation
General Infrastructure	Remove unless requested to leave in place and transfer to the regional government or government agency. To be discussed and agreed with stakeholders
Haul roads	Leave in situ and transfer to regional government or government agency unless requested to remove. Mechanism to be discussed and agreed with stakeholders

SUMMARIES OF POST CLOSURE OBJECTIVES

Specific rehabilitation and closure criteria will be fully developed as part of the subsequent consultation process. Components of the rehabilitation criteria will include:

- Land use objectives;
- Physical aspects (e.g. landform stability, resistance to erosion, re-establishment or drainage);
- Biological aspects (e.g. plant choice, canopy cover, fauna return, weed and invasive species control) for areas of re-vegetation; and
- Water quality and soil standards.

Good Practice for Closure

It is generally acknowledged that the closure of operations and rehabilitation of mine sites must be considered throughout the life cycle of mining sites, in particular during the planning and operational phases: attempts to address closure in isolation is considered as “poor practice”.

In general terms, good practice for closure incorporates measures that:

- Are widely accepted and applied;
- Enable legal compliance as a minimum standard;
- Meet industry and community expectations;
- Include suitable involvement and consultation with interest and affected parties;
- Are transparent with respect to process and outcomes;
- Integrated into the remaining lifecycle of the mine; and
- Sustainable, or leading to sustainability.

While the World Bank documents offer guidance and establish acceptable standards for outcomes, they are not prescriptive in defining good practices in terms of technical or management approaches. The location specific nature of many potential environmental and socio-economic issues necessitates the development of a distinct group of responses for each site. Failure to account for the various external factors that significantly influence the implementation of good practice at site level is likely to lead to important site specific factors being ignored or misjudged, with subsequent unwanted and unexpected flaws in the closure process. Therefore the closure plan described here will be developed to respond to the context and requirements of each site, including, for example:

- National and regional development priorities;
- End- use issues and requirements (e.g. community needs and perspectives, other stakeholder perspective, legal aspects);
- Local hydrological and hydrogeological conditions;
- Soil types and availability, and land capability;
- Topography and visibility of area;
- Climate;
- Degree of post-closure management capacity available;
- Risk to national hazards (e.g. flood); and
- Time available to complete the closure and rehabilitation process.

End-Use Options for Land

In general terms, the proposed post-closure land end-use is a key factor in determining the type of, and the degree of, rehabilitation required to meet the appropriate performance standards. Total restoration is often perceived as the most appropriate objective without considering the feasibility of such a goal or the potential to generate other beneficial end-uses. Regulatory criteria such as ‘restoring the area to pre-mining conditions’ may be in conflict with the most sustainable or desirable development options in an area, and long-term land use plans and regulation may need to be adjusted to allow new uses for the land. In addition, restoration to pre-mining conditions may not be technically and ecologically feasible, especially in areas that display high biodiversity prior to quarrying. Further, no baseline study was done prior to the commencement of quarrying activities in the area some 80 years ago.

Consultation meetings will be held with the relevant government agencies, at which the possible post closure land used objectives, will be discussed. These objectives will be amended or confirmed to reflect the views of the stakeholders.

Performance Indicators and Monitoring

In order for stakeholders to evaluate the success of closure, indicators will be developed to measure and report performance, bearing in mind that what constitutes acceptable

performance may vary according to different stakeholder perspectives. Emphasis will be on both socio-economic and environmental issues due to the number of people that will likely be affected by the closure.

The primary function of any post-closure monitoring is to ensure that closure targets and an appropriate level of performance have been achieved. The schedule will be established so that any monitoring programme is simple to operate and will provide data that can be directly understood and utilised by the relevant stakeholders. Development of a detailed post-closure monitoring program will comprise the following activities:

- Identification of the scope of monitoring required and listing of sub-programmes corresponding to each environmental issue;
- Definition of the objectives for each sub-programme;
- Specification of how data or information collected will be used in measuring success against desired performance criteria and targets;
- Definition of the spatial and pathway boundaries for the work and selection, mapping, planning of scales and sites for direct measurement observations or sampling;
- Based on appropriate characterisation studies, selection of key indicator for direct measurement; observation or sampling;
- Definition of how the data will be analysed and interpreted, and how it will be presented in a monitoring report;
- Definition of the precision and accuracy required in the data; and
- Consideration of compatibility of the data to be collected with historical data and with contemporary related data (e.g. from existing studies).

A clear feedback loop will be established between information acquired and the success of closure measures. If reporting indicated that performance is not in line with targets, then the closure process will be modified as appropriate. A post closure and monitoring plan will be developed in conjunction with the final closure plan.

22.0 Closure approaches and Actions

Introduction

This section identifies environmental and socio-economic issues that have a bearing on closure and the post-closure phase and identifies conceptual options for effectively managing the closure process for each. Where relevant, preliminary performance targets and monitoring requirements will be identified. Technical investigations will be used to assist in decision making and in the choice of suitable option in specific cases. The items presented are preliminary and will require updating to conform to the final financial commitment.

The principal closure-related issues can be summarised as:

- Final voids (pits) arising from the quarry extraction;
- Waste dumps;
- Surface water management;
- Infrastructure (general, haul roads, bridges and plant)
- Post closure aftercare and monitoring.

Each of these will be described in each sub-section.

Specific Issues and Related Closure Options

Final Voids

Evaluation of the shape of the final void will depend on the size and extent, physical constraints and backfilling done during the quarry life. Determining the most appropriate closure for final void is one of the most difficult aspects due to the related technical challenges and economic cost. Options for beneficial uses are a priority where they can be identified and confirmed as being economically viable and sustainable.

Due to the close proximity of some of the proposed quarry to creeks, inundation of the pits will occur rapidly once dewatering activities are halted, leading to the creation of pit lakes.

Waste dumps and disposal areas

The variety of closure options available for waste dumps and disposal areas are generally linked to the need to create a final landform that is safe, stable, non-erosive, and designed so that it will support the final agreed land use. The most suitable land use for this aspect is to allow natural re-vegetation to create healthy and sustainable ecosystems. Specific options adopted will be determined by the physical and chemical characteristics of the waste and topography of the dump disposal area. However, in general terms, initial preparation is likely to include levelling and re-grading of steep slopes, installation of drainage, limited backfilling of depressions and preparation of ground in a stable state that blends in with the surrounding area.

The best and most site cost-effective erosion prevention method are good site design and the establishment of vegetation. It is generally wise to retain any existing drainage controls during the initial re-vegetation phase. Deep ripping may improve water infiltration, again reducing flow of surface water flow that causes soil erosion.

From observations in the area, natural re-vegetation will provide good cover within one year once there is some amount of top-soil present. No special measures are likely to be

needed to promote the establishment of vegetation although some local amelioration may be required to promote rapid growth where low permeable material are on the surface.

Re-vegetation should establish native plants, particularly as the presence of invasive or non-native vegetation may impact the long term sustainability of vegetative cover. In some cases, non-weed plants that have shown an aptitude for colonising disturbed sites adjacent to native vegetation, are likely to be useful for rehabilitation.

Surface water management

The main issue surrounding the surface water quality during the closure and post closure phase depends on the acceptance of the responsibilities for the management of the haul roads. In the future, the company plan to have discussions with respect to this concern. However, if these roads are accepted, then regular maintenance will be required and will include:

- Culverts should be kept cleared on an on-going basis; and
- Any part of the haul road that potentially impedes drainage and is not taken over by agencies will be removed.

Further, when the operation ceases, there will be no dewatering, or any other activity that will impact surface water quality. The promotion of natural re-vegetation in other areas will prevent or significantly reduce soil erosion. Hazardous materials will be removed and adequately disposed of.

Infrastructure

- The first step in the management of infrastructure during closure will be the general clean to and securing of the immediate site area, including:
- Removal of fixed and mobile plant that is no longer required;
- Removal of temporary and permanent structures unless specifically identified as transferable to appropriate creditable government agencies or other bodies;
- Levelling or re-profiling of any bunds and waste piles not specifically addressed in closure plans for waste dumps and disposal areas;
- Removal and safe disposal of non-mineral wastes including hazardous materials;
- Breaking and burial/removal of concrete slabs and foundations;
- Ripping of roads, office sites, and hard standing areas not required or transferred to other agencies;
- Identification and removal of hazardous or contaminated material, weeds or potentially problematic materials; and
- Restrict access to required power supplies and remove non-essential power-related infrastructure (e.g. remove all elevate wires and poles and ground any buried wires).
- Beyond these requirements, generally two broad options exist for infrastructure:

- Transfer to, and use by third parties; and
- Demolition and/or removal.

It is anticipated that all the roads and associated bridges will be transferred to the relevant authorities in Guyana, and that they will develop these resources according to detailed development management plans that address health, safety, environmental and socials issues relating to their presence and use, in particular the potential impacts arising from improved access to the area (e.g. expansion of commercial forestry operations and increase hunting).

If the haul roads and bridges and other infrastructure are not transfer to appropriate Guyana authorities, then demolition and safe disposal or reuse/recycle will be required. Demolition usually involves the destruction and removal of physical structures (buildings, plant and roads) and often done in tandem with making the area safe. Demolition of contaminated surface buildings, foundations and plant can be a source of contamination (e.g. dispersion of contaminated solids, dust, wastes and liquids from buildings and therefore this issue must be addresses in planning and implementing demolition work.

Stakeholder Engagement

Key stakeholders will be consulted since input from them (local authorities and informed parties) is critical to the identification and successful implementation of closure measures. Following the distribution of this concept report, consultations will be held with the Government Agencies and local communities' part of development of a detailed closure plan. During this program, possible post-closure land use objectives will be discussed.

Opening up the above area will have implications for environmental integrity and conservation, and it is therefore critical to develop a strategy regarding control of access and development, while considering productive uses of the land, such as formal development and responsible land management.

It is envisioned that a multi-stakeholder forum will be convened, at which development priorities will be identified and management terms will be agreed. It is anticipated that the following parties and institutions may be invited to participate in this consultation:

- National Government Ministries
- Regional Officers/Committees
- Government Agencies- GFC, GGMC, EPA, GLSC
- International NGO-CI, WWF
- National NGO-APA, GOIP, local indigenous groups

Following consultations, the suggested post closure land use objectives will be developed and approved to reflect the views of these stakeholders.

Summary of Closure Issues

The following summarizes the proposed approach to closure

- Re-profiling of dump area as appropriate;
- Removal or maintenance of surface water management features as appropriate;
- Natural re-vegetation of mine waste facilities, with assistance as necessary;
- Backfilling of pits where practical and economically feasible, replacing topsoil and natural re-vegetation;
- Demolition and removal of all buildings and infrastructure;
- Removal of scrap and rubbish;
- Access roads to be left in place if agreed with the government, otherwise ripped and allowed to re-vegetate naturally, with assistance if necessary; and
- Bridges to be left in place if agreed with the government, otherwise removed and scrapper or sold.
- Retrenched workers adequately compensated and trained to perform other livelihood activities.

From observation of other worked out areas near the property that was mined, it was observed that the waste dumps can rapidly recover to integrate with the existing natural environment**.** There are no long term closure issues that cannot be successfully managed by GACI.

Project Component	Issue	Closure Action	Performance target	Monitoring Requirements
Quarry	***Physical***			
	Safety	Install fencing to minimize unauthorised human access	No unauthorised access	Physical integrity of fencing
	Final Void	Backfill, re-profile and promote natural re-vegetation	Adequate vegetative cover, development of sustainable ecosystem	Ecosystem health. And species assessment
	Dewatering around pit	Terminate dewatering activities	Restore recharge dynamics	Groundwater flow
	Visual impacts and visual intrusion	Maintain screening vegetation	Sites not visible to casual observers.	Not required
	Biological			
	Removal of the forest cover	Create conditions to promote natural regeneration of alternative and appropriate ecosystems; forest removal should be minimised throughout the remainder of the mining life.	Develop sustainable ecosystem in areas where primary forest has been removed	Ecosystem health, species diversity
	Destruction of habitats important to fauna and avian species with high conservation value.	Create conditions for natural regeneration of suitable host habitats in surrounding areas to facilitate inward migration of relevant species	Return of affected fauna and avian species to regenerated areas	Species diversity, population numbers.
	Poor ground water quality	Backfill above predicted recovered ground water level		

Project Component	Issue	Closure Action	Performance target	Monitoring Requirements
		Maintain water quality during remaining mine life Refill pit with water (from stream or groundwater recovery)		
	Physical			
	Stability	Create conditions for re-vegetation to prevent erosion and maximise stability	Maximise slope stability	Stable slopes
	Dust generation	Create conditions for re-vegetation in keeping with surrounding areas, to prevent erosion and dust generation	Eliminate significant windblown dust	Airborne dust concentrations
Overburden Dumps	Surface run-off and related suspended solids	Install toe drainage where none exist, create conditions for re-vegetation in keeping with surrounding areas	Eliminate adverse impact on water quality or run-off volume	Water quality.
	Visual impacts	Promote re-vegetation of surfaces	Complete vegetative cover	Sustainability of vegetative cover
	Biological			
	Re-vegetation	Promote re-vegetation and sustainable ecosystem development	Effective and sustainable re-vegetation; minimal erosion	Sustainability of vegetative cover
	Destruction of habitats	Create conditions for natural reinstatement and development of suitable	Presence of fauna and avian species in rehabilitated areas	Species diversity, population numbers.

Project Component	Issue	Closure Action	Performance target	Monitoring Requirements
		host habitats in surrounding areas to facilitate inward migration of relevant species		
	Physical/chemical			
	Safety	Transfer to Guyana agencies. Otherwise remove and safely dispose of above and below surface items	No safety risks	Risk assessment
	Visual impacts and visual intrusion	Remove and safely dispose of above surface items and create suitable conditions for natural regeneration of vegetation	Maximised land restoration and integration with surrounding areas	Sustainability of vegetative cover
	Local alteration of drainage conditions	Break/remove subsurface and surface items (e.g. foundations) likely to significantly affect drainage	Reestablishment of acceptable surface flow patterns	Surface flow
	Surface and ground water quality	Remove, treat and/or safely dispose of potentially contaminating or hazardous material and items, including contaminated hard-standing material	No impact on water quality	Water quality
General infrastructure	***Socio-Economic***			
	Post transfer impact	Any transfer to Guyana agencies should be subjected to the provisions	Confirm relevant plans to address potential health, safety,	Not required, Guyana agencies will assume

Project Component	Issue	Closure Action	Performance target	Monitoring Requirements
		of a sound development plan for the area	environmental and social impacts and maximise socio-economic benefits are agreed with relevant stakeholders and implemented prior to transfer.	responsibility in post transfer phase.
Haulroads	***Physical***			
	Stability and safety	Re-grade prior to transfer to Guyana agencies; otherwise, re-profile to create conditions for natural re-vegetation	No impact on water quality	Water quality
	Surface water run-off	Transfer to Guyana agencies; otherwise re-profile and install run-off channels	Transfer to Guyana agencies or effective regeneration of vegetative cover	In the case of transfer, the agencies will assume responsibility, other sustainability of vegetative cover
	Visual impacts and visual intrusion	Transfer to Guyana agencies; otherwise create conditions for natural re-vegetation	Transfer to Guyana agencies or effective regeneration of vegetative cover	In the case of transfer, the agencies will assume responsibility, other sustainability of vegetative cover
	Biological			
	Removal of forest cover	Transfer to Guyana agencies; otherwise create conditions for natural regeneration of alternative and appropriate ecosystems;	Transfer to Guyana agencies or develop sustainable ecosystems in areas where primary forest has been removed	Eco-system health; species diversity

Project Component	Issue	Closure Action	Performance target	Monitoring Requirements
		forest removal should be minimise throughout the remaining mine life		
	Destruction of habitats important to fauna and avian species with high conservation value	Transfer to Guyana agencies; otherwise create conditions for natural regeneration of suitable host habitats to facilitate inward migration of relevant species	Transfer to Guyana agencies or return of affected species to regenerated areas	In the case of transfer, the agencies will assume responsibility, other sustainability of vegetative cover
Haul roads	Increases/decreases in swamp water levels and associated dieback of vegetation	Ensure culverts are maintained and cleared prior to transfer to Guyana agencies; in the absent of transfer to agencies, re-profile or remove material and create conditions suitable for natural regeneration of vegetation	Transfer to Guyana agencies or effective regeneration of vegetative cover	In the case of transfer, the agencies will assume responsibility, other sustainability of vegetative cover
	Socio-economic/Cultural			
	Post transfer impacts	Any transfer to Guyana agencies should be subjected to the provisions of a sound development plan for the area	Confirm relevant plans to address potential health, safety, environmental and social impacts and maximise socio-economic benefits resulting from improved access are agreed with relevant stakeholders and	Not required, Guyana agencies will assume responsibility in post transfer phase

Project Component	Issue	Closure Action	Performance target	Monitoring Requirements
			implemented prior to transfer, in particular measures to address unplanned migration and its consequences	
Retrenchment	Socio-economic	Develop closure plan in consultation with potential affected workers; assists where possible with redundancy and retirement; train unskilled workers to become semi-skilled or skilled; retain workers where possible	Workers acceptance of the termination agreement with appropriate compensation	Not required

Area	Parameter	Sampling / Monitoring Approach*
Waste Landforms	▪ Erosion ▪ ▪ Vegetation Establishment ▪ Biotic Activity ▪ Dust	▪ Visual, photographic, sediment loading in runoff, EFA* ▪ Transects, density, cover, diversity, EFA, photographic, regeneration ▪ Ants, pollinators, vertebrate fauna return, EFA ▪ Deposition dust gauges, high volume samplers Runoff/seepage water quality, lysimeters
Tailings Storage Facility	▪ ▪ Seepage ▪ Erosion ▪ Vegetation Establishment ▪ Dust	▪ Monitoring bores ▪ Visual, photographic, sediment loading in runoff, EFA ▪ Transects, density, cover, diversity, EFA, photographic, regeneration ▪ Deposition dust gauges, high volume samplers
Process Plant Site	▪ Vegetation Establishment ▪ Dust	▪ Transects, density, cover, diversity, EFA, photographic, regeneration ▪ Deposition dust gauges, high Volume Samplers
Roads / Hardstand / Infrastructure Areas	▪ Vegetation Establishment ▪ Dust	▪ Transects, density, cover, diversity, EFA, photographic, regeneration ▪ Deposition dust gauges, high volume samplers
Open Pit	▪ Pit wall stability ▪ Abandonment bund ▪ Pit water quality	▪ Visual, photographic, periodic survey ▪ Visual, photographic ▪ pH, TDS, metals etc
Adjacent and Downstream Areas	▪ Dust ▪ Surface water quality	▪ Deposition dust gauges, high volume samplers ▪ pH, TDS, metals, nutrients etc

Monitoring techniques include – EFA (Ecological Function Analysis) and TDS (Total Dissolved Solids

INDICATIVE POST-DECOMMISSIONING MONITORING PROGRAMMES