ABSTRACT

This document gives an overview of the intended operational plan which will guide further works

Greenheart Aggregates Project Summary – Arawai Quarry

Prepared by : Robert Bostwick

B.Eng – Geological Engineering

Msc. – Environmental Management

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Executive Summary

Greenheart Aggregates Inc. (the company) recognizes the demand for aggregate, the current limitations of supply and the anticipated increase in demand from the emerging oil and gas sector and the expanding construction sector.

As such the company seeks to obtain from the Guyana Geology and Mines Commission (GGMC) and Environmental Protection Agency approval for Quarry License (QL) to develop a modern, large-scale quarry to meet the existing and projected demand for aggregates.

The St. Mary's, Monkey Jump, Bethany and Agatash quarries are all located on the Essequibo River, in the vicinity of the location of the proposed Arawai quarry development.

The proposed Arawai Quarry project site is located on the right bank of the Essequibo River, ~35 km SE of Bartica, ~85 km from Parika and ~125 km from Georgetown, all distances measured along the riverain routes.

The potential for hard rock occurrences which may become exploitable quarry material is very good. Both areas form part of the Trans-Amazonian Craton and the underlying rocks are collectively known as the Barama – Mazaruni Supergroup (BMS). Arawai lies on the younger intrusions within the Bartica - Gneiss Complex. The general area is covered by young alluvium, fluviatile materials as well as saprolitic material. Fresh rocks can be observed throughout the areas and the topographic highs indicates underlying 'hard rock' materials being good for extensive quarriable material.

The Projects lie on the major dominant regional structural trends of younger mafic/ultramafic intrusions and is perfectly placed to host a significant quarry reserve

The proposed project site encompasses approximately ~1200 acres of land. The topographic high is approximately 250 feet in elevation and undulates most of the aerial extent of the proposed QL.

This topographic high will be the initial focus for the development of the new quarry, where initial reconnaissance has shown the presence of rock at and close to the surface.

The main operational center will be closer to the northwestern sector of the license; rocks harvested from the central and eastern sectors will be transported here for processing into aggregate or will be shipped as boulders for use in sea defenses projects if needed.

The proposed QL is near the Sherima/Suribanna crossing, at this point in the Essequibo River it is easily navigated with sizable vessels.

The Arawai area is already connected by trails to the Suribanna - Rockstone - Linden - Soesdyke tails/road. Transport will be done by trucks along these routes.

The company will be investing and expending more than three million United States Dollars (US$3,000,000) in the development and commissioning of this new quarry operation.

This investment is being made to meet the growing demand for aggregate domestically as the economy continues to be boosted by increasing construction, infrastructure and sea defenses works, with further expansion anticipated with the increasing oil production related activities.

The initial output of this quarry is expected to be at least 2000 tons per week of aggregate (½", ¾",⅞" size fractions).

The company is committed to being a responsible corporate partner to the Government of Guyana and is currently assembling a team of experienced and professional persons to manage this project.

The project developmental plan will be revised at the direction and requirements of the relevant regulatory bodies.

Introduction

The company is currently applying for a Quarry License (QL) from the Guyana Geology and Mines Commission (GGMC). The QL being applied for covers an approximate area of 1200 acres. These proposed QL is located on the right bank of the Essequibo River just east of the Shermina/Suribanna crossing. The Arawai area was selected and located based on the presence of the numerous historic and active quarries in the area along with the indications of fresh rock suitable for aggregate being present in the topographic high that occurs along a NE/SW trending mafic intrusion which dominates this entire area.

A historic and respected estimate by the notable H. Schielly in 1968 from the surveys and work he did in all of the potential quarry sites in the entire Essequibo - Mazaruni - Cuyuni confluence area places the reserves of the St. Mary's quarry at 7 million tons. This reserve is based on much geological conditions very similar to those that occur in the proposed QL.

After initial developmental works, a consolidated reserve estimate will be arrived at through a comprehensive drilling program with major resources anticipated in the topographic highs to the eastern of the proposed QL.

For the combined projects it is estimated that not less than 2000 tons of rock will be produced per week for the first phase of established production. The annual production for the first few years during the consolidation of operations will be ~100,000 tons of aggregate and some estimated 20,000 tons of boulders and other sea defenses related materials.

After the recovery of a substantial portion of the capital investment a second phase of investment and expansion will aim to have production increased. The quarry will see the capital investment of not less than USD$3,000,000 and will have an initial work force of at least 40 (local) employees. Development of the facilities for this quarrying complex will be completed within 6 to 8 months of the QL being granted. The primary reason for the establishment of this quarry is to satisfy the current and anticipated demand based on the projections by the Ministry of Public works and private sector.

Location and Access

Arawai Project

The Arawai Quarry Project area is centered on N 6° 8.5' W 58° 27.5' in the Mazaruni #3 mining district, central northern Guyana (See Map 2). The area is approximately 125 km southwest of the capital city of Georgetown and the closest town is Bartica some 35 km to the northwest, all distances along the riverain routes.

The Project area is located in the Amazon rainforest of Guyana. It is bracketed to the north by the Moraballi River, to the west by the watershed of the Suribanna creek, to the east by the watershed of the Moraballi River. To the South is the Arawai River.

Access to the project area, depends on the nature of what is being transported I.e. (a) Personnel and Perishables; (b) Heavy Equipment; and (c) Light Equipment and fuel.

The closest town is Bartica some ~35km away to the northwest. Personnel and perishables can be taken from Georgetown to Parika by road; then by river from Parika up the Essequibo to the project site. The area is also accessible by helicopter or small aircraft from either Timehri or Ogle to the Bartica airstrip which is only 20 km due northwest on the Bartica-Potaro Road, in the same direction as Bartica. The air strip is connected to the project site by roads and trails and the Sherima pontoon crossing. There is an established pontoon service at Sherima to cross the Essequibo River to connect to the trials to Linden and the Soesdyke highway to Georgetown.

Heavy equipment can be transported by pontoon from Georgetown to the nearby Suribanna wharf and then by road and trials to the project site directly. Light equipment and fuel can be taken by road from Georgetown to Parika, then from Parika by boat or barge to Suribanna, then to the site.

Alternatively, all transportation needs can be facilitated from Georgetown through Linden and Rockstone by the road/trail to the project site.

Access within the boundaries of the prospect is relatively good; the previous logging operations within the area left a network of trails and lines throughout the proposed QL.

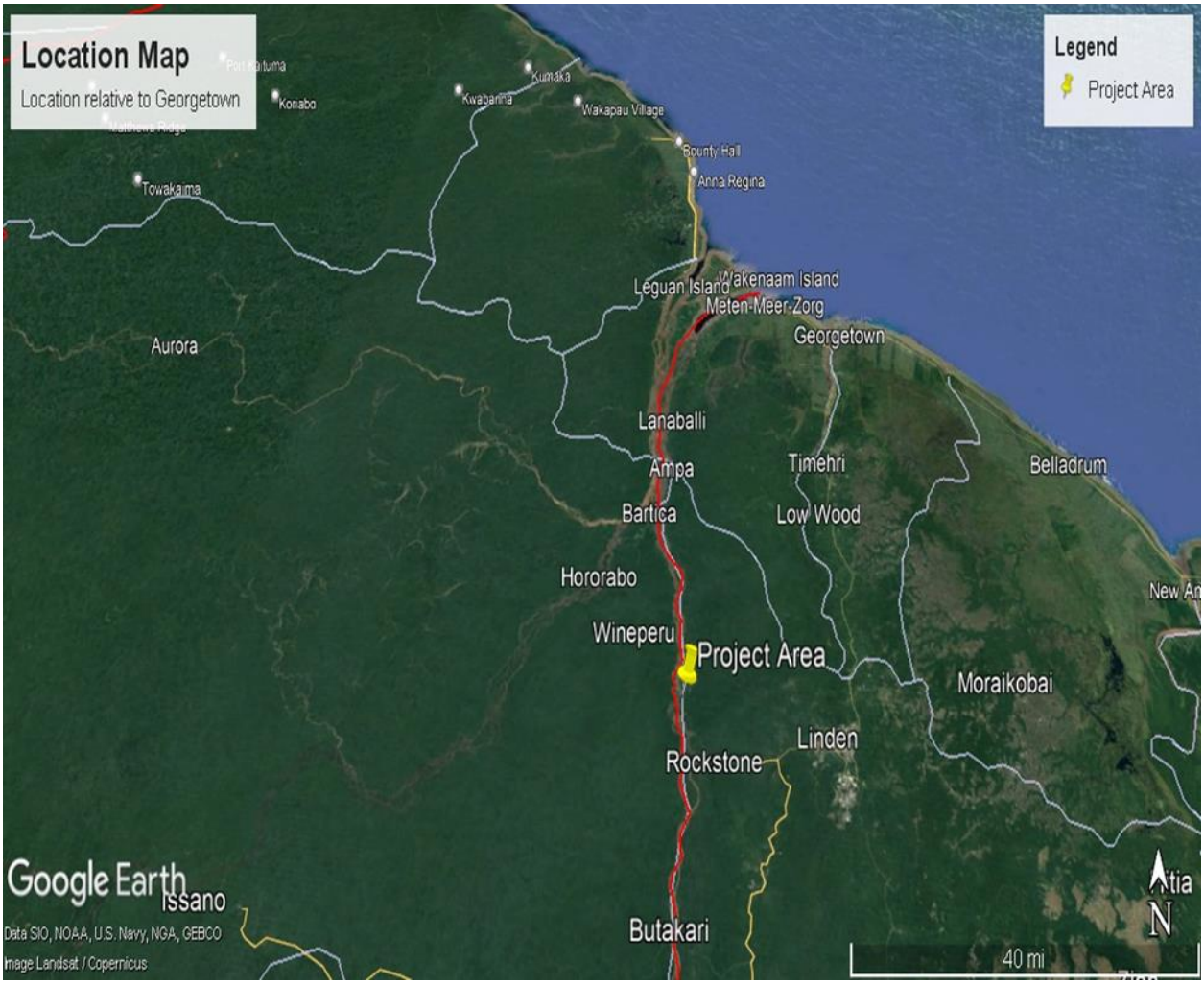

Fig 1. Location and access Arawai Project

Property Title

The Arawai and Haimaruni Quarry Project is a proposed QL which is being sought by the company from the Guyana Geology and Mines Commission (GGMC). A QL is usually issued for 25 years with subsequent renewals being determined by the life of the mine.

For the Arawai Project, the area applied for is held within the GGMC closed area whereas the Haimaruni Project, the area being applied for is already allocated for mining by the GGMC for gold mining and there are no active gold mining operations in the area and the potential for significant gold occurrences is virtually non-existent. A no objection for these projects were sought by the GGMC and was Granted by the Guyana Lands and Surveys commission (GL&SC).

The GGMC usually issues multiple permits over the same areas providing the minerals being sought and the activities associated with them are not competing or pose a conflict. This was done for BK Quarries Inc. on PL B-70 for stone and for the Ramdial Quarry License, as well as for Guyomb Minerals Inc. for Col-Tan, Reunion Manganese Inc. for manganese, Prometheus Resources (U308) for uranium and Greenpower Energy for lithium - just to reference a few.

The QL carries a work performance bond which must be lodged with the GGMC and a fixed schedule of rental payments for the land as well as several other reporting and performance requirements to keep the license in good standing.

Cartographic Description of Proposed QL

Arawai

Tract of state land located in the Essequibo Mining District No. 3 as shown on Terra Surveys Topographic Map 27SE, at scale 1:50,000 with reference point 'X' located at the confluence of the Essequibo River and Arawai Creek with geographical coordinates of Longitude **-58° 33' 37.5696"W** and Latitude **6° 8' 26.322"N**

Thence at a true bearing of **185º**, for a distance of **1.5 mile**, to the point of commencement:

Point A, located on the right bank Essequibo river having geographical coordinates of longitude **-58° 34' 6.042"W** and latitude **6° 7' 16.9932"**, thence at true bearing **East**, for a distance of approximately **0.5 mile** , to **Point B**, located at geographical coordinates of longitude **-58° 33' 41.7564"W** and latitude **6° 7' 17.4252"**, thence at true bearing **South**, for a distance of approximately **2.5 Miles**, to **Point C**, located at geographical coordinates of longitude **-58° 33' 50.0148"W** and latitude **6° 5' 7.8612"**, thence at true bearing **West**, for a distance of approximately **0.7 mile**, to **Point D**, located at a point along the right bank Essequibo river having geographical coordinates of longitude **-58° 34' 27.3108"W** and latitude **6° 5' 10.896"**, thence in a Northerly along the right bank Essequibo river, for a distance of approximately **2.8 Miles**, to the point of commencement at **Point A**

Thus enclosing an area of approximately **1190 acres**, save and except all lands lawfully held or occupied.

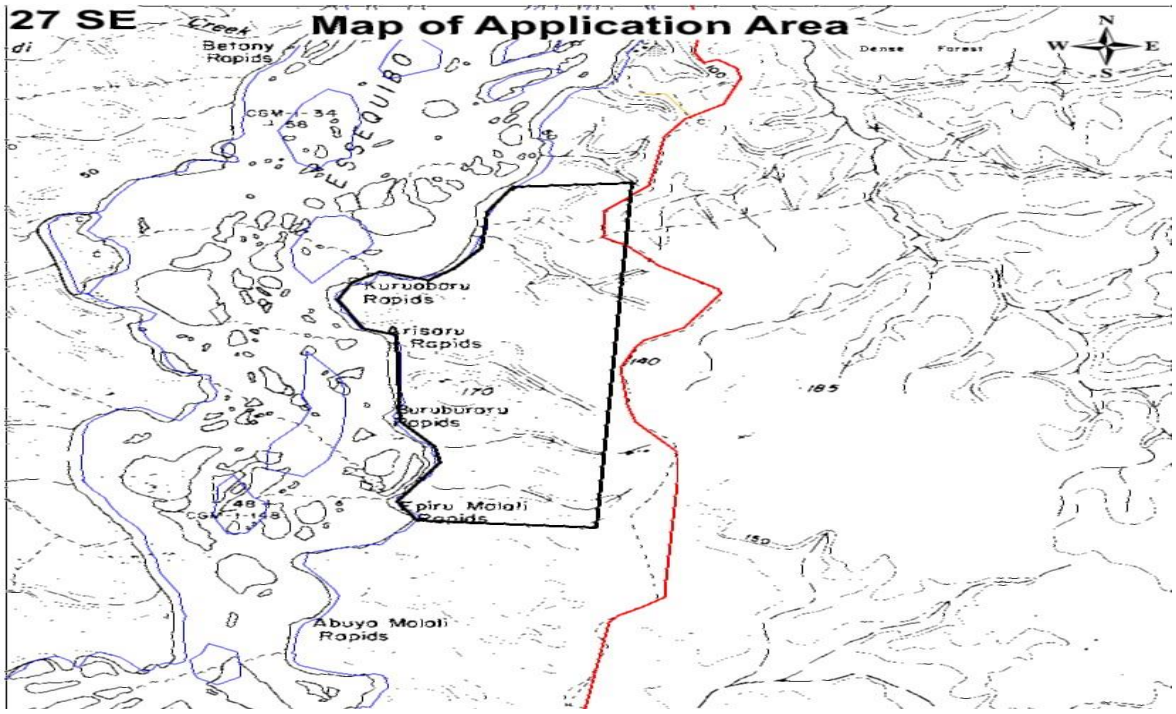

Fig 2. Map of Arawai Project area

Local Geology

For the Arawai project the geological feature which stands out is the Bartica - Gneiss complex, which is a broad term applied to a large area of metamorphosed rock, which were generously intruded by the younger granitoids. From H. Schielly 1968 observations in this and similar areas found the variation in this setting to be between biotite gneiss /biotite granite/granite gneiss and biotite hornblende gneiss.

The material within the project area is described by Schielly as heavily jointed, foliated, hornblende-biotite gneiss with granite and pegmatite dykes and even if fractured moderately still carries good characteristics for the following utilization:

1. It is suitable for first class concrete aggregate

2. It is suitable for road foundation works and other foundation and fill applications

3. Large boulders and armor layer material for use in sea defenses

The suitability for utilization of the other rocks originating from the geological formations will depend on the extent to which it may have been deformed/metamorphosed/foliated and will be determined upon further investigation.

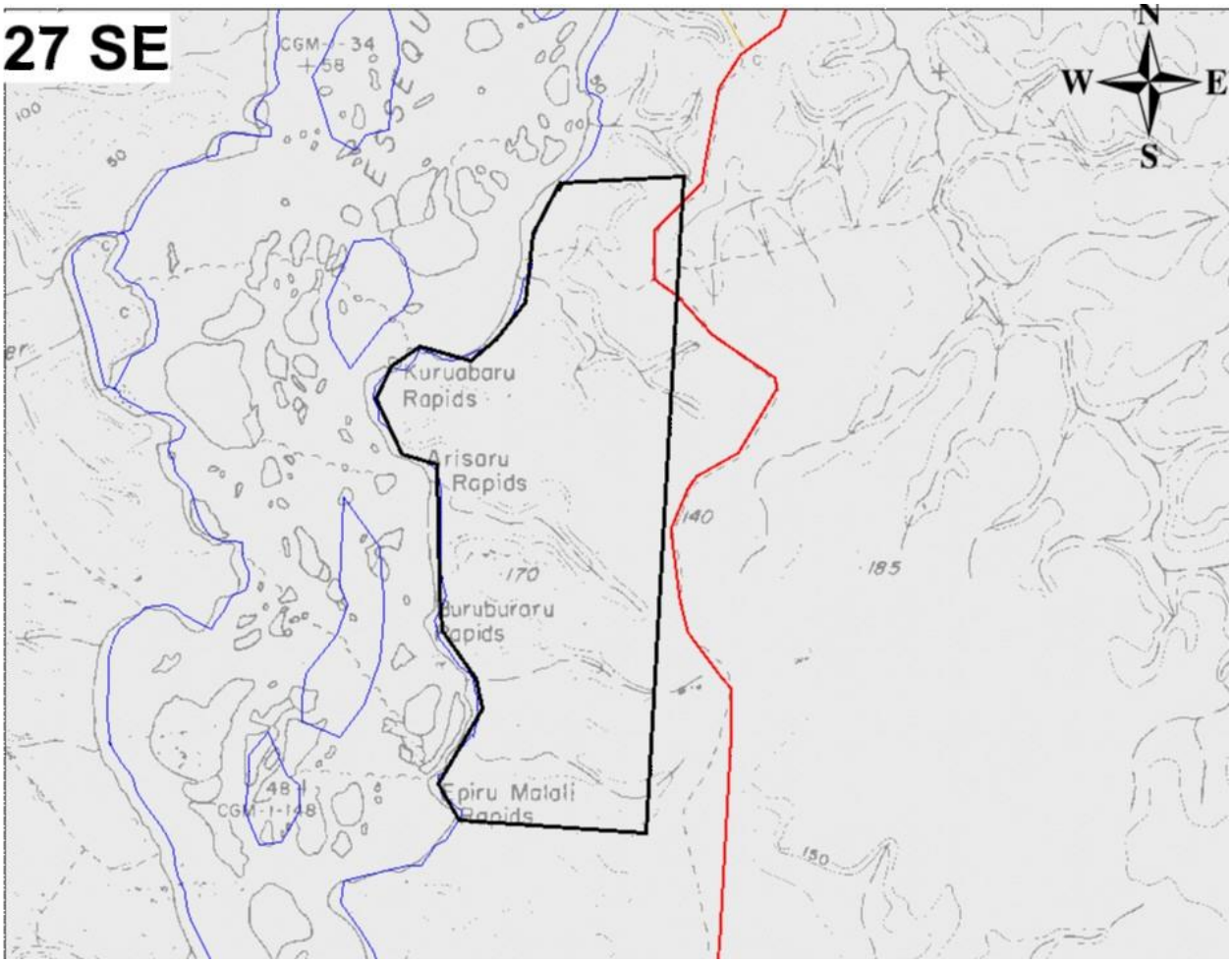

Fig 3. Geological Map of Arawai application area

Stripping Plan (General)

The Cat. D8 bulldozers, excavators and trucks will spend 100% of their time for the first month to strip the overburden and establish the working faces. After which the bulldozer will carry on much of this work by itself with the excavators and trucks using an expected 20% of their time when necessary to help remove the overburden. Dumping of overburden will take place outside the stripping limits into valleys and other low areas; adequate dumping room is available.

Quarry Plan (General)

Quarrying will be done with a fleet of two (2) 720 Cat. Trucks being loaded by two 245 Cat. Excavators; the 980 Front-end loader (Caterpillar) can serve as a standby loading machine. Quarrying of stone will be done using an operating system (2*10*6). A truck productivity of 40 tons per hour is estimated with average cycle time of 30 minutes and effective truck capacity of 20 tons.

The annual production (estimated) is ~134,400, tons and with an estimated ore, loss of 2.5% or 3,360 tons the crude ore supply will be 131,040 tons; approximately 110,000 for aggregate and 21,000 being boulders/rip rap for sea defenses projects.

Drilling and Blasting (General)

An Ingersoll Rand ECM590 Rotary percussive Blast hole Drill will be utilized to drill 3 ½ inch diameter holes. Senatel Magnafrac will be used as the primary explosive, initiated by primer cord and 25 millisecond delay detonators.

Drainage Plan (General)

An effective drainage system is necessary for this Quarry. The 236 excavator and D8 bulldozer 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 directed to the river. Priority will be given to the maintenance of these drainage systems for a clean/ dewatered quarry

Crushing and Loading

Crushing operating will start with a mobile crusher being used to crush first 200,000 tons. This mobile

Crushing Plant is rated at 80 tons/ operating hour.

This size specification for the crusher is as follows:

Siftings

¼”minus)

⅜”)

½”) Aggregate

¾”)

1”)

Rip-Rap

Boulders

Project Development (In Quarry)

In order to improve on the general appearance of the quarry and also to render the operation more efficient, the following development works are necessary:

Ramp to Top of exposed rock.

The ramp will be initially established within the stripping and quarry limit, It is proposed that at the opportune time the ramp be relocated outside the northern 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 eastern and southern face) in quarry limits to a length of (1200) ft. This 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 South and East for easy reference.

Establishment of trucking ramp

The ramp will quarried in two (2) lifts of approximately 32” each. The ramp should have a slope angle of approximately 6% extending a horizontal distance of 200” from the toe to the crest (plan distance of). The ramp width should be approximately 60 feet for truck maneuverability and two-way traffic.

Quarrying of long face (1200ft)

A two (2) face quarrying operation will be maintained with the face being split in two to give North and western Cuts. Ramps (650”) wide will be retained at the northern and Southern quarry limits as well a 50” 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.

Infrastructural Development

The company intends that the quarrying complex will be a model complex with facilities that are comparable with other regional and international quarrying operations. The topography is ideal with housing etc. overlooking the operation. The quarry will have a full-time sanitation crew and a medic will always be on site with adequate medical supplies. Because of the threat of malaria in the area, the company 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 a suitable area within the quarry and water will be supplied from the treatment plant to the various sectors of the quarry.

Project Management (General)

The true purpose of the Network analysis is to show the precedent relationship between the various activities. The company will have this Network computerized and may have cause to vary the duration and precedent relationships for maximum utilization of resources and overall greater effectiveness – this will be a dynamic model. More development activities for the project will be included on this network for a more complete picture and care will be taken that priority is given to activities with the least Total Float.

Mine Reclamation (General)

In accordance with the mining regulations and the environmental regulations there will be consultation and implementation of progressive reclamation to restore the mined-out areas. This will be done in stages throughout the progression of the mine. The nearby town of Linden will be the most important stakeholders in this consultation. The mine will be dewatered and recontoured to prevent standing pools and to prevent landslides of unstable faces or dumps.

Key Potential Ecological Environmental Impacts and Risks

This section goes into detail regarding the Projects main ecological dangers and probable effects. For the project's construction, operation, and closing phases, specific effects and dangers on the mine site and access road are described.

The main goal of this evaluation is to pinpoint any potential effects and dangers that will call for protective management and mitigation measures at each stage of the project. The Environmental Management Plan elaborates on the protective measures and mitigation strategies. Impacts are considered in this assessment as outcomes expected to happen during routine operations. Risks are thought of as unexpected negative outcomes brought on by accidents or system failure. Considering this, a fuel spill brought on by a tanker truck accident is a risk, whereas habitat loss brought on by removing land for development is an impact.

Prior to the identification of impacts, it is crucial to emphasize the ecological background of the Project Area of Direct Influence. Additional ecological effects could be caused by the Greenheart quarry Project's surrounding environment.

Most possible effects on the biological environment are likely to happen while building is underway. In the section that follows, the potential effects and risks are broken down by project component and phase.

Ecological Baseline

The project’s location is situated at the low-lying Essequibo River and its watershed. The Essequibo District has active mining and logging extraction projects and is noted for its mineral and timber resources. The project site is covered in a tropical lowland forest, with a canopy height of 15 to 20 meters. Aside from the tracks left behind by earlier logging, there is evidence of sporadic illicit timber harvesting. However, the forest cover is basically unaltered.

There is no ecological classification system that has been applied to Guyana and therefore there is no formal bio-geographical classification of the national territory.

Identifying sensitive species and places of biological importance within proximity to the project development landscape was the goal of the biodiversity baseline assessment. The mechanisms

used to carry out this assessment included the baseline information obtained from the EPA approved Environmental Social Impact Assessments of other significant projects within the Essequibo Region. In addition, some baseline assessments were obtained from field personnel attached to Greenheart aggregates Inc. and who have extensive knowledge of the proposed project location and the Area of Influence of the proposed quarrying activities.

To establish if the area where the project is located has been defined as a priority area for conservation interest, areas of acknowledged global, national, or local importance to biodiversity within Guyana were taken into consideration in this evaluation. This considers areas that are officially protected, as well as natural reserves, community reserves, world heritage sites, Ramsar sites, important bird areas, and key biodiversity regions. The government has not designated the project area as a conservation interest priority. The Rupununi Savannas or central and southern Guyana's bigger forested landscapes are the main targets of the country's conservation efforts. It therefore follows that the Greenheart aggregates project fall outside of the boundaries of the designated protected areas. As it relates to conservation in Guyana, there are two legally designated protected areas in Guyana (Kaieteur National Park and Iwokrama Rainforest Reserve), as well as five other non-legally designated conservation areas in Guyana. These have been identified as Shell Beach, Kanuku Mountains, Mount Roraima, Orinduik Falls and Southern Guyana.

Our research informed that there are over thirty animals listed on the IUCN Red List for endangered species. These animals are threatened by human activities such as trafficking, mining, logging, settlement, and hunting. Animals such as the jaguar, leatherback turtle, harpy eagle, giant otter, caiman, manatee and the red siskin bird are all endangered. In addition, animals also believed to be endangered are the Canje pheasant and the Arapaima, the world's largest fresh water fish. At this juncture it should be worth noting that Greenheart aggregates Inc. would ensure that hunting and killing of endangered species by members of the Company or contractors aligned with Greenheart aggregates is prohibited within the project area and its surroundings.

Guyana does not have any identified Critically Endangered mammals, however the Giant River Otters (Pteronurabrasiliensis) is regarded as being in danger of extinction because of the continued population decline brought on by habitat destruction. Giant River Otters choose their environment based on the quantity, accessibility, and fragility of their prey, claims Duplaix (1980). They favor rivers and creeks with sluggish currents, pure black water, and pristine ecosystems in deep forested territories, especially waterways with little human activity. The Giant River Otters choose low-sloping banks with adequate shelter and easy access to excellent fishing spots for their habitats, where they raise their young. These habitat requirements are provided in Guyana's interior rivers, especially the Rupununi River, where there are a respectable number of gigantic otters (Duplaix, 2004).

Because it features regions with low sloping banks, good shelter, and easy access to great fishing locations, the proposed project location and its AOI partially satisfies the Giant River Otter's need for this type of habitat. The Essequibo Region within the Project's environment, however, is not known to be crucial for the support of regionally or globally significant populations of the Giant River Otter, and there are no records of Giant River Otters living there. Additionally, it is not anticipated that project development and quarrying activities will significantly alter current riverine habitats or have an impact on the Giant Otter's long-term survival in the AOI, and consequently, Guyana.

Other key faunal species of international economic importance which are found within the Guiana Shield include over 20 species of parrot (macaws, parrots, parakeets and parrotlets - Psittacines), toucans, songbirds, 38 species of non-CITES reptile species, yellow spotted river turtle, spectacled caiman, 6 species of frogs, primates, ornamental fish and arapaima.

Trichiliasurumuensis (Endangered), Anibarosiodora (Endangered), Virola surinamensis (Endangered), and Vouacapoua americana are the only Endangered or Critically Endangered plant species found in Guyana. Anibarosiodora is indigenous to northern South America, and the genus Anibaoccur is extensively distributed in Wallaba forest and in mixed forest on white and brown sand in Guyana. Trichiliasurumuensis is an understory species that is only found in the Roraima highlands of Brazil and Guyana. In Guyana, the marsh forest, mora forest, and swamp

forest are all home to Virola surinamensis, which is extensively dispersed and abundant to frequent. Locally widespread in mixed woods in the adjacent interior, the genus Vouacapoua can also be found in southeast Guyana growing in swamp forests on alluvial flats and on reefs on rocky slopes or sandy clay.

The timber species Vouacapoua Americana, Anibarosiodora, and Virola surinamensis are common in Guyana and not pursued for economic purposes.

The commercial and frequently almost endemic species Swatzialeiocalycina, Chlorocadiumrodiei, Mora excels, Mora gonggripii, Alexa imperatrics, Alexa leiopetala, and Clathrotopis spp. are highly abundant in the central Guyana wet forest. With the exception of Alexa and Clathrotropsis spp., Eschweilera spp., and Licania spp., which are prevalent but not dominant in all of the region's woods, one of the aforementioned species often dominates the forests in this area. Along the rivers, forests with a predominance of Mora excelsa are frequently seen in conjunction with Carapa spp. In creek heads, swamps with Pterocarpus and Tabebuia insignis are common. On the white sand soils of this area, there are extensive forest stands dominated by Eperua falcate, E. grandiflora, and Swartzialeiocalycina.

Common Name	Scientific Name	Family
Black Yari Yari	*Guatteria punctata*	Annonaceae
Blood wood	*Vismia sp.*	Guttiferae
Bunduripimpla	*Macheriumlunatua*	Unknown
Clump Wallaba	*Dicymbealtsonii*	Caesalpionoiceae
Coffee mortar*	*Terminalia dichotama*	Combretaceae
Common Baromalli*	*Catostemma commune*	Bombacaceae
Darina*	*Hymenolobium flavum*	Fabaceae
Fern	*Pityrogramma spp.*	Adiantiaceae
Greenheart*	*Chlorocardiumrodiei*	Lauraceae
Hill Dalli *	*Virola sebifera*	Myristicaceae
Hububalli*	*Loxopterygiumsagotii*	Anacardiaceae
Itikiboroballi*	*Swartziabenthamiana*	Papilionaceae
Kabukalli*	*Goupia glabra*	Celastraceae
Kautaballi*	*Licania alba*	Chrysobalanaceae
Kokerite	*Maximiliana maripa*	Palmae
Kufa	*Clusia spp*	Clusiaceae
Manicole	*Euterpe oleracea*	Arecaceae
Masoaplimpla	*Bactris major*	Palmae
Mokru	*Ischnosiphonarouma*	Marantaceae
Monkey Ladder	*Bauhinia scala-simiae*	Leguminosae-caesalp
Mora*	*Mora excelsa*	Caesalpiniaceae
Morabukea*	*Mora gonggrijpii*	Caesalpiniaceae
Nibi	*Heteropsisflexuosa*	Areacaceae
Purple Heart*	*Peltogyne Venosa*	Leguminosea-Caesalp
Shibadan*	*Aspidosperma album*	Apocynaceae

Tauroniro*	*Humiria Balsamifera*	Humiriaceae
Common Name	**Scientific Name**	**Family**
Trysil	*Pentaclethramacroloba*	Leguminosae-Mimos
Turu	*Jessenia bataua*	Arecaceae
Ulu*	*Trattinnickiaburserifolia*	Burseraceae
Understorey palm	*Bactris spp*	Areacaceae
Wallaba*	*Eperuafalcatae*	Caesalpionoiceae
Wamara*	*Swartzialeiocalycina*	Leguminosae-papil
White Yari Yari	*Duguetia pauciflora*	Annonaceae
Wild ginger	*Ginger sp.*	Zingiberaceae
Wina	*Lecythiscorrugata*	Lecythidaceae
Yarula	*Swartziajenmani*	Apocynaceae
Yuruwe	*Bactris humilis*	Palmae

Table 1- Common Trees found in the Essequibo Catchment

*Refers to the species that are used commercially.

Within the project's proposed location, there are no designated regions that are crucial for biodiversity on a global scale. There are no official places in Guyana recognized as Important Bird Areas, planned or listed Ramsar Wetland Sites, or Zero Extinction Sites (IBAs). However, the Rio Branco Gallery Forest of Brazil and Guyana and the Tepuis (or table-mountains) dispersed throughout Bolivar and Amazonas states of southern Venezuela (south of the Orinoco River), penetrating as far as west-central Guyana and northern Brazil, have both been recognized by Birdlife International as Endemic Bird Areas (EBAs) within Guyana. The two EBAs found in Guyana are not found inside the project AOI.

Construction Impacts

Loss of Aquatic Habitats

There will be a loss of several swamp habitats inside the concession area due to the development of the quarry and related infrastructure. History of exploration at the location has already had an impact on a few of these ecosystems. According to IFC PS6 criteria, no aquatic habitats have been found to be important habitats by surveys. In the area, similar water environments are frequent. The open pit area, water management pond, and other sites where considerable alteration of the land surface is necessary will all have minor aquatic habitats because of the nature of the activities.

To prevent storm water discharges from impairing the water quality and habitat structure of the receiving bodies, retention ponds and other detention storage/sedimentation facilities will be put in place. None of the aquatic species found in the streams and creeks in the Area of Direct Influence are recognized to be endangered.

It is believed that the concession area's loss of aquatic habitat will have only minor effects (low likelihood, low severity). The extent of areas cleared for diversion channels will be kept to a minimum, and where feasible, bypass structures will be installed to allow for easier flow in the diverted streams' downstream portion. When these mitigation strategies are used, aquatic ecosystems will experience minimal aftereffects (low chance, low severity).

Loss of Terrestrial Habitat and Flora

An estimated 138 acres or less of land will be cleared to make room for the quarry site and related infrastructure. Within the project footprint region, the loss of terrestrial ecosystems and plants is unavoidable.

According to IFC PS6's standards, none of the terrestrial habitats in the Area of Direct Influence have been classified as critical habitat. None of the plant species that are known to exist in the Area of Direct Influence are known to be endemic or threatened locally. One significant effect is the loss of terrestrial ecosystems in the Area of Direct Influence (medium likelihood, high severity). The impact rating is regarded as minor with adequate mitigations, such as stringent clearing minimization and eventual restoration (low likelihood, low severity).

Loss of Terrestrial Fauna

During land clearing and earthmoving activities, there will inevitably be some loss of small and/or slow-moving fauna. No endemic or threatened species of invertebrate, amphibian, non-avian reptile, or small mammal have been found to exist in the Area of Direct Influence. Large mammals and adult birds, as well as other more mobile wildlife, will most likely leave the region well before any land clearing operations fully begins. The region is big enough to take in wildlife escaping cleared areas. Since the area has been affected by previous mining and exploration activities, the loss of terrestrial fauna in the Area of Direct Influence is projected to have a moderate impact (high likelihood, medium severity).

This impact will be mitigated by minimization of the areas cleared. The residual impact will consequently be minor (low likelihood, low severity).

Increased Human Population and Activity in the Area of Influence

The construction works will lead to increased human population and increased levels of general activity in the area. The increased human presence has the potential to lead to increased impacts on flora and fauna through harvesting, collecting, hunting, fishing, disturbance, and other activities by construction workers. This impact is considered minor (low likelihood, low severity). The company will enforce a policy of no hunting and fishing by its employees and will also implement measures to ensure that no flora and/or fauna are harvested from the area or brought into the area. Implementation of these measures will result in low residual impacts (low likelihood, low severity).

Operation Impacts

Loss of Aquatic Habitats

Swamp habitats located inside the concession area will be impacted by the mine's operation and related infrastructure. The beginning of mining operations will have significant effects on these aquatic habitats that have already been impacted by construction phase activities.

Due to the nature of the activities, impacts to aquatic ecosystems related to the operation of the quarry pit area, the water management pond, and other sites where considerable modification of the land surface occurs, will be impossible to avoid. Streams' upstream and downstream

portions will be impacted. The aquatic life of the receiving bodies of water downstream will be impacted by the water discharged from the diversion channels surrounding the trash accumulation regions.

It's thought to have a small influence on the concession area's aquatic environment (low likelihood, low severity). The residual impact rating for surface waters and groundwater will be low after applying the mitigation measures (low likelihood, low severity).

Loss of Terrestrial Habitats and Flora

During operation, the additional loss of habitats and flora will not affect any threatened or restricted- range endemic species of flora and fauna. Much of the fauna will have likely already left the affected habitats due to disturbance during the construction phase. This impact is rated as moderate (medium likelihood, medium severity). These impacts will be minimized by implementation of the following:

- Minimization of the Project footprint; and,
- Initiating restoration as soon as practicable in temporary work areas.

Implementation of these measures will result in minor residual impacts (low likelihood, low severity).

Loss of Terrestrial Fauna

During the operation of the mine, most of the larger animals will have already abandoned the area during the construction phase. Only small fauna accustomed to disturbed environments are likely to remain in or enter mining areas and other work sites. It is likely that small numbers of small animals such as amphibians and snakes will experience mortality due to equipment and vehicle use.

The loss of terrestrial fauna during the mining operations phase is rated as moderate (high likelihood, low severity). These impacts will be mitigated by implementation of the following:

- Minimization of the Project footprint; and,
- Performance of preclearance surveys.

Key Sociocultural and Socioeconomic Impacts and Risks

The concession's immediate vicinity is devoid of any communities, however, the communities of Rockstone and Winiperu are approximately more than 10 miles away from the proposed project area at Arawai. An indirect area of influence was taken into consideration by the social impact evaluation (IAI). The IAI includes locations outside the project's operational parameters. It covers regions that supply the projects with goods and services, including labor, as well as logistical corridors that will be needed for the project's efficient execution. Despite their geographic separation from the project site, communities that are indirectly impacted by interactions with the project are also included in the IAI.

Several of the societal problems described in this document are implementation-related risks. The following sections go into detail about the project's potential societal impacts and hazards. By project component and phase, the impacts and risk are recognized and divided.

Construction Impacts

The project's building phase is expected to last more than two months. The project will probably have a positive effect on several localities' economies during the construction phase. The project's effects on the general socioeconomic situation of the towns will include the creation of jobs and an increase in the demand for some goods and services. It is anticipated that at the height of development, the project will create employment for about 15 people. These people will work directly for Greenheart Inc. and its suppliers. The number of jobs in the area will increase as a result.

Goods, services, and logistics will all be needed during the construction process. These will comprise transportation services, building supplies, and tools for construction. Truck drivers and security firms, as well as logistics contractors, will immediately gain. Those that provide construction supplies and equipment will also directly profit from the rise in demand.

The project will also enhance the economic conditions in the country through payment of taxes and royalties to the Government.

The overall impact on the national socio-economic conditions during the construction phase is a major beneficial impact with high level of enhancement and medium likelihood.

The quarry site is in an interior area with a small and dispersed population. During construction, the project will be construed as a potential employment opportunity and may attract people to the site in search of work.

This is a low potential impact with low likelihood and low severity. Greenheart Inc. will develop and implement a focused influx management plan to mitigate these potential impacts. The post mitigation impact is rated to have a low likelihood and low severity.

Consultations revealed that unemployment and lack of economic opportunities are primary concerns. There is an expectation that the Project will provide both employment opportunities and economic benefits. As currently configured, the projects will centralize hiring in Regions 10 and 7, If employment and economic benefits do not accrue to Regions 10 and7, disappointing this expectation may engender antipathy towards the project and this may be manifested in the form of sabotage or other criminal acts.

This is a low impact with low likelihood and low severity. Greenheart Inc. will undertake an aggressive outreach and engagement program to identify means to satisfy some of the expectations. The post mitigation impact is rated to have a low likelihood and low severity.

Operational Impacts

An economic cycle of "boom and bust" is produced by quarrying ventures. During the construction phase, there will be a significant demand for labor, materials, and services. During the project's operational phase, this need will considerably decline. During the project's operational phase, workers and subcontractors sourced from Communities may experience financial vulnerability. Thus, some regions may experience a greater degree of economic distress than others, and there may be unexpected and widespread layoffs, a loss of supplies and contracts, and a loss of reliable sources of revenue.

As the project moves into the operation phase, the demand for construction employees is likely to decrease. But the need for qualified quarry workers will rise. It is anticipated that fewer skilled quarry workers will be needed than during the construction phase.

Once work is over, there will likely be a major decrease in the need for service providers and contractors, including construction firms. The sourcing of items from Georgetown, including

food, electrical supplies, camp equipment, etc., is also likely to decrease, which will influence the livelihoods and earnings of many people who profited from the construction boom.

A big impact is determined to have a medium likelihood and a high severity. The "boom and bust" cycle will need to be managed, and any potential collateral negative effects will need to be mitigated. To successfully mitigate these effects, strategies like workforce skill diversification (so that employees can work in many industries) and worker family income creation projects can be used.

Although precise traffic figures are unknown, it is anticipated that the mine's development and operating phase will greatly increase the volume of road traffic. To meet the energy needs of the quarry, it is projected that fuel will be transported in massive amounts.

This has a moderate impact and is regarded as having a medium likelihood and medium severity. The impact will be minimal thanks to the implementation of a road traffic management strategy in collaboration with the Guyana Police Force Traffic Department and other users.

Closure Impacts

The Project as currently envisaged has a projected total life of 25 years from the start of production. Closures of projects of such scale typically have significant impacts on the national socio-economic conditions.

Depending on the scale of total employment provided by the project over its lifecycle, there could be a decrease in employment due to project closure. This may disproportionately affect one area of the country over another.

All the service providers and suppliers to the project could be severely impacted, especially if the bulk of their business came from the project. The closure of the project will also result in decreased revenues to the Government in the form of taxes and royalties. This in turn may negatively impact the GDP of the country.

The impacts of closure are therefore considered to be potentially major. The project proponents in partnership with the Government and its workforce along with suppliers/contractors need to

carefully plan for eventual closure. A carefully formulated forward-looking closure plan should be commissioned to address the socio-economic impacts of closure.

Landscape and Visual Resources

The projects will change the landscape's vertical dimensions and the materials found there. Additionally, because the operations would be hidden by nearby vegetation, the color, reflectivity, and apparent emissions will differ slightly from current levels. The construction of the access road to and from the quarry site will have an impact on the landscape and the surrounding area. These effects will be negligible (low severity, low likelihood). These effects won't be lessened. The removal of vegetation for facility construction, quarrying, and other reasons will have further landscape and visual effects. However, compared to the total area, the cleared area will be relatively small and will be protected and absorbed by the nearby forest. The effects of clearing will be negligible (low severity, low likelihood). These effects won't be lessened.

Heritage

The quality of the artifacts will be compromised by their removal and destruction from the project area. In addition, if artifacts exist below ground in the project area, removal of the ground cover may alter the pressure required to maintain the integrity of these items. The quality of any artifacts located below ground in the project area could also be harmed by changes in the water conditions. If there are artifacts in the region, their quality can be diminished. These are mild effects (medium severity, low likelihood). These consequences will be addressed by drafting an archaeological watching brief for implementation during earth transport, excavation and blasting. After consulting with the Guyana National Trust, archaeological evidence will be documented and artifacts should either be removed or left in their current location. The mitigation efforts will have little effects (low severity, low likelihood).

Land Use

The primary land use activities in the Arawai area is quarrying and forestry. The land will be initially used for quarrying and will be reconverted to forestry after mine closure. The project will result in no impacts on land use. These impacts will be mitigated.

Cumulative Impacts Associated with Proposed Action

The term "cumulative impacts" refers to the aggregation of various effects from past projects, the proposed project, and/or predicted future initiatives that may have major positive and/or negative effects that would not be anticipated in the case of a stand-alone project. The potential cumulative effects of the proposed quarry projects and previous and/or upcoming actions/projects on the natural and socioeconomic environment are described and analyzed in this section.

It is necessary to identify the cause-and-effect connections between the various acts and the resources, ecosystems, and human groups that are of importance to calculate the cumulative environmental effects of the planned action. The absence of information describing the environmental effects of current and proposed actions within the project's region of influence limited the scope of this cumulative impact research.

Potential Cumulative Impacts

The poverty levels in Guyana are relatively high. However, Guyana is a natural resource rich country and there are approximately 100,000 persons who work directly or indirectly in gold and other mineral resources exploitation. The areas are well known for its quarrying, forestry and mining activities and has historically been the lead geographical region in these resources exploitation. Evidence from communities within the project’s area of influence indicates employment in mining and logging in addition to other subsistence livelihood activities are the main sources of livelihood in the Regions.

This project together with logging operations around the concession will provide significant sources of employment, training, and revenue for the region.

An upsurge in uncontrolled resource extraction activity and other knock-on activities may have significant adverse effects on the natural environment, social and economic conditions, the

overall health of the area and Regions. These are major impacts (major severity, medium likelihood). These impacts will be managed by implementation of a Multi-Stakeholder Influx Management Committee. This committee will be composed of representatives of any established community, GGMC, GFC, major stakeholders such as loggers and miners and Greenheart Inc. The committee will provide an ongoing mechanism to manage and respond to attempts by unauthorized persons to access the areas adjoining the access road and quarry site to exploit resources constructed to be present in those areas. This committee will meet quarterly or with greater frequency if circumstances dictate, to discuss access issues and concerns related to development of the access road and quarry site. At a minimum the committee will conduct periodic stakeholder and access management reviews. These measures will result in significant impacts (low severity, low likelihood).

The cumulative impacts in the area will be managed by the institution of a long term, multi-stakeholder regional planning program. Such planning will be done by building consensus, collaboration, and partnerships between the affected and responsible parties. Key stakeholders who will be included in the process are:

- Government of Guyana through authorities in the Regions 10 and 7;
- Residents of Kwakwani, Linden and Bartica;
- Guyana Forestry Commission;
- Guyana Geology and Mines Commission;
- Guyana Gold and Diamond Miners Association;
- Guyana Women Miners Organization;
- Local WWF and CI conservation NGO offices; and
- Other regional stakeholder organizations.

The Life of the Quarry

Assuming an annual crude ore supply of 134,400 tons to satisfy a minimum annual out-loading of 131,040 tons for the first three (3) years of operation and from the fourth year, production will be boosted by 50% by works done in the third year to increase capacity and productivity, it is envisaged that the quarry will have a life of at least 15 years based on the reasonably estimated reserves of ~7,000,000 tons. The expected total reserves in the proposed QLs subsequent to drilling verification should see at least 10 years added to the life of the quarry for a total of at least 25 years.

Financials

Projected Capital investment

Description	Amount (USD)
Crushing plant	1,200,000
Conveyors and motors	125,000
Generators 300 kva (2)	150,000
CAT excavators (2)	300,000
CAT Loaders (2)	150,000
30 Tons truck (5)	335,000
4x4 pickups (5)	200,000
Utility vehicle (2)	85,000
6-inch water pump	25,000
Plant assembly	160,000
Site preparation	115,000
Spares	50,000
Administration	75,000
Misc	100,000
total	3,070,000

Projected Annual Revenue

Description	Amount (USD)
52,000 tons ¾ minus stones @ $50/ton	2,600,000
35,000 tons crusher run @ $55/ton	1,925,000
Total	4,525,000

Projected Annual Expenditure

Description	Amount (USD)
Mining 87,000 tons of raw materials @ $8/ton	696,000
Trucking 87,000 tons of material @ $10/ton	870,000
Crushing 87,000 tons of material @ $15/ton	1,305,000
Administration	500,000
Total	3,371,000

Gross Income before tax 1,154,000