

EXECUTIVE SUMMARY

for

“GREY GRANITE QUARRY”

at

Survey No. 48 & 49
Arasinakere Village, Koppal Taluk & Koppal District,
Karnataka State

(Extent: 27 Acres (10.926 Ha.))

of

M/s. P. BALASUBBA SETTY & SON'S

*No. 2078, 22nd Ward, J.P Nagar, Ballri Road,
Hosapete- 583201, Ballari District.*

Patta Land

Prepared by

NABET/EIA/1821/SA 100



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Executive Summary

of Environmental Impact Assessment & Environmental Management Plan

1.0 INTRODUCTION

M/s. P. Balasubba Setty & Son's, has notified for a Grey Granite Quarry over an extent of 27.00 Acres (10.926 Ha) of Patta Land in Sy.No. 48 & 49 of Arasinakere Village, Koppal Taluk, Koppal District, Karnataka State. This lease area is notified by Sr. Geologist, Department of Mines & Geology, Koppal vide Notification No.DMG/KMD/SQ-Patta-54/2018-19/1041 Dated: 14.09.2018. The entire 27.00 Acres area patta land is converted as non agriculture (NA) for quarrying activities.

The said lease is having an approved quarrying plan for the maximum production of 30555 cu.m/annum as approved by Sr. Geologist Dept. of Mines and Geology, Koppal vide Letter No. DMG/SG/KPLA/QPA/2018-19/1945 Dated: 27.03.2019.

As per the EIA notification of Ministry of Environment Forests and Climate Change, Government of India (MoEF&CC), dated 14th September, 2006, and subsequent as amended from time to time, this quarrying project falls under category 'B1' project, activity 1(a) of EIA Notification, an Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) is required for obtaining Environmental clearance based on Terms of Reference (TOR) as approved by the State level Environment Impact Assessment Authority (SEIAA) and TOR was granted vide letter No. SEIAA 322 MIN 2019 dated 31.08.2019.

Further to assess the impact on environment, it is necessary to ascertain present status of environment prevailing at the project site and proposed Quarrying and operation including identification and Assessment of impact on the environment. Keeping these points and statutory requirement in view, this Environment Impact Assessment Report (EIA) and Environmental Management Plan (EMP) has been prepared. The Environmental Study has been carried out within 10 km radius from the quarry area for the of period of March 2019 to May 2019 (Summer Season).

2.0 PROJECT DESCRIPTION**Table.No.1 Project Details**

Sl. No	Item	Details
1	Name of the project	Grey Granite Quarry of M/s. P. Balasubba Setty & Son's
2	Project Location	Sy No – 48 & 49 Village – Arasinakere Taluk - Koppal Dist - Koppal , State - Karnataka.
3	Nature of Project	Quarrying of Grey Granite
4	Extent of the Lease Area	27.00 Acres (10.926Ha.)
5	Proposed Production Capacity	The maximum production of Granite per annum shall be 30555 cu.m/annum and waste quantity of 56745 cu.m/annum.
6	Category of Project	B1
7	Land Type	Patta Land
8	Topo sheet	57 A/7.
9	Coordinates Latitude Longitude	N 15° 28' 50.6'' to 15° 29' 10.9'' E 76° 17' 12.5'' to 76° 17' 23.1''
10	New / Expansion / Modernization	New Quarry
11	Importance of Project	This quarrying project is located in the backward area and shall have positive impact on socio-economics, The Grey Granite blocks are having good export and domestic market. The granite of this area is used in our country mainly for flooring and decorative purpose after polishing.
Environmental Setting Details (With approximate aerial distance and direction from the mining lease boundary)		
12	Nearest Village	Arasinakere is located at the distance of 2.0km North from the lease area.
13	Nearest City	Koppal
14	Nearest National Highway	NH-13 (Solhapur to Chitradurga)
15	Nearest Railway Station, Air port, Sea port	Nearest railway station Munirabad is at a distance of 26 km. Hubli airport is located at a distance of 150 kms from said quarry.
16	Interstate Boundary	74km (Karnataka- Andhra Pradesh)
17	Archeological Places,	Hampi -30km

17	National Park, Wild Life Sanctuary, Wild Life Corridors, Biosphere Reserves, Migratory routes for Birds. Reserved / Protected Forest with in 10km radius study area	Apart from Agoli Reserved forest (near to the Bommasagar) located which is located at a distance of 3.0 km East from the lease, no other sensitive areas are located Within 10 Km radius from project boundary																										
18	Water bodies with in 10km radius	<table border="1"> <thead> <tr> <th>Sl. No</th> <th>Water bodies</th> <th>Distance (Km)</th> <th>Direction</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Irakalaguda</td> <td>6.5</td> <td>W</td> </tr> <tr> <td>2</td> <td>Tavargere</td> <td>7.25</td> <td>SSW</td> </tr> <tr> <td>3</td> <td>Indragi</td> <td>6.0</td> <td>SSE</td> </tr> <tr> <td>4</td> <td>Parapur</td> <td>8.0</td> <td>NE</td> </tr> <tr> <td>5</td> <td>Kudrimuti</td> <td>9.5</td> <td>NWW</td> </tr> </tbody> </table>			Sl. No	Water bodies	Distance (Km)	Direction	1	Irakalaguda	6.5	W	2	Tavargere	7.25	SSW	3	Indragi	6.0	SSE	4	Parapur	8.0	NE	5	Kudrimuti	9.5	NWW
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5	Kudrimuti	9.5	NWW																									
19	Seismic Zone	Zone – II [as per IS 1893 (Part-I): 2002]																										
Cost Details																												
20	Total Project Cost	270.00 lakhs																										
21	Cost of Environmental Protection Measures (Recurring cost)	19.00 lakhs																										

MINING DETAILS

Sl.No.	Particulars	Details
1	Method of Mining	Open Cast fully Mechanized Quarrying Method
2	Granite Production Capacity	Max 30555 cu.m/annum
3	Total Mineable Reserves	6,72,009 cu.m
4	Total waste generation till the end of Life of quarry	255220 cu.m
5	Life of quarry	23 years
6	Bench Height	6m
7	Bench Width	6m
8	Elevation Range	Highest elevation is 634mRL Lowest elevation is 616mRL
9	General Ground Level	625m AMSL
10	Ground water table	50-70m BGL
11	Ultimate working depth	30m
12	Overall pit slope	45 ⁰

3.0 GEOLOGY:**3.1 TOPOGRAPHY:**

This Grey Granite stone quarry is a small hillock with gentle slope. The highest elevation in this area is 634mRL and the lowest elevation is 616mRL. The slopes are trending towards Eastern as well as Northern side.

3.2 REGIONAL GEOLOGY:

The geology of this area corresponds to the regional geology of Dharwar group. The granites are of the batholic nature. The regional stratigraphic sequence in the region.

Clospet Granites	
Dharwar Supergroup	Phyllites, slate, Greywackes, slate and tuff Epideorite flows, pillow lavas, Ferruginous and manganese phyllites Massive Bands of Iron formations.
Peninsular Gneisses	

3.3 LOCAL GEOLOGY:

The major part of the lease area is covered by the grey granite, which are the part of clospet granites. The Granite is exposed on surface within as well as all around the lease area. The granite is characterized by multi color and hard in nature. The granite is grey in colour with small black dots.

The granite are exposed on surface in the lease area whereas in the region it is extended upto the depth of 60m. The granite is batholithic in nature and having great geological depth. This area is well exposed by granite.

3.4 GEOLOGICAL RESERVES

The reserves have been estimated using cross sections drawn at an interval of 100m to 127.5m depending upon the Granite availability & shape of the lease. Proved reserves considered up to 30m depth from the surface of the lease. From the cross sectional area of Granite zone, volumes are arrived using the cross sectional interval. The recovery of Grey Granite Blocks is 35 %. The total estimated geological resources of Granite in this area are 888,487 m³.

3.5 Mineral Reserves:

The total Granite reserves in this quarry area are 6,72,009 cu.m. It is proposed for quarrying of 137,427m³ Granite Blocks during five years of the plan period. The estimated reserves are based on the present exploration data.

3.6 QUARRYING :

The proposal is made for the opencast Quarrying by other than fully mechanized method. It is proposed to produce maximum quantity of 30555 cu.m/annum granite from this quarrying in the V-year of plan period. The quarry is planned out in such a way by taking advantage of the geological structures especially the major sets of joints/cracks. The height of the bench shall be maintained to 6mt with the width of 6mt. The bench slope shall be maintained to 45⁰.

Initially drilling by pneumatic jack hammers (hole diameter is 33mm) shall be done at appropriate intervals (20-30 cms) to the desired depth. Smooth blasting shall be effected by using gun powder. When the surface of a certain bench is too uneven because of exposed horizontal joints, wire saw is used to make the side cuts of the primary block. The back cut and drilling 33mm holes with the line drill does the horizontal bottom cut of the primary block and smoothly blasted with gunpowder. The loose joints can be split by feather and wedges. If the joints are tight, as we go deep, the methodology will change accordingly. The waste generated from working benches shall be loaded to dumpers by excavators and front end loaders and hauled to the dumping yard.

The granite shall be either transported directly to the consumer or shall be stacked at the area earmarked for mineral storage. The waste shall be transported to the area earmarked for waste dumping. The finished product shall be sold mainly for export and domestic market.

3.7 PROPOSED PRODUCTION:

The proposed quantities of development and production expected year wise during the Plan period are given in Table No.2.

Table No.2:-Proposed Production & Development

Year	Granite Blocks 35% rec	Waste 65% rec	Soil
	Volume in m ³	Volume in m ³	Volume in m ³
I	20825	38675	0
II	25020	46465	0
III	30524	56687	0
IV	30503	56648	50
V	30555	56745	850
Total	137427	255220	900

3.7.1 MINEABLE RESERVES AND ANTICIPATED LIFE OF THE MINE:

The mineable reserves in the lease area are 6,72,009 m³, out of which 137427 m³ Granite shall be mined during these 5 years plan period. The balance quantity 534582 m³ shall be mined in next 18 years. Therefore that life of the quarry is 23 years. However, the life of quarry will increase if additional reserves could be proved by exploration.

The quarry is proposed for excavation upto the depth of 15m from the surface during the plan period; however the quarry design and depth may change after proposed exploration. Around 255220 m³ of waste shall be generated during the plan period. The waste consists of hard rock and Fractured zones. The waste generated during Quarrying shall be loaded to tippers by excavator and dumped at the 1.27 Acres area earmarked for dumping. The waste also can be transported to the nearby crushers after obtaining due permission as well as permit from the Department of Mines & Geology. About 900 m³ soil is expected to generate during the plan period. The soil is black in colour and silty in nature.

3.8 DRILLING:

Initially drilling by pneumatic jack hammers (hole diameter is 33mm) shall be done at appropriate intervals (20-30 cms) to the desired depth. Further pouring the crack reagent powder with water through the drill holes can split the secondary blocks. Then the final dressing will be done by drilling & feather and wedges.

3.9 EMPLOYMENT POTENTIAL:

The man power required shall be employed from the local areas. The drivers / truck Operators also shall be engaged from local areas. Hence influx of population from Outside is not anticipated. Others shall be employed through contractor

Table No.3:-Employment Potential

Sl. No	Particulars	No's
1	Highly Skilled	6
2	Skilled	10
3	Semi-skilled	8
4	Un-skilled	20
	Total	44

3.10 SITE SERVICES:

As at present there is no any site services exist, now it is proposed a small office, rest shelter, first aid room and urinal shall be constructed at the entrance of the lease area.

4.0 LAND USE:

The ultimate land use plan (the land proposed to be degraded due to quarrying and other allied activities at the end of Plan Period) is given in Table No.4.

Table No.4:-Land use at the end of Plan period & Conceptual Plan

Particulars	Land use pattern at present stage (Acres.)	Land use at the end of plan period (Acres)	Land use pattern (Conceptual Period) (Acres.)
Area for Quarry	-	6.66	23.92
Area for safety barrier/Green Belt	-	3.07	3.08
Area for Waste Dump	-	1.27	-
Area for Road	-	0.90	-
Area for St. Buildings	-	0.16	-
Area for Mineral Storage	-	1.38	-
Unused Area	27.00	13.56	-
Total Lease area	27.00	27.00	27.00

5.0 NATIONAL SANCTUARY/ ARCHAEOLOGICAL IMPORTANCE SITES/ INTERSTATE BOUNDARY WITHIN 10 KMS RADIUS?

There is no National parks, Wild life Sanctuaries, Biosphere reserves, Tiger reserves, Elephant corridor heritage site, Archaeological importance sites, Interstate boundaries, Habitat etc., within 10Kms radius.

6.0 PUBLIC BUILDINGS, PLACES OF WORKSHIP AND MONUMENTS :

There are no buildings and monuments of historic importance within the QL area. However, the Arasinakere village is at distance of 2.0kms away from the lease boundary.

7.0 COST OF THE PROJECT:

Considering the fluctuating market scenario and present domestic market conditions of the products, the cost of the project estimated to be around 270 Lakhs.

8.0 ENVIRONMENTAL STUDIES:

The Environmental Monitoring studies were carried out during March – May 2019 (Summer Season). The environmental studies were carried out in Core zone and buffer zone of 10 kms radius for Meteorological data, Air, Water, Noise, Soil, Flora, Fauna etc.,

8.1 METEOROLOGY:

8.1.1 Temperature

On perusal of last 6 years temperature data reveals that the highest temperature is 41.00°C during the peak summer season & maintains the maximum temperature for a week. The summary of the 3 months study period (March-May2019) temperature data is given in the Table No.5.

Table No.5:-Monthly Maximum & Minimum Temperature

Month	Temperature in °C		
	Min.	Max.	Avg.
March -2019	16.0	36.5	28.01
April-2019	20.0	39.5	29.95
May-2019	22.0	40.0	30.22

The perusal of mean monthly temperature data shows that lowest & highest temperature of 16.0°C and 40.0°C respectively were observed in the month of March - 19 and April - 19.

8.1.2 Relative Humidity

The morning and evening relative humidity data collected during the study period is shows that the highest humidity is 85% in April-19 and lowest humidity is 19% in March-19. The values of different month for the study period are given in the below Table No.6.

Table No.6:- Monthly maximum & Minimum Relative Humidity

Month	Relative Humidity in %		
	Min.	Max.	Avg.
Mar- 2019	19.0	84.0	49.02
April-2019	20.0	85.0	51.30
May-2019	21.0	78.0	54.37

8.1.3 Rainfall

The summary of the rainfall data of the year 2015 to 2019 is given in the Table No.7.

Table No.7:- Summary of Rainfall of Five years

Year	Rainfall (mm)
2015	577.8
2016	452.6
2017	700.9
2018	581.3
2019	726.0
Average	607.72

The Maximum is 2.80mm rainfall in the month of April-19 and minimum rainfall of 1.40mm is observed in the month of May-19.

8.1.4 Wind Velocity & Direction

Predominant Wind directions during this study period were from the NE to SW sector. Wind speeds during this study period were varying between 6.09-11.82kmph. The maximum wind speed is 11.82m/s during study period. For the month of March, April & May 2019 flow vector is predominantly towards NE to SW.

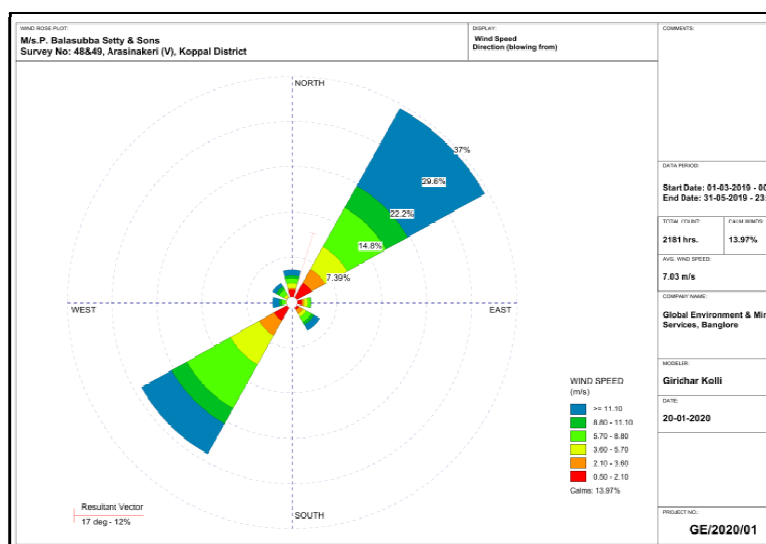


Fig: 1 Windrose Diagram of March 2019 to May 2019

8.2 AIR ENVIRONMENT:

Ambient air quality of the study area has been assessed through a network of nine (9) ambient air quality locations. Results of the ambient air quality at all the above locations were found to be well within the limits of National Ambient Air Quality (NAAQ) Standards specified for Rural, Residential and Industrial areas. Concentrations of PM₁₀, PM_{2.5}, SO₂ and NO_x are mainly contributed due to vehicular traffic and local activities. The following is the summary of Ambient Air quality in the study area.

Table No.8:-Summary of Ambient Air Quality ($\mu\text{g}/\text{m}^3$)

Station Code	Locations	24 hrs average contribution ($\mu\text{g}/\text{m}^3$)							
		PM ₁₀		PM _{2.5}		SO ₂		NO _x	
		Min	Max	Min	Max	Min	Max	Min	Max
A1	Core zone	20.06	34.82	3.13	9.61	BDL	BDL	BDL	BDL
Buffer zone									
A2	Bommasagar Tanda	39.35	54.50	9.16	15.31	6.08	9.70	8.00	11.33
A3	Jinnapur Tanda	34.46	55.05	8.42	14.82	6.63	10.19	7.25	12.16
A4	Arasinakere	39.44	53.70	8.48	14.99	7.05	10.19	8.50	11.55
A5	Metagal Village	42.89	57.59	9.93	19.98	7.15	11.17	8.93	12.16
A6	Wanballari	41.53	56.62	10.48	18.42	6.41	9.86	8.32	10.98
A7	Kamanuru	41.00	52.70	9.38	18.32	6.08	9.84	8.00	11.68
A8	Irakallagada	45.12	58.48	9.76	15.44	7.21	13.50	8.37	15.05
A9	Muslapur	43.72	55.01	9.16	14.18	7.21	10.54	8.34	12.16

In general, Quarrying activity contributes to pollution of air due to working of mining equipment and transportation. Since the mine is proposed to work by fully mechanized means, there is pollution to the air. However, the ambient air quality results area well within the standards and lead is Below Detectable Limits.

8.2.3 CONTROL MEASURES

Following measures shall be adopted to mitigate air pollution generated due to the quarrying activities:

- Sharp drill bits are being used for drilling to reduce generation of dust.
- All the haul roads are being kept properly graded with sufficient width and regular water spraying is done on the haul roads.
- Proper maintenance of vehicles is being carried out regularly for minimization of generation of gaseous pollutants.
- Personal Protective Equipments like dust mask, ear plug/ear muff, goggles, safety shoe, hand gloves are being provided to all employees
- Periodical ambient air quality monitoring is being done.
- Development of green belt/plantation around lease boundary and other places to arrest dust.

8.3 NOISE QUALITY

Noise levels in the proposed quarry will be produced due to movement of vehicles for transportation of granite blocks. But the pronounced effect of noise is felt only near the active working area. Since the proposed quarry will adopt open cast mechanized method for mining, there will not be much impact on the surrounding villages due to the mining operations.

Noise pollution in quarrying area is mainly due to noise generation from the moving of machinery & Transportation. The noise level may increase in core zone due to drilling and quarrying operations. Since this mine is worked by means of fully mechanized, the noise levels are monitored as per the norms laid down by the governing agencies. The results are shown in the following Table No.9.

Table No.9:-Summary of the Noise Level

Sl. No.	Location	Environmental Setting*	Average Day Noise level (dBA)			Average Night Noise level (dBA)		
			Mar-2019	Apr - 2019	May - 2019	Mar-2019	Apr - 2019	May - 2019
1	Core Zone	Industrial area	48.07	48.24	49.47	38.03	38.57	37.90
2	Bommasagar Tanda	Residential area	50.17	50.07	50.40	39.17	37.10	41.38
3	Jinnapur Tanda		51.86	50.41	51.44	41.78	38.85	39.51
4	Arasinakere Tanda		50.00	49.83	49.44	38.12	38.37	37.82
5	Metagal Village		51.39	53.07	51.86	38.70	40.70	41.78
6	Wanballari		50.19	50.59	51.71	40.39	38.28	41.84
7	Kamanuru		51.98	52.14	52.80	39.47	41.96	40.06
8	Irakallagada		52.31	52.49	52.58	40.91	39.46	42.95
9	Muslapur		51.39	53.04	52.65	40.07	41.94	41.68

Ambient Noise levels varied from 48.07 to 49.47 Leq dB(A) during day time and during night time noise levels ranged from 37.09 to 38.57 Leq dB(A). In Buffer zone 49.44 to 53.04 Leq dB(A) day time and during night time noise levels ranged from 37.82 to 42.95 Leq dB(A).

8.3.2 NOISE CONTROL MEASURES

Noise levels will be kept within acceptable limits by:

- Use of sharp drilling bits, delivery of compressed air at optimal pressure and proper maintenance of compressor, drilling machine, jackhammers and tipper trucks. Particular attention should be given to the silencers and mufflers.
- Ear muffs or other protective devices shall be provided to the staff working in high noise prone areas and Provisions of rotation of workers to minimize exposure time shall be envisaged.
- Limiting the speed of empty haulage vehicles/tippers to a moderate level to prevent undue noise.
- A green belt shall be developed all around the lease boundary to minimize propagation of noise.
- Regular monitoring of noise pressure level shall be done inside and outside the Quarry lease area.

8.4 WATER ENVIRONMENT

Thirteen (13) water samples were collected from different locations. 10 Ground water samples and three surface water samples collected from the study area showed compliance of all parameters with the drinking water standard of IS 10500.

Table No.10:-Summary of the Noise Level

Station No	Location	pH	TH mg/l	TDS mg/l	Ca mg/l	F mg/l
GW1	Arasinakere Tanda	7.41	852	530	108	0.82
GW2	Bommasagar Tanda	7.50	1260	790	124	1.32
GW3	Wanballari	8.47	425	224	55	0.24
GW4	Jinnapur Tanda	7.52	444	176	49	1.02
GW5	Metagal Village	8.10	516	286	39	0.76
GW6	Kukanpalli Village	7.30	774	354	60	1.23
GW7	Abbigeri	7.97	1098	526	148	1.30
GW8	Kamanuru	7.70	982	484	116	1.30
GW9	Irakallagada	7.78	592	324	52	0.82
GW10	Muslapur	7.38	684	276	42	0.52
SW1	Kamanuru Pond	8.43	260	124	35	0.68
SW2	Irakallagada Pond	8.72	520	334	64	0.77
SW3	Muslapur Pond	8.50	276	152	40	0.89

8.4.1 Observation of Ground Water & Surface water:**Analysis results of ground water in summer season the following:-**

- pH varied from 7.30 to 8.47
- Total hardness varied from 176 mg/l to 790 mg/l
- Total dissolved solids varied from 425 mg/l to 1260 mg/l

Analysis results of Surface water in summer season reveal the following:

- pH varied from 8.43 to 8.72.
- Total Hardness varied from 260 mg/l to 520 mg/l
- Total dissolved solids varied from 124 mg/l to 334 mg/l

8.4.2 Impacts on Water Environment

There are no natural drainage channels within quarrying lease area. The ground water table is available at a depth of 50 m from the general ground level. No seepage water is envisaged in the quarry as no other quarry pits exist above the present working level of subject quarry. Hence there will not be much impact on the ground water table due to quarrying activities.

To avoid soil erosion, rain water entering into the mine pit, and carry of the silt material with rain water, Mine Management will provide suitable garland drains all along the active quarry area. Construction of retention wall all along the toe of the dumps, afforestation on the active dumps, construction of Check dams, Gully plugs etc. Hence impacts due to storm water by soil erosion followed by siltation are minimal.

8.4.3 Water Control Measures

Adequate control measures are being adopted to check not only the wash-off from soil erosion but also uncontrolled flow of quarry water. The measures to be adopted are:

- During rains, water will precipitate within the quarry and in the vicinity, to arrest the velocity of rain water flow and settling of heavy particles sufficient gully checks to check any silt flowing along with the surface run-off in the valleys shall be provided.
- Construction of catch drains and settling tanks around dumps for channelization of rainwater and to prevent siltation/sedimentation.
- A green belt shall be developed all along the lease boundary in 7.5 m safety barrier with good root bearing species A garland drain shall be constructed all along the lease boundary to divert the rain water into the working pit.
- No stored water will be released directly to streams/nallah.
- Construction, maintenance and cleaning of Check dams and gully plugs across the seasonal nallah.

9.0 LAND ENVIRONMENT

The present Land use/ Land cover map for the proposed project activity is prepared by latest satellite image. The Grey granite Quarry is a new quarry, the present land use in the core zone (lease area) is given in the shown below Table No.11.

Table No.11:-Land use Pattern

Particulars	Land use at the end of plan period (Acres)	Land use pattern (Conceptual Period) (Acres.)
Area for Quarry	6.66	23.92
Area for safety barrier/Green Belt	3.07	3.08
Area for Waste Dump	1.27	-
Area for Road	0.90	-
Area for St. Buildings	0.16	-
Area for Mineral Storage	1.38	-
Area for Top Soil	-	-
Unused Area	13.56	-
Total Lease area	27.00	27.00

9.1 Soil Quality

Soil samples reveal that there is not much variation in chemical composition. Soils are mostly sandy silt in texture. The soil analysis data indicate that the pH values ranges from 6.05 to 8.16. Soil pH plays an important role in the availability of nutrients. Soil microbial activity as well as solubility of metal ions is also dependent on pH. Electrical Conductivity value ranges from 60 μ S/cm to 210 μ S/cm.

Table No.12:-Chemical Properties of Soil

Sl No	Parameters	Unit	Results								
			S1	S2	S3	S4	S5	S6	S7	S8	S9
1	pH	-	6.85	7.21	7.01	7.36	8.16	7.96	6.05	7.24	6.85
2	Conductivity	μ S/cm	140	80	60	80	160	120	210	130	190
3	Chloride	mg/kg	24	18	13	22	15	17	21.0	18.0	24.0
4	Sodium Absorption Ratio	meq/l	3.82	1.10	0.90	0.71	1.55	0.65	1.06	1.08	1.21
5	Moisture Content	%	3.09	1.88	3.13	2.01	5.81	5.09	3.26	2.72	1.64
6	Sodium as Na ₂ O	mg/kg	47.86	17.17	17.87	14.92	13.83	11.12	20.70	17.71	24.61
7	Potassium as K ₂ O	mg/kg	1.10	31.44	15.69	12.56	16.68	19.02	15.27	12.33	18.50
8	Phosphorus as P ₂ O ₅	mg/kg	0.64	1.19	0.71	0.62	1.99	0.57	0.82	0.54	0.96
9	Organic Matter	%	2.42	2.26	2.08	2.36	2.14	2.40	1.26	2.04	2.46

Locations : S1: Core Zone

S2: Bommanasagar Agricultural Land Soil.

S3: Jinnapur Agricultural Land Soil.

S4: Arasinakere Agricultural Land Soil.

S5: Metagal Agricultural Land Soil

S6: Wanballari Agricultural Land Soil

S7: Kamanuru Agricultural Land Soil

S8: Irakallagada Agricultural Land Soil.

S9: Muslapur Agricultural Land Soil.

All the samples are showing moderately fertile in nature and favorable for afforestation/ agriculture.

10.0 FLORA AND FAUNA

As the lease area covered by rocky out crop, so no vegetation is found. However some thorny bushes are seen here and there.

The core zone is partly rocky area and does not support vegetation. There are no endangered and endemic plant species. There are no reports of wild animals.

10.1 Disasters Management.

The complete quarrying operation will be carried out under direction of qualified mines manager and superior mining personnel, following the directions of Directorate General of Mines Safety (DGMS) and officers of Dept. of Mines & Geology. Code of practice of different operations will be formulated to maintain of high standard of safety. Work persons have been given vocational training and further the standing will be continued to new entrants. The nearest Police Station & Fire Brigade Station is Koppal at a distance of 32 kms from lease area. The contact person responsible for Disaster Management and Risk Assessment is as follows:

Name: **M/s. P. Balasubba Setty & Son's**
 No. 2078, 22nd Ward,
 J.P. Nagara, Ballari Road,
HOSAPETE-583201, Ballari Dist.,
 Karnataka State .
 Mobile: +91 9740637291

10.2 Plantation Program

Greenbelt development as per the scheduled plan shall be reviewed every year. Post plantation status also is regularly checked every season and the plantation related data / information shall be kept and compiled every year. The details of the plantation with respect to the area, period, type of plantation and expected survival rate is given in the below.

Table No.13:-Year wise plantation Programme

Year	No. of plants	Common name	Botanical Name	Expected Survival Rate
I	600	Honge	<i>Pongamiapinnata</i>	70%
		Neem	<i>Azadiractaindica</i>	70%
II	600	Arali	<i>Ficusreligiosa</i>	70%
		Anjana	<i>Hardwickeiabinata</i>	70%
III	600	Banni	<i>Acacia Perruginea</i>	70%
IV	600	Aaladamara	<i>Ficusbenghalensis</i>	70%
V	600	Hippe	<i>Madhucaindica</i>	70%
		Muthuga	<i>Buteamonospema</i>	70%
Total	3000			

As there is no good rainfall in the area regular watering is required to improve the survival rate.

11.0 SOCIO-ECONOMIC BENEFITS

Apart from the various environmental protection measures, the company is conscious of its corporate social responsibility and as any good corporate citizen, it is undertaking the following works in the surrounding areas of the mine.

In order to enhance the contribution of mining industry and share a greater responsibility not only towards its employees but also for the community residing around lease area. Hence, it is considered necessary to provide minimum facilities to the surrounding villages for their better living standards.

This mine has proposed to provide financial assistance of Rs.5.0lakhs/annum for the development of social infrastructure of the area. Following measure will be taken to improve the Social infrastructure of the study area:

The socio-economic parameters of the area undergo change due to:

- Changes in the employment pattern of the area.
- Changes in the pattern of facilities available, both in respect of the infrastructure facilities as well as other services.
- Improvements in money supply in the area through better earning capacity of population.

It proposes to taken up the following CSR activities listed below:

- Assistance to Educational institutions located in the Taluk by way of providing “Teaching aids, Books & Periodicals”.
- Scholarships for the best outstanding students.
- Health care camps arrangements and distribution of medicines freely organizing occupational health camps through trained doctors.
- Employment oriented training to youth.
- The following training programs shall be conducted for 25 girl students for nearby villagers. Every year the training programme will be conducted.
 - Computer training programmes for SSLC passed candidates
 - Tailoring training
 - Fashion designing for SSLC passed/failed candidates

Agricultural Improvement

Help in arranging in association with nearby agricultural department for soil testing and technical inputs for increasing yield.

12.0 FINANCIAL IMPLICATIONS

The below table give overall investment on the environmental safeguards and recurring expenditure for successful monitoring and implementation of control measures.

Table No.14:- Cost of Environmental Protection Measures

Sl.No.	Work Name	Capital	Annual recurring Cost (in Rs.)
1	Occupational Health & Safety		1,00,000
2	Air Pollution Control : Gunny bags/ cloth for covering drill rods, Water sprinkling haul roads & greenbelt, developing greenbelt	2,200,000	6,00,000
3	Water Pollution Control: Constructing garland drains with silt traps & Check dam	500,000	1,50,000
4	Greenbelt Development	-	1,50,000
5	Medical Examination		2,00,000
6	Environment Monitoring		2,00,000
7	Social Welfare Measures/CER		5,00,000
Total			1900000

13.0 CONCLUSION

Based on the EIA study it is observed that there will be a marginal increase in the dust pollution, which will be controlled by sprinkling of water and transportation of granite. There will be insignificant impact on ambient environment and ecology due to the mining activities on the other hand quarrying operation will lead to direct and indirect employment generation in the area.

Hence, it can be summarized that the development of **Grey Granite Quarry of M/s. P. Balasubba Setty & Son's** will have a positive impact on the socio-economic of the area and lead to sustainable development of the region.
