

**PRE - FEASIBILITY**

**CUM**

**ENVIRONMENT MANAGEMENT PLAN**

**Chapter- I**  
**Introduction**

**1.1 Brief Foreword of Project proponent and Project Site**

Sri Joshy P Mathew has applied a quarrying permit for operating Granite Building Stone over an extent of 0.7849 Ha at Sy No 322/1,284/1,285,103 in Mupliyam Village, Chalakkudy Taluk, Thrissur District, Kerala. Tax receipts, Possession certificates as applicable are enclosed as **Annexure No's 2 &3.**

Mining Plan for Granite Building Stone Quarry of M/s Green rock crushers & mines pvt.ltd at Sy No 322/1,284/1,285,103 in Mupliyam Village, Chalakkudy Taluk, Thrissur District, Kerala for total mine permit area of 0.7849 Ha is approved by District Geologist, Department of Mining and Geology, Thrissur.

Mr. Sri Joshy P Mathew is the Authorized Signatory of this Granite Building Stone Quarry to submit application to statutory authorities like Department of Mining & Geology, DEIAA and to receive Environmental Clearance from DEIAA, Kerala. Attested Copy of Photo ID of the Authorized Signatory is enclosed as **Annexure No-1.**

This feasibility report for Granite Building Stone Quarry of M/s Green rock crushers & mines pvt.ltd over an extent of 0.7849 ha at Re Sy No322/1,284/1,285,103 in Mupliyam Village, Chalakkudy Taluk, Thrissur District, is prepared towards getting environmental clearance from DEIAA Kerala.

## Chapter- II

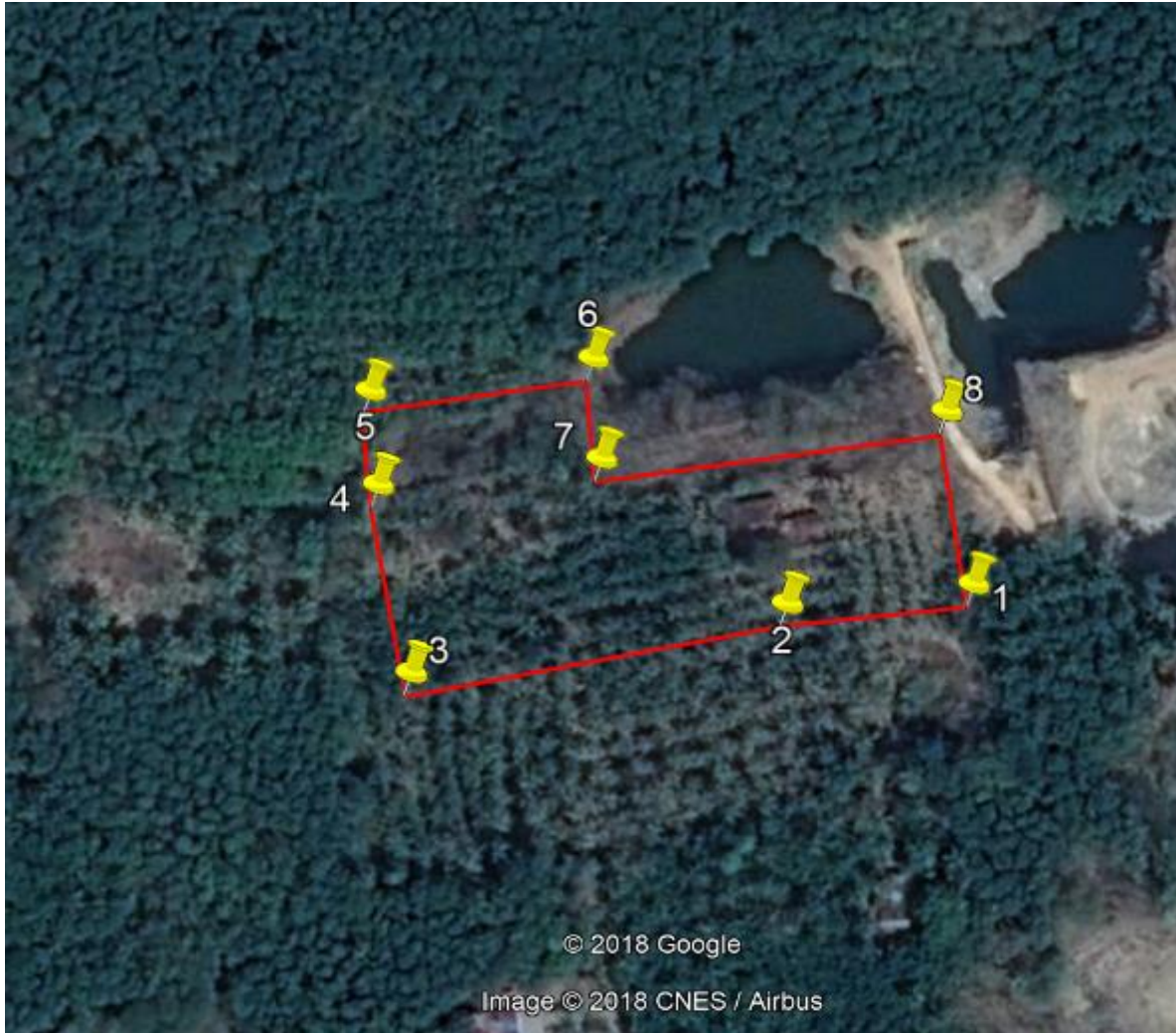
### 2.1 Project Description

<b>Project Proponent</b>	Sri. Sri Joshy P Mathew
<b>Mailing Address</b>	Director Green rock crushers & mines Pvt. Ltd
<b>Sy No</b>	322/1,284/1,285,103
<b>Location</b>	Mupliyam Village Chalakkudy Taluk Thrissur District Kerala State
<b>Quarry permit Area</b>	0.7849 Ha
<b>Type of land</b>	Private Land

### 2.2 Salient features of the study area

<b>Latitude</b>	10°24'22.69"N to 10°24'25.04"N	
<b>Longitude</b>	76°21'24.13"E to 76°21'29.03"E	
<b>Nearest Railway Station</b>	Nellayi Railway Station - 9 Km	
<b>Nearest Airport</b>	Kochi Airport – 30 Km	
<b>Elevation in (M SL)</b>	Highest	100m above MSL.
	Lowest	95m above MSL.
<b>Working depth</b>	Top most level	100m above MSL
	Bottom most level	80m above MSL

The Google Map showing Location of the permit area is given below:-



**Table 1: Description of Each Pillar in the permit Area**

<b>Pillar No</b>	<b>Latitude</b>	<b>Longitude</b>
BP 01	10°24'23.42"N	76°21'29.03"E
BP 02	10°24'23.26"N	76°21'27.51"E
BP 03	10°24'22.69"N	76°21'24.49"E
BP 04	10°24'24.25"N	76°21'24.20"E
BP 05	10°24'25.04"N	76°21'24.13"E
BP 06	10°24'25.32"N	76°21'25.94"E
BP 07	10°24'24.47"N	76°21'26.01"E
BP 08	10°24'24.88"N	76°21'28.84"E

### 2.3 Land use plan of the project site

Proposed quarry permit area is **0.7849 Ha**. Land use pattern of the permit area is shown on the surface plan (**Plate No. 3**). The present, plan period and conceptual land use pattern of the permit area is shown below:

**Table No.2 – Land Use Pattern of the permit area**

S.No.	Particular	As on date	Plan Period	Conceptual period
1.	Area under Quarry pit	0.0000	0.4865	0.4865
2.	Green belt/ plantation	0.0000	0.2960	0.2960
3.	Area for future use/undisturbed	0.7849	0.00240	0.00240
	<b>Total area</b>	<b>0.7849</b>	<b>0.7849</b>	<b>0.7849</b>

At the end of life of mine, the excavated pit will be 0.7231Ha, in which 0.2631Ha will be reclaimed with stacked dumping and overburden and rehabilitated by plantation and the remaining part 0.46 Ha will be used as a water pond. The details of the post mine land use are given below:

**Table No-3 –Details of Post Mine Land Use pattern**

Sl. No	Type of activities	Extent in Ha	Post mining land use of degraded land	Extent in Ha.
1	Area under Quarry pit	0.4865	Converted as water pond	0.2112
			Backfilling and Reclamation	0.4865
2	Green belt / Plantation	0.2960	Green belt / Plantation	0.2960
	<b>Total</b>	<b>0.7849</b>	<b>Total</b>	<b>0.7849</b>

### 2.3 Employment Generation

It is proposed to employ 10 people from nearby villages for the said quarry. This project will also create additional employment indirectly.

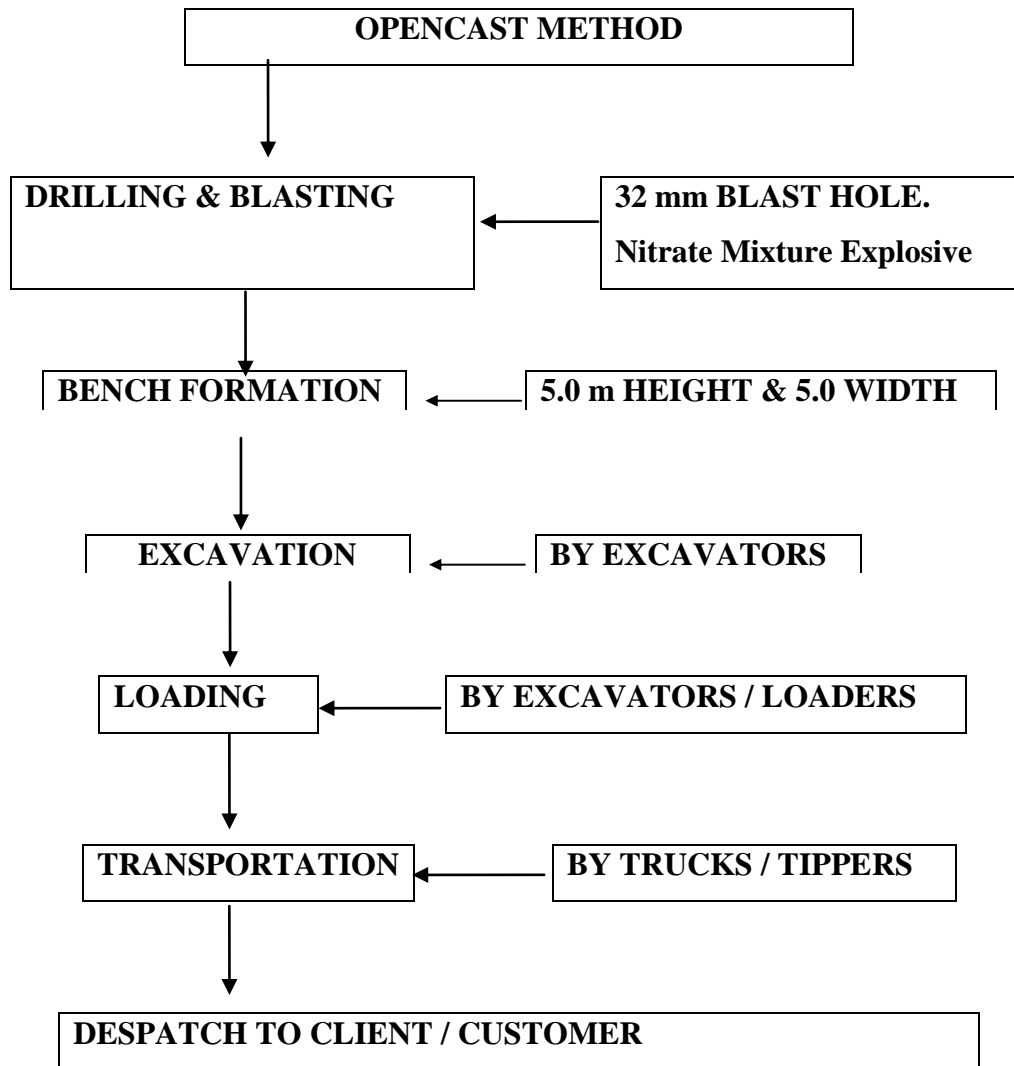
### 2.4 Project Cost

Total Project cost: Rs. 30,00,000/

### Chapter- III

#### 3.1 Process description

The Quarrying operation is carried out in different stages. A flow chart depicting the operations is shown below:



The quarry is proposed to work with conventional open cast with bench system method with mechanized mode of operation. Based on the mode and method, taking into the consideration of geological parameters of the charnockite body, the quarry pit will be so designed such that the height of the bench is kept about 5.00 m max.

### **3.2 TOPOGRAPHY**

Topography of the permit area is plain terrain with some of the proposed land is covered with native trees, shrubs, herbs bushes etc. Highest elevation of the permit area is 100 M above MSL and lowest is 95 M above MSL. The drainage of the area is controlled by seasonal channels which joins to seasonal streams. The contour map/surface plan of the proposed area is enclosed as **Plate No.2**.

### **3.23 REGIONAL GEOLOGY**

Thrissur district can be broadly divided into four geological units:- (i) Charnockite belt which is widespread and most prominent in the district; (ii) Gneissic belt represented by biotite gneiss, hornblende-biotite gneiss and quartzo-feldspathic gneiss, (iii) Granitic gneiss (PGC) restricted to the south eastern part and (iv) the Quaternaries of the coastal tract. Pink granite (granite gneiss) of Peninsular Gneissic Complex is seen along the south eastern border, the major part of which extends to the adjacent Idukki district in the east. The rock is seen to occur interbanded with the associated rocks. It consists of varying proportions of orthoclase, plagioclase, quartz, green hornblende and brown biotite. Calc-silicate rock belonging to the Khondalite group occurs as small outcrops near Vadakkethara in the north eastern part of the district. The distribution in the area is very limited and it occurs as thin bands within the charnockite. Charnockite is the widespread rock of the area. It is generally massive but when foliated has a gneissic look. Varieties like medium- and coarse-grained, highly feldspathic and migmatitic are also not rare. Pyroxene granulite, a member of the Charnockite Group, occurs as thin bands enclosed by charnockite and/or biotite gneiss. These bands are a few metres in width and a few tens of metres in length. Biotite gneiss of Migmatite Complex is next to charnockite in abundance. This is the major rock in the western part extending from Thrissur in the north to Kottapuram in the south. Small lenticular bodies of biotite gneiss are seen within the charnockite terrain as well. The rock is well foliated and is characterised by banding due to alternate foliae rich in biotite and quartzo-feldspathic material. In places they tend to become massive and granitic. The other members of the Migmatite Group namely quartzo-feldspathic gneiss and hornblende biotite gneiss have restricted distributions. Fairly large area around Vellani Mala and Peechi are occupied by hornblende-biotite gneiss. The major part of the quartzo-feldspathic gneisses seen as linear band in the north eastern part is extending to adjacent Palakkad district in the east. Linear bands of this rock is seen in the south eastern part also. Near Ambalapara in the south eastern part there is a quartz syenite acid intrusive body. It

is leucocratic, medium- to coarse-grained, medium- to coarse-grained, composed of feldspars with rare green pyroxene. Dolerite and gabbro dykes are seen cutting across these older rocks and are generally aligned in NNW-SSE trend. Pegmatite s and quartz veins occur within the charnockite and gneisses, mostly as fracture fillings. They are of small dimension and show no concentration in specific locality. A small patch of Warkalli bed is seen near the coast in the northern part. Unconsolidated Quaternary sediments overlie these basements unconformably. The sediments are classified into different morphostratigraphic units based on their lithic content and environment of formation. Guruvayur Formation is an older marine deposit while Periyar Formation, Viyyam Formation and Kadappuram Formation are the contemporary fluvial, fluvio-marine and marine deposits.

### **3.2.1 LOCAL GEOLOGY**

The main rock type in the quarry site is charnockite, consisting of pyroxenes, feldspars, quartz and occasional biotite. Two sets of joints are seen traversing the rocks, often rendering the rock mass as elongated and isometric blocks of different shapes and sizes. As a result, the quarry products cannot be used as blocks of dimension stone. Thin veins of pegmatite are seen intruding the charnockite mass. The upper part of the rock is weathered, giving rise to a thin veneer of soil, thickness of which does not exceed 1.0 m within the quarry site.

### **3.2.2 GENERAL DESCRIPTION OF FORMATIONS**

The geological parameters / features of the ore body as obtained from the Re Sy mapping and exploration studies reveal the following:

Length of the ore body : ranging from 56.3 to 140.7 (Avg-197) m

Width of the ore body : ranging from 45.12 to 71.47 (Avg-58.295) m

### **3.3METHOD OF ESTIMATION OF RESERVES**

The estimation of ore reserves is made by conventional parallel cross section method using geological cross section. The geological cross sections are prepared across the strike of the ore body. The area of individual litho units in each and every cross section is calculated separately. The volume between the cross section is arrived on the basis of the average area of production cross section and multiplying sectional interval. And tonnage is arrived at by multiplying by bulk density.



**Note : Following are the parameters considered for reserve estimation:**

- (i) In the allotted area, the mineral is exposed from the lowermost level of 95 m MSL to the top most part of the hill at 100m MSL.
- (ii) Bulk Density of Stone and associated minor minerals is taken as 2.5 Tonne /M<sup>3</sup>.

### **3.3.1 RESERVES OF MINERALS**

Considering the above parameters and exposures observed in the existing pit in the allotted area, the surface geological plan and geological cross-sections & longitudinal section are prepared. Accordingly, the reserves for Stone and associated minor minerals have been estimated on cross- sectional area method.

#### **Geological Reserves: -**

**Table 4- Section wise Geological Reserve Estimation**

Section line	Area of cross section (m <sup>2</sup> )	Influence length (m)	Vol. in m <sup>3</sup>	Total Tonne
A-A'	1121	62	69502	173755
B-B'	821	41	33661	84153
C-C'	782	50	39100	97750
<b>Total</b>				<b>355658MT</b>

#### **Mineable Reserves: -**

To estimate the minable reserves, the reserves blocked under 7.5 statutory barriers and due to formation of systematic benches up to Ultimate Pit Limit have been considered.

**Table 5- Section wise Mineable Reserve Estimation**

#### **Proved Reserves**

Section line	Area of cross section (m2)	Influence length (m)	Vol. in m3	Bulk Density	Total Ton
A-A'	701	55	38555	2.5	96388
B-B'	352	39	13728	2.5	34320
C-C'	311	43	13373	2.5	33433
<b>Total`</b>					<b>164141 MT</b>

**Total Geological Reserve = 355658 MT**

**Total Mineable Reserve = 164141 MT**

**Blocked Reserve = 191517 MT**

**Table 6- Reserve Estimation Table**

<b>RESERVE ESTIMATION</b>				
<b>MINEABLE RESERVES</b>				
<b>SECTION A-A'</b>				
<b>Bench</b>	<b>Area</b>	<b>Influence</b>	<b>Density</b>	<b>Ton</b>
95	80	55	2.5	11000
90	206	55	2.5	28325
85	230	55	2.5	31625
80	185	55	2.5	25438
<b>TOTAL</b>				<b>96388 MT</b>
<b>RESERVE ESTIMATION</b>				
<b>MINEABLE RESERVES</b>				
<b>SECTION B-B'</b>				
<b>Bench</b>	<b>Area</b>	<b>Influence</b>	<b>Density</b>	<b>Ton</b>
95	87	39	2.5	8483
90	132	39	2.5	12870
85	89	39	2.5	8678
80	44	39	2.5	4290
<b>TOTAL</b>				<b>34320 MT</b>
<b>RESERVE ESTIMATION</b>				
<b>MINEABLE RESERVES</b>				
<b>SECTION C-C'</b>				
<b>Bench</b>	<b>Area</b>	<b>Influence</b>	<b>Density</b>	<b>Ton</b>
95	54	43	2.5	5805
90	131	43	2.5	14083
85	86	43	2.5	9245
80	40	43	2.5	4300
<b>TOTAL</b>				<b>33433MT</b>

### 3.3.2 SUMMARY OF GEOLOGICAL & MINEABLE RESERVES

In this area the building stone exposures are bordering to the permit boundary. The mineable reserves are arrived after deducting the reserves locked in mines barrier along the boundary in compliance with Metalliferous Mines Regulations 2015. Summary of Geological and mineable reserve is given below.

**Table No. 7- SUMMARY OF GEOLOGICAL & MINEABLE RESERVES**

<b>Reserves in MT</b>	
<b>Category</b>	<b>R O M</b>
<b>Geological reserves</b>	<b>355658MT</b>
<b>Mineable reserves</b>	<b>164141MT</b>
<b>Blocked reserves</b>	<b>191517MT</b>

**Note :** **Geological Reserves = Mineable Reserves + Blocked Reserves**

Of the above Geological reserves of **355658MT**, only **164141MT** of reserves can be exploited / mined, while the balance of **191517MT** of reserves is getting blocked which cannot be mined, due to the boundary and practical constraints. Hence for all practical purpose (for production and future planning) only Mineable reserves are considered.

### 3.4 Method of Quarrying

The quarry is proposed to work with conventional open cast with bench system method with mechanized mode of operation. Based on the mode and method so adopted and taking into the consideration of geological parameters of the ore body, the quarry pit is so designed such that the height of the bench is kept about 5.00 m (2.50 m x 2 sub benches) max., and the width is also kept 5.00 m, maintaining 45° pit slope. Benches are advanced side ward and lateral to win the material at lower level /depth.

The System or method of working shall be performed as stipulated under Rule 69(1) by formation of benches as per the Metalliferous Mines Regulations, 2015, issued under the Mines Act, 2015. The area is covered with a thin layer of weathered charnockite; recovery of saleable material is about 95% of ROM.

During the first year of mining, the work will be carried out from 100 to 90m MSL by bench cutting method to obtain the proposed rate of rock as shown on the sections A-A' & B-B' & C-

C'. The details of bench wise production & total quantity of rock raised during this year are given in **Table No.8**.

During the second year of mining, the work will be carried out from 95m to 85m MSL by bench cutting method as shown on sections A-A' & B-B' & C-C'. The details of bench wise production & total quantity of rock raised during this year are given in **Table No 9**.

During the third year of mining, the work will be carried out from 90m to 80m MSL by bench cutting method as shown on sections A-A' & B-B' & C-C'. The details of bench wise production & total quantity of rock raised during this year are given in **Table No 10**.

**Table No. 8-Details showing estimation of bench- wise production of minerals during 1<sup>st</sup> Year of mine planning.**

<b>Bench m MSL</b>	<b>Section</b>	<b>Area (M<sup>2</sup>)</b>	<b>Influence Length(IL)</b>	<b>Volume in M<sup>3</sup> (Area x I.L.)</b>	<b>ROM (MT)</b>
100m MSL to 95m MSL	A-A'	80	55	4400	11000
100m MSL to 95m MSL	B-B'	87	39	3393	8483
100m MSL to 95m MSL	C-C'	54	43	2322	5805
95m MSL to 90m MSL	A-A'	206	55	11330	28325
95m MSL to 90m MSL	B-B'	11.291	39	440.33	1101
<b>Total</b>				<b>21885.33 M<sup>3</sup></b>	<b>54714MT</b>

**Table No.9 -Details showing estimation of bench- wise production of minerals during 2<sup>nd</sup> Year of mine planning.**

<b>Bench m MSL</b>	<b>Section</b>	<b>Area (M<sup>2</sup>)</b>	<b>Influence Length(IL)</b>	<b>Volume in M<sup>3</sup> (Area x I.L.)</b>	<b>ROM (MT)</b>
100m MSL to 95m MSL	A-A'	80	55	4400	11000
100m MSL to 95m MSL	B-B'	87	39	3393	8483
100m MSL to 95m MSL	C-C'	54	43	2322	5805
95m MSL to 90m MSL	A-A'	206	55	11330	28325
95m MSL to 90m MSL	B-B'	11.291	39	440.33	1101
<b>Total</b>				<b>21885.33 M<sup>3</sup></b>	<b>54714MT</b>

**Table No.10- Details showing estimation of bench- wise production of mineral during 3<sup>rd</sup>**

**Year of mine planning**

<b>Bench m MSL</b>	<b>Section</b>	<b>Area (M<sup>2</sup>)</b>	<b>Influence Length(IL)</b>	<b>Volume in M<sup>3</sup> (Area x I.L.)</b>	<b>ROM (MT)</b>
90m MSL to 85m MSL	A-A'	20.097	55	1105.3	2763.3
90m MSL to 85m MSL	B-B'	89	39	3471	8678
90m MSL to 85m MSL	C-C'	86	43	3698	9245
85m MSL to 80m MSL	A-A'	185	55	10175	25437.5
85m MSL to 80m MSL	B-B'	44	39	1716	4290
85m MSL to 80m MSL	C-C'	40	43	1720	4300
<b>Total</b>				<b>21885.3 M<sup>3</sup></b>	<b>54713.8 MT</b>

**3.4.2 Proposed Rate of Production and Expected Life of Mine-**

The annual production targets have been planned, the average proposed production (ROM) will be about **54714MT** for the quarrying permit period. As per the production capacity proposed the life of the quarry will be **3 years**.

**Table 11- Proposed Production details of the Quarry**

<b>S. No.</b>	<b>Year</b>	<b>Bench MSL</b>	<b>ROM (in MT)</b>
1	First Year	100-90	54714
2	Second Year	95-85	54714
3	Third Year	90-80	54713
<b>Total</b>			<b>164141MT</b>

**3.5 Extent of Mechanization**

List of Quarrying machinery deployed for quarry operation along with their capacities, efficiencies and other details are shown in below:

**Table No.12 – Machinery Details**

<b>Sl.No</b>	<b>Equipment/ Machinery</b>	<b>No. of units</b>	<b>Size/ Capacity</b>
1.	Excavator	2	150 HP
2.	Tipper	3	-
3.	Rock Breaker	1	-
4.	Compressor	1	-

### **3.6 Quarrying Activity**

The quarry is proposed to work with conventional open cast with bench system method with mechanized mode of operation. Based on the mode and method so adopted and taking into consideration of geological parameters of the Charnockite body, the quarry pit is designed such that the height of the bench is kept about 5.00 m max., and the width is kept min 5.00 m, maintaining 45° pit slope. Two sub benches are created of 2.50 m height each, when it reaches its ultimate limit, all the two benches will be joined together to form a height of 5.0 m. Topsoil is sparsely distributed in the area, this topsoil will be removed separately and it will be used for plantation purpose.

As the rock is mainly hard to medium hard in nature, drilling and blasting is required to dislodge/loosen the material from the main rock mass. The broad blasting parameters are determined in subsequent paragraph. The operation flow chart of the quarry activity is given in the above chapter – II under head Process Description.

#### **3.6.1 Explosives Management, drilling and Blasting**

##### **BLASTING**

Granite is compact rock, at places it is fractured also. Production from the fractured zone will be obtained with the help of excavator, whereas from compact zone the production will be obtained by drilling and blasting. Drilling will be done by jack hammer with the help of air compressor.

- Whole location will be properly dressed by excavator to remove the loose boulders for efficient drilling and for avoiding jamming of drilling hammer and bits.
- Drill holes of 32mm diameter and 1.5 M in depth will be made.

- To reduce the noise level the holes will be blasted by using nitrate mixture and Milli-second delay detonators.
- To maintain the bench height of 5 M, sub bench of 2.5 m will be formed first, later on Two benches will be merged and one bench of 5m will be formed and maintained
- The spacing and burden will be kept at 1.0 M.
- About 30 to 50 holes will be blasted in one blast
- Yield per hole will be  $1.5 \times 1 \times 1 = 1.5M^3$ .
- Number of blasts per day will be 2 blasts of 40 holes each

### **3.6.2 Blasting Pattern:**

The blasting pattern entirely depends on the situation of the joints present in the rocks. The drilling is done as per the requirement of the rock fragmentation with desired production of mineral.

### **3.6.3 Requirement of explosive**

- Charge per hole will be 375 grams
- Yield of explosive - about  $6.6 M^3$  per Kg. or 17.16 tonne/Kg
- For 54714 ton per year or 4560 tons per month the requirement of explosive will be about 265.7 kg per month.

### **3.6.4 Precaution during blasting**

No explosives other than those provided by company, the agent or manager shall be used in the mines and the explosives shall not be taken inside any building except magazine approved by the licensing authority under the Indian Explosives Act 1884. Cases and containers for carrying explosives shall be of substantial construction and securely locked as required under MMR157. Containers of steel or iron shall be galvanized and not more than 5 Kg explosives shall be carried in one case or container. The manager shall fix maximum number of shots that a blaster may fire in one shift and should not exceed 80 in case of electrical firing or 50 in case of firing with igniter codes as fixed under MMR (160). Shot firing tools conforming to MMR (161) will be used and provisions under 162 on drilling, charging, stemming and firing of shot holes shall also compiled with.

As static charge can be generated and stored on bodies of persons wearing synthetic fiber cloths and/ socks and such potential may go up to 60,000 volts during dry months, especially on a cold day in a dry climate, blasters /shot fires and their helpers should not ware such

clothes while on duty. They will be provided only non-conducting type of shoe or boots egleather sole footwear as prescribed under (cir.Tech.1/1985).Chapter XV on Explosives & Shot firing i.e MMR 153 to 169 shall be enforced and followed in the quarry.

### **3.6.5 Type of Explosives to be used**

Only class 2 and class 6 explosive is proposed for use as given below:-

Booster (20%)	Slurry explosive
Explosive (Column charge) (80%)	Nitrate Fuel oil (NFO). The NFO mixture can be readily produced at a site by mixing nitrate (94.5 %) with diesel oil (5.5 %).
Initiator	Delay /Electric detonators

#### **a. Safety precautions to be adopted.**

#### **PRECAUTIONS:**

- Blasting in the open cast pit will be done only during day time at designated hours.
- Only competent blasters will be appointed to handle explosives.
- Explosives will be stored in approved and licensed magazine as per Explosive Act/ Rules.
- Explosives will be brought from magazine to blasting site in licensed Explosive Van under the care of blaster.
- Sufficient warning signals will be given before blasting the holes.
- Guards will be posted on all roads and paths at least 250 m distance to stop entrance to the danger zone during blasting hour.
- Controlled blasting will be practiced to control vibrations and flying fragments.
- Optimum charge will be used, while blasting near office complex/ infrastructure site.

### **3.6.6 Excavation and Crushing**

The quarry is proposed to work with conventional opencast with bench systems and operating in a mechanized mode. The bench height and width is kept at 5m maximum with a pit slope of 45<sup>0</sup>. Subsequent to the drilling and blasting, the material so dislodged/loosen from the rock mass, the big boulders are broken in to small boulders with a help of rock breaker. There after the material is loaded into trucks/tippers of 10 tones capacity with the help of the excavator.



### **3.7 Topsoil:**

A total quantity of 11773 Tonne of topsoil is proposed to be removed during mining operations. The topsoil excavated from the quarry will be dumped separately at predetermined place and subsequently utilized for spreading over reclaimed areas for plantation.

### **3.8 Mine Waste Management**

About 5813Tonne of overburden (OB) will be generated throughout the mine life. This waste will be utilized within the pit for lying of haul roads. At the end use, OB can be reutilized as soil base for plantation.

### **3.9 Site Security and Safety**

Copies of all safety and management documents will be made available to on site, personnel and mandatory training for operations at the Quarry will take place. The Area Coordinator will ensure that operations are consistent with other management plans, terms and conditions of the issued permits, and safety procedures for the Project.

Security signage will be posted at the entrance to the quarry. The remoteness of the quarry and the onsite presence of operations personnel will make perimeter fencing unnecessary. Audible warning systems will be employed for all blasting operations at posted intervals prior to any detonations.

Loose rocks will be properly dressed and nature of rocks and available structural planes will be studied to avoid any slip. Explosives will be stored in safe approved and licensed magazine. Competent blasters (with blasting certificate of competency issued by DGMS) will only handle explosives to avoid any accident. Proper and full proof security will be provided to the magazine to avoid any theft, unauthorized entry etc. proper fencing with sign boards will be provided to separate out the magazine. Blasting and processing operations will be suspended if incursions into the quarry occur. On site monitors for animals will provide warnings if the approach of any animals is noted. Before the onset of monsoon, drains are cut along the toe of the quarry faces to divert the surface run off. Garland drain is provided at the quarry top to regulate monsoon water and direct the same to the settling ponds / quarry pit to contain the quarry wash off and to avoid the same joining to the adjoining surface water bodies / water courses. It also helps to avert eventual collapses and damages to the quarry faces. The pit will be fenced by barbed wire, such that no habitats can enter the pit and watch and ward is provided round the clock.

## **Chapter –IV**

### **Environmental Baseline data Description**

#### **4.1 Air Environment**

The Reconnaissance survey of the quarry area reveals that there will be possible dust emissions that would result from transportation of vehicles and the stone powder generated during the drilling, blasting and dislodging activity.

To assess the ambient air quality status, monitoring stations were identified on the basis of Meteorology in the upwind and downwind direction as well as to represent the cross sectional scenario of the project site. Based on the production activity, the parameters chosen for assessment of air quality are Particulate Matter (PM<sub>10</sub>&PM<sub>2.5</sub>), Sulphur dioxide (SO<sub>2</sub>), and Nitrogen dioxide (NO<sub>2</sub>).

##### **4.1.1 Analysis of Baseline Concentrations**

The Ambient Air Quality data were collected in the month of August 2017 from the four corners of the project site .The data have been collected on 24 hourly basis for parameters of PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, NO<sub>2</sub>.

**Table No.15- Ambient Air Quality survey Monitoring Values**

<b>Direction</b>	<b>PM<sub>10</sub></b>	<b>PM<sub>2.5</sub></b>	<b>Sulphur dioxide</b>	<b>Nitrogen dioxide</b>
East Side	46.7 µg/m <sup>3</sup>	23.6 µg/m <sup>3</sup>	8.7 µg/m <sup>3</sup>	5.9 µg/m <sup>3</sup>

From the Re Sy measurement results of the ambient air, it is observed from the report that the ambient air quality at site within the prescribed standards (NAAQS) with respect to PM<sub>10</sub>, PM<sub>2.5</sub>, NO<sub>x</sub> and SO<sub>2</sub>.

#### **4.2 WATER ENVIRONMENT**

The purpose of this study is to:-

- Assess the water quality characteristics for critical parameters;
- Predict the likely impacts on water quality due to the project and related activities

##### **4.2.1 WATER MONITORING**

To analyse the suitability of water for domestic purpose, sample from open well near to the

project site were collected by NABL accredited laboratory and samples were analysed for physical, chemical and biological parameters.

**Table No. 16 - Water Quality Monitoring Values**

<b>Parameters</b>	<b>Well water-1</b>	<b>Well water-II</b>	<b>Well water-III</b>	<b>Surface water</b>	<b>Acceptable Limit</b>
Colour	4Hazen Unit	4Hazen Unit	3Hazen Unit	3Hazen Unit	5 Hazen Unit
Odour	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
Turbidity	BDL	BDL	BDL	BDL	1 NTU
pH	6.64	6.75	6.74	6.84	6.50-8.50
TDS	60	89	62	67	500
Total Hardness	28	27	26	26	200
Total Alkalinity	16	16	16	20	200
Residual Chlorine	BDL	BDL	BDL	BDL	0.2
Chloride	8.12	12.57	7.31	8.64	250
Calcium	6.41	8.58	4.32	7.48	75
Magnesium	4.21	4.32	2.14	3.34	30
Total Iron	0.26	0.22	0.23	0.25	0.3
Sulphate	7.35	6.71	4.25	3.25	200
Fluoride	BDL	BDL	BDL	BDL	1.0
Coliform Bacteria	110	50	23	90	Absent
E coli	Absent	Absent	Absent	Absent	Absent

**Results & Conclusion:** - The water samples collected and analysed from the locations discussed above it is observed that the water quality of water is fit after filtration, disinfection & treatment for domestic consumption and for activities attached with the mining operations except pH value, Turbidity, &Coliform bacteria.

#### **4.2.2 Water & Hydrogeology Environment**

The aquifer system in the district can be broadly divided into hard rock aquifers, laterite aquifers and sedimentary aquifers. The hard rock and laterite aquifers constitute major aquifer

system of the district while the sedimentary aquifers are seen along the coast and river courses. Groundwater occurs under phreatic, semi confined to confined conditions in the weathered and fractured portions of the crystalline formations and occurs semi-confined and confined condition in deep seated fractured and sedimentary formations.

The depth to water level in pre-monsoon period ranges from 1.57 to 14.42 m bgl and in post monsoon period 0.53 to 11.73 mbgl. In general the water level is shallow during both monsoons particularly along valleys and topographically low areas. The data of ground water monitoring wells shows that around 13 % of the wells fall within 10.00 to 15.00 mbgl categories while 55% of the wells fall in the water level showing 5.00 to 10. 0 mbgl category and 23% of the wells falls in the 2.00 to 5.00 mbgl category and 9 % of the wells falls in the 0.00 to 2.00 mbgl during the pre-monsoon. The post monsoon data reveals that the 13 % of the wells falls under 10.00 to 15.00 mbgl category and 54 % wells falls than 5.00 to 10.00 mbgl category and 8 % of the wells fall in the 0.00 to 2.00 mbgl. The depth to water level ranges of pre & post monsoon data of April & November. (CGWB report March 2009).

The ground water level measured from the nearest well is about 8-10m below the ground level. The ultimate depth of the working of the quarry is 30m MSL. Since the working is much above the general ground water table, it does not affect the ground water.

#### **4.3 Noise Environment**

The main objective of noise monitoring in the study area is to establish the base line noise levels and assess the impact of the total noise expected to be generated during the mining operations in the project site. Instant sound level meter is used for the collection of data related to noise at an interval of one hour per reading. Noise level for 24 hours was conducted in a day within the site.

**Table No. 17- AMBIENT NOISE MONITORING RESULTS IN dB (A)**

<b>Monitoring Location</b>	<b>Ambient Sound Level in Day Time</b>	<b>Ambient Sound Level in Night Time</b>
Near East Side Boundary	48.6 dB (A)	33.7 dB (A)

**Results and Conclusion:-**It is seen from the monitoring results that the Noise levels at monitoring station are within the prescribed national standards.

#### **4.4 Biological Environment**

Biodiversity means the diversity or variety of plants and animals and other living thing in a particular region or area. An observation in the land use show that the area was mainly covered by coconut and rubber plantation and the entire permit area is devoid of any endemic flora and fauna. Faunal diversity is also observed to be not very rich with the occurrence of some common birds, amphibians, mammals and reptiles.

##### **4.4.1 Aim of this report**

The assessment is conducted to develop a database on the floral and the faunal characteristic of the quarry of M/s Green rock crushers & mines Pvt.Ltd. The report gives information regarding plants and animals around the mining site.

##### **4.4.2 Methodology**

For the preliminary data collection survey in the site was conducted and species list is developed after proper identification of the samples collected/ photographs taken and consulting relevant taxonomic literature. The assessment was focused on all taxonomic groups, such as plants, birds, fishes amphibians, insects, reptiles.

##### **4.4.3 Flora:**

A detailed survey was carried out in the study area. Only a few number of flora were observed. Interviews were carried out with local people to collect information about the flora. Based on this, a detail list is prepared.

##### **4.4.4 Fauna:**

**Mammals:** The mammals in the study area were listed along the frequency of occurrence for sighting, calls, scats / fecal matter, track marks or other indirect signs transects as well as quadrant.

**Birds:** The birds on the area were studied by frequency of occurrence for sighting, calls as well as other indirect signs and road kills along the sector.

**Reptiles and Amphibians:** The reptiles and amphibians were studied by direct sighting and indirect signs like molt as transect as well as quadrants.

#### 4.4.5 Biodiversity of the Study Area

An observation in the land use show that the area and its surrounding was mainly covered by rubber plantation and the entire permit area is devoid of any endemic or endangered flora or fauna.

**Table 18. List of plants recorded from the core & buffer zone**

Sl.No	Botanical Names	Family	Common Name
1	<i>Gliricidia sepium</i>	Fabaceae	Seemakonna
2	<i>Hevea brasiliensis</i>	Euphorbiaceae	Rubber tree
3	<i>Eupatorium odorum</i>	Asteraceae	Kammunistpacha
4	<i>Synedrella nodiflora</i>	Asteraceae	Mudiyendra pacha
5	<i>Centrosema pubescens</i>	Fabaceae	Kattupayar
6	<i>Mimosa pudica</i>	Mimosaceae	Thottavady

#### FAUNA

##### Reptiles & Mammals

On the basis of survey and communication with the local people, a list of reptiles and mammals in the study area are given in the table below:-

**Table 19. List of Reptiles & Mammals recorded from the core & buffer zone**

Sl.No	Scientific Names	Common Names	Malayalam Names	Conservation status
<b>Reptiles</b>				
1	<i>Ptyas mucosa</i>	Rat snake	Chera	Least concern
2	<i>Calotes versicolor</i>	Garden lizard	Oondu	Least concern
<b>Mammals</b>				
1	<i>Mus musculus</i>	Mouse	Chundeli	Least concern
2	<i>Bandicotabengalensis</i>	Bandicoot rat	Peruchazi	Least concern

## **Birds**

Birds diversity in this region is very less compared to other part of Kerala. Some of the common birds in the study area are given in the table below.

**Table 20. List of Birds recorded from the core & buffer zone**

<b>Sl.No</b>	<b>Scientific Names</b>	<b>Common Names</b>	<b>Malayalam Names</b>	<b>Conservation status</b>
1	Acridotherestrictis	Common myna	Myna	Least concern
2	Milvusmigrans	Black kite	Chakhiparundu	Least concern
3	Motacillacinerea	Grey wagtail	Vazhikulakhi	Least concern
4	Corvussplendens	House crow	Kaka	Least concern

## **CONCLUSIONS**

The floral and faunal diversity of the area is found to be low when compared to the diversity of the country sides of Kerala. The present study area do not possesses any specific group of ecological important assemblages. Majority of the surrounding area was planted bycoconut &rubber plantationand also this region does not come under any conservation reserves.

This region does not have any endemic or endangered species, so any development activity in the region does not have any direct bearing or significant influences in the ecosystem stability or biodiversity.

### **4.5 Socio Economics**

The major occupation of the Thrissur and adjacent Ernakulam district is Cultivation, Household activity, Livestock, Forestry, Mining, Quarrying activities. The quarrying activity will benefit local villages in both directly and in-directly. Direct beneficiary will be those who get employed in Quarry as skilled and unskilled workers.

#### **a. Addressing concerns of local inhabitants like health, water, employment, resettlement / rehabilitation**

Proponent shall provide required Medical facility to all the employees at the quarry such as first aid, regular checkup, ambulance etc. In addition proponent also provides the medical checkup camps to the local villagers, supply of drinking water, and contribution of funds for social and cultural program. The proposed permit area extends over an area of **0.7849 Ha**.

There are no settlements within the permit hold area, hence there is no resettlement or rehabilitation of the same.

**b. Compensation for loss of land, crops and other adverse impacts on account of mining**

Entire permit area belongs to lessee hence there is no compensation for loss of land. Due to the quarry activities, if any crop/s are damaged to the adjacent land, the lessee will pay the compensation for the said crop which will be decided by the agriculture / concerned department.



## **Chapter- V**

### **MANAGEMENT PLAN (EMP)**

The Environment Management Plan (EMP) for a development project prescribes the mitigation measures to be adopted to nullify or to minimize various anticipated environment impacts so as to ensure nil / low impact due to the project to the surrounding environment. This will ensure sustainable development and environment friendly mining operations. The Environment Management Plan for various facets of environment is given below: -

#### **5.1AIR ENVIRONMENT**

##### **Anticipated Potential Impacts**

##### **Drilling, Blasting & Transportation**

Apart from the mining operations of drilling & blasting, movement of vehicles like dumpers, trucks, tankers etc. will generate dust. The transportation activities on unpaved area will results in fugitive emissions to the tune of 1.261 kg/VkmT for PM<sub>10</sub> and 0.126 kg/VkmT for PM<sub>2.5</sub>.(Calculation based on USEPA- AP 42 series.).

##### **Gaseous Emission rate due to transportation**

CO	5.45 g/kWh
HC	0.78 g/kWh
NO <sub>x</sub>	5.0 g/kWh

##### **Mitigation Measures:**

Mining activities will generate certain quantities of dust during drilling, blasting, loading and transportation operations. The following measures will be taken to mitigate the fugitive dust from these operations.

- Laying of haul road as per the standards, black topping of permanent haul road and service road to avoid or eliminate air – borne dust.
- To avoid the dust generation from the drilling operations, wet drilling method will be adopted.
- Drill machines will be equipped with dust collectors.
- Use of appropriate explosives for blasting and avoiding overcharging of blast holes.
- Controlled blasting techniques will be adopted.

- Watering of haul road and other road at regular intervals.
- Provision of dust filters/ mask to workers for highly dust prone and affected areas.
- Provision of green belt all along the periphery of the permit area.
- Periodical monitoring of ambient air quality in and around the permit area.

**The extracted mineral will be transported from the quarry to the end user by adopting following measures so as to minimize dust emissions.**

- In case of long transportation the trucks after loading will be covered with tarpaulin sheets.
- Speed of the vehicles will be maintained within the prescribed limits.
- Trucks will not be over loaded and will be maintained to the body level.

## **5.2 WATER ENVIRONMENT**

### **5.2.1 WATER FOR DOMESTIC CONSUMPTION**

#### **Anticipated Potential Impacts**

From the analysis report of the water sample collected from the open well, it is observed the water from the open well is having Turbidity & Coliform bacteria which are in excess of the permissible standard. The consumption of non potable water can lead to water borne diseases and which will affect the health of workers attached to project.

#### **Mitigation Measures:**

It is suggested to adopt appropriate treatment / filtration / disinfection of water before consumption.

### **5.2.2 DOMESTIC SEWAGE**

#### **Anticipated Potential Impacts**

The domestic sewage generation, if discharged untreated, can contaminate the groundwater and other ground & surface water sources.

#### **Mitigation Measures:**

The sewage generated from the site will be diverted to the septic tank followed by soak pit.

### **5.2.3 STORM WATER CONTAMINATION WITH SILT**

#### **Anticipated Potential Impacts**

Mining activities may cause adverse impacts due to siltation due to runoff/ storm water. An impact due to soil erosion during monsoon period is also significant in nature. This also has the potential to clog the water channels and to spoil agriculture.

#### **Mitigation Measures:**

Some of the control measures adopted for controlling water pollution due to the siltation of storm water by mining operations are as follows:-

- Storm water drains with silt traps will be suitably constructed all along the periphery of the pit area (Garland drains) to collect the run-off from the permit area and divert into the storm water pond/tanks proposed within the complex.
- Appropriate channelization of storm water with channels of sufficient width
- All measures will be taken not to disturb the existing drainage pattern adjacent to the other property.
- De-siltation traps and storm water collection pond proposed for silt removal.
- The storm water collected from the permit area will be utilized for dust suppression on haul roads, plantation within the premises, etc.
- The layout of channelization of storm water from the project site is shown in the environmental plan and in the storm water drainage plan.
- Construction of check dams and collecting channel all around at the foot of the hill to prevent soil erosion during the monsoon season and also to collect the storm water for various use within the mine permit area.

### **5.2.4. CONSUMPTION OF WATER – A NATURAL RESOURCE**

#### **Anticipated Potential Impacts**

The mining operations require large quantity of water for dust suppression, wetting of roads etc. Therefore, if appropriate measures are not adopted, it will lead to withdrawal of large quantity of ground water and which will deplete the ground water table.

## **MITIGATION MEASURES – CONSERVATION OF WATER**

- The quarry site has got potential to store large quantity of storm water. The storing of surface run-off can be done in a storm water collection pond. Stored storm water can be used for dust suppression & greenbelt development which will reduce / eliminate the usage of fresh water. Therefore, the conservation of water is achieved.
- Further, in the mine closure phase of the mine, a large area is proposed to be used as surface run-off storage structure. The stored rain water will be used for maintenance of eco-restoration carried out in the mine permit area.

## **5.3 NOISE ENVIRONMENT**

The Noise is the environment attribute associated with the quarrying activity and operation of heavy machinery operation which causes vibration and noise. The quarrying operation will be restricted to only day time. To attenuate noise, various measures shall be taken up from the source point. The activity such as drilling shall be updated to latest technology which involves wet drilling technology and blasting will be carried out with controlled mechanism. Persons who are exposed to critical operation like drilling and operation of excavators are being provided with personal protective equipment's (PPEs) as Occupational Safety Measures. Greenbelt will be developed, which will act as an acoustic barrier for noise transmission.

### **Mitigation Measures**

The following noise control measures are undertaken to bring down the noise levels:-

- Proper maintenance of machinery, equipment's and improvement on design of machines.
- Use of personal protective devices i.e., earmuffs and earplugs by workers, who are working in high noise generating areas.
- Creation of wide green belt of dense foliage between mine areas and residential colonies.
- Regular medical check-up related health problems
- Proper training to personnel to create awareness about adverse noise level effects.
- Planned noise monitoring at suitable locations in the plant and outside location for

proper effective remedial actions.

#### **5.4.1 LAND ENVIRONMENT**

##### **Anticipated Potential Impacts**

- A. Land use change
- B. Loss of Top soil & overburden
- C. Soil erosion due to storm water

##### **Mitigation Measures**

In order to minimize the adverse effects, the following suggestions have been made.

- Concurrent eco restoration will be carried out.
- Construction of check dams and collecting channel all around at the foot of the hill to prevent soil erosion during the monsoon season and also to collect the storm water for various use within the mine permit area.
- Green belt development along the boundary of the permit area.
- It is proposed to reclaim the pit area and this area will be suitably planted with local species for eco-restoration in all possible means.
- Proper barricading and monitoring of the water stored area will be taken up to prevent accidents (if any)

#### **5.4.2 OTHER ANTICIPATED POTENTIAL IMPACTS IN LAND ENVIRONMENT**

##### **5.4.2.1. GROUND VIBRATIONS**

- The only source of ground vibrations is due to blasting operations. Based on the ground vibration studies made earlier proper care will be taken during blasting.

##### **5.4.2.2. BLASTING HAZARDS**

- Blasting in mining areas may give rise to ground vibrations. Fly rock is another problem that deserves attention. Based on the ground vibration studies made earlier, proper precautions will be taken during blasting operations for controlling the ground vibrations.

### **Mitigation Measures**

The mitigation measures for addressing the various impacts due to blasting operation are presented below.

Controlled blasting technique will be adopted in this project in order to reduce blast vibrations. Further, charge per delay will be regulated to minimize blast vibrations. Proper hook-up will be adopted while firing the drill holes. Moreover the experience gained in other open cast mines would be gainfully utilized to limit the ground vibration levels within the prescribed limit of 15 mm/sec (as per DGMS). In practice, this is kept much less to about 10mm/sec.

In addition, the following guidelines will be adopted wherever required to check the ground vibrations:-

- The maximum charge per delay will not be more than 10 kg so as to limit the PPV values to 10mm/ sec. (As against the permissible 15 mm/ sec.).
- Optimum delay sequence and stem to column ratio will be maintained to minimize the fly rock distance and ground vibration intensity.
- Basing on the distance of the nearest sensitive areas from the epicentre of the blast, large weight will be altered to meet the stipulated standards.
- Design of optimum blast hole geometry considering bench height, diameter of hole, type of explosive, nature of rock, level of fragmentation required etc.
- Divide total charge/ blast in several parts so as to keep minimum explosive per delay, i.e. use of millisecond delay detonators & relays.
- Avoid concentration of explosive by using deck charging.
- Avoiding blasting in unfavourable weather conditions.

#### **5.4.2.3. FLY ROCK CONTROL MEASURES**

There are a large number of factors that influence fly rocks. Most important of these factors are long explosive columns with little stemming at the mouth of the hole, irregular shape of face, long water column in holes, loose stones on face of the surface blasting area, and strong wind.

### **Mitigation Measures**

Certain preventive measures will be taken to minimize the risks arising from flying fragments.

These are given below:-

- **Marking of danger zone:** - The area falling within 100 m of the blasting area will be marked off as danger zone with red flags, or other appropriate signs, and entry of any unauthorized person into this zone will be prohibited during blasting operation.
- **Warning signals:** - An audible warning signal will be given, fifteen minutes before actual firing of blast to enable persons to move out of danger zone. For this purpose, a set of sirens/ hooters will be provided at appropriate places.
- **Providing blasting shelters:** - In order to protect the personnel engaged in blasting operations, blasting shelters will be provided for taking shelter during blasting.

#### **5.4.2.4. AIR BLAST CONTROL MEASURES**

The release of explosive energy through air and movement of fragmented rocks are primary causes for noise and air over pressure during blasting.

### **Mitigation Measures**

Adoption of the following measures while carrying out blasting operation will help in reducing the intensity of air blasts and will also minimize the noise level associated with the air blasts.

The measures suggested are given below:-

- Avoiding overcharging of blast holes
- Adequate stemming
- Maintaining proper inter-hole & inter-row delays.

## **5.5 BIOLOGICAL ENVIRONMENT**

### **Anticipated Potential Impacts**

Clearing and cutting of trees, shrubs & herbs during the mining operations will have impact on biological environment by way of loss of habitat, loss of biodiversity. In order to compensate the anticipated impacts due to the mining activity, the following measures are proposed:

### **Mitigation Measures**

#### **1. COMPENSATORY MASS PLANTATION PROGRAMME**

An area equivalent to about 10% of the area proposed for quarrying is reserved in the area owned by the project proponent outside the proposed quarry for compensatory mass plantation. The area selected is such that there is enough depth of top soil and overburden and the quarrying in this area is not proposed in future. In the instant project site, about 0.6 hectare of land is dedicated to green belt / tree plantation so as to minimize the loss of biodiversity due to the mining activity.

## **2. GREEN BELT DEVELOPMENT/ ECO-RESTORATION**

In the concurrent eco-restoration of mine, about 700 trees will be planted in an area of 0.7849hectare.

## **3. RECOMMENDED SPECIES FOR ECO-RESTORATION PROGRAM**

For eco-restoration we are proposing inter cropping pattern of coffee and cocoa with rubber plantation.

## **5.6 MINE CLOSURE PLAN**

Various works that are to be taken up under the mine closure plan includes:-

**(i) Re-vegetation:** It is proposed to develop green belt to about 80 % which includes areas like along mine permit boundary (7.5 m width), all along the periphery of the mine permit area and the reclaimed area. Grass and bushes will be planted in areas prone to erosion especially at the foot of the mine permit area. Other areas will be fertilized and planted with local species. The characteristics of this vegetation will resemble that of the natural environment except for the early growth, which may be a protective cover crop of non-seeding annuals. Before re-vegetation, the land will be properly prepared by spreading the top soil which is rich in organic contents. Vegetation will be self-sufficient after planting and require no fertilization or maintenance.

### **(ii) Buildings and Infrastructure**

#### **a. Site office building, Rest Room and Toilets**

These structures may be utilized for the mining project as the life of the mine is much more than the present permit period.

#### **b. Support & Transport Infrastructures**

As such there is no major infrastructure facilities planned in this project and does not call for importance. The main mining site and secondary access road will be kept in a sufficient



condition to allow access for monitoring till such time any other authorities wish to maintain and legally accept responsibility for the access roads.

**c. Surface Equipment and Heavy Machinery**

No heavy and surface equipment are proposed in this project. Open cast semi mechanized method is used in this case. The equipment's and small machinery if used will be taken out of the premises.

**d. Hazardous substances**

The hazardous materials and explosives will be totally evacuated from the mine site and the site will be cleared of any such materials and substances.

**(iii) Water Resource Management**

Prior to the commissioning of the project area the surface run-off used to flow naturally and used to join the nearby drainage nallahs/ streams. It is proposed to collect and hold this runoff/ storm water from the permit area including own property and use it for various purposes within the permit area. The grounding of the project will not be causing any alteration to the drainage pattern of the area. The quality of the water will be maintained in compliance with the general effluent standards / drinking water standards.

**(iv) Monitoring:**

The monitoring of the mine closure plan is an essential requirement for review of the efficacy of the mine closure and to take corrective actions. The monitoring consists of measuring the air quality, water quality, preservation of landscape, aesthetic and other land use values.

**(v) Submission of detailed Mine Closure Plan**

The detailed mine de-commissioning plan will be made on the above-mentioned principles, before the closure which will be submitted for approval. This plan will also provide the fund provision for the mine closure plan. The map showing conceptual plan (post mine closure plan) of the proposed mine area is enclosed as Plate No-5.

**5.7 Social Responsibility**

To identify the needs of the nearby community to the project site, a community need assessment study was carried out. The main purpose of the study was to assist the project proponent in delivering their Corporate Social Responsibility (CSR). As per the guidelines of

*Company's Act (Amendment) 2013*, the study was mainly focused on the following areas.

**1. PROMOTION OF EDUCATION**

**2. HEALTH CARE**

**3. SOCIAL ASPECTS**

As part of study the socio economic expert conducted interviews with different stake holders of the Panchayath. The list of stake holders are given below

**Identified Corporate Social Responsibility**

The Socio - Economic expert conducted Need Assessment study and identified Corporate Social Responsibility (CSR) for the project proponent.

The identified CSR activities are given below.

**1. PROMOTION OF EDUCATION**

A. To improve the infrastructure facilities, the project will support the Govt School, near to our project.

<b>Particulars</b>	<b>Total Amount</b>	<b>Type of Expense</b>
Library books	10,000	Recurring
Waste bin	10,000	Recurring
School Kit (Uniform, Bag etc)	30,000	Recurring
<b>TOTAL</b>	<b>50,000</b>	

**2. HEALTH CARE**

<b>Particulars</b>	<b>Total Amount</b>	<b>Type of Expense</b>
Financial support Patients	25,000	Recurring
Medical Camp	25,000	Recurring
<b>TOTAL</b>	<b>50,000</b>	

**3. SOCIAL ASPECTS**

<b>Particulars</b>	<b>Total Amount</b>	<b>Type of Expense</b>
Well recharge	5X1000=50000	Recurring
Construction of houses	50,000	Recurring
<b>TOTAL</b>	<b>1,00,000</b>	

**Table No.21-SUMMARY OF CSR ACTIVITIES PROPOSED**

<b>Sl. No</b>	<b>Area of Intervention</b>	<b>No of Intervention</b>	<b>Recurring Expense</b>
1	Promotion of Education	1	50,000
2	Health Care	1	50,000
3	Social Aspects	1	1,00,000
<b>TOTAL</b>			<b>2,00,000</b>

## **CHAPTER VI**

### **RISK ASSESSMENT AND DISASTER MANAGEMENT PLAN**

#### **6.1 FALL OF SIDES**

- Flatter slopes angles are adopted where occurrences of loose earth are encountered.
- No disaster like land slide, flood or inundation or fire is anticipated in this case.
- Unmanageable heights are not created.
- Loose rocks are properly dressed.
- Nature and structure of the rocks are properly studied for their slips.
- The faces will slope at 45°.
- The hanging wall, footwall & mineralized zone are competent to stand safely for long Time.

#### **6.2 STORAGE AND USE OF EXPLOSIVES**

- Proper and safe storage of explosives in approved and Licensed Magazine.
- Proper, safe and careful handling and use of explosives by competent Blasters having Blaster's Certificate of Competency issued by DGMS.
- Proper security system to prevent theft/ pilferage, unauthorized entry into Magazine area and checking authorized persons to prevent carrying of match box, mobile phones, cigarette etc.
- The explosives of class 2 will be used in their original cartridge packing and such Cartridge shall not be cut to remove explosive for making cartridge of different size.
- Detonators will be conveyed in special containers. These will not be carried with other explosives.
- The holes which have been charged with explosives will not be left unattended till blasting is completed.
- Before starting charging, clear audible warning signals by Sirens will be given so that people nearby can take shelter.
- Blasting operations will be carried out in day times only. However, in this project the mining operations are proposed to be carried out in day times.

### **6.3 STORAGE OF OIL AND FUEL**

- Due care will be taken to avoid oil spillage.
- Storage will not be allowed beyond necessity.
- Fuel oil and lubricants will be stored only in approved containers in separate storerooms. Match box, lighters, mobile phone, dry wood, plastic paper sheets and smoking will not be allowed near the storage area.

### **6.4 WATER**

- Due care will be taken to provide channel all around the foot of the hill to collect run off and also to avoid soil erosion.
- There is no danger of flood or inundation as the proposed working is above the normal ground level. The area is not susceptible to floods.

### **6.5 DISASTER MANAGEMENT PLAN**

During mining activities, proper measures will be taken to ensure safety at site. In order to handle disaster/ emergency situations, an organizational chart entrusting responsibility to various project personnel will be prepared with their specific roles during emergency.

### **6.6 OCCUPATIONAL HEALTH AND SAFETY**

The main areas of concern for ensuring adequate occupational health and safety are:-

- All working places will have safe means of access, safe working platform and exit. Persons working in hazardous dust prone area will be provided with dust mask.
- Personal protective equipment's like respirators, ear plug, noise muff, helmet etc. Will be provided to the workers.
- Proper unit design and engineering controls in order to protect workers, including by control of process and fugitive emissions.
- Adequate arrangement of drinking water will be done.
- Education & training will be provided to the workforce about facilities, protective equipment, risk associated, potential health effects, etc.
- Display board will be provided showing the hazards associated and recommended precautionary measures.

### **6.7 Site Management Measures**

The Quarry permit area is an undulated rocky terrain with thin layers of soil as substratum and shrubby growth of weeds. The site is a rocky area with an outcrop of charnockite without extensive vegetation. The weeds and shrubby growth of plant are cleaned manually. The loose soil layer is removed and stored in the non-mining area, which will be used for plantation purpose. The boulder and the underneath rock bed consist of rock mass, which is the mother rock where the extraction of products shall be undertaken.

The number of workers for the current production including the machinery operators and drivers is 10(adult workers). The quarry shall not employ any children below 18 years. Also the workers are from nearby villages and no migrated laborers are employed for the current quarry operation. Thus settlement of migrated worker is not involved inside the Quarry permit area, as the workers shall be daily waged laborers of the area. The main activity is drilling, excavation, storage and transportation of final product.

### **6.8 Drainage Management**

Before onset of monsoon, drains are cut along toe of the quarry faces to divert the surface run off. Garland drain is provided at the quarry top to regulate monsoon water and direct the same to the settling ponds / quarry pit to contain the quarry wash off and to avoid the same joining to the adjoining surface water bodies / water courses. It also helps to avert eventual collapses and damages to the quarry faces if any.

The quarry is currently designed to avoid surface water courses and drainage channels. Sources of contamination from the operation that could affect water quality include dust from blasting and refueling for equipment. Blast residues from explosives will be managed by ensuring that all material is ignited during the blasting process. Vehicle fueling will be conducted at a centralized fueling facility off site that has proper containment and spill response capability. Fueling for non-moveable onsite equipment, such as generators, will take place in a secured area with approved spill containment.

## **Chapter VII**

### **Environmental Control Measures**

#### **7.1 Environmental Management measures**

The entire quarry area is planned systematically and scientific method of mining with 5.0 bench height and 5.0 m bench width. Once the reserves are exhausted, the quarry pit will be reclaimed to the extent possible by suitable plantation. Some area of the pit will be retained as water pond with fencing around the quarry permit. Qualified Mines Manager will supervise mined area management. Mines Manager will identify the suitable personnel for implementation of Environmental Management Plan (EMP).

#### **7.2 Safety and Environment Management measures**

- Mitigation measures will be taken in respect to non - compliance.
- Review of the safety practices being followed and additional safety measures if necessary.
- Identification of unsafe conditions/ practices prevailing in the area and mitigation measures, if any.
- Arrangement of training to develop safety awareness among all staff including laborers.
- Preparation of safety codes/ manuals of operations which will be distributed to workers.

#### **7.3 Occupational Health measures**

An occupational health unit will be organized and the proposed measures will be adopted:

- Periodic Medical Checkup program for all the workers.
- Compulsory medical checkup program for risk group
- Training for workers regarding occupational hazards.
- Lung function test for workers exposed to dusts.

#### **7.4 Post Environmental Clearance Monitoring Programme**

An environmental monitoring cell will be constituted for constant monitoring of environmental parameters like air, water, noise and soil to assess the status of environment during mine operations and other activities. The environmental monitoring cell will conduct routine monitoring as given below to ensure the protection of environment from any degradation. Besides, the compliances to all environmental clearance conditions and consents from KSPCB / MOEF will be monitored and reported periodically.

**Table No.17- Post Environmental Clearance Monitoring Programme**

<b>SI No</b>	<b>Potential Impact</b>	<b>Actions to be Followed</b>	<b>Parameters for Monitoring</b>	<b>Frequency of Monitoring</b>	<b>Location</b>
1.	Air Emissions	Ambient air quality within the project site from four corners.	PM <sub>10</sub> , PM <sub>2.5</sub> , SO <sub>2</sub> and NO <sub>2</sub>	Once in a year	At least one location at site and nearest habitation
		Good conditioned vehicles shall be used to ferry the rock fragments by making minimum number of trips from the project site. Periodic vehicular servicing shall be carried out to limit the vehicular emission within the standard prescribed by PCB	Systematic maintenance of Vehicle logs	Daily Records	Main Entrance
		The main source of the dust emission is from haulage road and quarry site. To minimize the dust emission, periodic maintenance of the haulage road, sprinkling of water along the haulage road and the quarry site, shall be carried out.			
2.	Noise	Noise is mainly generated from quarrying activities	Spot noise level recording during	Once in a year	Noise measurement



		and operation of heavy machinery and vehicular movements. To minimize noise disturbance the quarrying operations shall be restricted to day time, vehicular movements shall be minimized, the drilling technology shall be updated to the latest and blasting shall be carried out with controlled mechanism and green belt can be developed which act as an acoustic barrier for noise transmission.	and after blasting.		at site and nearby habitations
3.	Waste water and solid waste discharge	Waste water and solid waste generated from the domestic activity will be disposed through septic tanks and soak pits. The quarry wash off will be directed to the quarry pit. No untreated discharge to be made to the surface water, ground water or soil.	No discharge will be made in to or in the vicinity of water courses.	Periodic during operational phases.	-
4.	Drainage management.	Drains will be cut along toe of the quarry faces to divert the surface runoff. Garland drain shall be provided at the quarry top	Visual inspection of drainage & mitigative measures.	Periodic during operation phase.	-

		to regulate monsoon - storm water and direct the same to the settling ponds.			
5.	Water quality and Water levels.	Used water and ground water shall be monitored for assessing the quality and the ground water level will be checked.	Comprehensive monitoring as per IS 10500	Periodic during operation phase	3 location surrounding the mine site
6	Energy usage	Energy usage will be minimised as possible. Consumption of conventional energy will be reduced by utilizing renewable energy sources.	Energy audit report.	Annual audits and periodic checks during operational phases	-
7	Emergency preparedness such as fire fighting	Assessment of fire protection and safety measures to take care of fire and explosion hazards and steps taken for their prevention	Mock drill records and onsite emergency plans	Periodic during operational phases	-
8	Maintenance of flora and fauna.	Vegetation, green belt/green cover development	No. of plants, species	During monsoon	-
9	Waste Management	Implement waste management plan that identifies and characterizes every waste arising associated with proposed activities and which identifies the procedures for collection	Records of solid waste generation and disposal.	Periodic during-operation phase	-

		,handling and disposal of each waste arising			
10	Health	Periodical Medical check-up programmes, Training for workers regarding occupational hazards	Occupational Health Checkup.	As per Mines Acts	-

### 7.5 Environmental control cost estimate

S. No.	Description of item	Recurring cost
1	Air Pollution Control - Water sprinkling	60,000
2	Water Pollution Control	40,000
3	Green belt Development(saplings, plant guard, etc)	30,000
<b>Total</b>		<b>1,30,000</b>

Additionally, 1% of annual profit shall be given to concerned Panchayath for Biodiversity Management Committee toward eco-restoration.

### Conclusion

It is predicted that socio-economic impact due to this project will positively bring prosperity and improvements in physical and social infrastructure in the area. It will increase the chance of more employment to local people. There is no resettlement and rehabilitation involved in this project. Revenue of the state government and central government will be increased through collection of various taxes. The entire project area is devoid of any endangered flora and fauna.

It is proposed to reclaim the land to a maximum possible extent by providing green belt in refilling and surrounding areas. In addition to this 10% of the total area is converted to water pond. Thus the proposed project is not likely to affect the environment or adjacent ecosystem adversely.

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**Declaration**

We certify that the information given above is true to the best of our knowledge and belief. If any of the information is found incorrect or misleading, we agree that the proposal may be rejected.



Joshy P Mathew  
Applicant



Nazar Ahamed K.V  
DMG/KERALA/RQP/7/2016