SOURCE ONE OIL AND GAS MARINE SUPPLIES INC.

AND

ALYA CONSTRUTORA S.A

QUARRY PROJECT SUMMARY

Proposed quarry site at Mallali Land, Linden to Mabura Hill Road

Region 10

Prepared by

Source One Supplies

ÁLYA Construtora SA

1. Description of the Project

1.1 Developer's Information

Name of the Project: Quarry Project for Linden to Mabura Hill Road Upgrade

Name of the developer: Source One Supplier / ÁLYA Construtora S.A

Contact details:

- Mr. Terry Sighn, Source One Oil and Gas Supplies CEO (Phone: 630 9923)
- Mr. Pedro PauloTosca, ALYA Construtora S.A Project Manager (Phone: 632 1391)
- Mr. Gibran Ferreira ALYA Construtora S.A Sustainability Manager (Phone 600 3634)

Address: Lot 38 Croal Street, Stabroek, Georgetown

Type of Project: Quarriable materials extraction

1.2 Economic/ Financial Statement

Quarriable material is a support activity for Project Linden to Mabura Road Hill Upgrade and this is one of the biggest development projects in Guyana, the capital investment for the entire project is GY$ 32,501,421,713.85. An estimate number of 500 people will be part of the entire project.

1.3 Location of the project

The project is in Administrative Region #10: Upper Demerara – Upper Berbice. S-1095/MP/000, located on stocksheet 37SW, in the Potaro Mining District, central Guyana (Figure 1). The area is on the left bank of the Demerara River, approximately 60 km south of Linden. The closest settlement is Malali and located 20 km to the east. The project area is located in the Amazon rainforest of Guyana. They are bracketed on all sides by forested areas. The location of the project site is shown in Figure 1 below.

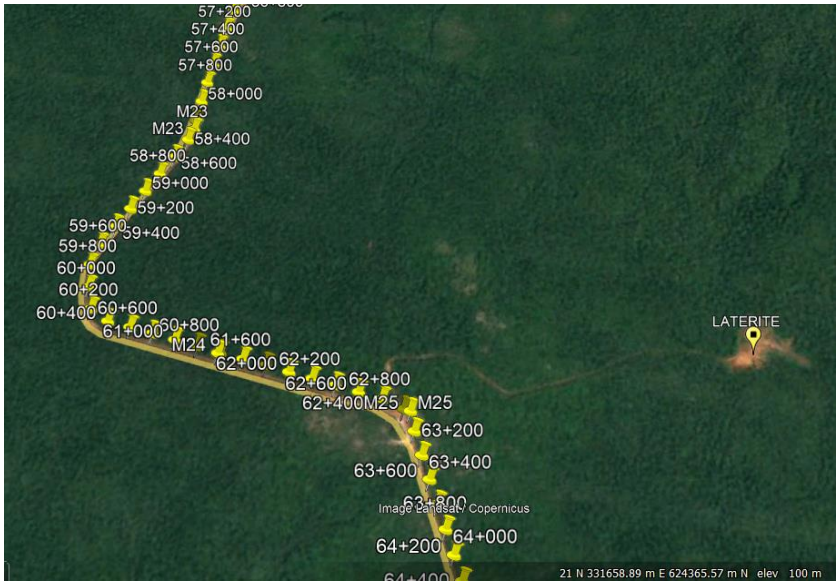

Figure 1. Coordinates UTM 21 N X 338491.00 m E Y 621567.00 m N

The total land area occupied by the project will be 1,000 acres.

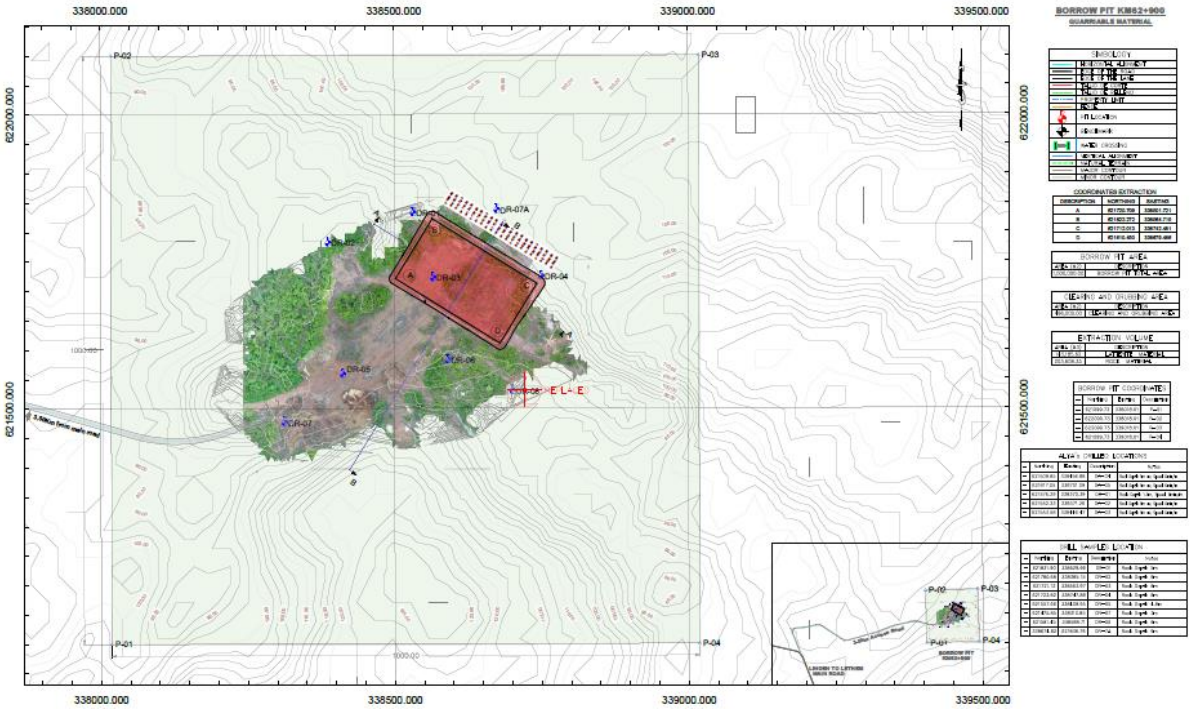

Figure 2. Location of the area of extraction

The present land-use at the site is empty, the existing conditions identified is a borrow pit which was already exploited years ago by another company. At the location, some existing environmental impacts were identified, certainly caused by a misconducted soil extraction and/or a non-implemented reclamation plan.

The previous extraction process done in the zone, led to several environmental and geological hazards which are present conditions for soil erosion and accident-risk to people and fauna, due the type of slopes found in the surroundings.

It is important to mention these conditions in the borrow pit are not related to any Contractor's activities, once its extraction`s operations have not even performed yet. All impacts found are pre-existing scenarios.

Figure 3. Existing dangerous slopes and inadequate drainage

1.4 Project Life and Sustainability

The quarry project is being developed for 5 years, this life span is based on the extraction of reserves both above and below nominal elevation. Both companies will be Owners and operators of the Quarry Operations within the License, under the supervision of the Guyana Geology and Mines Commission and other regulatory agencies. It is estimated that the project will be used for Linden to Mabura Hill Road Upgrade. The quarry material produced by this operation will help to reduce imports of the material and also for the entire project with a lot of positive social impacts.

1.5 Employment

The project is expected to generate approximately 80 jobs during construction and 60 jobs during operation. The following are the possible areas for employment:

- Laborers
- Maintenance Personnel
- Electricians
- Operators
- Engineers
- Masons
- Cleaners
- Carpenters
- Security
- Surveyors
- Drivers
- Linesmen
- Drillers
- Blasters
- Supervisors
- Cooks
- Managers
- H&S Officer

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

1.6 Process Details

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

1. Cutting & Clearing of Vegetation
2. Removal of Top Soil and Overburden
3. Excavation by Drilling and Blasting
4. Rock Braking and Transport to Crusher
5. Crushing of Rocks in Crushing Circuit
6. Segregation and Stacking of products
7. Dispatch to End User by Transshipment

1.7 Project Components

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

- Crushing plant comprising
- Washing facilities
- Siltation / Settling Pond
- Haulage Roads and Service Roads
- Stockpiles of materials
- Power Generation Unit of 550 KVA
- Fleet of heavy-duty earthmoving equipment
- Rock drills for establishing blast pattern
- Mechanical support/service bay
- Explosives Magazine and Police Outpost
- Admin and accommodation facilities

1.7.1 Crushing Plant

The crushing plant is expected to comprise:

▪ **Primary Crusher:** This will be a jaw crusher. The main purpose is to reduce the material to a small enough size that it can be transported by conveyors to the next crushing stages. As the name suggests, jaw crushers reduce rock and other materials between a fixed and a moving jaw. The moving jaw is mounted on a pitman that has a reciprocating motion, and the fixed jaw stays put. When the material runs between the two jaws, the jaws compress larger boulders into smaller pieces. The primary will accept the run of mine ore from blasting, i.e. boulders of between 1- 2 meters in diameter, and reduce them to approximately 8-10 inches diameter. This allows the rock to be fed to the downstream crushers for further processing.

▪ **Secondary Crusher:** This will be a cone crusher. Cone crushers have an oscillating shaft, and the material is crushed in a crushing cavity, between an external fixed element (bowl liner) and an internal moving element (mantle) mounted on the oscillating shaft assembly. The secondary will accept the output of the primary and further reduce the particle size from 8-10 inches to either 5/8” or 3/4” as required.

▪ **Tertiary Crusher:** This will be a cone crusher also, It will accept the output from the secondary crusher and further reduce the particle size from 5/8” or ¾” to < 1/2”.

▪ **Vibrating Screens:** A vibrating screen is formed by a vibrant chassis that supports in its interior one or several surfaces or elements of screening. The screens serve to classify the different particles by size,

starting from a bulk product in a continuous process. The inlet material advances from the part where the screen is fed to the opposite end in which the particles come out separately according to their size. Screens will be utilized within the crushing circuit to control the feed and output particle sizes of all crushers.

▪ **Conveyors:** These are bulk material handling units that will facilitate the automated feed, discharge, and returning of input and output materials within the crushing circuit. They are generally designed to be discrete units of belts on frames with all necessary drive units included so they may be repositioned as necessary. These units will have 30” wide, heavy-duty belting that will travel in a concave manner. Units will be between 60 and 100 feet in length. The discharge capacity is regulated mainly by the speed of travel of the belt and will be automatically regulated by the control facility.

▪ **Control Room**: This is a fully integrated and automated crushing circuit. There will be cameras and sensors at all points monitoring a range of factors such as speed, weight, temperature, etc. The computer in the control room will regulate the circuit to maintain the set output requirements. The control system is also a safety mechanism that can detect failure or unsafe parameters to alert the operator or automatically shut down the system.

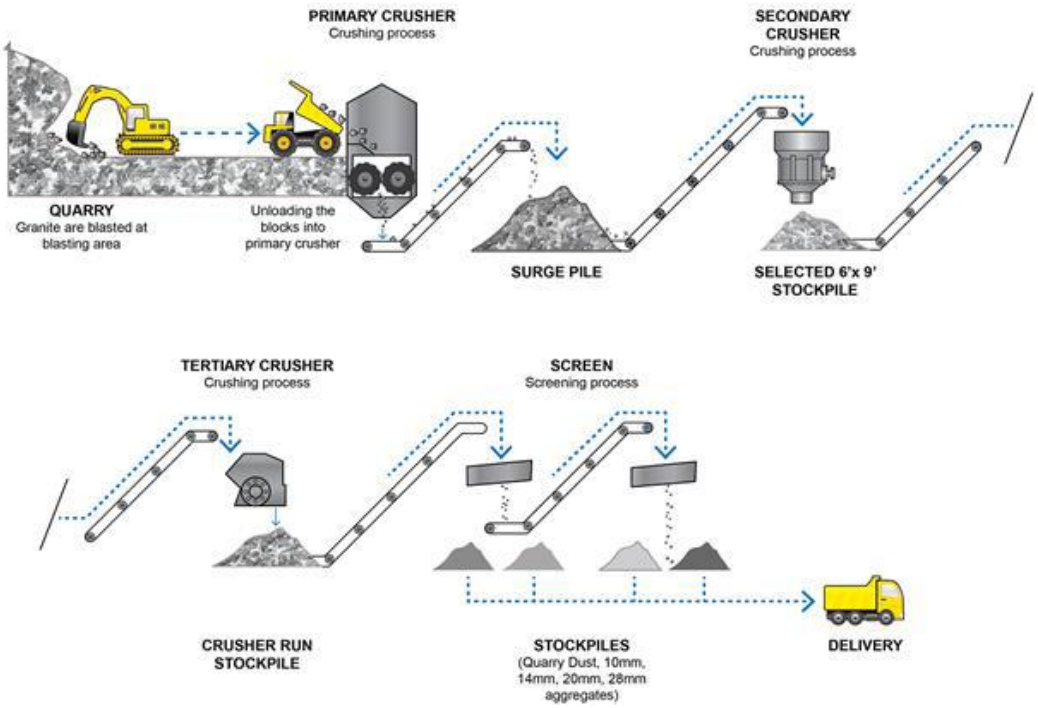

Figure 4. Crusher Plant

1.7.2 Asphalt Plant

The asphalt plant Magnum 140 Terex Roadbuilding is composed in its basic configuration, with system of feeding and dosage of aggregates, drying and mixer set, system of exhaustion with dry filtering for baghouse, elevating and storage system of asphalt mass. Specifications and technical data is in the attachment.

The asphalt Plant is for the production it will be needed bitumen and aggregates and two generators of 35 litres per hour.

All process is above:

1 – Stockage of the material;

2 – Material feed;

3 – Distribution of the materials in the feeder bins. Materials of lesser granule size, must be placed in the bins having vibratory system;

4 – Transport and weigh of the material through the process control system; 4.1 – Control cabin;

5 – Transport materials into drier-mixer;

6 – Asphalt injection – AC;

7 – Burner;

8 – Drying and mixture of the material 8.1 – Exhaustion of the particles in suspension;

9 – Asphalt output of the drier;

10 – Dusty air entering baghouse filter;

11 – Bags with incorporated venturi - action of "air pulse";

12 – Decantation of dust retained in bags;

13 – Exhaust fan with control valve;

14 – Chimney;

15 – Filler recovery from the filter to the drier;

16 – Transport of material in the "Drag-mixer ®" conveyor;

17 – Discharge of material in storage silo;

18 – Trucks loading (3-point procedure prevents seggregation);

19 – Application of asphalt to the road, by an Asphalt Paver;

20 – Final result: roads with high quality pavement from the asphalt plant

1.7.3 Washing facilities

● The rock which will be fragmented from the blasting to feed the crushing circuit must be washed to prevent contaminants, particularly clay particles, from entering the circuit. The presence of clays in the final product is undesirable as it will weaken the resulting concrete if mixed into the cement with the aggregate.

● Washing will be done by having the trucks which are loaded with rocks from the quarry face drive through an overhead wash bay where jets will direct water into the tray of the truck from above. This washing facility will have a concrete floor with drains leading to a settling pond.

● The settlement pond will periodically be desilted as necessary. The removed material will be taken to the waste dumps where the overburden is being stored.

1.7.4 Haulage Roads and Service Roads

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

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

1.7.5 Stockpiles and Dumps for ore and overburden

There will be several stockpiles associated with the quarry development and operations. These being stockpiles for top-soil, overburden, feed material for primary crusher, feed for secondary crusher, feed for tertiary crusher, final products from crushing circuit. Topsoil will be dumped and stored separately for use in reclamation activities. Overburden will be dumped in a flat area away from the working face and not in the direction of advancement of the quarry.

1.7.6 Power Generation Units of 550 KVA

The crushing circuit, as well as support facilities, will be run by electricity generated on-site by diesel generators. There will be 2 generators, each rated at 550 KVA, these will be used alternatingly so that one is always on standby in the event that the other develops a fault.

1.7.7 Fleet of heavy-duty equipment

There will be a number of hydraulic excavators, bulldozers, trucks, drill rigs, front-end loaders, fuel trucks, service trucks, and other heavy-duty equipment on-site to carry out the quarrying and other supporting activities. These will all be diesel-powered equipment.

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

Fixed Asset	Species
003.0436	003. CRAWLER TRACTOR
005.0473	005. AGRICULTURAL TIRE TRACTOR
006.0469	006. MOTOR GRADER
008.0450	008. TIRE FRONT LOADER
009.0393	009. HYDRAULIC EXCAVATOR
009.0394	009. HYDRAULIC EXCAVATOR
009.0396	009. HYDRAULIC EXCAVATOR
009.0397	009. HYDRAULIC EXCAVATOR
009.0404	009. HYDRAULIC EXCAVATOR
011.0381	011. SELF-PROPELLED VIBRATORY ROLLER
021.0263	021.RETRO /PA-LOADER
037.0060	037. JAW CRUSHER
039.0140	039. VIBRATING SIEVE
039.0141	039. VIBRATING SIEVE
040.0065	040. VIBRATORY FEEDER
040.0066	040. VIBRATORY FEEDER
041.0638	041. CONVEYOR BELTS
041.0639	041. CONVEYOR BELTS
041.0640	041. CONVEYOR BELTS
041.0641	041. CONVEYOR BELTS
041.0642	041. CONVEYOR BELTS
041.0643	041. CONVEYOR BELTS
041.0644	041. CONVEYOR BELTS
041.0645	041. CONVEYOR BELTS
041.0646	041. CONVEYOR BELTS
041.0647	041. CONVEYOR BELTS
041.0648	041. CONVEYOR BELTS
041.0649	041. CONVEYOR BELTS

Fixed Asset	Species
041.0650	041. CONVEYOR BELTS
041.0651	041. CONVEYOR BELTS
041.0652	041. CONVEYOR BELTS
041.0653	041. CONVEYOR BELTS
041.0654	041. CONVEYOR BELTS
042.0278	042. ELECTRICAL CONTROL BOARD (IND. AREA)
042.0279	042. ELECTRICAL CONTROL BOARD (IND. AREA)
043.0291	043. AIR COMPRESSOR
043.0292	043. AIR COMPRESSOR
044.0083	044. DRILLING CART
044.0084	044. DRILLING CART
044.0085	044. DRILLING CART
056.0067	056.CONICAL CRUSHER
056.0068	056.CONICAL CRUSHER
057.0009	057. IMPACT CRUSHER
059.0056	059. VIBRATORY GUTTERS
101.1794	101. UTILITY
101.1796	101. UTILITY
104.3480	104. DUMP TRUCK
104.3481	104. DUMP TRUCK
104.3485	104. DUMP TRUCK
104.3486	104. DUMP TRUCK
104.3491	104. DUMP TRUCK
104.3492	104. DUMP TRUCK
104.3493	104. DUMP TRUCK
104.3494	104. DUMP TRUCK
104.3498	104. DUMP TRUCK
104.3500	104. DUMP TRUCK
104.3501	104. DUMP TRUCK
104.3503	104. DUMP TRUCK
104.3504	104. DUMP TRUCK
105.1113	105. IRRIGATION TRUCK
105.1119	105. IRRIGATION TRUCK
106.0426	106. CRANE TRUCK
106.0430	106. CRANE TRUCK
107.0283	107. TRUCK MAINTENANCE
107.0284	107. TRUCK MAINTENANCE
108.0238	108. TRUCK HORSE
109.0277	109. TRUCK FOR MACHINE HORSE
115.0262	115.BUS
200.0701	200.GENERATOR SET

Fixed Asset	Species
200.0702	200.GENERATOR SET
200.0708	200.GENERATOR SET
213.1379	213.BREAKER DRILLING HAMMER
276.0201	276. LIGHTING TOWER
276.0203	276. LIGHTING TOWER
304.0315	304. ELECTRICAL WELDING ASSEMBLY
327.0685	327.RETIFICATION ROTARY ELECTRIC WELDING

1.7.8 Mechanical support/service bay

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

1.7.9 Fuel Storage

It is estimated that the project will require approximately 25,000 gallons of fuel per month. As such there will have to be storage facilities on-site to accommodate the holding of roughly 8,000 - 10,000 gallons of fuel to support operations. Permission from the Guyana Energy Agency and other relevant authorities for this fuel storage facility will be sought by the company after the Quarry License is obtained from the GGMC.

1.7.10 Explosives Magazine and Police Outpost

There will be the need to store explosives on-site to facilitate blasting at the quarry face. This activity is controlled by the Guyana Police Force (GPF). The GPF will oversee and approve the siting and construction of a Magazine and Police outpost within the project area to safely store and secure the explosives. The GPF will allow only a registered and authorized blaster to access the magazine and carry out blasting.

1.7.11 Admin and accommodation facilities

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

2. Environmental Factors

2.1 Description of Surrounding Environment

2.1.1 Physical Characteristics

Soil Type

The soil has an association of deep, dominantly well drained, yellow and brown sandy clay loam and also clay soils. These are red-yellow latosols and red-yellow podzolic soils. There are also excessive drained deep sands and shallow sandy loam soils which are characterised as the regosols and the lithosolic soils. The aforementioned soil types are however found in the lower elevations (<40m) and accounts for less than half of the compartment.

A slightly different soil type is found on the higher elevation (>40m) and accounts for more than half of the compartment. The soils are white sands but are deep and excessively drained in some areas and poorly drained in others. These are classed as the regosol white quartz sand phase and the groundwater podzols.

Geologic Structure

The rocks at Quarry are medium grained, hard, massive granite formed by a NE-SW trending dyke that passes through the entire area. The estimated reserves of quarriable stone are about 1.9 million tons.

The total reserve is estimated at over 2.1 million tons of gabbro with high possibility of downward continuity.

Rock Mass Classification

The main rock classification in the project area is Gabbro. The main minerals found in these rocks include calcic labradorite, augite and pigeonite while accessory minerals include biotite, apatite, opaques and micropegmatite.

2.1.2 Biological Characteristics

The general description of the vegetation present in the area is non-flooded lowland forest. This is characterised by tall, evergreen non-flooded rain forest. The area has a *Eschweilera spp-Licania spp* dominance and occasionally *Catostemma spp*. The area also occasionally has *Chlorocardium spp* dominance since the area is in the Bartica Triangle (Chlorocardium's nature range).

3. Estimate of waste to be generated and treatment.

Topsoil

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

Overburden

Overburden (Laterite material) will be removed from above the rock strata and sock piled in accordance with mining regulations and best practices, this material will be used for the road construction. Volume to be determined upon completion of detailed mine plan.

Solid Waste

Domestic solid waste may be around 1.500 kg per month. Organic waste will be put into compost and layered dumpsite as appropriate in accordance with the appropriate regulations.

Hazardous Waste

Such as used engine oil and old batteries will be appropriately stored until removed by a service provider. Waste oil generation to be approximately 50 gals per month. Batteries have a life span generally of 2 years, the total number expected to be in use is approximately 30 units.

Liquid Waste

Water from the process will be directed to multi-stage settlement ponds before being directed for release to the environment. Process water is expected to be approximately 3.000 gals per day.

Sewage

Sewage will be dealt with through the construction of septic tanks in accordance with the regulations of Guyana Water Incorporated. Septic systems will be sized based on 50-person occupancy at a rate of 1.5 liter/person/day or as recommended by the GWI regulations.

Source/Origin		Type of Waste	Quantity Produced	Final Disposal
Domestic waste	Houses, Offices, lunch room.	Organic waste	6463,8 liters = 6,46 m3 in the landfil	Cevons Landfil Compost for farmers
	Houses, Offices, lunch room, Kitchen	Inorganic waste (cans, food boxes, glass bottles, pastic cups, plastic bottles)		Cevons
				Notebooks of reused papers Donations for schools
	Kitchen	Usel oil	20 liters per week	Soap making Business Project with communities
	Warehouse and offices	Paper and cardboard	30 kilos per month	Sheets to be reused inside the offices Reuse in notebooks
Construction Waste	Asphalt Plant	Asphalt and bitumen	Depends of the production	Outsourced company
	All facilities, all project	Personal Protective Equipment	Insufficient Data	Reuse Landfill
	Mechanical Workshop, asphalt plant, crushing plant.	Scrap metal	Insufficient Data	Recycling Company
Hazardous Waste	Mechanical Workshop	Used oil	400 liters per week	Community
				Bosai
				Mining Companies
		Batteries	20 batteries per month	Recycling Company
		Oil filters	30 filters per week	Outsourced company
		Contaminated soil with hydrocarbons and/or oils and lubricants	Depends of the spills and production of this waste	Outsourced company
		Used tires	20 per month	Reuse as traffic sings Donation for community
	Electronical and chemical	Printer's ink	6 inks per month	Outsourced company
	Clinic / Medical services	Infectious waste, sharps waste, chemical waste, pharmaceutical waste	Insufficient Data	Outsourced company

4. Environmental Impacts and mitigation measures

The Management Plan for potentially affected components is included below, with all measures presented in sheets. This will be the Environmental Management Guide for mining referring to the Quarry operation and associated activities.

Specific sheets include all activities, impacts and measures of the Environmental, social and safety Management related to the installation and operation of the Crushing plant, workshops, roads, accommodations, and others.

IMPACTS ON THE AIR	
Activities that generate Impact	**Potential Impacts**
• Clearing vegetation • Opening of access roads • Infrastructure construction • Asphalt Plant • Crusher Plant • Machinery movement • Mining activity • Fuel Storage • Storage of aggregates. • Transportation of materials • Relocation of stone materials • Waste Management	• Pollution by generation of particles and gases. • Pollution by generation of noise and vibrations
Management Measures - Sheets	
MNM 001 Management of particle and gas emissions. MNM 002 Noise and vibration management MNM 011 Waste Management	

IMPACTS ON THE SOIL	
Activities that generate Impact	**Potential Impacts**
• Cleaning and removal of vegetation cover. • Opening of access roads to the exploitation fronts. • Implementation of camps, infrastructure works, processing plants, equipment and fixed machinery. • Construction of complementary works. • Extraction of minerals. • Classification and storage aggregates. • Loading and transportation of materials.	• Direct impact dueto the development of mineral extraction. • Oil spill pollution. • Loss of fertile soillayer.

IMPACTS ON THE SOIL	
Activities that generate Impact	**Potential Impacts**
• Uninstallation and removal of infrastructure, equipment and services. • Removal of waste from the site. • Relocation of debris or non-commercial stone materials. • Re conformation of degraded soils. • Maintenance and regeneration of the flora in theaffected and perimeter	• Changes in land use. • Soil erosion

areas.	
Management Measures - Sheets	
MNM 001 Management of particle and gas emissions. MNM 003 Soil Management MNM 004 Management of spills and soil contamination MNM 011 Waste and Sewage Management	

IMPACTS ON THE WATER	
Activities that generate Impact	**Potential Impacts**
• Cleaning and removal of vegetation cover. • Opening of access roads to the exploitation fronts. • Implementation of camps, infrastructure works, • Processing plants, equipment and fixed machinery. • Construction of complementary works. • Extraction of minerals. • Classification and storage of aggregates. • Loading and transportation of materials. • Uninstallation and removal of infrastructure, equipment and • services. • Removal of waste from the site. • Relocation of debris or non-commercial stone materials. • Re conformation of degraded soils.	• Sedimentation contamination • Alteration ofnatural stormdrainage.

IMPACTS ON THE WATER	
Activities that generate Impact	**Potential Impacts**
Management Measures - Sheets	
MNM 001 Management of particle and gas emissions. MNM 003 Soil Management MNM 004 Management of spills and soil contamination MNM 006 Water Management MNM 011 Waste and Sewage Management	

IMPACTS ON THE BIOLOGICAL COMPONENT	
Activities that generate Impact	**Potential Impacts**
• Prospecting and exploitation studies. • Cleaning and removal of vegetation cover. • Opening of access roads to the exploitation fronts. • Implementation of camps, infrastructure works, • Crushing and asphalt plants. • Construction of complementary works. • Uninstallation and removal of infrastructure, equipment and services. • Relocation of debris or non-commercial stone materials. • Re conformation of degraded soils. • Maintenance and regeneration of the flora in theaffected and perimeter areas.	• Elimination ofplant cover and affectation of local fauna.
Management Measures - Sheets	
MNM 001 Management of particle and gas emissions. MNM 003 Soil Management MNM 004 Management of spills and soil contamination MNM 005 Management of berms and slopes MNM 006 Water Management MNM 007 Biodiversity management MNM 011 Waste and Sewage Management	

IMPACTS ON THE SOCIAL AND CULTURAL COMPONENT	
Activities that generate Impact	**Potential Impacts**
• Recruitment and training of personnel. • Cleaning and removal of vegetation cover. • Opening of access roads to the exploitation fronts. • Implementation of camps, infrastructure works, processing plants, equipment and fixed machinery. Extraction of minerals. • Classification and storage of aggregates. • Loading and transportation of materials. • Uninstallation and removal of infrastructure, equipment and services. • Removal of waste from the site. • Relocation of debris or non-commercial stone materials. • Reconformation of degraded soils. • Maintenance and regeneration of the flora in theaffected and perimeter areas.	• Generation of expectations, jobs • Use of goods and services. • Affectation of the natural culturalheritage • Work risks due tothe developmentof tasks indangerous conditions.
Management Measures - Sheets	
MNM 001 Management of particle and gas emissions MNM 002 Management of noise and vibrations MNM 004 Management of spills and soil contamination MNM 009 Social Management and Staff hiring MNM 010 Work Risk Management, Safety and Health MNM 011 Waste and Sewage Management	

IMPACTS ON THE WASTE COMPONENT	
Activities that generate Impact	**Potential Impacts**
• Opening of access roads to the exploitation fronts. • Implementation of camps, infrastructure works, processing plants, equipment and fixed machinery. • Construction of complementary works. • Extraction of minerals. • Classification and storage of materials.	• Solid waste generation. • Pollution due to the generation ofsewage or sewage

IMPACTS ON THE WASTE COMPONENT	
Activities that generate Impact	**Potential Impacts**
• Uninstallation and removal of infrastructure, equipment and services. • Removal of waste from the site.	
Management Measures - Sheets	

MNM 006 Water Management MNM 011 Waste and Sewage Management

4.1 Instructions on the use of Environmental Management Sheets (EMS)

The EMSs contain the following information:

- **Record number:** sequential numbering composed of the initials and the sequential number.It will be used the acronym for the non-metallic mining sector is MNM, which refers to its initials.
- **Title:** refers to the type of management described in the card.
- **Objective:** It describes what the objective of the sheet is, that is, what the measures recommended in that sheet pursue.
- **Cause of environmental impacts:** the actions that can cause the impacts to occur.
- **Affectation:** describes what happens when the measures recommended in the Guide arenot applied.
- **Actions to develop:** describes the measures that can be applied to achieve the objectiveof the Guide.
- **Technique or technology to be used**: describes the suggested techniques to be applied.
- **Place and period of application:** indicates where and when the recommended measuresare applied.
- **Responsibles:** indicates who can take care of the implementation of the recommendedmeasures.
- **Monitoring:** actions that the contractor will carry out to follow up on the measures appliedand determine their effectiveness.These sheets will be used as guides to do control measures that allow the Contractor to manage the support activities for the road construction in an appropriate manner and according to current regulations. They are used as a reference manual, where solutions can be found to the problems that arise in the environmental management in the production process.

These measures are part of the environmental management of the project and are intended to bea useful tool in achieving a more sustainable mining and support activities.

4.1.1 MNM N° 001 - Management of Particulate and Gas Emissions

SHEET N° 001 - MANAGEMENT OF PARTICULATE AND GAS EMISSIONS	
Objective: Prevent and reduce particle and gas emissions generated by mining,industrial plants, machinery and vehicles in operation.	
Environmental impacts	
Causes	• Clearing vegetation • Opening of access roads • Infrastructure construction • Aphalt Plant • Crusher Plant • Machinery movement • Mining activity • Fuel Storage • Storage of materials • Transportation of materials • Relocation of stone materials • Waste Management • Relocation of debris or non-commercial stone materials. • Impact due to the opening and use access roads and internalrads
Impacts	• Pollution from particle and gas emissions
Actions / Measures	
• The machinery and equipment will have effective and efficient maintenance • Water is used in the processes that allow it, to avoid detachment of particles • Location of stockpiles will be guided by the prevailing winds which is thenortheast • Speed limits will be applied to unsealed roads to limit dust generation (Max 30km/h) • Mining area will have vegetation barriers that they can act as windbreaks to helpalleviate dust generation. The vegetative buffer zone will have at least 200 (twohundred) meters between the quarry and other contiguous land uses. • It will be established vegetation around production facilities and along access roads • Temporary stockpiles will be protected from wind erosion • During periods of high wind speeds (Sustained speeds of 40 to 57 mph),operations will be ceased or curtailed to prevent excessive dust • Haulage Roads and Service Roads and access roads will be regularly sprayed with water. The frequency will be minimum twice per day and depends of theclimate conditions.	
Technique / Technology to be used	

• In the process of moistening the project area surface, tanks or other systems are used that adapt to the topographical and access conditions. In all cases onlyclean water is used. • The crusher plant will have mist sprays or another dust suppression equipmentin the transfer points to reduce the level of fugitive dust • Will be minimized the distance between the discharge point and the top of the stockpile • The asphalt plant will have treatment of dusty air with baghouse filter • Covers will be used to fix light materials in piles • Wind erosion in piles will be controlled by awnings • Provision of tarpaulins or other mechanisms to cover them according to storageneeds. • Use of tarpaulins to cover the trucks that transport the material • The speed of the traffic will be regulated in the work zone in order to avoid theraising of dust clouds during its movement	
Place of application	Haulage roads and service roads, crusher plant and asphalt plantarea, mining area.
Application period	During the operation of the project.
Responsible	Professional(s) responsible for the design, planning and operation. Environmental Engineer for the environmental management.
Monitoring	
• Air Quality Monitoring Procedure. • Periodic verification of the recommended measures in the field • If inefficiencies are observed in machines and may result in visible emissions toair, the operator shall: investigate and undertake remedial actions immediately,adjust the process or activity to minimise those emissions and record the actionstaken	

4.1.2 MNM N ° 002 - Management of Noise and Vibrations

SHEET N° 002 - MANAGEMENT OF NOISE AND VIBRATIONS	
Objective: Prevent and reduce as much as possible the pollution caused by thegeneration of noise and vibrations	
Environmental impacts	
Causes	• Clearing vegetation • Opening of access roads • Infrastructure construction • Asphalt Plant • Crusher Plant • Machinery movement • Mining activity • Fuel Storage • Storage of aggregates • Transportation of materials • Relocation of stone materials • Waste Management
Impacts	• Pollution due to the generation of noise and vibrations causedby the machinery that will operate in the project. • Direct impact on the soil due to the development of mineralextraction activities. • Impact due to the opening and use of internal and access roads.
Recommended Actions / Measures	
• The machinery and equipment used in the project have an effective and efficientmaintenance. • Detonations for mining extraction will only occur during daylight hours andaccording to a previously established program. • Ensure the appropriate blast design parameters are in place prior to the actual blasting. Attain minimum ground vibration by the utilization of	

- Appropriate delay intervals for charge ignition
- Appropriate pattern
- Orientation of blast holes
- Confinement of the charge

These parameters are included in the *Drilling and Blasting Plan*

- When the technical specifications allow it, low-density explosives and low detonation speeds will be used for blasting because they produce lower levels of vibrations.
- Mining area will have vegetation barriers that they can act as windbreaks to helpalleviate dust generation. The vegetative buffer zone will have at least 200 (twohundred) meters between the quarry and other contiguous land uses.
- When, as a result of the operation of the machinery in the project area, noise and vibrations have been generated causing complaints from people living nearby, a mechanism for dialogue and search for appropriate solutions will be established, to avoid disturbances.
- During the crushing activities and in the asphalt plant activity, PPE will be used(protective equipment, plugs or earmuffs)
- Reduce Speeds of empty hauling trucks
- Sound-making devices like generator, planers, etc. Will have silencers to reducenoise level and/or enclose all sound making devices in structures constructed.

with materials of good insulation properties.

Technique / Technology to be used

- The machinery used for earthmoving (bulldozers, graders, excavators) and other equipment (generating plants, air compressors, cranes, etc.) will be provided with silencers.
- Natural sound barriers will be generated using shrubby vegetation
- In explosions, to mitigate the level of the wave in the air, the following recommendations are followed:

- Bare detonation cord lengths are reduced or, where possible, covered with finesand.
- Explosive charges per micro-delay unit are reduced.
- It is ensured that the explosive charges are confined within the blastholes.
- It is convenient to wait until the wind does not have the direction with the inhabitedarea.
- Geometric schemes and firing sequence are selected to avoid wave reinforcement.
- Between the blasting area and the receiving points, screens of vegetation and earthare built, so that the wave is reflected in them.
- The delay times are chosen so that the progression of the blasting along the front

is carried out at a speed less than the speed of sound.

- To control projections and vibrations produced by blasting, the followingrecommendations are considered:

- The layout of the drilling pattern is carried out with precision, especially in the firstrow of the blast.
- The depth and inclination of the drilled holes are controlled.
- The loading of explosives and their distribution is controlled.
- An appropriate firing sequence is chosen

Place of application	Sectors of the mining project where explosions are carried out orwhere machinery and equipment generate noise or vibrations.
Application period	During the operation of the Project

Responsible	Professional(s) responsible for the design, planning and operation. The professional responsible for the management and the application of the measures is the HSE Supervisor
Monitoring	
• As part of the environmental management tasks of the mining project, the Contractor has developed a self-control and monitoring mechanism, which includes periodic monitoring of the noise, carried out by the environmental manager, the safety manager and the project blasting manager. • The monitoring program consists of the periodic verification of therecommended measures, aimed at monitoring the proper environmental and social development of the project. • It is verified that workers use protective plugs or earmuffs. • It will be applied the Noise Quality Monitoring Procedure to comply the nationalstandards	

4.1.3 MNM N° 003 - Soil Management

SHEET N° 003 - SOIL MANAGEMENT	
Objective: Promote an effective management of the environmental impactscaused on the soil by the development of mineral extraction activities andthe operation of industrial plants.	
Environmental impacts	
Causes	• Extraction of minerals • Vegetation clearing • Opening of access roads • Fuel Storage • Storage of materials • Transportation of materials • Construction of complementary Works • Workshop • Asphalt Plant
Impacts	• Direct impact on the soil due to the development of mineralextraction activities. • Soil contamination due to sediments • Loss of topsoil • Changes in land use • Changes in the morphology and topography of the project area. • Impact due to the opening and use of internal and access roads. • Alteration of the local drainage system • Water erosion
Recommended Actions / Measures	

• It will be maintained natural vegetative cover, especially in the vicinity of steepslopes occurring at project site. • Storage of topsoil (overburden) within three meters (3m) of natural vegetationor mine face is strictly prohibited. • Topsoil and vegetation will be carefully stripped and stockpiled in an allocated area marked by a sign, so that it can be used for reclamation and re-vegetationas mining finishes. • Store overburden stockpiles at least 200 m. away from any water courses. • Runoff from the overburden will be directed to sedimentations ponds treatmentbefore discharge • Tree cover areas located in watercourse protection zones will be respected. • Drainage systems will be designed and established • It will be considered the weather pattern before initiating major earthworks • Avoid soil compaction, erosion, rutting and sedimentation during operation by limiting the size of the disturbed area, slope length and gradient, and the duration of soil exposure.
Technique / Technology to be used
• Drainage systems will be directed to the sedimentation ponds • The larger blocks of material that are not used in the crusher plant are placedas energy sinks and filters in rainy season • Soil erosion in the roads will be reduced by using uncovering material from the quarry.

Place of application	Mining area
Application period	During the operation of the project
Responsible	Professional(s) responsible for the design, planning and operation. Safety and Environmental responsible for the management andthe application of the measures

Monitoring
• Stockpiling areas are monitored, including removal soils and land preparation, so that they are not carried down the slope by runoff and sedimentation of thelocal drainage • Monitor areas of exposed soil during periods of heavy rainfall • Also apply all measures established in the MNM No. 004

4.1.4 MNM N° 004 - Management of Spills and Soil Contamination

SHEET N° 004 - MANAGEMENT OF SPILLS AND SOIL CONTAMINATION	
Objective: Avoid soil contamination due to possible spills of fuel and oils frommachinery, work equipment or fuel storage	
Environmental impacts	
Causes	• Implementation of camps, infrastructure works, processingplants, equipment and fixed machinery. • Construction of complementary works. • Extraction of minerals. • Classification and storage of materials. • Loading and transportation of materials. • fuel storage • Workshop
Impacts	• Soil contamination due to fuel or oil spills, due to dripping frommachinery and work equipment. • Work risks due to the development of tasks in dangerous conditions.
Recommended Actions / Measures	
• Machinery and equipment will have periodically maintenance and adjustment • For the loading of fuel or other substances of this type, there is a fuel dispenserand elements (buckets with sand, spill collection trays, etc.) that allow retainingand containing any type of drip or accidental spill, with in order to avoid, as faras possible, that it can make direct contact with the ground. • Fuel trucks will be used for loading fuel at work sites, each fuel truck will have a spill kit. • As far as possible, the loading of fuel is given in the work area only to the heavymachinery that requires it. Pick-ups and other equipments that are easier to mobilize will receive it in the fuel dispensing area. • Used oils after the maintenance of the machinery are properly collected • The used oils will be storage under roof, in an impermeable surface and with spill containment wall • In the maintenance processes of the machinery within the project area, used oils and exchange fats will be delivered to external company dedicated and authorized commercialization of these residues. • Heavy machinery will have to be transported to the workshop for majormechanical repairs and avoid unnecessary spills in the soil. • Machinery and mechanized equipment are operated only by designated qualifiedpersonnel • Necessary spill control training and the use of spill kits will be carried out for allemployees. • There will be grease traps to retain spills; these traps receive regular cleaning and maintenance.	
Technique to be applied	

Fuel Storage - Will have an impervious secondary containment wall around fuel storage tank, creating a temporary holding area in the event of accidental spillage.The containment wall for the area with multiple tanks will have the capacityto provide at least 110% containment of the largest tank. - All piping must enter or exit the containment over the wall and no part of the infrastructure (e.g. dispenser, filing hoses and valves) shall protrude outside the containment - All adequate signage will be installed in fuel storage areas, such as “No Smoking”, “Flammable materials”, etc. - Fire emergency equipment is available - There are trained personnel responsible for handling fuels.
- The personnel responsible for handling fuels has the indicated workequipment. - There are buckets of sand and spill kits to contain occasional spills that mayoccur during loading. In the event of spillage of combustible liquid, the following recommendations aregoing be followed: Place a demarcation tape to warn of the danger - Immediately notify people in the vicinity of the spill area. - All non-essential people in the care of the event must be removed from thearea - Safety and environmental responsible must be informed of the emergency - Any sources of ignition or heat in the area must be turned off. - The spill must be confined or contained to prevent its spread. - The fault of the leak will be reviewed, if the fault is structural in the storagetank, tanks should be brought in to temporarily store the spilled material, using a pneumatic pump. If the spill has been due to overflow of the tank, the reception activities in the tank must be suspended, and then proceed tocollect the material with a pneumatic pump. - Cover spill area with sand, sawdust, or absorbent material. All items that have been splashed are carefully removed - All elements and contaminated soil are collected and transferred in specificbags to the area designated for temporary storage. Protection measures for fuel storage tanks such as painting, and coating will bemaintained to minimize corrosion of fuel tanks Leak detection systems will be installed on a fuel tanks, like gauging system, dipstick measurements, sensors on walls of tanks.

Place of application	-Areas where machinery operates, vehicles circulate -Fuel Storage -Workshops
Applicationperiod	During the operation stage
Responsible	Personnel in charge of the operation and maintenance ofequipment and machinery. The personnel in charge of the fuel storage will carry out dailycontrols of the storage tanks to detect any leaks.

	The environmental specialist and the HSE Superisor will be responsible for managing the environmental and safety management of the project, they will carry out follow-up and monitoring.
Tracking and monitoring	
• The monitoring program consists of monthly verification of the storage tanks todetect any loss, which will be immediately communicated to those responsible for the environment and safety to take the necessary precautions. • Control of fuel loading and unloading devices. Maintenance and/or repair of fittings, pipes and hoses will be conducted monthly. • Periodic control of spill kits, spill containment bins	

4.1.5 MNM N° 005 - Management of Berms and Slopes

SHEET N° 005 - MANAGEMENT OF BERMS AND SLOPES	
Objective: Establish compensatory measures and actions for the environmental effects caused in the soil by the loss of the organic layer, changes in the geographic space of the project area, its morphology and topography, inthe design and management of slopes.	
Environmental impacts	
Causes	• Cleaning and removal of vegetation cover. • Opening of access roads to the mining • Implementation of camps, infrastructure works, processingplants, equipment and fixed machinery. • Construction of complementary works • Relocation of debris or non-commercial stone materials • Regeneration of the flora in the affected and perimeter areas
Impacts	• Direct impact on the soil due to the development of mineralextraction activities. • Loss of fertile soil layer. • Changes in land use. • Changes in the morphology and topography of the project area. • Alteration of the local storm drainage system. • Effects on the infiltration recharge capacity of the zone underthe area of operation. • Landslides (mass movements)
Recommended Actions / Measures	

• In the creation of slopes for the operations, the area strictly defined for themining project is used, with a minimum affectation of the other zones. • Extracted organic soil from the slopes will be used to start the process ofrecovering the vegetation. • By forming the slopes, areas with vegetation located in areas of protection ofwatercourses are respected. • Drainage systems will be established for slope management. • Warning signs will be available to help prevent any type of accident with peopleor animals.
Technique / Technology to be used
• A surface drainage system is designed for the water to be intercepted on theinner face of the mining slopes. • The detonations to break up and pre-fracture the existing rock will be carriedout with the authorized blaster based on the ***Drilling and Blasting Plan***. • Mining terraces will have a width of between 2.5 and 5 m, both temporary andfinal. • For the temporary and final mining slopes, angles must be between 60 and 74 degrees of inclination respect to the horizontal.

Place of application	In all areas of the project where slopes are established, earthworksare carried out, as well as in the material extraction and exploitation fronts.
Application period	During operation stage
Responsible	Professional(s) responsible for the design, planning and operationof the quarry Technicians in charge of the development of intervention worksand modifications to the land, specialist in drilling and blasting.

Monitoring
• Special care will be taken in the degree of fracture of the rock before and duringthe work on the mining fronts, checking that there are no unstable rocks that could fall down the slope. If this situation is identified, a removal of these blocks will be done.

4.1.6 MNM N° 006 – Water Management

SHEET N° 006 – WATER MANAGEMENT	
Objective: Control and mitigate the environmental effects caused by alterationsin the water's quality and in local patterns of pluvial drainage.	
Environmental impacts	
Causes	• Opening of access roads to mining fronts • Implementation of camps, infrastructure works, processingplants, equipment and fixed machinery. • Construction of complementary works • Extraction of minerals • Relocation of debris or non-commercial stone materials. • Changes in the morphology and topography of the project area • Workshop
Impacts	• Direct impact on the soil due to the development of miningactivity • Pollution from oil and fuel spills, due to dripping frommachinery and work equipment • Changes in land use • Contamination of surface water due to the contribution of sedimentary particles (turbidity) or fuel/oil from machinery orwork equipment. • Alteration of the local natural storm drainage system • Elimination of vegetal cover and affectation of local fauna.
Recommended Actions / Measures	
• The machinery and equipment have an efficient and constant maintenance to avoid spills of fuel and oils • As far as possible, it will be maintained the natural condition of storm drainageexisting in the project area. The drainage system will be designed and developedapproaching the current natural condition, considering the topography and adapting it to the quarry exploitation design. • The designed channels will allow the mobilization of water, preventing accumulations or swamping of rainwater at the extraction site. • During periods of intense rain, earthworks will be avoided, to minimize the transport of sediments from the work areas to the receiving channels. • During the construction and exploitation phases, the project is limited to usingthe strictly necessary and planned area for the development of the works • Taking advantage of the large amount of rainfall in the site where the Project isdeveloped, rainwater collection systems will be developed and its use will be promoted for some activities, for example for road irrigation in dry seasons. • Training program promoting an effective use of water, its care and avoid excessive spending. • Is prohibited thrown waste into bodies of water • Accumulation of overburden and rocks is avoided to favour the free circulation of drainage • Is prohibited extraction of water in points upstream in creeks used by communities. The extraction will be done downstream the abstraction's point ofthe community. • Septic tanks will be installed, equipped with filter bed and soak	

Technique / Technology to be used	
• Waters with sediments are channelled towards the waterfall-type retaining walls. Following the contour lines, the waters with sediments will be channelledtowards the sedimentation pool, before they are emptied into the local and natural drainage of the area. • Sanitary services with septic tank will be used • The piles of already crushed material will be on flat land, to avoid dragging by runoff. • It will be determined the protection areas for the surface water, creeks and others.	
Place of application	In the mining area and in the industrial area
Application period	During operation stage
Responsible	Professional(s) responsible for the design, planning and operation, as well as the rest of the personnel in charge of the mining, service and maintenance works. The environmental specialist and safety specialist will be responsible for managing and they will do monitoring.
Monitoring	
• The monitoring program consists of periodic verification of surface drainage channels	

4.1.7 MNM N° 009 - Social Management and Staff Hiring

SHEET N° 009 - SOCIAL MANAGEMENT AND STAFF HIRING	
Objective: Promote adequate social management of the project, in order to avoidthe generation of false expectations, conflicts and externalities of the project that can cause conflicts due to its inappropriate socialization.	
Environmental impacts	
Causes	• Prospecting and evaluation studies. • Recruitment and training of personnel • Cleaning and removal of vegetation cover • Opening of access roads to the exploitation fronts • Construction of support activities infrastructure, asphalt plant,crusher plant, workshop. • Mining activity • Classification and storage of materials • Transportation of materials • Waste management

Impacts	• Generation of employment and economic expectations innearby communities. • Generation of uncertainty in local communities about theadvantages or disadvantages of the project • Generation of jobs • Impact on cultural and natural heritage • Noises and vibrations • Work risks due to the development of tasks in dangerousconditions.
Recommended Actions / Measures	
• Communities neighbouring the project area will be informed about the blastingactivities at least two weeks before the blasting • Special attention to any complaint of nuisance manifested by the neighbours ofthe project. This is recorded and immediately passed on to social and community officer, in order to proceed to solve the situation. • The personnel and their activities are kept under a follow-up in accordance withthe customs and activities of the area (frequency and working hours, holidays,etc.). • The wages, benefits and guarantees of the workers are complied with. • Work schedules are defined that do not alter public tranquillity, both for the working day of the staff and for the times of loading, transporting and grindingmaterial • Neighbours will be periodically consulted about the perception of inconveniencefrom the development of project activities • Contractor will have prior on hiring local labour supply • It is guaranteed that the subcontractors of the project comply with the labourlegislation • A health and safety program is applied to the project, including risk prevention,response to emergency situations and compliance with the provisions of the C-ESMP. • The machinery and equipment used will operate and circulate during daylight hours. • The contractor will have 24-hour private security to prevent the entry externalpeople to the industrial area and the mineral material extraction area. • A contingency plan is disclosed and applied in the project area and personnel are trained in emergency response and accident care. This plan is established in the C-ESMP • Application of the Stakeholder Engagement Procedure	
Technique / Technology to be used	
• Access will have identification sings of the industrial area • All excavations will be done in compliance with the safety measures, regardingthe management of work risks • A contingency plan will be shared with all employees • Training in Environmental Education, Safety and Occupational Health for allemployees • PPEs will be provided to all Contractor personnel	
Place of application	Area of influence of the industrial area
Applicationperiod	During project operation

Responsible	Professional(s) responsible for the design, planning andoperation of the quarry and the industrial area The professional responsible for the measures include in this sheet is the Social Officer, the Environmental engineer and Safety engineer.
Monitoring	
The Stakeholder Engagement Plan, Grievance redress mechanism, isfollowed up in order to minimize or avoid inconvenience with the neighbour community	

4.1.8 MNM N° 007 – Biodiversity Management

SHEET N° 007 – BIODIVERSITY MANAGEMENT	
Objective: Control the vegetation clearing and the impact in the local fauna, aswell as promoting adequate management of the regeneration of local conditions	
Environmental impacts	
Causes	• Prospecting and evaluation studies • Vegetation clearing • Opening of access roads • Construction of the support infrastructure, asphalt plant,crusher plant, workshop.
Impacts	• Loss of fertile soil layer • Changes in land use • Susceptibility to water and wind erosion • Affectation of local fauna. • Impact on the landscape • Impact due to the opening and use of internal and accessroads.
Recommended Actions / Measures	
• Workers will not be able to enter the wooded areas adjacent to the Project area. The extraction of specimens of flora and fauna is prohibited • It will be prohibited to dispose of waste mineral waste or any other type of waste in the areas of forest cover adjacent to the Project • If during the development of the project an important niche of local fauna is found, its respective protection and/or transfer to another natural environmentwill be carried out. • No waste is discharged directly onto forested areas • All workers will be trained in identification of species of conservation importance based on the Guyana Wildlife Regulations, to take care andcommunicate to Environmental Engineer for the register if they observant anyanimal. • Hunting of wildlife is prohibited, as well as the purchase or captivity of animalspecies in the area. • Awareness talks for the protection of local fauna	
Technique / Technology to be used	

• Reclamation plan will be developed promoting natural regeneration of the vegetation • The organic soil from clearing will be used for reclamation • In general, among the compensation measures, there is the reforestation of the areas with species native to the place to protect the soil, rescue the flora and fauna, and create a barrier that cushions the effects of the intervention	
Place of application	Haulage roads and service roads, crusher plant and asphalt plantarea, mining area.
Application period	During project's operation
Responsables	Professional(s) responsible for the design, planning and operation of the quarry and industrial area. The professional responsible for the measures include in thissheet is the Environmental engineer
Monitoring	
• Biodiversity monitoring is carried out in the project area and its surroundings.	

4.1.9 MNM N° 010- Work Risk Management, Safety and Health

SHEET N° 010- WORK RISK MANAGEMENT, SAFETY AND HEALTH	
Objective: Prevent risks to the health of workers due to the development of workin dangerous conditions; ensure industrial safety and occupational healthmeasures. These measures also include subcontractors, suppliers and residents of the area.	
Environmental impacts	
Causes	• Clearing of vegetation • Opening of access roads • Construction of support infrastructures: crusher plant, asphaltplant. • Crusher Plant • Asphalt Plant • Mining activity • Classification and storage of materials • Transportation of materials • Heavy duty equipment
Impacts	• Work risks due to the development of tasks in dangerousconditions • Negative effects on the body due to exposure to chemicalelements • Health risk due to exposure to animals and natural environment
Recommended Actions / Measures	

• The company trains and equips all its workers with adequate training and therequired safety equipment, as required by the activity they perform. • Workers have health insurance • Facilities or workplaces are always kept in a sanitary (clean and orderly)condition. • Work instruments are stored properly to avoid deterioration or any risk orcontingency that endangers the safety of workers or residents of the area. • The work areas are equipped with basic services, such as drinking water forconsumption, toilets by gender, among others. • The working hours established in the current norm are complied with • Individual protection and first aid equipment will be provided for workers • There is equipment for fire extinction and control in all areas. Fire extinguishersare identified and placed in an accessible place. • All hazardous areas will be identified • Workers and operators who are exposed to the noise and particles generated by the crushers have the corresponding industrial safety elements, adapted to the climatic conditions: ear plugs, face masks, work clothes, helmet, gloves, boots and any other more specific depending of their functions. This equipment will be provided by the Security Officer • Workers who do not use PPEs will be sanctioned. • All areas will be properly identified • The project area has prevention signs to avoid traffic accidents.
Technique / Technology to be used
• Toolbox talk will be scheduled for workers about safety and health practices • Workers will be trained about safety at work, considering the different types ofwork, the general and specific risks to which they are exposed and the best wayto prevent them. • Haulage roads and access roads complies with technical and safety standards • All employees will be trained in dangerous tasks • Circulation areas, as well as stacked or covered material, are kept moist to prevent excessive dust generation.

Place of application	Haulage roads and service roads, crusher plant and asphalt plantarea, mining area.
Application period	During project operation
Responsible	Professional(s) responsible for the design, planning and operation,in addition to the rest of the personnel who participate in the execution of extraction, maintenance, etc. The professional responsible for the measures include in this sheetis the HSE Supervisor.
Monitoring	

• The Contractor ensures that all its workers apply occupational safety measures • A strict internal security will be implemented. • The monitoring program consists of the periodic verification of therecommended measures aimed at monitoring the proper development of the project. • It is reviewed that the industrial safety and human health measures proposed contribute to minimize the risks of accidents implicit in the mining activity. • Control of dust production, signalling and training of personnel, as well as goodengineering practices in general. • It is verified that the contents of the portable first aid kits are adequate • Daily verification of the hygiene conditions of the accommodations • The noise levels generated in the quarry area and exploitation fronts will be verified. See sheet No. 002

4.1.10 MNM N° 011 - Waste and Sewage Management

SHEET N° 011 - WASTE AND SEWAGE MANAGEMENT	
Objective: Promote integrated waste management and sewage management, toavoid negative impacts in the environment	
Environmental impacts	
Causes	• Opening of access roads • Implementation of support infrastructure: accommodations,workshop, asphalt plant, crusher plant • Mining activity • Loading and transportation of materials.
Impacts	• Pollution by generation of solid waste.
Recommended Actions / Measures	

• Contractor will promote reduction, recycling and/or reuse using separate bins to facilitate the collection and sorting of waste according to liquid and solids, organic and inorganic, etc. • Is prohibited waste disposal in or near to any waterways • The ordinary solid waste generated is collected and transported to the solid waste pits • Sanitary dumpsites will be constructed above the ground water table and linedto the floor with an imperious earthen or other material to prevent leaching to ground water • Solid waste pits will be located at least 100 meters away from any watercourses,or habitation. • Maintain goof housekeeping, sanitary and hygienic practices and the aesthetic quality of the surroundings al all times. • Topsoil and overburden will be accumulated to be used in revegetation and reclamation plan. • Workers are prevented from throwing waste anywhere, to avoid unauthorized dumps. • Waste collection it will be done periodically, at least once a week, depending ofthe generation. • All waste produced in oil or fuel spill will be considered as hazardous waste andthreatened like one. • Hazardous waste like batteries will be temporarily stored in an impermeable surface beneath the roof. • A program for the rational use of water is promoted, in such a way that waste is avoided, and the minimum amount of liquid waste is generated. • It will be promoted a rational use of water looking for the minimum amount of liquid waste is generated. • Construct and maintain a septic tank system onsite.
Technique / Technology to be used
• Separate binges for waste temporary disposal • The waste will be disposed in sanitary dumpsites created exclusively withimpermeable materials at least 100 meters from watercourses • Organic type waste will be separated for composting and subsequent productionof organic fertilizer • Septic tank for sewage treatment will be accessible for cleaning and de-sludging. Septic tanks will be installed with a sand and charcoal filter bed.

Place of application	Industrial area
Application period	During project operation
Responsible	Professional(s) responsible for the design, planning and operation,in addition to the rest of the personnel who participate in the execution of all tasks, especially those of maintenance, housekeeping and general cleaning. The professional responsible for the measures include in this sheetis the Environmental engineer
Monitoring	

• It will verify that hazardous waste is correctly managed • It will verify that the solid waste of the camp is properly disposed for compostingin the sanitary dumpsites. • Training for all employees on waste separation • The project, through its environmental officer and technical managers,maintains a monitoring program for wastewater management, and preventive or corrective measures when necessary.

5. Company Representatives

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Terry Sighn CEO Source One	Gibran Ferreira, Engineer Alya Construtora S.A.