



# ARISARU QUARRY PROJECT SUMMARY

ARISARU, ESSEQUIBO RIVER

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## EXECUTIVE SUMMARY

New Thriving Restaurant is a Guyanese business that has a number of mining interests and has been active in Guyana mining industry since 2015. New Thriving Restaurant has formally expressed interest in applying for a stone aggregate (gabbro) quarry within the Arisaru Mountain area, Mabura, north of Omai. The operation will consist of several heavy-duty equipment along with crushing plant and support equipment and employment of approximately 20 persons.

New Thriving Restaurant is well qualified to undertake the proposed program based on:

- Many years' experiences operating in Guyana, access to technical personnel, including familiarity with experience in local operating conditions and with Guyana Mining and Business laws.
- Capacity to fund such major program in Guyana
- Understanding and ability to source the technical capacity to develop this project
- Commitment to social responsibility in relation to undertaking a project of this sort and finally,
- Commitment to compliance with environmental regulations and minimization of impacts to the ecological, cultural and social environment of Guyana in connection to a project of this magnitude.

The preliminary work plan is as follows;

- Exploration program to establish a complete resource within 12 -16 months of acquiring the license, with a tentative resource within 4-6 months,
- Environmental assessment on area to be mined completed within 4 months,
- Mine Plan Development completed within 6-7 months
- Complete engineering, construction and commissioning production within 8-10 months.

## STATEMENT OF QUALIFICATIONS

New Thriving Restaurant who has over 35 years' business experience in Guyana has been part of the mining industry of Guyana for over 5 years and has developed and managed several small-scale gold mining operations.

New Thriving Restaurant also has the ability to acquire other technical expertise if the need arises.

New Thriving Restaurant has the financial capacity to fund a project of this magnitude and plans to invest up to USD\$780,000 (GUY\$163,800,000) in getting this quarry project off of the ground.

**PROJECT LOCATION**

The Project area is located in the Mabura Mining Area just Southeast of the confluence of the Kwapanna creek and Essequibo River, on the Arisaru Mtn. Access is mainly via 4WD road from Linden to Arisaru Mtn via the Mabura/Kurupukari Road, ~80 kilometers from Linden (Figures 1 & 2).

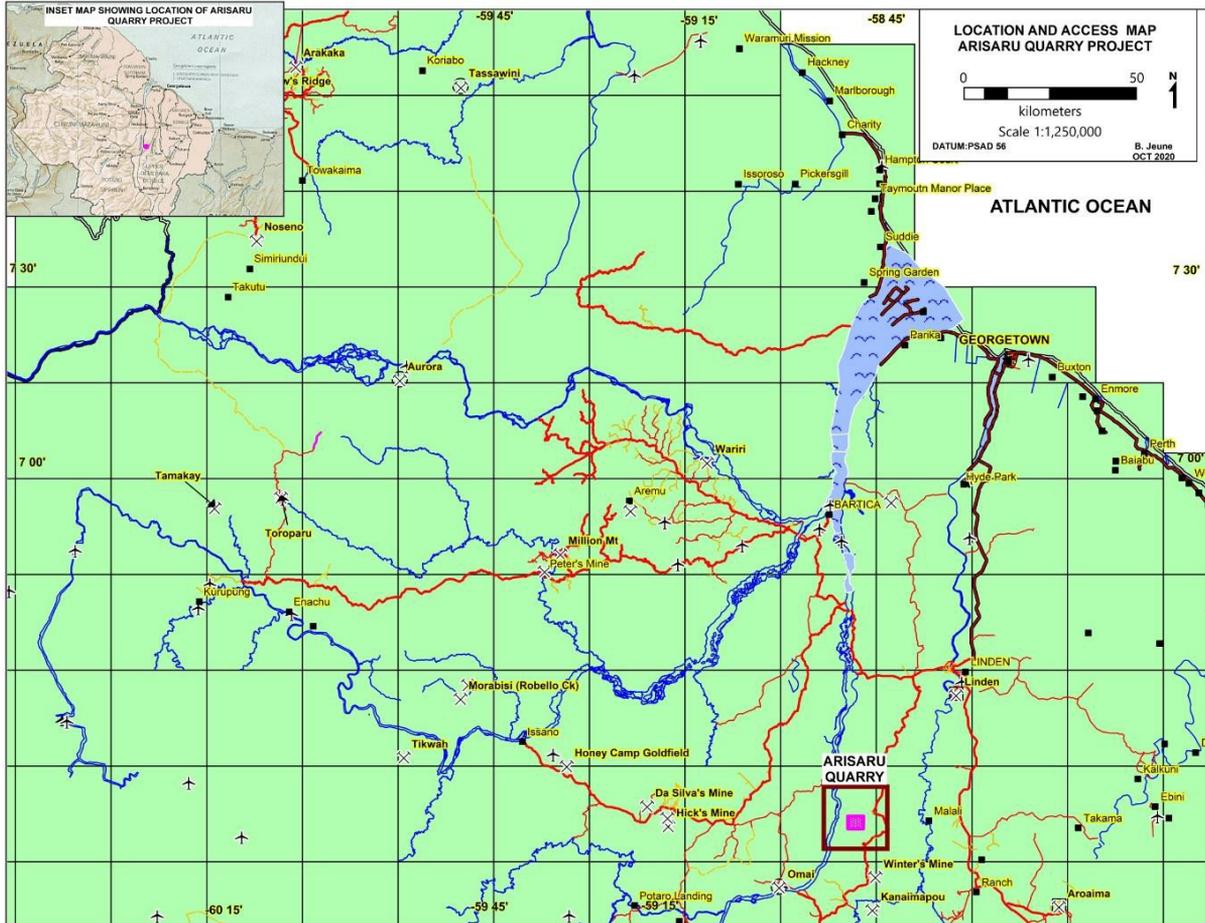


Figure 1: Access Map Arisaru Quarry

# ARISARU QUARRY MINE PROJECT SUMMARY

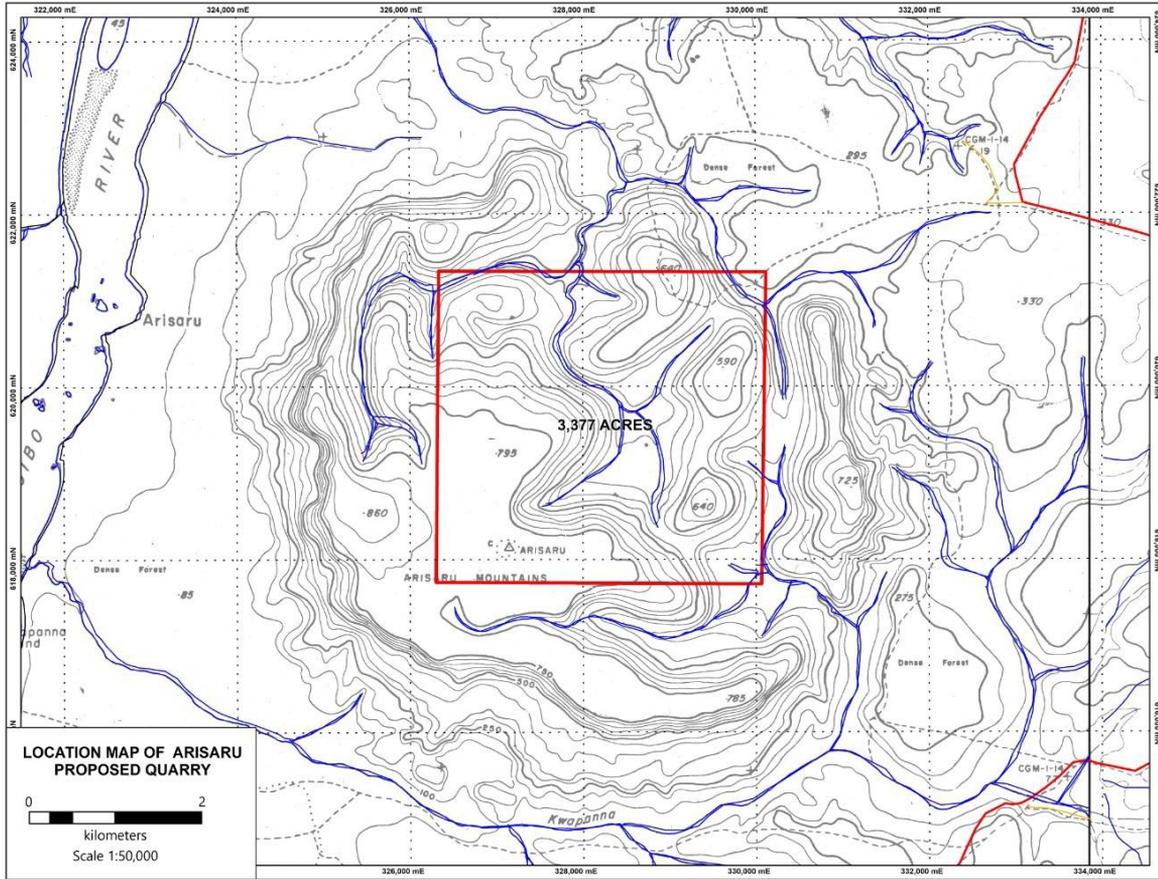


Figure 2: Location Map Arisaru Quarry

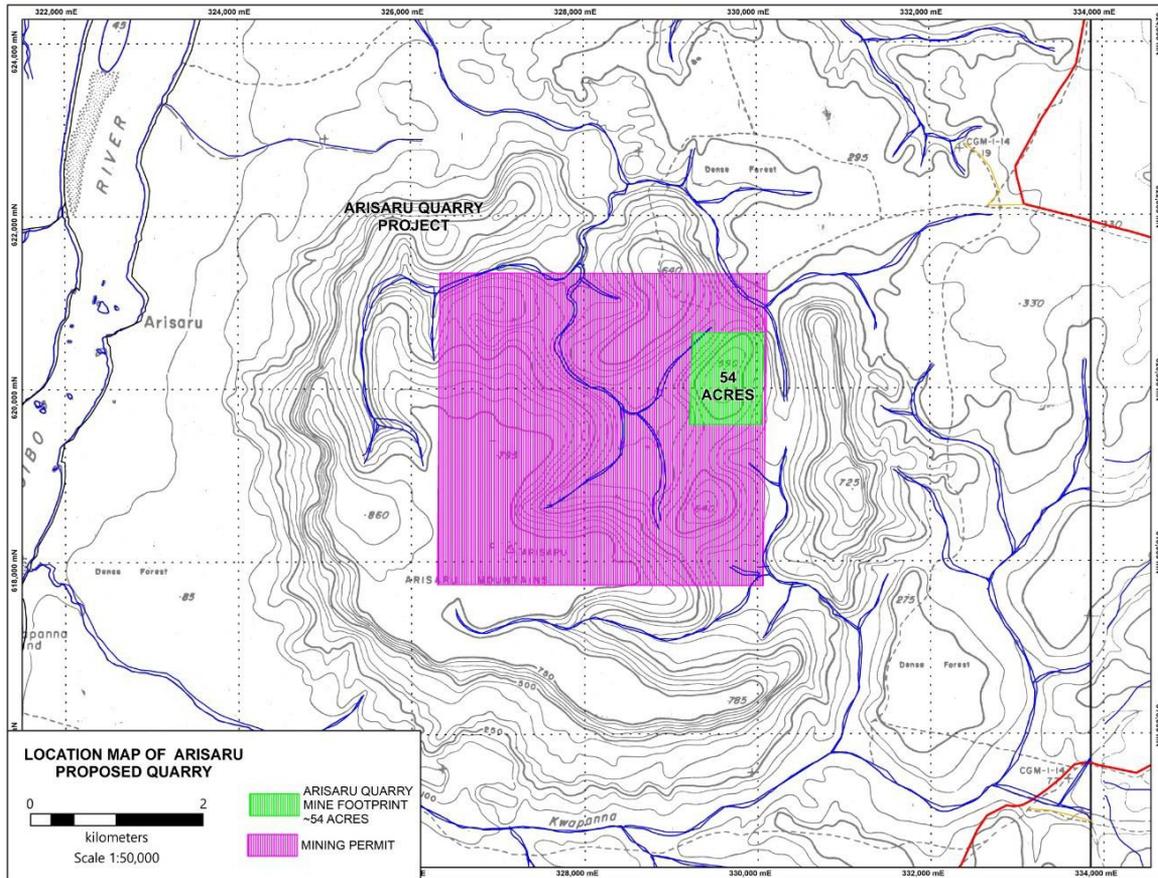


Figure 3: Proposed Arisaru Quarry Mine Footprint

### Formal Boundary Description

A Tract of state land located in the Potaro Mining District No. 2 as shown on Terra Surveys Topographic 1:50,000 Map Sheet 36SE, within the following boundaries; Commencing from a reference point located at the confluence of **Kwapanna Creek and the Essequibo River** located at geographical coordinates of longitude **58°36'39.2"W** and latitude **5°35'16.2"N**, thence at true bearing of **45°**, for a distance of approximately **3.6 miles** **Point 1**, located at geographical coordinates of longitude **58°34'4"W** and latitude **5°37'9"N**, thence at true bearing of **90°**, for a distance of approximately **2 miles 612 yards**, to **Point 2**, located at geographical coordinates of longitude **58°32'1"W** and latitude **5°37'9"N**, thence at true bearing of **181°**, for a distance of approximately **2 miles 447 yards**, to **Point 3**, located at geographical coordinates of longitude **58°32'3"W** and latitude **5°35'11"N**, thence at true bearing of **90°**, for a distance of approximately **2 miles 591 yards**, to

**Point 4**, located at geographical coordinates of longitude **58°34'5"W** and latitude **5°35'12"N**, thence at true bearing of **0°**, for a distance of approximately **2 miles 441 yards**, to the point of commencement at **Point 1**, thus enclosing an area of approximately **3,377 acres**, save and except all lands lawfully held or occupied.

#### EXPLORATION PROGRAM, GEOLOGY AND RESOURCE DEFINITION

Regionally, the geology of this area is similar to that seen in other parts of the greenstone belts of Guyana with the oldest rocks consisting of the Lower Proterozoic Barama-Mazaruni-Supergroup, intruded by Younger Granites, and both units intruded by the Younger Basic Rocks.

Large areas consist predominantly of granite, greenstone and gabbro, with the high relief providing evidence of geology via outcrops found in ravines and creeks and along the ridges. Locally the geology of the area consists of the Gabbro-norite dykes which has been intruded by the younger granites of the Mariaba Granodiorite suite. In several cases, the granodiorite is foliated. The rocks within the proposed area consist essentially of gabbro, dolerite and granodiorite (Allen, 1963). Mapping has identified a gabbroic plug approximately 7km x 6km along with multiple outcrops of gabbro (Figure 5).

A reconnaissance team consisting of a Geologist technician along with 3 samplers, visited the area of interest (figure 5) where mapping and prospecting were carried out over a 3-day period. This consisted of cutting lines along the ridge and spur with checking the creeks and ravines for outcrops of quarriable rocks such as gabbro and granodiorite. The team found 16 outcrops of gabbro boulders which is related to the large interpreted gabbro-norite plug with sizes ranging from 1m to 10m and a weathered outcrop of granite/ganordiorite? (Figure 5 and see pictures below). From the erosion of the creeks and ravines, it was estimated that these areas have an overburden of ~6m (historically overburden depths range from 5-15m within the regional area). It is expected that with further work, namely drilling, the extent of the overburden within the area will be determined.

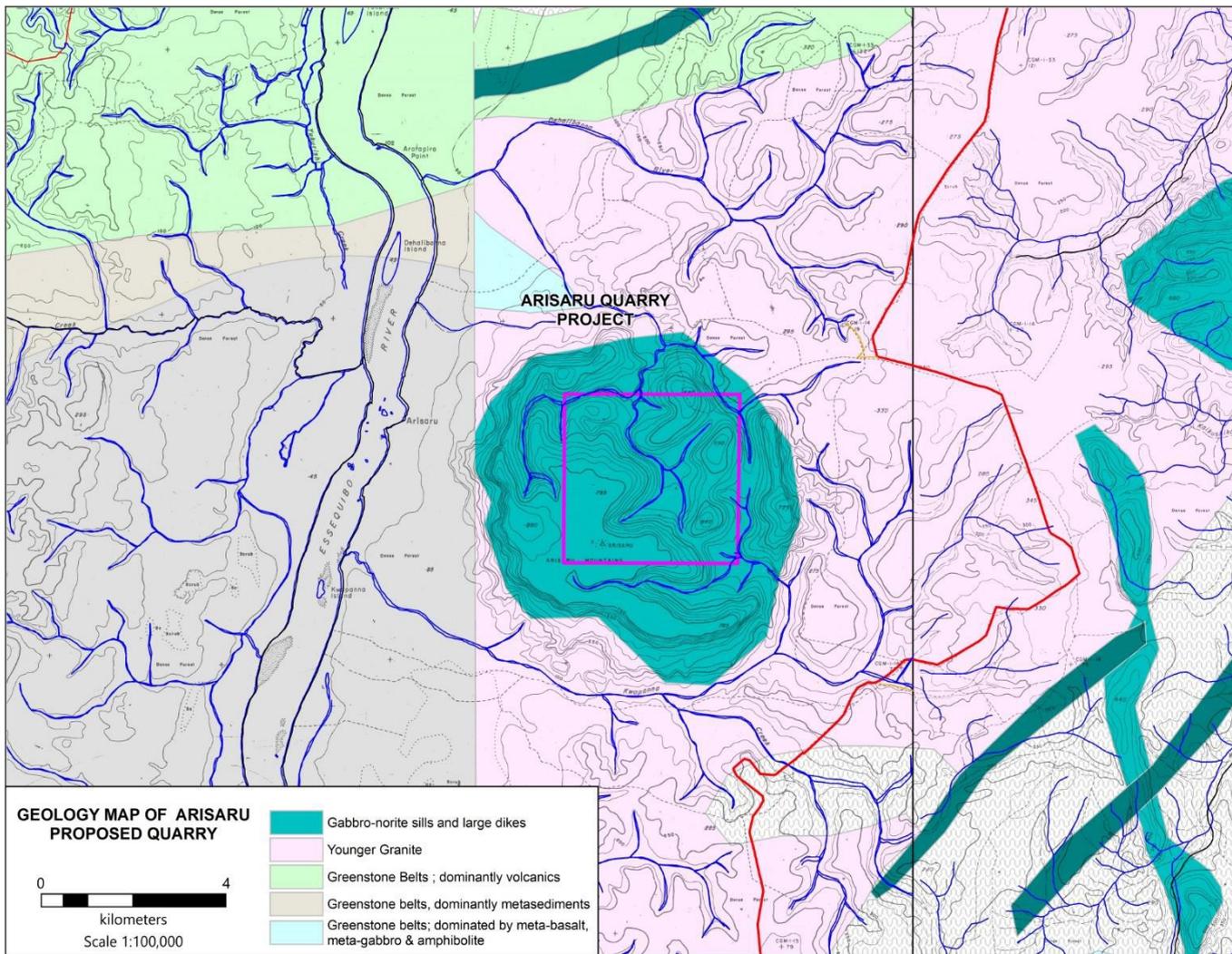


Figure 4: Geology Map of Arisaru Regional Area

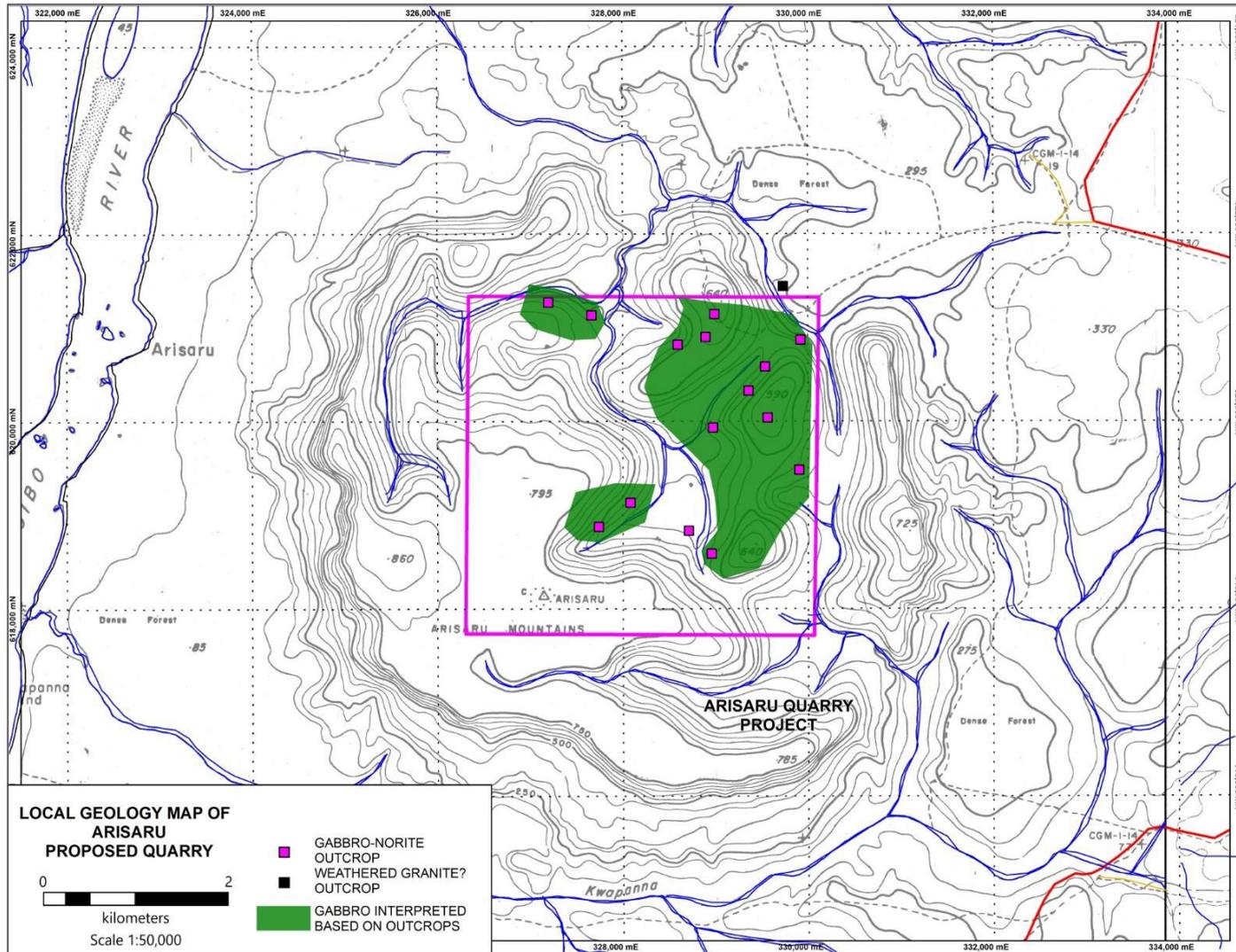


Figure 5: Local Geology Map based on field mapping done

Based on the outcrop mapping carried out within the area, an inferred resource of ~29 million tons of quarriable gabbro stone was derived for Zone A area (figure 6). Within Zone A, the proposed pit for the Arisaru Quarry has been estimated to host a resource of ~1,620,000 tons of gabbroic rock (Table 1 & Mine Plan). This resource was estimated from the mapping and prospecting carried out by the reconnaissance team within the proposed permit area. For the proposed Pit, outcrops of gabbro were mapped on the ridge top and along the hillside. An estimated depth of 36m along with a width of 100m and length of 450m were used to derive the tonnage of quarriable stone shown in Table 1 (Note: This resource is estimated and does not fall in the category of a Reserve and/or Proven/Probable Resource estimates; this can only be done with drilling on the blocks).

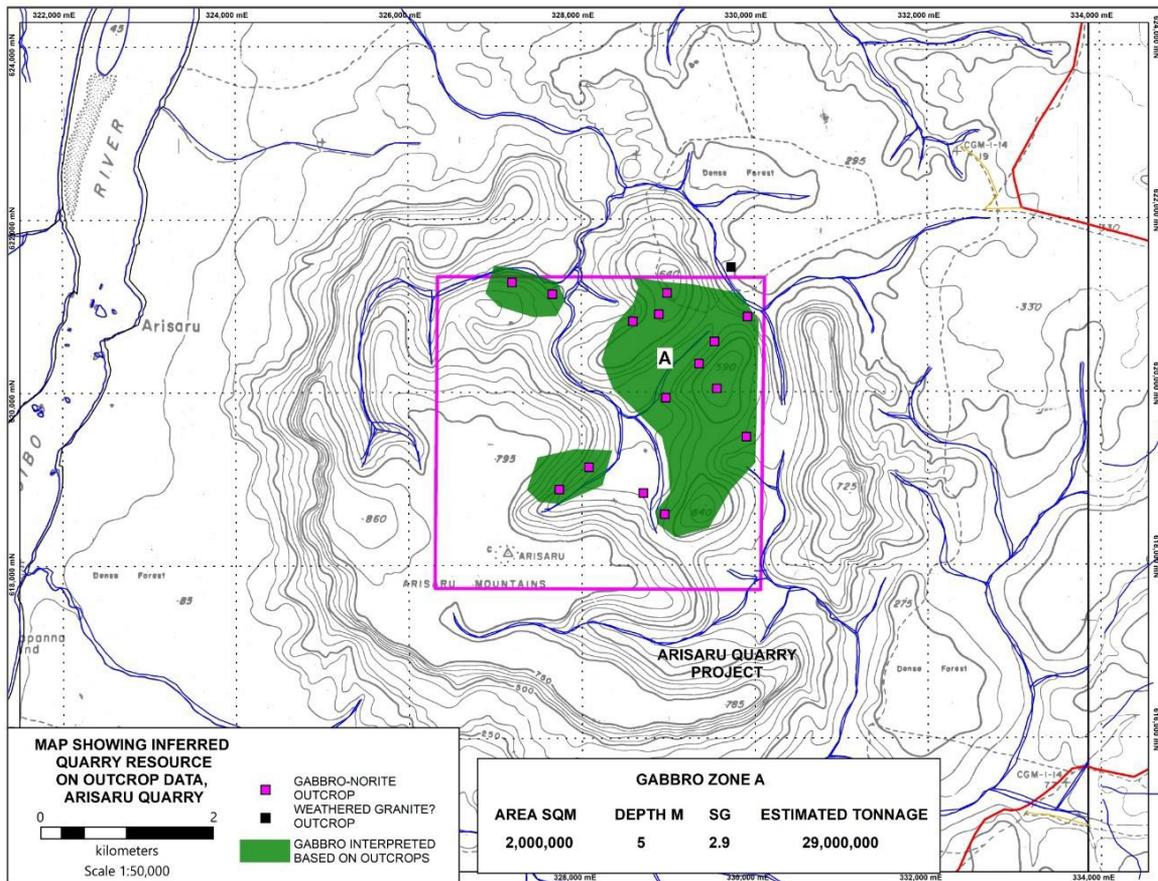
*Table 1: Estimated Quarry Resource based on Outcrop mapping of the Gabbro for the Proposed Pit within Zone A*

	<b>WIDTH M</b>	<b>LENGTH M</b>	<b>DEPTH M</b>	<b>TONNAGE</b>
<b>ZONE A - PIT</b>	100	450	36	1,620,000.00
				1,620,000.00

Reserve calculations will be updated once exploration work has been carried out within the proposed area. This will consist of extensive drilling on 50m \* 100m line spacing using a Diamond drill rig for 1000m of drill core to define quarriable resource within the gabbro-norite dyke. This is expected to cost approximately USD\$120,000 (GUY\$25.2 Million) and will be done within 5-6 months of the License being granted.

It is expected that approximately 300,000 long tons of material will be mined and produced annually from the Arisaru Quarry. This material will be mined from the gabbro dyke.

Figure 6: Map showing Inferred Quarriable Resource for Arisaru





**Outcrops of Gabbro seen from Field Mapping and Prospecting as shown within Figure 5.**

## PRODUCTION OBJECTIVE

The production objective for Arisaru quarry is to produce riprap and aggregates for the local market. The estimated mine life based on the current resource for the proposed Pit is 6 years (Note that this resource can be upgraded significantly with extensive drilling and will expand the lifetime of the mine). Over the 6-year period, 54% of the quarrying material will be aggregates with 46% rip-rap. Initial production will focus on 2.8/6 and 6.3/10 Category GC aggregates for local construction and road building industry. It is expected that the Quarrying Operation will commence 3<sup>rd</sup> Quarter, 2022 and have a projected mine life of ~6 years. It is therefore estimated that for 2022, 125,000 tons of aggregates and Rip-rap will be produced. From 2022 to 2026 the estimated production (final Product) will be 270,000 tons in the 2<sup>nd</sup> year with 280,000 – 320,000 tons in the 3<sup>rd</sup> – 5<sup>th</sup> years and 325,000 tons in the 6<sup>th</sup> year with 150,000 tons being Rip• Rap and 175,000 tons being aggregate. The table below gives a proposed breakdown.

*Table 2: Proposed Production by Year for Arisaru Quarry*

Product (1,000 tons)	2022 (Months)			Years					TOTAL
	July	Aug	Sept- Dec	2023	2024	2025	2026	2027	
Rip-Rap	5	5	50	120	130	140	150	150	<b>750</b>
Aggregates	5	10	50	150	150	160	170	175	<b>870</b>
<b>TOTAL</b>	<b>10</b>	<b>15</b>	<b>100</b>	<b>270</b>	<b>280</b>	<b>300</b>	<b>320</b>	<b>325</b>	<b>1620</b>

## PRODUCTS

The proposed quarry will produce the following products:

Large size blocks blasted from the quarry face, from approximately 0.5 m<sup>3</sup> (approximately 0.36-ton weight) to 1.25 m<sup>3</sup> (approximately 5-6 tons weight), are called rip rap or rock armor and are used in coastal and river flood defense schemes to shore up sea fronts and river banks.



Rubble and boulders drawn direct from the shot pile is called face fill and is used as large scale fill on construction sites and sea defense.



14/20 SCREENINGS



6.3/10 SCREENINGS



## 2.8/6 SCREENINGS

Material screened immediately prior to primary crushing is called scalping or grizzly which is again used as fill on construction sites.

The direct, unscreened output from a crusher contains a complete mix of size from dust up to the maximum size that the crusher can pass. Output from the primary and secondary crushers is fed, unscreened, to intermediate or separate stockpiles. Material drawn from these stockpiles is called crusher run and is used for construction fill.

Screened out fine material from the secondary crusher is called blinding. Some screens have multiple decks and can screen out several grades of blinding. As with crusher run, blinding materials contain a mix of sizes, from the maximum size that the screen mesh can pass, down to dust. Blinding, because it is finer than crusher run, is used for final shaping up of construction sub bases, particularly in road construction, where the sub base is the last unbound layer before coated materials are laid (see pictures below).



Screened aggregate (ballast) for concrete.

32/50 is used as filter media in water treatment plants (if the rock type is tough enough).



Large quantities of 2.8/6, 6.3/10 and 8/14 Category GC aggregates are used to surface dress many roads. Surface dressing is a cost-effective remedial process which seals, restores grip and prolongs the life of the road treated.

## MINE AND PROCESS METHODOLOGY

As mining is done on undisturbed areas, vegetation will be removed according to EPA regulations, and overburden along with topsoil will be stockpiled for reclamation efforts. Once a desirable surface is exposed, the gabbro will be excavated via ripping with appropriate tracked equipment and blasting. The first cut will be carried out within the Proposed Pit (see Mine Plan) with the overburden cleared and stockpile within the “Overburden Stockpile Dump” area located ~200m SSW of the Pit. The equipment used (Table 3) will be;

- Doosan 300 Excavator
- Caterpillar D6R Bulldozer
- Caterpillar 950L Wheel loader
- CAT 745 Articulated truck 45 Ton

In general, a series of high-walls and benches trending chiefly NNE to SSW will be created. Areas too hard to be ripped by tracked excavators will be drilled and blasted. Blasting will be done using ANFO (ammonium nitrates and fuel oil) explosives which are readily available locally and the blast pattern proposed will be a standard 6 x 6 matrix. Note that blasting pattern can change depending on mining conditions. All blasting and related activities will be supervised by Hopkinson Logistics which is a local company providing blasting services within the mining industry. A hydraulic breaker mounted on a tracked excavator may be used to break oversize boulders in the pit and at the crusher grizzly.

Overall pit configuration will reflect local geological conditions of rock orientation and stability. The pit will closely follow a northeasterly orientation, and the approximate 70° dip of bedding will affect high-wall and bench construction. Construction of 30 foot high-walls with 70° faces and 20-foot benches would produce a 1:1 (45°) overall slope. If high-walls were 25 feet high with 70° faces and 25-foot benches, the overall slope would be about 1.34:1 (horizontal to vertical; -36° slope). Exact high-wall to bench ratios will depend on site specific conditions. Maximum height of high-walls would probably be around 30-35 feet. Where steep high-walls are developed, they will be designed and maintained in compliance with regulations.

Pit wall slopes and bench widths are dependent on the types of rock involved and the size of equipment working the mine faces. High-walls developed in coherent rock being worked by large excavators can be higher and steeper than high-walls in loose material being worked by small equipment.

Once the desired material is broken loose in the open pit, it will be transported by front end loaders and dump trucks to a primary crusher and loading facility located within the northeastern part of the permit. Stockpiles will be established to store run-of-mine and crushed material such that crushing and loading capacities will not be exceeded. Crushing operating will start with the crusher being used to crush first 125,000 tons of boulders. The Crushing Plant is rated at 200 tons/operating hour. This size specification for both crushers is as follows:

Siftings:

¼" Minus, 3/8" Minus, ½" Minus, ¾" Minus, 1" Minus (all Aggregates)

Rip-rap

Boulders

Crushing will be accomplished only during daylight hours (8-10 hours per day). Materials (rip-rap and aggregates) will stockpile and shipped via trucks to the targeted market mainly road construction along the Mabura-Linden corridor. Some materials will be used for cement manufacturing. It is estimated that ~300,000 tons of quarriable products will be transported per annum for the local road construction projects. The quarry will be operated 12 hours a day (plant operation).

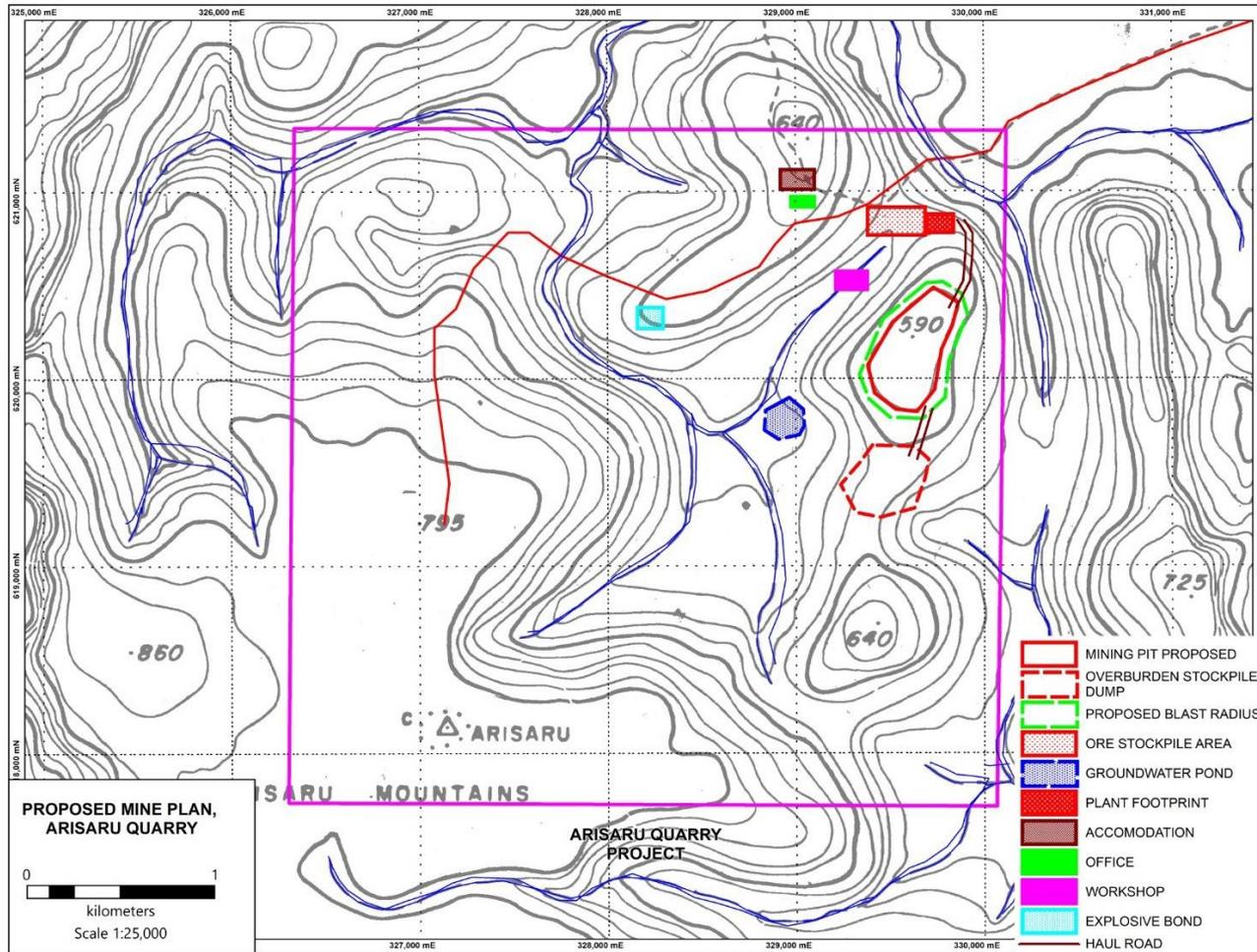
Water will be routinely sprayed from a water tanker onto roadways and active stockpiles, and water spray bars will be installed on crushing equipment. Roads and process areas within the facility will be periodically graded and bermed to allow for safe travel and to control surface drainage.

The following equipment are proposed to be used in the mining and processing of quarrying material at the Arisaru quarry;

Table 3: Proposed Equipment for Quarry mining at Arisaru Quarry

<b>No.</b>	<b>Machinery Details for Model Quarry</b>
1	Stitch drill (JRD50) with one Jack hammer and parts
2	Compressor 375 CFM with air hose and air tank
3	Excavator Doosan 300
4	CAT 950L Wheel Loader
5	Bulldozer D6R Caterpillar
6	CAT 745 Articulated truck 45 Ton
7	Manual jackhammer

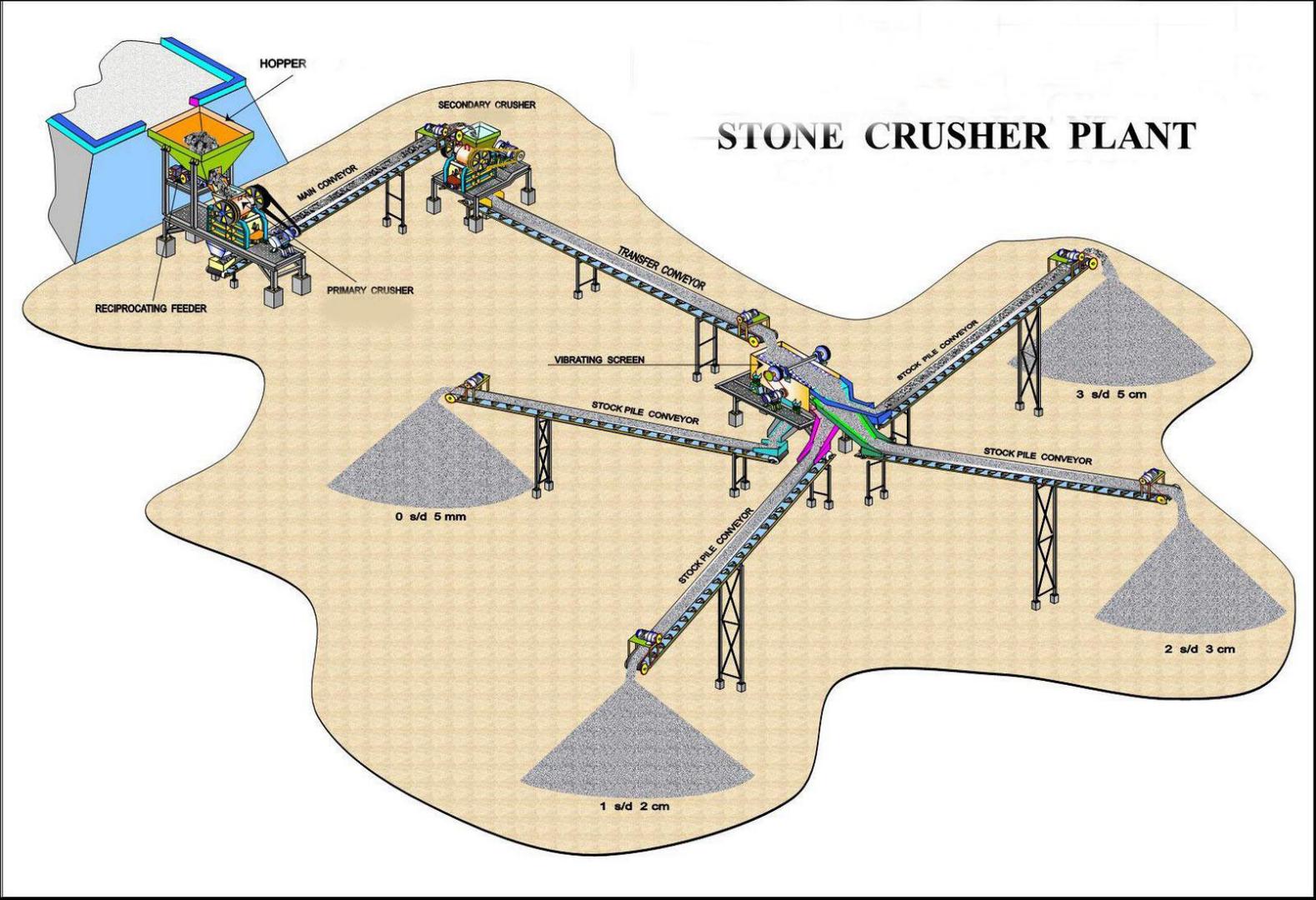
MINE PLAN PROPOSED



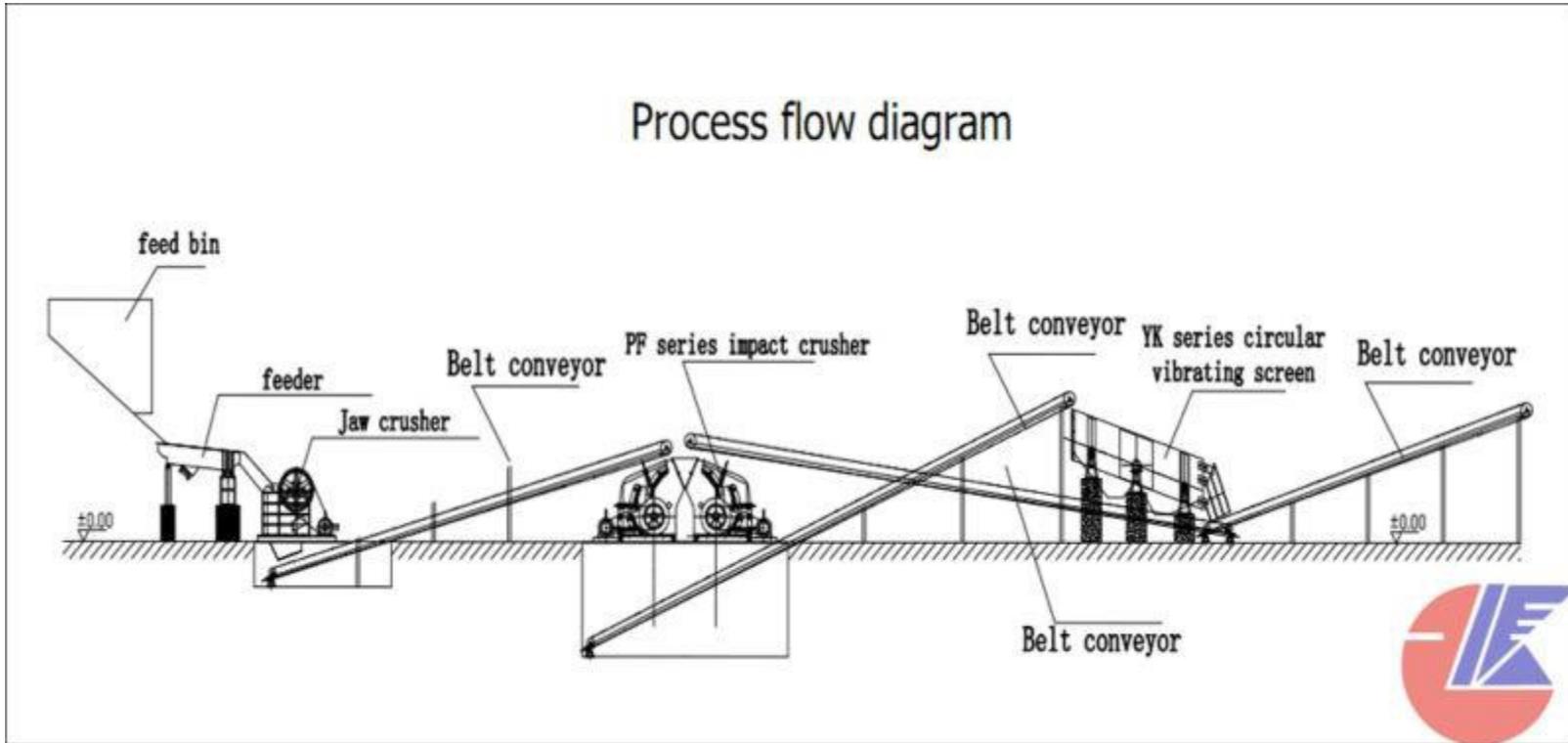
CONCEPTUAL MINING PLAN FOR ARISARU QUARRY



CONCEPTUAL PLANT FOR ARISARU QUARRY



CONCEPTUAL PROCESS FLOW DIAGRAM



## DRILLING AND BLASTING TECHNIQUES

Drilling and blasting will be carried out to fracture the rock to enable mechanical excavation. Holes will be drilled behind the working face and filled with an explosive (ANFO explosive). When detonated, the rock is broken into manageable fragments and transported for further crushing and processing. Multiple blast holes will be drilled with the help of 32 mm drill rod, Jack Hammer and Air Compressor of 375 cfm capacity. The plan at Arisaru quarry is to hire the services of Hopkinson Logistics to supervise all blasting and blasting related activities carried out within the mine. Below is the proposed blasting plan for the Arisaru quarry.

**Purpose:** This blasting plan is in support of the necessary drilling and blasting at the Arisaru quarry site for the fracturing of rock for processing.

**Responsibility:** Mine safety personnel will be responsible for the proper communication with operating personnel

**Procedure for delivery and procurement of explosives:** The explosive vendor will notify the Mine safety personnel at least 24 hrs in advance of expected delivery time and make arrangements for the mine safety personnel to meet the explosive hauling vehicle, inspect the vehicle and escort the vehicle to designated storage magazines.

Transportation of explosives will be done in accordance to Guyana laws

Storage of explosives will be done in separate magazines located on the Arisaru property.

**Adjacent and sensitive structures and facilities:** There are no immediate structures and facilities within 1km radius of the immediate quarry pit.

**Mine Blasting plan:**

**GENERAL OBJECTIVE:** to fracture the Gabbro/Gneiss deposit for processing. The exact elevation that the rock will be fractured will be field determined

**ROCK TYPE AND CHARACTERISTICS:** The type of rock indigenous to this area is Gneiss/Gabbro. The characteristics of Gneiss/Gabbro are as follows:

Specific gravity =2.3 to 2.9

Density= 155lbs./cu. ft., 12.8 cu. ft./ton, 2.09 ton/cu. yd.

**CHARACTERIZATION OF EXPLOSIVES INTENDED FOR USE:** A. The type of explosive intended for use is Ammonium Nitrate Fuel Oil, a nitro carbo nitrate blasting agent (ANFO at a strength of .90), using a 75% power primer (one (1) inch x 6-inch booster per hole). B. The initiating system will be non- electric blasting caps, shock cord and noiseless trunk line delays.

DRILLING PATTERN: The drilling pattern for production shots is described as follows: The following pattern is a typical only, actual shot patterns may differ but all shots will be calculated using this method.

- A. Pattern will be a square.
- B. Burden distance = 5 feet.
- C. Spacing distance = 5 feet.
- D. Hole depth= 15 to 25 feet.
- E. Hole size = 3-inch diameter minimum.

CHARGE CALCULATION, LOADING DENSITY(TYPICAL)A. Calculation of a charge for a free face:

Given: Burden distance = 5 feet Spacing distance = 5 feet Depth = 10 feet

Powder factor = 1.26 lbs. per cubic yard

Calculation: (1) Vol of rock displaced per hole shot  $V$  (vol. Of rock)  $\#B = (\text{Burden distance}) S = (\text{Spacing})$

$D=(\text{Depth})$

$V = (\text{vol. Of rock}) = (5 \text{ feet}) (5 \text{ feet}) (10 \text{ feet})$

$= 250 \text{ cubic feet}$

$= 9.25 \text{ cubic yards}$

Powder factor= 1.26lbs. per 27 cubic feet= 1.26lbs. Explosives/hole= 1.26 x 9.25

(10ft. depth) = 11.65 lbs. per hole

(25 ft. depth) = 29.14 lbs. per hole

Testing will be done for proper burden and spacing distance, and proper hole diameter, with powder factors varying (0.75lbs./cubic yard) to (1.35 lbs./cubic yard).

SHOT LAYOUT AND DELAY PERIODS: To be determined using Guidelines.

GROUND SHOCK AND VIBRATION: Ground motion: One (1) standard will be used for peak particle velocity at critical receptors. Receptors such as buildings, walls and other structures will be limited to 1.92 in/sec.

## BLASTING FORMAT:

1. Preparation of the blasting area
  - a. The blasting area is that area surrounding the excavation site in which personnel could be injured or equipment damaged by blast or fragmentation. This will be defined as a 500-foot radius around the excavation area. The blasting foreman will notify the Mine Safety Personnel prior to blasting for coordination with Operating Contractor Personnel.
  - b. Entry of personnel or vehicles to the blast area will be limited to those individuals that are necessary during the blasting period.
  - c. A vehicle horn will be the blasting warning system. This system must be checked and verified ready for operation. Three 5-second sound blasts of the horn will be the firing signal.
  - d. The explosives, HE ANFO and EBC's will be stored in accordance with EPA Guidelines
  - e. The explosives transport vehicle must be readied to comply fully with transportation requirements. This vehicle (see picture Appendix B) will be outfitted to provide adequate segregation of detonators from other explosives and explosives to be transported will either be in securely attached containers or other fit for purpose means.
  - f. The drilling cuts in the bedrock must be checked for depth, location, and size, and must be air blown to eliminate fines, and sealed until loaded.
  - g. A drilling log must be kept recording all drilling operations.
  - h. All required blasting equipment should be accounted for and tested for reliability.

A list is as follows:

1. Blasting machine
2. Lightning Detector
3. Blasting galvanometer

4. 500ft. firing lines: REO compatible
5. Wooden tamping rod
6. Sand/clay stemming
7. Cap crimpers or dynamite punch
8. Tape
9. Logbook

2. Priming

- a. The 60% or 75% gelatin power primer, ANFO and EBC's will be delivered to the blast site.
- b. Priming and loading will be supervised by the blasting foreman. Qualified personnel will prime and load the cartridges. Standard electric cap priming techniques will be used in making up the primer cartridges.

The priming sequence is as follows:

1. Making up primer cartridges
  2. Load holes and tamp
  3. Add stemming
  4. Tie in circuit using loopties
  5. Cover site with 3-feet overburden (if required)
- c. The EBC's will be minimum of #6 and will be checked for conductivity. Leg wire shunts will be maintained until they are wired in the series and connected into the main firing line. Connections will be taped if necessary to eliminate ground faults.
  - d. The blasting machine will be in the possession of the blasting foreman

3. Loading and Stemming
    - a. The primer cartridge will be bottom loaded in the drilling holes as they are made up
    - b. Wet holes will not be primed.
    - c. All charges will be loaded and stemmed in series before leg wires are tied in the circuit.
  
  4. Connecting Blasting Circuits
    - a. Lay out leading wire, maintain shunts.
    - b. Remove EBC leg wire shunts, connect in series, and check with blast galvanometer.
    - c. Tie in EBC leg wires to lead line.
    - d. Lead line will be connected to the blasting machine during the firing sequence
    - e. Personnel evacuation to 500 feet to safe firing area.
  
  5. Firing
    - a. A conductivity check of the main firing line will be made and the shunt replaced.
    - b. An accounting of all personnel will be made.
    - c. Sufficient controls will be implemented to control access to blast area.
    - d. Adequate cover will be insured for all personnel.
    - e. The warning horn will be sounded for three 5-second periods as the positive warning signal.
    - f. The blasting machine, CD sequential type, will be tested before being connected into the lead line.
    - g. The firing line will be deshunted and the blasting machine connected.
-

- h. The charges will be fired.
  - i. Investigate throw and long distance in the explosives log.
6. Return to the Blast Area
- a. Only the powder man will be allowed to initially re-enter the blast area. The main firing line will be shunted and the blasting machine carried.
  - b. Re-entry will be allowed only when smoke, fumes and dust have cleared.
  - c. Each detonated or misfired charge must be accounted for.
  - d. Burning holes (evidenced by smoke or irregularity) must not be approached until at least an hour after the smoke has subsided.
  - e. A vocal "all clear" signal shall be given after the powder man has checked the area and found it free of all explosive hazards.
7. Emergency Action for Misfires
- a. Should a blasting misfire occur; Mine Safety Personnel shall be notified before taking corrective action.
  - b. Mine Safety Personnel or its designated representative shall investigate and approve the method(s) to be used to fire or remove the unfired charge.
  - c. Do not attempt to investigate a misfire too soon. For non-electric and electric primed charges an hour wait is required. If it becomes dark, the area will be secured until the following morning.
  - d. Burning holes should not be approached for at least an hour after the burning has subsided. Fumes from burning dynamite are very toxic and the burning may result in an explosion called a "hang fire".
  - e. There are not specific instructions for handling all misfires. Each situation must be judged upon its own safety conditions. Under most conditions the safest way to dispose of a misfire is to shoot it.
-

- f. If EBC's are involved in the misfire, disconnect the leading wires from the source of power before returning to the blast area. If the leg wire of the misfired priming cartridge is accessible, test the cap with the blasting galvanometer and if it shows a circuit, reconnect cap leg and lead wires and fire it in the usual manner.
- g. Sequential timer safety interlocks are sometimes caused by ripping and tearing rock which may produce broken wires in subsequent series. These will be handled by:
  - 1. Find the broken series with the use of a blasting galvanometer.
  - 2. Test all caps in the remaining series.
  - 3. Reconnect and fire the remaining series
- h. Explosives shall not be extracted from any hole that has once been charged or has misfired unless it is impossible to detonate the unexploded charge by insertion of a fresh additional primer.
- I. EBC shots that fail the second time, non-accessible EGC leg wire situations, and holes that contain only 12-15 inches of stemming, shooting with a fresh primer will be tried.
- J. If the procedure as stated in (h) fails or is impractical, stemming may be removed by means of a wooden spoon or jet of water if the misfired charge is water resistant, or a stiff rubber hose and compressed air. The distance from the top of the misfired charge to the collar of the hole should be known from the loading data. With the aid of the wooden tamping rod one can determine hole access to within 12 inches of the misfired charge. When sufficient stemming has been removed, the stemming left in the hole should be moistened and a new high velocity primer inserted and fired. A careful search shall be made for unexploded material in the debris of the second charge.
- k. When stemming entry is not possible, the missed holes may be opened by benching.
- l. Missed hole may be handled by drilling a new hole no nearer than two feet from the misfired charge. It is preferable to place the second hole so that

both holes lie in a plane parallel to the face or so that the second one is in front of rather than behind the missed hole in order to prevent throwing unexploded dynamite into the broken rock from the blast. This is a hazardous procedure and should be used only as a last resort.

- m. For large diameter holes or sprung holes, it is neither safe nor practicable to drill another hole near them to blast out the charge. This is due to the fact that drill holes drift to a surprising degree in certain types of ground, and to some degree in concrete.
- n. Partially detonated charges in a borehole should be handled in the same manner as those involving the entire charge.
- o. Unexploded dynamite spread about an area or lying in a "muck" pile should be collected, placed in a storage magazine or secured and disposed of in a manner approved by the manufacturer. Mine Safety Personnel will be notified of the details prior to implementation.
- p. Workers re-entering the blasting area should be briefed on the hazards and visual qualities of unexploded dynamites or detonating caps. A suspicious "find" by anyone should be immediately reported to the blasting supervisor.
- q. An investigation of a misfire will usually disclose the cause of the trouble, such as improperly made primers, defective or deteriorated explosives, the use of non-water-resistant explosives in wet work, improper loading practices, injuries to leg wires, detonator-explosive disengagement, failure to light the fuse or connect electrical hookup, improper power source, cutoffs, direct priming, improperly trimmed fuses, improper use of delays, or improper blasting design.

## GROUND AND SURFACE WATER MANAGEMENT

Ground water occurs at a shallow depth at the proposed Arisaru quarry with small sections of an un-named tributary of the Dehallbanna river within the quarrying concession. If significant ground water accumulates in an active pit, it may be pumped for use in processing and dust control. Ground water level and quality measurements will be recorded periodically during mine operations and within the proposed pit if ground water is encountered there. The Dozer and excavator will have

to be utilized to establish both top level and quarry floor level drainage. Dykes 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 Dehallbanna river, a 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. The mine water pond is proposed approximately 50m \* ~75m for the quarrying operation just SW of the proposed quarry pit.

In the Environmental Management Plan (EMP), additional details will be set out on parameters to be tested for surface runoff and ground water seepage.

### CASH FLOW ANALYSIS

The initial cost of the project has been estimated as follows;

ITEM	COST (GUY\$)
Plant, Machinery and Equipment	\$115,000,000.00
Mine development expenses	\$8,000,000.00
Building and civil works	\$9,000,000.00
Furniture and Fixtures	\$1,500,000.00
Vehicles	\$5,500,000.00
<b>TOTAL</b>	<b>\$139,000,000.00</b>
<b>NET INITIAL WORKING CAPITAL</b>	<b>\$25,000,000.00</b>
<b>PROJECT COST</b>	<b>\$164,000,000.00</b>

ARISARU QUARRY MINE PROPOSAL OCTOBER 2020

PROJECTED INCOME STATEMENT

MODEL QUARRY - PROJECTED PROFIT AND LOSS ACCOUNT

	Year 1 (GUY\$)	Year 2(GUY\$)	Year 3 (GUY\$)	Year 4 (GUY\$)	Year 5 (GUY\$)	Year 6 (GUY\$)
<b>SALES</b>	\$ 791,700,000.00	\$ 1,726,200,000.00	\$ 1,780,800,000.00	\$ 1,906,800,000.00	\$ 2,032,800,000.00	\$ 2,068,500,000.00
Operating cost	(\$175,000,000.00)	(\$200,000,000.00)	(\$250,000,000.00)	(\$275,000,000.00)	(\$290,000,000.00)	(\$300,000,000.00)
<b>GROSS PROFIT</b>	\$ 616,700,000.00	\$ 1,526,200,000.00	\$ 1,530,800,000.00	\$ 1,631,800,000.00	\$ 1,742,800,000.00	\$ 1,768,500,000.00
Administration, Rehabilitation and other expenses	\$20,000,000.00	\$30,000,000.00	\$35,000,000.00	\$35,000,000.00	\$40,000,000.00	\$40,000,000.00
<b>NET PROFIT BEFORE TAX</b>	\$ 596,700,000.00	\$ 1,496,200,000.00	\$ 1,495,800,000.00	\$ 1,596,800,000.00	\$ 1,702,800,000.00	\$ 1,728,500,000.00
Provision for taxation 20%	\$ 119,340,000.00	\$ 299,240,000.00	\$ 299,160,000.00	\$ 319,360,000.00	\$ 340,560,000.00	\$ 345,700,000.00
<b>PROFIT / (LOSS) AFTER TAX</b>	\$ 477,360,000.00	\$ 1,196,960,000.00	\$ 1,196,640,000.00	\$ 1,277,440,000.00	\$ 1,362,240,000.00	\$ 1,382,800,000.00

Rip-Rap	\$5460 per tonne
Aggregates	\$7140 per tonne



ARISARU QUARRY MINE PROPOSAL OCTOBER 2020

**MACHINERY REQUIREMENTS;**

A balance mix of imported and locally available machinery has been selected to maintain optimum level of productivity and efficiency.

<b>No.</b>	<b>Machinery Details for Model Quarry</b>	<b>Quantity</b>	<b>Total Cost GUY\$</b>	<b>Unit Duty</b>
1	Hydraulic Jacking Plant with Jacking Capacity of 200 tons Complete	1	\$13,000,000.00	Plant for crushing
2	Hydro pushing plant with Pushing Capacity of up to 150 tons Complete	1	\$9,000,000.00	Plant for sorting
3	Stitch drill (JRD50) with one Jack hammer and parts	2	\$4,500,000.00	Blasting prep
4	Manual jackhammer	2	\$800,000.00	Blasting Prep & Oversize
5	Compressor 375 CFM with air hose and air tank	1	\$1,200,000.00	Blasting and other work
6	Excavator Doosan 300	1	\$20,205,000.00	Quarrying raw material
7	CAT 950L Wheel Loader	1	\$16,000,000.00	Loading raw material
8	Bulldozer D6 Caterpillar	1	\$17,100,000.00	Stripping of topsoil/overburden
9	CAT 745 Articulated truck 45 Ton	4	\$21,250,000.00	Cart raw material
10	Water Cart 2500 liters	1	\$4,250,000.00	Allaying dust
11	Toyota Double Cab Pickup	1	\$4,000,000.00	Operations
12	Welding Plant electric	1	\$500,000.00	Operations
13	Water Pump 5.5 HP (3'x3')	1	\$225,000.00	Operations
14	Diesel Tank	1	\$450,000.00	Operations
15	Gas Welding Plant with Complete kit	1	\$1,500,000.00	Operations
16	Water Pump 6.5 HP (petrol)	1	\$220,000.00	Operations

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17	Generator 25 KVA	1	\$800,000.00	Operations
	<b>TOTAL</b>		<b>\$115,000,000.00</b>	

BUILDING AND INFRASTRUCTURE

Detail of Building and Civil Works		
Description	Covered Area sq ft	Cost GUY\$
Offices/Prefabricated Containers	850	\$1,100,000.00
Workshop/Bond	1500	\$3,100,000.00
Residential Setup /Prefabricated Containers	2,000	\$3,500,000.00
Haul Road	2300	\$6,900,000.00
<b>Total</b>	<b>6,650</b>	<b>\$14,600,000.00</b>

ARISARU QUARRY MINE PROPOSAL OCTOBER 2020

PERSONNEL QUARRY

NO	STAFF	NO OF EMPLOYEES	SALARIES ANNUAL
1	Quarry Master/ Manager	1	\$4,680,000.00
	<b>Engineers</b>		
2	Mining	1	\$3,600,000.00
3	Mechanical/ Mechanic	2	\$5,280,000.00
4	Blasting	1	\$4,200,000.00
	<b>Supervisors and others</b>		
5	Compressor/Jackhammer operator	1	\$2,100,000.00
6	Excavator Operator	1	\$3,600,000.00
7	Drill operator	2	\$7,200,000.00
8	Heavy duty operator	2	\$7,200,000.00
9	Heavy duty drivers	2	\$6,240,000.00
10	Store Keeper	1	\$2,160,000.00
11	Electrician	1	\$2,160,000.00
12	Labor's	6	\$10,800,000.00
		<b>20</b>	<b>\$59,220,000.00</b>

FUEL POWER AND LUBRICANT

Item	Liters/Kgs Consumption per annum	Price per Liter/Kg
Diesel	80,000	190
Lubricant oil	3,000	695
Hydraulic oil	3,500	1,325
Grease	750	575

		Years					
		1	2	3	4	5	6
Capacity Utilization	100%	50%	60%	70%	80%	90%	95%
Diesel	15,200,000	7,600,000	9,120,000	10,640,000	12,160,000	13,680,000	14,440,000
Lubricant oil	2,085,000	1,042,500	1,251,000	1,668,000	1,876,500	1,980,750	1,980,750
Hydraulic oil	4,637,500	2,318,750	2,782,500	3,710,000	4,173,750	4,405,625	4,405,625
Grease	431,250	215,625	258,750	345,000	388,125	409,688	409,688
		11,176,875.00	13,412,250.00	16,363,000.00	18,598,375.00	20,476,062.50	21,236,062.50
		11,176,875.00	14,753,475.00	19,635,600.00	24,177,887.50	28,666,487.50	30,792,290.63

Taken on capacity utilization and increased @ 10% per annum

## EXISTING AND REGIONAL INFRASTRUCTURE

There are no operating quarries located within the general area of the proposed Arisaru quarry. There is river access for tugs and small barges using the Essequibo River but given the numerous rapids this is not feasible since the load will be below 1000 tons per shipment and usually mainly during when the river level is high limiting the amount of load to market. Road access from the site is readily available to take the product (stone aggregates) to market. The local markets targeted are roads and housing construction industry. Infrastructure development in country is expected to rise significantly by 2022.

## ENVIRONMENTAL ISSUES

New Thiving Restaurant desires to conduct the Arisaru quarry operations in an environmentally responsible manner and will address all pertinent issues to insure proper stewardship of public lands and preservation of wildlife. A separate environmental assessment will be completed to further address the following and other issues of environmental concern. Details of the environmental mitigation measures to be employed at the quarry will be provided in the Environmental Management Plan (EMP). The EMP will address potential impacts of the design, construction, operation and closure phases of the quarry.

**Air Quality:** Dust and diesel emissions are the main elements of air quality concern at the quarry. To limit dust formation during mining and transport of materials at the site, water will be periodically sprayed on roadways, process areas and accessible working faces. Dust suppressants will also be used as required. Appropriate speed limits (25-15 mph) will be enforced within the quarry and access road to limit fugitive dust, and spray bars will be installed at several points on crushing equipment to limit dust generation. Combustion emissions will result from the use of diesel and gasoline fueled equipment. Due to the small nature of the operation and the small number of heavy equipment to be used very minor changes in air quality resulting from equipment emissions is anticipated. Fueled equipment will be maintained according to the manufacturer's manual and kept in good working order.

Storm Water Runoff: Surface water from disturbed surfaces of industrial sites can cause pollution down gradient from areas of disturbance. The most likely form of down-gradient pollution is siltation caused as fine materials washed away from active mine operations are deposited in areas where such deposition is harmful to plants and wildlife. Because much storm water runoff is or will be captured by internal drainages associated with quarries, large amounts of storm water will not flow from the area of mining operations. Untreated discharge can result in increased turbidity in the receiving water bodies. Dewatering of the quarry of accumulated water resulting from surface runoff or ground water infiltration will require pumping excess water to the Dehallbanna River and may potentially impact surface water turbidity. Surface runoff will be directed to a settling pond. Excess water from the settling pond will be discharged to the Dehallbanna River through site drains to prevent overflowing and overtopping. Discharge from the settling pond under these circumstances will be monitored to ensure the compliance with water quality standards established by the EPA.

Ground Water: Because New Thriving Restaurant will use only clean water and processes inert materials in his operations, it will not release pollutants into the ground-water table. Because it is planned that crushing equipment will be electric powered, fuel spill exposure on mining areas should be from mobile equipment only. Fuel, lubricants, coolant, waste oil, waste chemicals and hazardous materials will be stored in suitable clearly marked containers or surface tanks within impervious clay and or concrete bund walls to contain spillage. The storage areas will be completely covered to prevent any entry of rain and located away from operating areas, waterways and drainage lines and areas prone to flooding. The fuel and hazardous materials storage areas will be constructed with a containment capacity of 110% of the largest container stored. Discharges from the fuel storage and workshop areas will be directed to an oil/water separator before discharge to the environment.

Fire Safety and General Safety: Approved fire extinguishers will be located on all pieces of mobile equipment and in process control rooms. Heavy equipment and water will be available on site to assist in firefighting. Police and emergency medical services are readily available.

Cellular/Satellite telephone service is available at the Arisaru quarry for emergency and other communications. New Thriving Restaurant employees will be trained in proper emergency response, incident reporting and general health and safety. The emergency response plan will outline the measures to respond to possible emergencies such as the unintended release of hazardous materials, fire and accidents at the project site. New Thriving Restaurant will identify and have trained an emergency response team and nominate an emergency response coordinator. The coordinator will have the authority to commit resources necessary to respond to emergencies. He will also ensure that all employees are trained in emergency response scenarios.

They will establish and maintain an emergency response outfit, which will be located at a strategic location within the Mine Site and equipped with communication equipment as well as equipment to respond to potential emergencies. The outfit will have the following equipment readily available at their disposal for emergency response:

- Designated evacuation vehicle; boat. Transport vehicles will be provided with emergency communication equipment.
- Earth Moving Equipment.
- Pumps.
- Earthen gravel; sand, clay.
- Booms and absorbents.

In the event of an emergency, an emergency alarm will be raised to alert all persons likely to be affected and to summon the emergency coordinator and crew. All personnel within the affected area will be evacuated to an established emergency assembly point. Emergency assembly areas will be clearly identified and communicated to all employees and visitors of the mine site.

In the event of a spill, the spill response and clean up procedures will be initiated. If there is a release of fuel oil or other hazardous material all persons living downstream and downwind of the release will be notified. Spills will be contained by deploying relevant equipment such as booms in water and earthen material on land. In the event of a fire, water and/or other fire

suppressants shall be used. In the event of an accident, a first aider will render first aid care. The emergency response coordinator will make contact with the Linden Public Hospital and inform them of the estimated time of arrival of the injured person. Details of the injuries sustained, and the state of the injured will also be communicated. The coordinator will complete an accident report to be provided to the hospital on arrival of the injured.

Emergency contact numbers/radio frequencies/phone numbers/etc and for identified medical personnel, hospital, and police will be clearly posted at the mine and camp. An accident report will be prepared describing the cause and nature of the accident, and the remedial actions taken to prevent the reoccurrence of the accident. This report will be forward to the relevant regulatory agencies on request.

For effective implementation of the EMP and for a safe and healthy work environment, training will be provided to all workers. A site induction will be conducted for all new workers. This policy will ensure that employees become familiar with potential hazards and safety precautionary measures in a quarry environment. The training program will be coordinated and implemented by the Environmental Manager.

Hazardous Materials: Diesel fuel and lubricants will be the major hazardous materials present at the quarry site. Care will be taken so that equipment lubricants, fuels and other industrial liquids do not drip or flow onto natural surfaces. Waste oil, other related fluids, filters, oily rags, etc., will be collected and disposed of properly. Large metal refuse containers will be positioned at the site for collection of hazardous waste materials.

Hazardous Waste: No hazardous waste will be produced at the proposed Arisaru quarry.

Mine Safety: The proposed Arisaru quarry will be inspected periodically and will operate under applicable EPA and Guyana safety and health regulations. All employees will receive initial training before commencing work and annual refresher safety training.

Impacts from blasting will be mitigated by:

- Ensuring prescribed procedures for blasting are followed, which include (1) assessing the type of rock formation; (2) determining the depth of drill holes and (3) determining the Frequency of Blasting and Type of Explosives used.
- Careful design of the blast sequence and ensuring detonation is designed using appropriate delay intervals for charge ignition to avoid detonation of large unconfined charges and to reduce air-blast and vibration effects. The use of electronic detonators will also be employed to reduce vibrations. The number of explosives used in the blast will be carefully administered to reduce fly rock.
- Ensuring that blast safe zones are established during blasting.
- Informing the residents of Batavia of blasting times in advance.
- Strict procedures for transport, storage and handling of explosive and blasting will be implemented in accordance with Mining regulations and the GGMC Code of Practice for Quarrying.
- A Certified Blaster will be recruited to supervise the blasting exercise, as required by law.
- Blasting will be done according to the Blasting Plan approved by the GGMC.

Blasting: Blasting will periodically be required at the Arisaru quarry. All blasting will be conducted by qualified individuals in compliance with Guyana Laws. A model blasting plan for the project is presented in the section Drilling and Blasting techniques. The closest community (Mile 48) lies approximately 13 miles SSW of the project area. Given the distance, blasting activities will not affect any of the small communities within the area.

Blasting will occur only during workdays during daylight working hours such as to minimize impact to surrounding area. Noise limiting methodologies will also be used to lessen noise impact. Stakeholder consultations will be conducted with communities such as Rockstone. Stakeholder engagement is an on-going process of sharing information and knowledge, seeking to understand the concerns of others and building relationships based on collaboration and partnership. Developing relationships with stakeholders is a long-term process, which will take

place throughout the lifetime of the Quarry. The ultimate aim is to engage stakeholders as part of the project process to ensure that issues and concerns can be dealt with as quickly as possible thereby avoiding any potential conflict, and to build a general sense of goodwill towards the project.

**Vibration and Noise:** In addition to blasting, other mine operations including mechanical excavation, crushing and processing can produce significant noise and vibration. Best available practices of noise and vibration reduction will be utilized at the quarry and noise monitoring will be conducted during initial mine operations. The project's operations will be associated with noise and vibration generating activities – excavation with machinery, drilling and blasting of rock, transport of boulders within the site and loading of barges are the critical noise generating activities. Excessive noise can affect workers and give rise to hearing loss, sleep disturbance and can also affect wildlife within the project area.

Noise will be mitigated by installing sound suppression equipment on vehicles, e.g. mufflers and ensuring vehicles are maintained according to the manufacturer's manual and are kept in good working order. Operators will be equipped with PPEs such as air plugs or earmuffs. Generators will be installed with sound proofing or at a safe distance away and downwind from the living quarters. Blasting will be implemented in accordance with Mining regulations and the GGMC Code of Practice for Quarrying. Careful design of the blast sequence and the use of electronic detonators will be employed to reduce vibrations. Quarry operations will comply with the decibel limits outlined in the GNBS Noise Emission Standard.

**General Housekeeping:** Operational litter will be collected in appropriate containers and removed as required from the site. No waste will be buried on site. A septic system on the land will be utilized

**Waste and Ablution Facilities:** Project activities is expected to produce both liquid and solid waste which, if not properly stored and or disposed can lead to pollution of receiving water bodies or accumulate on site creating an unhygienic and un-aesthetic environment. Improper management

of domestic waste and sewage can pollute land and water resources in the area, resulting in health impacts on site.

Waste generated will be collected, segregated, stored and transported to an on-site landfill constructed in accordance with the EPA Guidelines for establishing landfills. Domestic wastewater will be directed to a soak-away filter treatment system prior to discharge to the Dehallbanna River. Discharges to the river will be in accordance with the EPA domestic wastewater discharge limits. All sewage will be directed to septic tanks with filter bed treatment installed.

### REHABILITATION AND CLOSURE PLAN

A detailed closure will be developed along with a reclamation plan that is specific to the quarry once the project is implemented. The GGMC and the EPA will be notified in writing of the intention to close the mine prior to mine closure since additional exploration can add reserves to the quarry mine increasing the current plan mine life of 6 years.

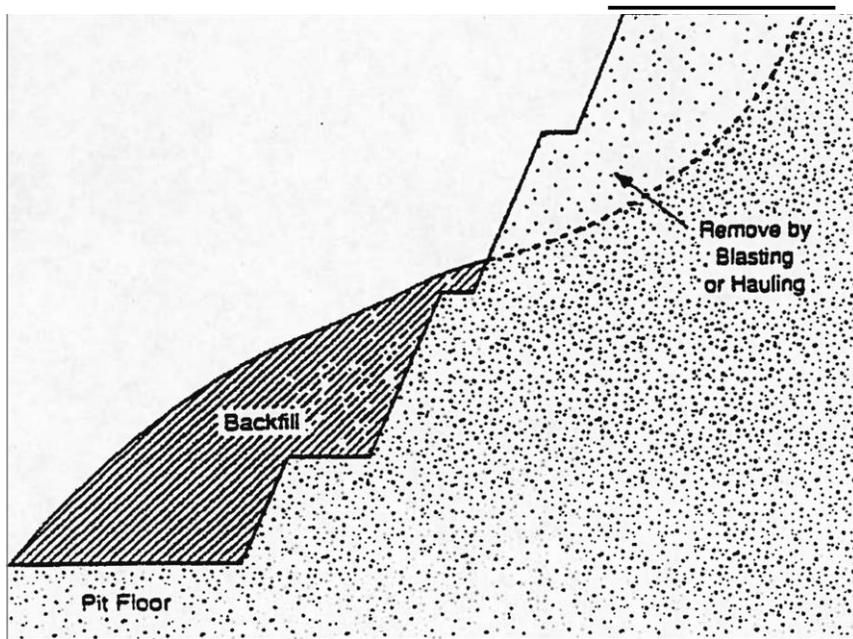
The main aims of the rehabilitation work are to:

- Achieve long-term stabilization of all work out areas to minimize ongoing erosion
- Re-vegetate all worked out areas with suitable plant species
- Minimize visual impact of distributed areas and
- Ensure that worked out areas are safe for future uses.

The overall approach is to employ best site maintenance practices to reduce environmental stresses. Meeting the requirements for site closure will be easier if best practices are followed throughout the quarrying operation.

### RECLAMATION WITH LIMITED BACK FILLING

Reclamation at the Arisaru quarry will proceed concurrently with mining wherever possible and shall be conducted in accordance with reclamation guidelines. As valuable material is mined out, those areas not to be affected by future quarrying operations will be reclaimed. Although it will be impossible to restore the land surface to its exact original configuration, it should be possible to reclaim the disturbed surface such that it closely matches the natural surface expression of adjacent undisturbed land. At closure, most pit walls will be reduced to a safe slope by such mechanisms as illustrated in the figure below.



*Figure 7: High-wall reclamation schematic*

Where feasible, upper portions of pit high-walls will be ripped from above and pushed into the pit. Where necessary, stockpiled overburden and processing waste will also be placed against the high-wall. Any loose high-wall or fill material will be compacted to a safe, stable slope significantly less than the angle of repose for unconsolidated materials. Final pit slopes are anticipated to be 2.5:1 or less for most areas. Where high-walls cannot be collapsed from above, those portions of the high-wall remaining above backfill will be scaled from within the partially refilled pit or otherwise made safe and stable. Any remaining steep pit wall slopes will resemble steep cliffs of natural rock units as exposed on nearby undisturbed hills.

If it is determined that artificial seeding (re-vegetation) of reclaimed areas would be cost efficient, a seed mixture approved by EPA/GGMC will be applied. The seed mixture would likely attempt to duplicate the area's natural vegetation. All reclaimed surfaces will be graded in such a manner as to limit soil erosion and to allow for reestablishment of appropriate drainage permanent structures or foundations will have been constructed; this should not be a difficult task.

#### **APPROACH ROAD, HAUL ROAD AND LANDING RECLAMATION**

Approach and haul road and landing will be continually maintained throughout the life of the quarry. Roadside ditch line through the area will be re-established and grubbed out to convey surface flow so as to minimize erosion.

#### **SITE CLEAN-UP**

Site cleanup works to be undertaken after cessation of extractive operations include;

- Removal of all fixed and mobile plant
- Removal of all temporary and permanent structures unless required for an agreed future use
- Leveling of noise control bunds
- Removal and burial of concrete slabs
- Rehabilitation of surplus roads, office sites and hard standing areas
- Identification of any hazardous or contaminated materials
- Approval to retain any of the infrastructure, which may be consistent with the proposed

final land use, would be sought from the regulatory authority.

## APPENDIX A : PRINCIPAL CLOSURE AND DECOMMISSIONING ISSUES

The principal closure related issues relate to the quarry have been identified as:

Final voids (pits) arising from the rock 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:** detailed proposals 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. The proposal will be supported with relevant plans sections depicting the method of land restoration and rehabilitation.

**Water quality management:** detailed proposals 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, underground 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 are supported.

In the specific environmental and socio-economical context of the site, options for post closure land use with respect to these issues will be limited and technical constraints at the time of this assessment and the potential for long term quarrying activities in the surrounding areas. The first priority therefore must be to protect the environment and public health and safety by using safe and responsible closure practices. For each principal component of the project plan, 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.

## APPENDIX B: GENERAL PICTURES



PROPOSED EXPLOSIVE TRANSPORT VEHICLE



PROPOSED EXPLOSIVE BOND DESIGN