BASE LINE STUDIES IS PREPARED FOR

Nagamangalam
Grey Granite Quarry

BASE LINE STUDIES

The base line a study is prepared for ***Nagamangalam Grey Granite quarry.*** Base line studies provide a base data for regular Environmental Monitoring and Environmental Impact Assessment (EIA).

The international Association for Impact Assessment (IAIA) defines the base line studies as the process of identifying, predicting, evaluating and mitigating the Bio physical, Social and other relevant effect of development proposals prior to major decision has been taken and commitment mode.

Hence the baseline study provides a bench mark for carrying out environmental Impact assessment due to the course of quarrying and mining activities. The purpose of these studies is to evaluate the benefited and adverse effect of developing activities on the neighborhood environment and the area where the quarrying is proposed to carry out.

Tmt. A.Rajamani has applied for Grey Granite quarry lease for over an extent of **2.02.5Ha** in **S.F.No.629 (Part)** of Nagamangalam, Denkanikottai Taluk and Krishnagiri District. The area proposed for mining for the present mining period is about **1.64.3Ha** which is below 25% of the total area applied for lease; hence the impact assessment due to quarrying may be considerably low.

As per the Gazette notification 2006 the proposed project falls under B2 Category.

The area proposed for quarrying is a fresh area and there are no factories, industries within the radius of 1Km hence the atmospheric air is quite fresh. The area exhibits flat terrain which is devoid of vegetation and Agriculture. In some small patches small agricultural activities are been carried out by drift irrigation some thorny bushes and wild gars are found in the area with scanty Palm trees (*Borassus falabellifer*). *Tridax procumbens* and *Lucus aspera* are some of the common species along with *Julia flora* trees. The density of these about 20% to 40% in the area and the remaining area is dry barren land.

As no agricultural activities are carried out the people in and around the villages migrate to nearby town for their livelihood. Most of the people are illiterate and depend upon the lively hood in the paper and pulp manufacture industries and Granite industries.

The project in this area will fetch a quit considerable employment to nearby village which in turn enhance the earning source of the nearby villages. The comprehensive base line studies

and standards constitute of collecting data on Ambient Air quality, Dust fall rate, Water quality, Soil analyze, Noise level and Ground vibration study in the area proposed for quarrying along with Flora and Fauna statistics.

The Methodology adopted in this project is based on the basic principles of capitalization identification analysis and preparation of action plan to Mitigate negate or adverse impact. Baseline studies adverse the significant environmental Issue and also provide necessary information pertaining to the Environmental Attributes in the project area. Monitoring and evaluating the effect of the works environment factors on health of people working on granite quarry.

Collection and analysis of Baseline Environmental Data.

Baseline Environmental Data plays a key role in the EIA procedure as it provides the important information on the Environmental parameters which are likes to be affected due to the Grey Granite quarrying activities.

Physiography

The area exhibits hilly terrain, There is no topsoil hence the Grey Granite is clearly visible. The Granitic Gneiss is medium to fine grained with feldspar and quartz is major constituents, Garnet and other mafic minerals are secondary minerals. This gneissic formation is having wavy pattern of alternate layer which is widely used for slabs, Tiles and Monuments after cutting and polishing. The general gradient is towards the south. The altitude of the area is 840m (Maximum) above from MSL. The area receives rainfall about 800 to 900mm/annum and the ground water occurs at a depth of 50m in summer and 45m at rainy season below the general ground level. The Grey Granite is medium to fine grained.

Geology of the area

The Krishnagiri district is underlain by hard Crystalline rocks of Archaean age comprising of various rock types such as Gneiss, Charnockite, etc., The Gneissic type of Crystalline formation is found in the North and Northeastern part of the District. Shoolagiri, Hosur, Mattur and soolamalai areas covered by Granitic Gneiss (Migmatite).

The Late Archaean crust of Krishnagiri, TamilNadu, consists of tonalitic – trondhjemitic – granodioritic (TTG) gneisses with mafic and sedimentary enclaves, formed between 2.7 and 2.5 Ga and metamorphosed at amphibolite facies in the north to granulite facies in the south close to 2.5 Ga. Migmatization occurred at all grades, and numerous small granite bodies were emplaced near

the amphibolites–to–granulite facies horizon. This nearly syn-accretion meta-morphism affected the entire crust and left a chemically differentiated section later exposed by uplift and erosion.

Such rocks that were formed at great depths during the Archaean age are now exposed at the surface of the earth as a result of the combined actions of wind, air, sun, water, weathering and denudation over the past several million years.

The Grey granite has the characteristic pink rythamatic banding by which it can be identified even from a distance. These are seen to the central part and the SE part of the district, more specifically in Rayakottai, Kaveripattinam, Jagadevi and Velampatti. These dimensional blocks are quarried to make a polished stone, slabs, monuments etc.,

The general geological sequence of the rock types in the lease area is:-

Structural settings of Krishnagiri:

Order of super position:-

AGE		**ROCK TYPE**
Pleistocene to Recent	-	Topsoil
Archaean to Proterozoic	-	Migmatites
		Migmatites Complex
		Charnockite group
		Granites
		Peninsular Gneisses Complex

The Physical attitude of the Grey Granite deposit of this area is given below:-

Strike Direction	-	$N70^{o}E - S70^{o}W$
Dip direction	-	$65^{o}SE$

Vegetation

The lease area exhibits hilly terrain, Grey Granite exposes in the lease area and it is strewn with boulders of various sizes ranging from a few cm to one to half mater in diameter. Except some small bushes there are no other trees in the applied area. Crops are only seasonal cultivation with lift irrigation is practiced. The main crops are mango, ground nut, Cardamam, Millet, Paddy and Sugar cane.

The land use pattern of the project area

Description	Present Area (Ha.)	Area to be required at the present Scheme period (Ha)	Area at the end of life of quarry (Ha)
Area under Quarrying	1.33.5	0.30.8	1.64.3
Waste Dump	Nil	0.24.0	Backfilled
Infrastructure	Nil	0.01.0	0.01.0
Roads	0.01.0	0.01.0	0.01.0
Green Belt	Nil	Nil	Nil
Stocking Blocks	0.68.0	0.11.2	0.36.2
Grand Total	**2.02.5**	**0.68.0**	**2.02.5**

General approach to Environment

The Environmental besides data comprise of the features present of the site area its includes environmental features such as forest area, conservation area, water bodies, industries, wild life and fauna place of historic and importance etc.,

The data collected to cover the following.

1. Air environment
2. Noise Environment
3. Water environment
4. Ecology (Biological and Cultural Environment)
5. Physical Environment.

Air Environment

Air environment is responsible for the health of human beings, animals, wild life and vegetation. Air pollutants emitted by project and non point source are transported dispersed or concentrated by meteorological and topographical conditions.

The atmosphere is dynamic system which absolute range of solid, Liquid or gases from both Natural and Manmade source. There substances travel through the air disappear and reveal among themselves and also with other substances both physically and chemically which result in air pollution.

The Grey Granite propose to quarry is non toxic which does not emit any undesirable pollutants in the form of solid liquid or gas. The dust emitted during the transportation of vehicles the drilling will be carried out in wet condition to prevent dust into air and the haul roads will be periodically sprinkled with mist water spray to prevent dust into the atmosphere. The area in and around is quit fresh and the impact an air environment will always be under

controlled and will be monitored. No processing or beneficiation is proposed except quarrying hence the impact an air will be controlled monitored and mitigated.

The ambient air quality within the study area on both core and buffer zone forms the baseline information. The air quality monitoring points selected based on the Meteorological conditions, topography of the study area and likely impact boundary location of the ambient air quality monitoring stations was selected on the basis of wind pattern.

The ambient Air quality monitoring stations are shown in the map. Four major pollutions were consideration significantly.

I. Particle matter - PM
II. Suspended Particle Matter - SPM
III. Sulphur dioxide - SO_2
IV. Nitrogen dioxide - NO_2

Respectively the overall of emission we identified the direction of the wind in the majority observed time was predominantly south west to North East direction. The Air quality monitoring data is enclosed as Annexure No-I.

S. No	Test Parameters	Unit	Protocol	Results	CPCB Standards
1	Particulate matter less than 10 micron size (PM_{10})	$\mu g/m^3$	IS 5182 Part 23-2006	43.1	100
2	Particulate matter less than 2.5 micro size ($PM_{2.5}$)	$\mu g/m^3$	IS 5182 part 4-1999 (Reaff 2010)	35.2	60
3	Sulphur dioxide SO_2	$\mu g/m^3$	IS 5182 part 2-2001 (Reaff 2006)	4.2	80
4	Nitrogen Dioxide NO_2	$\mu g/m^3$	IS 5182 Part 6-2006	5.4	80

Noise Environment

Sound/Noise can be defined as atmospheric or airborne vibration perceptible to the ear. Noise is usually unwanted or undesired sound. Sound loud enough to be harmful is called noise without regard to its other characteristics hence noise has a significant impact on the quality of life and in that sense it is a health problem in accordance with the (WHO) definition of health.

Impact of noise on environment depends on various factors such as intensity distance from the source type of exposure and nature (Impulse or continuous), the type of activities

movement of machineries, traffic density etc., hence it is to measure the levels so as to adjust the environment Impact and undertake amendment measures if warranted.

Standard precession noise level meter were used for the purpose. The readings in the form of instantaneous sound measures levels were taken in the time brackets of two hours in order to here carry out assessment of noise level in the area.

There are few heavy industries nearby; the noise level of the area will be as same as the regional level. More over the noise level measurements does not rise for this area since very low explosives will be used for mining and the machineries to be used shall hydraulic types, it does not create much noise except the compressor, drilling and jet bummers. The traffic density in the area is very little. The average noise level in that area is less then 90dB (A) in and around 1Km radius.

This noise level survey was carried out as per MOEF norms i.e., 1.5m above the ground level and 2mts away from the noise emit source. At present the noise is only through the movement of Vehicles in that area. No other significant noise emitting source found.

S.No	Location	Results dB (A)	CPCB Standard Limit
1	Project site – Centre area	41.2	70*
2	Project Site SW corner	43.1	70*
3	Project site SE Corner	42.6	70*
4	Project site NE Corner	42.2	70*

Ground vibration studies

Hence the vibration source are only through the movement of vehicles where the frequency is also very less. Hence the vibration is well below the standard permissible by MOEF. Displacement, Velocity and acceleration of the three kinematics descriptions which are to be studies to describe ground motion. The peak particle velocity is the more referred since the area is virgin there is no significant measured velocity found in the area.

Water Environment

Geo Physical investigation was carried out by signal stacking resistivity meter 3 profiling was carried out in the area applied for lease and 15 Vertical electrical sounding was carried out to find out the lateral variation and vertical in homogeneity's it was observed that the water table is found to be 50mts below ground level and the same was correlated with the wells found at a distance of 700mts NE of the area.

The water quality monitoring data is enclosed as Annexure No-II.

Test	Protocol	Results	Limits as per IS 10500 :	
			Acceptable Limit	Permissible limit in the absence of alternate
Colour	IS : 3025 part : 4-1983 (Reaff : 2006)	10 Hazen	5	15
Odour	IS : 3025 part : 5-1983 (Reaff : 2006)	Agreeable	Agreeable	Agreeable
pH at 25^0C	IS : 3025 part : 11-1983 (Reaff : 2006)	7.4	6.5 – 8.5	No relaxation
Total Dissolved solids	IS : 3025 part : 16-1984 (Reaff : 2006)	1355mg/l	500 mg/l	2000mg/l
Aluminium as Al	IS : 3025 part 2:2004 (Reaff : 2009)	BDL (DL:0.004 mg/l)	0.04 mg/l	0.2 mg/l
Barium as Ba	IS : 3025 Part 2:2004 (Reaff : 2009)	0.27 mg/l	0.7mg /l	No relaxation
Boran as B	IS : 3025 Part 2:2004 (Reaff : 2009)	BDL (DL: 0.1 mg/l)	0.4mg /l	1.0mg/l
Calcium as Ca	IS: 3025 Part 2: 2004 (Reaff : 2009)	160 mg/l	70mg/l	200mg/l
Chloride as Cl	IS : 3025 Part 32-1988 (Reaff . 2009)	479mg/l	250mg/l	1000mg/l
Copper as Cu	IS: 3025 part 2: 2004 (Reaff : 2009)	BDL (DL:0.01 mg/l)	0.05mg/l	1.5mg/l
Fluoride as F	IS : 3025 Part 60: 2008	0.72 mg/l	1.0mg/l	1.5mg/l

METHODOLOGY AND DATA ACQUISITION:

Electric Resistivity Method is well established for delineating lateral as well vertical discontinuities in the resistive structure of the Earth's subsurface. The present study makes use of vertical electric sounding (VES) to delineate the Vertical Resistivity structure at depth. Schlumberger electrode set up was employed for making sounding measurements. Since it is least influenced by lateral in homogeneities and is capable of providing higher depth of investigation. This is four electrodes collinear set up where in the outer electrodes send current into the ground and the inner electrodes measure the potential difference.

The present study utilizes maximum current electrode separation AB/2. The data from this survey are commonly arranged and contoured in the farm of Pseudo-section that gives an approximate of the subsurface resistivity. This technique is used for the inversion of Schlumberger VES data to predict the layer parameter namely layer resistivity and Geo electric layer thickness. The main goal of the present study is to search the vertical in homogeneities that is consistent with the measured data.

For a Schlumberger among the Apparent resistivity can be calculated as follows

$$\rho_a = \frac{G\Delta V}{I}$$

ΔV = potential difference between receiving electrodes

G = Geometric Factor.

Rocks show wide variation in resistivity ranging from 10-8 more than 10+14 ohmmeter. On a broad classification, one can group the rocks falling in the range of 10-8 to 1 ohmmeter as good conductors. 1 to 106 ohmmeter as intermediate conductors and 106 to 1012 ohmmeter as more as poor conductor. The resistivity of rocks and subsurface lithology, which is mostly dependent on its porosity and the pore fluid resistivity is defined by Archie's Law,

$$\rho_r = F\rho_w = a\,\emptyset^m\rho_w$$

ρr = Resistivity of Rocks

ρw = Resistivity of water in pores of rock

F = Formation Factor

$\emptyset$ = Fractional pore volume

A = Constants with values ranging from 0.5 to 2.5

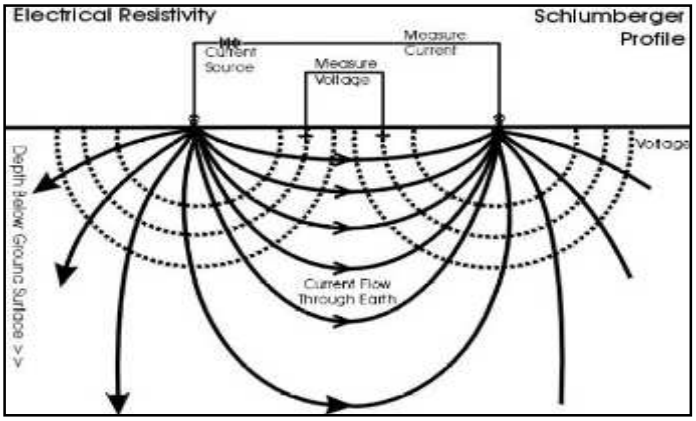
SURVEY LAYOUT:

The layout for a resistivity survey depends on the choice of the current and potential electrode arrangement, which is called electrode array. Here the present study is considered with Schlumberger array. In which the distance may be used for current electrode separation while potential electrode separation is kept on third to one fifth of the same. One interesting aspect in VES is the principle of reciprocity, which permits interchange of the potential and current electrode without any effect on the measured apparent resistivity.

EQUIPMENT:

The field equipment deployed for the study is in a deep resistivity meter with a model of SSR – MP – AT. This Signal stacking Resistivity meter is a high quality data acquisition system incorporating several innovation features for Earth resistivity. In the presence of random earth Noises the signal to nose ration can be enhanced by $\sqrt{N}$ where N is the number of stacked readings. This SSR meter in which running averages of measurements [1, (1+2)/2, (1+2+3)/3 … (1+2...+16/16)] up to the chosen stacks are displayed and the final average is stored automatically, in memory utilizing the principles of stacking to achieve the benefit of high signals to noise ratio. Based on these above significations the signal stacking resistivity meter was used for (VES) Vertical Electric Resistivity Sounding.

MEASUREMENTS:



Measurements of ground Resistivity is essentially done by sending a current through two electrodes called current electrodes (C_1& $C_{2)}$ and measuring the resulting potential by two other electrodes called potential electrode (P_1& P_2). The amount of current required to be sent into the ground depends on the contact resistance at the current electrode, the ground resistivity and the depth of interest (Here 1000feet).

DATA PRESENTATION:

The field data obtained from a Vertical Electrical Resistivity Sounding is conventionally plotted on a paper with the help of slum software. (A computer aided diagram).

GEOPHYSICAL DATA INTERPRETATION

The geophysical data's was obtained to study the lateral variations, vertical in homogeneities in the sub – surface with respect to the availability of groundwater. From the interpreted data, it has inferred that the area has moderate groundwater potential in the investigated area.

Pond is situated within the 500m radius and no other streams, water bodies or water course within the radius of 500mts and the rainfall in the area is poor varying for maximum 50 days in a year. The average rainfall is about 800-900mm as recorded by the meteorological department in the last three years. In some areas of the District there was no Rainfall recorded for the last 3years. The underground water is portable without any adverse health effects. There are no boreholes or open wells in the project area hence the water collected in the area for analysis.

In summer the water drains and the well will be in dry condition. The quality of the water from well has been analyzed for records. The granite quarrying does not require any water for its operation. No beneficiation or processing is proposed in the project. The water required is only

for drinking and domestic purpose for which the water will be brought out from authorized water vendors from the nearby towns.

As water is very vital natural resource and most essential for the survival of human beings, the same will be consumed only after carrying out scientific studies and will be allowed if it is within the prescribed standards.

Soil Analysis

As mentioned earlier the area applied for lease is exhibits hilly terrain. The soil is the main unit for the eco system because of the dependence of flora and fauna. As the soil is acidic there are no thick flora noticed except some common species which are native of the terrain.

The quarrying activities may have impact on soil. The soil samples were called in 50mts grid fashion by average and after coning and quartering the same was send to laboratory for investigation. The following sources are obtained from Agricultural department.

The soil analysis report is as below

S.No	Test parameters	Method	Results
1	PH @25^{0}C	Is 2720 part 26 (Reaff:2011)	7.1
2	Conductivity @25^{0}C	Is 14767 : 2000 (Reaff : 2010)	346µmhos/Cm
3	Moisture content	Is 2720 part 2: 1973 (Reaff : 2010)	6.2%
4	Organic matter	Is 2720 part 22: 1972 (Reaff : 2010)	0.31%

Climate

The rain fall data of Krishnagiri region in a year is 800mm to 900mm. Temperature falls between 42°C - 27°C. Rainy season three months in a year from October to December. Temperature is maximum during May – July in a year.

Flora and fauna in and around the area

In small quarrying projects like this which involves very limited operations like secondary drilling and blasting, Conservation of Flora and Fauna along with ecology does not have significant impact of the overall eco system.

A detail study related to flora and fauna was carefully observed physically by environmental engineers, Botanist and zoologist. The following table shows the flora and Fauna available at the region.

S.No	Common Name	Botanical name	Pictures
1	Neem	*Azadirachata indica*	
2	Ground nut	*Arachis hypogaea*	
3	Mango	*Mangifera indica*	
4	Coconut	*Cocos nucifera*	
5	Maize	*Zea Mays*	
9	Avarampoo	*Senna auriculata*	

List of Faunas

S.No	Common Name	Scientific name
1.	Goat	*Capra hircus*
2.	rat	*Rattus norvegicus*
3.	Crow	*Corvus splenders*
4.	Squirrel	*Rodentia scrurus,*
5.	Ant	*Hymenopterous formicida,*
6.	Cat	*Felsis catus*
7.	Cow	*Bos taurus indicus*

Conclusion

The base line studies relents no hazardous levels of dust and noise and prevailing at the project area. A well implemented environmental Management plan as discussed in the mining plan will help in mitigation the adverse effects due to quarrying activities.

The project is a small operation were limited activities are being carried on the noise creating device will be only jack hammer drilling which will always be mitigated in wet condition to prevent noise and dust in the air. The movement of vehicles is very minimal. The entire vehicle used will be periodically maintained by well experienced mechanic and kept under TNPCB standards, emission testing will be carried out periodically and water will be sprinkled periodically to prevent dust into air. The small quantity of non humus rich surface soil will be removed and preserved in the boundary barrier to facilitate the Afforestation.

Blasting will be used for heaving effect and not shattering effect hence the fly rock problem will not arise. This is because the granite industry requires only huge blocks which are free from induced cracks and fissures. The flora in the area is only small bushes as much of the area is hilly terrain. No trees are proposed to uproot for the project and Infect Trees will be planted on boundary barrier which will act as acoustic sound barriers. Environmental care and attitude of preventing environment is inducted to the proponent and advice to carry out and mitigate the minor impacts due to quarrying. Appropriate persons are advice to get employed to protect the Environment and Ecology of the area.

Date : 20.04.2016
Place : Krishnagiri

1. **Signature of the applicant with Name and Full Address**

   A.Rajamani,

2. **Signature of the RQP**

   A.Jagannathan, B.E., F.C.C., M.M.E.A.,
   RQP/MAS/019/87/A