

## 0.0 EXECUTIVE SUMMARY

This is a Mining Lease of mineral Limestone , Clay and Bauxite, near village- Kubri , Tahesail-Maihar, District- Satna, Madhya Pradesh over an area of 69.301 hectare. GO has been issued in favour of Shri Sukhdeo Prasad goaynka, Station Road Katni vide deed no 451108 made on 19/08/2014.

The mine lease area is >50ha. is considered as Category ‘A’ project as per MOEF Office Memorandum J-13012/12/2013-IA(I) Dated 24<sup>th</sup> December 2013 hence it come under jurisdiction of Central Environment Impact Assessment Authority (EIAA), MOEF, New Delhi . Lessee applies for Environment Clearance under EIA Notification, 2006. Proposed production of from this mine is 2 million Tonne per annum.

The mine lease located on plot no – enclosed, near village- Kubri , Tahsil-Maihar, District- Satna, Madhya Pradesh over an area of 69.3021 hectare. Total land of mining lease comes under barren . **No forest land is involved in this area.** Topographically the area is barren rocky land. The area lies between Longitude **Latitude: 24° 06’ 49” N to 24° 07’ 38” N , Longitude: 80° 47’ 5.7” E to 80° 47’ 44” E** and the part of toposheet no- 63D/16.

**Table 1.1 Silent Features of the Project**

1.	Name of the project	Kubri limestone, Bauxite and Clay					
2.	Mine lease area	69.301 Hectare					
3.	Location of mine	Kubri, Tahsil-Maihar, District- Satna Madhya Pradesh.					
4.	Coordinates	<b>Latitude: 24° 06’ 49” N to 24° 07’ 38” N</b> <b>Longitude: 80° 47’ 5.7” E to 80° 47’ 44” E</b>					
5.	Area Details	Plot No.	Area	Village	Tahesil	District	State
		Annexure- I	69.301 Hectares	Kubri	M ahiar	Satna	Madhya Pradesh
5.	Toposheet	Toposheet No.: 63D/16					
6.	Mineral	Limestone					
7.	Reserve / life of mines	Category		Geological Reserves Tonne			
		Proved (111)		25918007			
		Prefeassible mineral resource(222)		17754899			
		Indicated mineral resource (332)		43672906			
		Total					
Mineable/ Recoverable Reserve							

		Life of mine Life of mine = Total mineable reserve / Annual Production = 25918007 tonne/ 2.10,803 tonne = 122 Years
8.	Proposed Production	2.10,803 tonne/annum
9.	Validity of lease	20 years
10.	Ultimate depth	6 meter
11.	Method of working	Opencast semi- mechanized without blasting
12.	Water demand	8.0KLD (2.0KLD for Drinking, 3.0KLD for Dust Suppression, 3.0KLD for Plantation)
13.	Man Power requirement	22
14.	Nearest Railway station/Air Port Nearest state / national highway	Railway Station: Mahiar (10 km) Airport: Jabalpur (130 Km) State Highway: 5 KM

## 1.0 INTRODUCTION OF THE PROJECT/BACKGROUND INFORMATION

### (i) Brief Description of nature of project:

This is a Mining Lease of mineral Limestone , Clay and Bauxite, near village- Kubri , Tahesail-Maihar, District- Satna, Madhya Pradesh over an area of 69.301 hectare. GO has been issued in favour of Shri Sukhdeo Prasad goaynka, Station Road Katni vide deed no 451108 made on 19 /08/2014. The Mining will be done in this proposed lease by semi-mechanized open cast method. Proposed workings will be systematic by forming proper benches.

### (ii) Need for the project and its importance to the country and or region :

Due to the globalization and new ventures and faster development of infrastructure project, the requirement for raw material like limestone has been on the rise over the last few years. The excavated mineral will be dispatched to the industries located in the state and different parts in the country. Its strength and quality makes it suitable for a number of purposes. Mining industry play an important role in economic sector in India. The state is endowed with major and minor mineral resources. The project is situated in the Satna district, where number of cement plant and other industries are located. Thus there is no problem of mineral consumption.

The economy of the District mostly dependant on agriculture and small industries like cement plant, lime cline . The important benefits accruing from the project to the state in the form of royalty can thus be stated as-boost to local and regional economy. The development of mining in the area provides direct and indirect employment opportunities better infrastructural facilities, communication and socio-economic infrastructure.

**(iii) Demand and Supply Gap :**

Limestone is used as a basic raw material in cement and infrastructure projects, the demand of limestone is increasing day by day. In past, demand was not too much but now a days due to rapid industrialization and urbanization its demand increasing with pace of time.

**(iv) Imports v/s Indigenous Production :**

Demand of limestone, Bauxite and clay in the domestic market is high. In the allotted area, limestone is available in abundant quantity along with Bauxite and clay ,which can be excavated indigenously. It had become a major source of economy in the area/region.

**(Vi) Export Possibility :**

There are an enough possibility for export of limestone in various forms such as cement, hydrated lime etc.

**(Vii) Employment generation (Direct & Indirect) due to the project :**

Employment opportunities for the local people and indirectly for the others. The total manpower requirement for the proposed mining operation will be around 22 persons directly. Huge Indirect employment approx 100 persons is expected by allied activities. Such as establishment of granite processing plants etc.

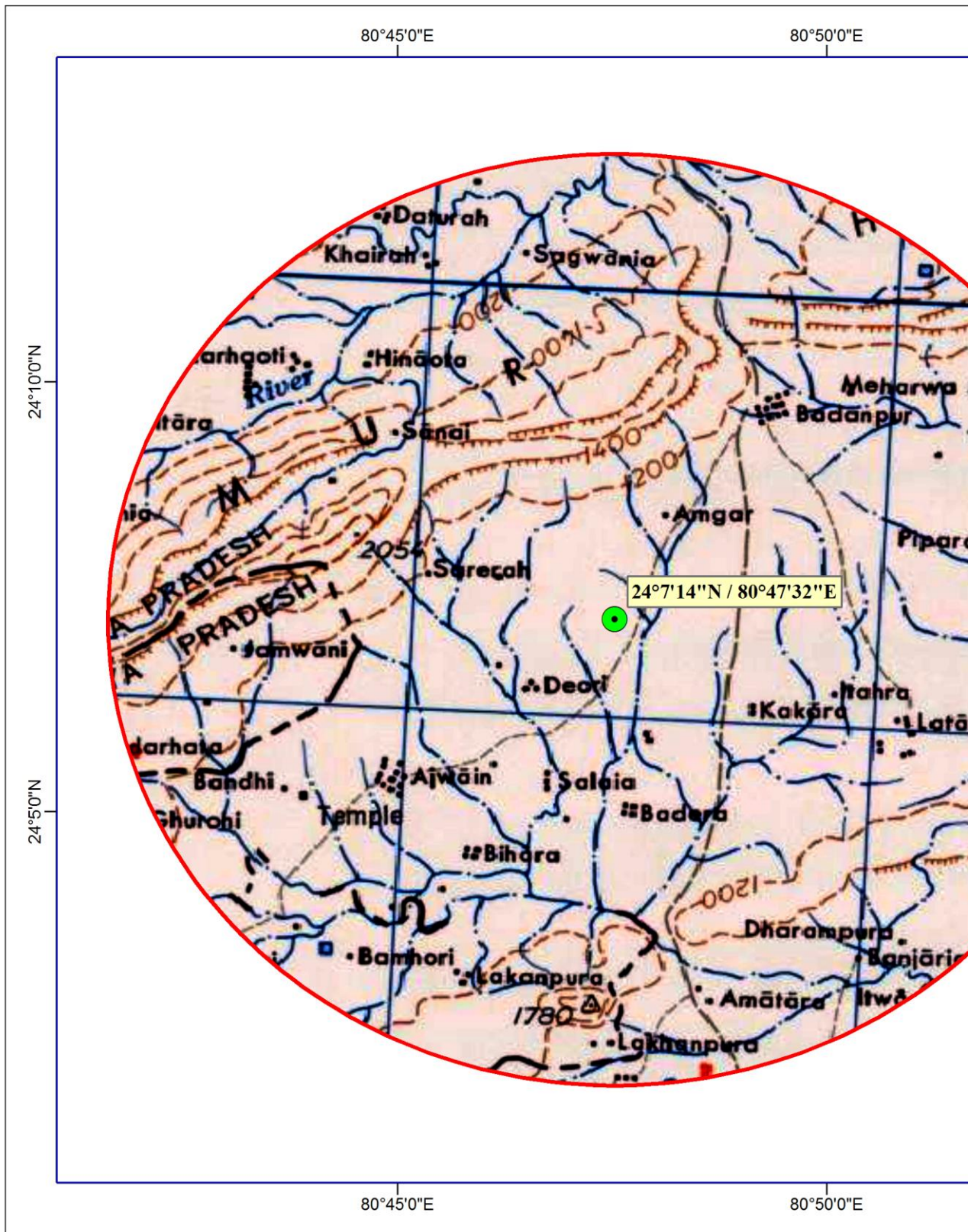
**2.0 PROJECT DESCRIPTION :**

**(i) Type of Project including interlinked and interdependent projects, if any |:**

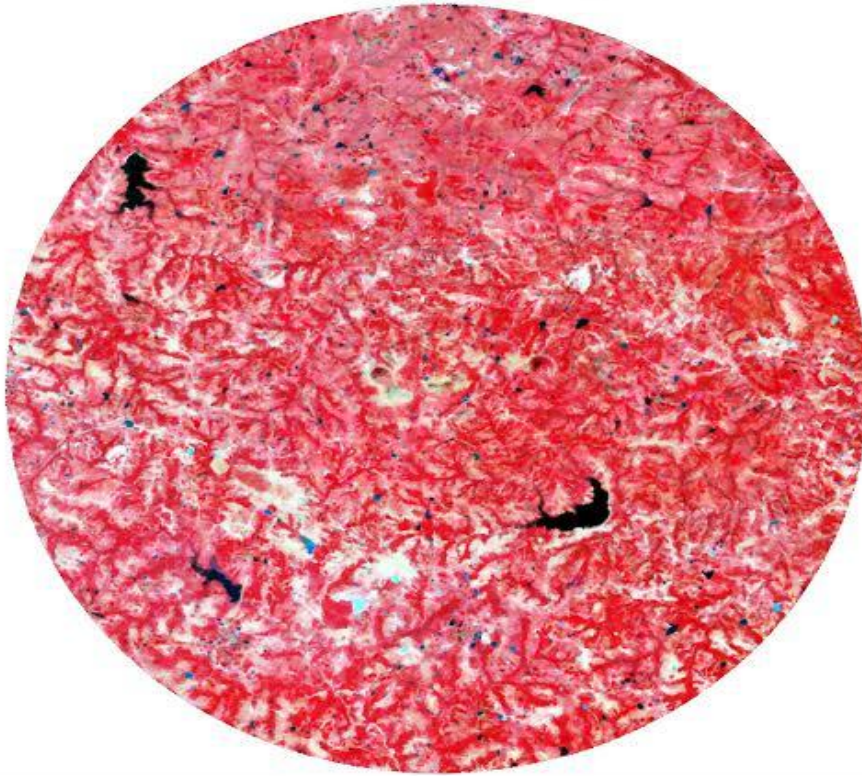
The proposed project of limestone, Bauxite and clay is an independent project in which mineral will be sold directly in domestic / overseas market.

**(ii) Location (map showing general location, specific location, and project boundary & project site layout) with coordinates :**

The project / mine lease located on plot nos – Annexure-I, near village- Kubri , Tahsil – Maihar, District- Satna, Madhya Pradesh over an area of 69.301 hectare. Total land of mining lease comes under (39.301 waste land and 30.00 Ha Agriculture land). **No forest land is involved in this area.** Topographically the area is barren rocky land. The area lies between Longitude 80°47'32" and Latitude 24°07'14" and the part of toposheet no- 63D/16. Location map of the project is as under.



**Satellite View Of The Study Area**



**Satellite view of the site(30/5/2015)**

**(iii) Details of alternate sites considered and the basis of selecting the proposed site:**

Mining of mineral is site specific and feasible in the allotted area hence no alternate site is examined for mining.

**(iv) Size and magnitude of operation :**

Total area of mine lease is 69.301 Hectares. The proposed output will be 2 million tonne per annum including limestone, Bauxite and clay.

**(v) Project description with process details :**

Mineral rocks present in this area as thick zone dipping almost vertical to sub vertical. The overburden is the Bauxite which will be removed by excavator and dumpers. The clay is also occurring in the area is being produced by forming systematic benches & with the help of drilling - cutting technology, mobile cranes. By doing so pits will be developed systematically.

Although the mining needs very keen observation & study of geological joints, cleavage, hair cracks etc.

(iv) Extent of Mechanization :

Machine	Nos.	Make	HP/ Capacity
Compressor	1	CPS/Atlas Copco	300 CFM
Slim Drills	2	Cosmic/JRD	115 mm
Blind Cut Machine	1	Local	115 mm
Jack Hammers	2	Atlas Copco	32 mm
Excavator	1	L & T – PC 210	0.9 Cu. M.
Tripper	1	Tata	10 MT
Jib Crane	1	Local	20 MT
D.G. Set	1	Kirloskar	125 KVA
Water Tanker	1	Tractor	35 HP

**Geology and Exploration:**

- a) Briefly describe the topography, drainage pattern, vegetation, climate, rainfall data of the area applied/mining lease area:

**Physiography of the area:**

The lease area in general comprise of a flat topography and the elevation ranges from 386m, to 394m mrl. The surrounding area comprises of few working mines, agricultural lands and road & infrastructure, regionally, the north of the area is bounded by the Kaimur Hill range and sloping towards south east to merge in the catchment area of son River.

The geomorphology of the area mostly guided by the geological formation and sandstone/shale unites those are relatively more resistant to the weathering actions stands as a denudation hills whereas limestone areas are more susceptible to weathering actions and stands upright as hills in different parts of the region.

A physiographic map has been generated based on SRTM (USGS) data available in the public domain and furnished in Plate No. (4)

**Land use pattern of the area:**

The lease area comprise of about 69.301 hect., is mostly of agricultural lands. The other units present within the lease are village roads and high tension electricity line passing through the

lease area in the central part. Beyond lease area, there are few working pits and abandoned pits, abandoned pits are mostly water filled. A pictorial representation of the lease area superimposed in Google Earth image has been furnished in Plate No. (5)

### **Vegetation of the area:**

The soil of the area understandably highly rich in the calcium and pulses cultivation are done through the years in this region.

Besides cultivation, the area is devoid of any major vegetation cover except few sparse trees.

### **Climate & Rainfall:**

#### **Temperature:**

The winter season starts from December and continues till the end of February, January is the coolest month with the mean daily maximum temperature at 22<sup>0</sup>C and the mean daily minimum temperature at 10<sup>0</sup>C. both the night and day temperatures increase rapidly during the onset of the pre-monsoon season from March to May. During pre-monsoon season, the mean maximum temperature (May) was observed to be 42.0<sup>0</sup>C with the mean minimum temperature (March) at 24<sup>0</sup>C. the mean maximum temperature in the monsoon season (Sep.) observed to be 34<sup>0</sup>C whereas the mean minimum temperature was observed to be 18<sup>0</sup>C. By the end of September with the onset of post-monsoon, the day temperatures increase slightly, with the mean maximum temperature at 26<sup>0</sup>C and the mean minimum temperature at 12<sup>0</sup>C.

#### **Relative Humidity:**

The air generally humid in this region during the monsoon when the average relative humidity at 0830 hr. was observed to be with a maximum of 100% and a minimum of 52%. Similarly, at 1730 hr., the average value was observed to be with a maximum of 94% and a minimum of 60%. Generally, the weather during post-monsoon was observed to be with a maximum of 90% and a minimum of 15%.

#### **Rainfall:**

Monsoon in the area comes from southwesterly winds. The rainfall in the area is very erratic. The average annual rainfall based on the last 10 year IMD data, was observed to be 1168 mm. The monsoon sets in the month of June and continues till mid observed in the evening, with clear mornings. During the monsoon season, both in the mornings and evenings, the skies were found to be clouded.

#### **Cloud:**

30 years average data reveal that maximum cloud cover was observed around 7.0 oktas in the month of July, august. Whereas cloud cover was observed around 2.2 (in oktas) in the month of November, December, January, February and March.

**Wind Pattern:**

Generally light to moderate winds prevails throughout the year. Winds were light and moderate particularly during the morning hours. While during the afternoon hours the winds were stronger. A review of the wind rose diagram shows that predominant winds are mostly from S, NW, NNW, SW, NE, N and E directions followed by NW direction.

**Drainage system:**

The lease area is falling in a water divider zone of two seasonal nalas flowing along the eastern and western boundary of the block to join ultimately to Mahandi River around 8 km south of the area. Mahandi in turn joins Son River flowing further east. Son in part of greater Ganga Basin..

**(b) Geology of the area:**

The area in general falls within proterozoic basin of Vindhyan Super Group. This basin is the largest exposed Precambrian basin of India comprise of around 104,000 Sq. KM area. The general Stratigraphic sequence of the area depicts lower and upper group with distinct unconformity between them. The generalized Stratigraphic sequence of the region is furnished below:

<b>Group</b>		<b>Formation</b>	<b>Lithology</b>
Upper Vindhyan		Bhander	Sandstone, Shale & Limestone
		Rewa	Sandstone & Shale
		Kaimur	Sandstone & Shale
<b>Unconformity</b>			
Lower Vindhyan	Semri Group	Rohtas	Bhagwar Shale
			Rohtas Limestone
		Kheinjua	Rampur Shale
			Chorhat Sandstone
			Koldaha Shale

		Mirzapur	Dconar Porcellanite
			Kajrahat Limestone
			Basal Shale
			Deoland Sandstone

The Vindhyan Supergroup, in contrary to the event of tectonics found to be least deformed, however, a very minor scale syn-sedimentary deformations are observed by few workers of the area. The geology is also equally important by discovery of trace fossils and presence of stromatolites (algal colony) in the Bhandar and Semri group of rocks.

**(c) Detailed description of geology of the lease area such as shape and size of the mineral/ore deposit, disposition various litho-units indicating structural features if any etc. (Applicable for Mining Plan for grant & renewal and not for Scheme of Mining/Modifications in the approved mining plan/scheme of mining):**

**Local geology of the mineral including drainage pattern:**

Geology of the lease area predominantly occupied by Top soil, Lateritic soil, shale and limestone if one move from top to bottom. All the lithounit belongs to Bhandar limestone. The top soil horizon varying from 1.5 meter 3.5 meter from the ground level. Often the top soil layer is found to be mixed with remnants of lateritic material and can be termed as latosol. The lateritic layer followed by a yellowish clay layer. The whitish grey limestone layer is underlain the clay layer. In few boreholes drilled within the area, found shale-limestone intercalation in certain depth range while the most of the drill holes are found to be continuous limestones. However, compositional variations are not mapped in all the boreholes except few check samples are gathered and analysed. A representative schematic diagram of the succession is shown below:

Lithounits	Depth range	Remarks
Soil	00.2.0 meter	
Lateritic soil/clay	2.0-4.0 meter	
Weathered Limestone	4.0-7.0 meter	
Limestone	7.0-50.0 meter	Occasionally found to be intercalated with shale

**Geological Axis:**

Influence of mineral Limestone exposed depth under G2 Category. Thus about entire area is considered as mineralized rest area is considered as un-explored area.

The lower limit of estimation is being considered as 50 meter below each borehole. The whole exercise of resource estimation is being limited to the northern part of the lease within an area. Lateral influence of the boreholes has been considered 100m in all direction.

The lease area is geologically probable from surface RL 394 to 344-336 m. Bore hole as marked on geological plan and sections for this explored depth assigned G-2 for geological axis of UNFC classification.

On the basis of existing quarry entire area is considered for mineralized zone.

**Details of minimization are as follows:**

Soil	Seen in as 1.0 to 4.5m the lease area.
Limestone (95%)	Below the Soil up to 50m. i.e. 344-336 mrl

On this basis reserves have been calculated by cross sectional method up to the depth Mrl 344-336 m in G-2 category.

**Pre-Feasibility Axis:**

As this is a Mechanized mine “A” Category mine the feasibility study carried out for this area is considered to be of pre-feasibility status. Hence feasibility axis under UNFC for the deposit is F-2.

**Economic Axis:**

On the basis of pre-feasibility study economic viability of the deposit has been established presently to Borehole G2=50m depth (Up to Mrl 336-344m) thick mineral over the mineable area of the lease. Hence economic axis under UNFC for the deposit is E-1,

Note:

332 = 122 probable + 222 PFMR

PFMR are potential resources blocked in 7.5m boundary, in ultimate pit slope, other block area left as per statute etc.

## UNFC CATEGORIZATION OF RESERVES

### Reserves Calculations:

1. Cat “A” (OTFM)
2. Area-69.301 hect.
3. Deposit – Sedimentary (bedded) Limestone.
4. O.B./soil – 1 to 4.5 m.
5. Surface RL – 394 to 386m
6. Bulk density – Limestone = 2.5
7. Recovery – Limestone = 95%

P1 = Average perimeter along lease boundary considered for loss in 7.5m boundary.

### Exploration in the area:

There are 11 boreholes having depth 50m, upto 344-366 mrl, observed in Limestone in explored part of the lease area. (Hence reserves have been calculated cross sectional method).

No further exploration is carried out.

### (i) Calculation of Geological Reserve: (Limestone) (G2):

The Limestone reserves have been computed by cross sectional method. Equidistant parallel cross sectional line have been drawn over surface geological plan to get the area of the mineral and to get the volume the distance between two cross sectional lines is multiplied to the area.

This total volume is multiplied to the bulk density of the mineral to get the total tonnage of the lease area as per the practical observation of recovery ratio.

Indicated mineral resource – 332

332 = Total tonnage-Excavated tonnage.

### Mineral Reserves/Resources:

Mineral Resources: (Mineral resources may be estimated purely based on level of exploration, with reference to the threshold value of minerals declared by IBM):

Level of Exploration	Resources in million tons	Minerale reserve	Grade
G1-Detailed exploration			
G2- General Exploration	<b>Limestone</b>	<b>Limestone</b>	<b>Cement Grade</b>

G3- Prospecting	<b>436,72,906 (T)</b>	<b>259,18,007(T)</b>	
G4-Reconnaissance			

### 3.0 Description of the Environment :

#### (i) Micro-Meteorology :

The climate of the area is mainly dry and bracing. The year can be divided in to three main seasons. The cold seasons from November to March, the hot season from March to May and the monsoon season from June to September, October is a transitional month between monsoon and winter seasons. Climatically, the area comes under sub-tropical zone.

Purulia is one of the drought prone districts of West Bengal. It has a sub tropical climate nature and is characterized by high evaporation and low precipitation. Temperature is very high in summer and low in winter which varies 2.8 degrees in winter to 50 degrees in summer thus causes dryness in moisture. South west monsoon is the principal source of rainfall in the district. Average rainfall varies between 1100 and 1500 mm.

#### (ii) Temperature :

The cold season starts from November and continues till as out the middle of February December and January are the coolest month. In association with cold waves which occasionally pass over the area in the wake of western disturbances. In the southern part of the district in the high Plateau, frost occurs in December of January by March temperature begins to rise steadily. In May and early point of June the maximum temperature can be as high as 50 °C on individual days. The effect of the extreme summer heat is somewhat alleviated by dryness of air and strong breezes that blow in afternoons. In general daily range of temperature is of the order of 4 to 23 °C during the winter season.

#### (iii) Rainfall:

Average annual rainfall is 1250 mm covering 49 rainy days. Major rainfall occurs during south-west monsoon during June to September. The rainy season is from June to September when the district gets 85% of the annual rainfall. From the onset of the monsoon by about the middle of June, rainfall rapidly increases reaching the peak value in August.

#### (iv) Humidity:

Relative humidity is generally lower in the afternoons than in the mornings, except in the monsoon months when there are little differences. The summer months are the driest with humidity as low as 20 to 25% in the afternoon.

#### (v) Cloudiness:

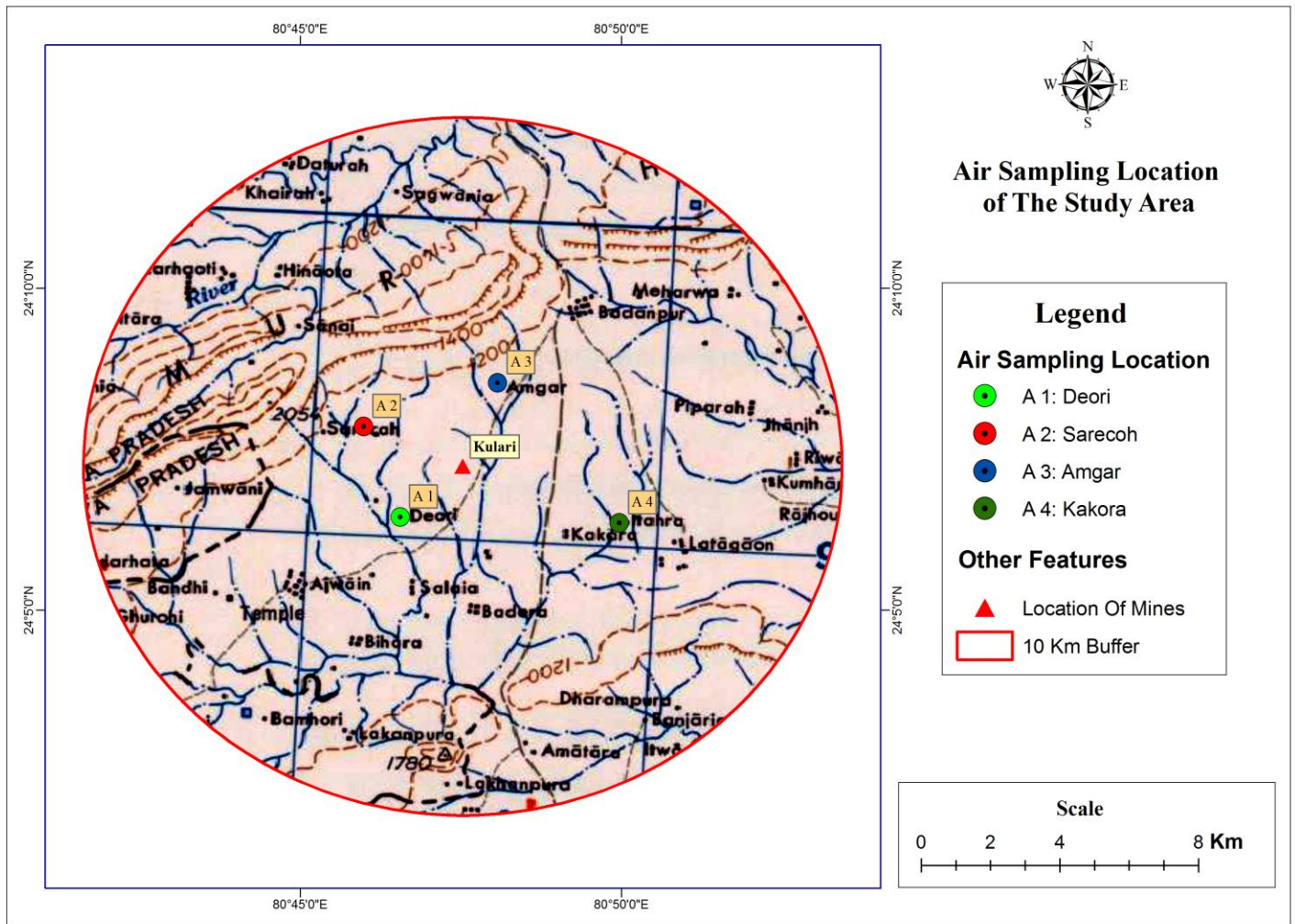
During summer and winter months sky is generally clear or slightly clouded. In April and May, cloudiness increases particularly in the afternoon. During monsoon months sky is heavily clouded to overcast.

**(vi) Winds:**

Winds are light to moderate during the winter and summer months, the speed being higher in the afternoons. In association with thunder storms during March to May and during the monsoon season when depressions pass west word across the central parts of the country, the area experiences strong gusty winds. The directions from which winds blow are variable especially during the monsoon season. Predominant wind direction is from south-west.

**(vii) Air Environment :**

The area is located in a remote village area where no industry or commercial place is located. Only a few household is located around 1 km away from the proposed mining site. Five sampling stations were selected for air quality monitoring on the basis of predominant wind direction and other meteorological parameters. One air sampling station was located in upwind direction and one station in down-wind direction. 24-hour average sampling was carried out using Combo PM<sub>10</sub> and PM<sub>2.5</sub> sampler (Make: Ecotech, Model: AAS271) and Gaseous pollutants sampler (Make: Ecotech, Model: AAS118) for measurement of PM<sub>10</sub>, PM<sub>2.5</sub>, Sulphur dioxide (SO<sub>2</sub>) and Nitrogen dioxides (NO<sub>2</sub>) concentrations. is shown in figure.



### LOCATION OF AIR MONITORING SITE

### Methodology and Instrument used for Air Quality Analysis

Parameter	Method	Instrument
RPM 2.5 $\mu$ and 10 $\mu$	IS-5182 Part XIV	High Volume Sampler (HVS) with RPM attachment and further by micron photo seizer
SPM	IS-5182 Part XIV	High Volume Sampler (HVS) with RPM attachment
SO <sub>2</sub>	IS-5182 Part II (Improved West & Gaeke method)	HVS with gaseous attachment
NO <sub>x</sub>	IS-5182 Part II (Jacob Hochheiser modified method)	HVS with gaseous attachment

CO	IS-5182 Part X	CO Monitor (Non dispersive infrared) Oldahm MX21
Ozone	UV Spec photometry method APHA	UV Spec photometry
Pb	APHA	AAS after sampling
NH3		Chemiluminescence
C6 H6	GC methods	Gas chromatography
Benzopyrene	GC methods	Solvent extraction followed by GC
As	AAS method APHA	AAS after sampling
Ni	AAS method APHA	AAS after sampling

**(viii) Duration of Sampling :**

24 hourly sampling has been done for measuring the parameters like RPM, SPM, and Pb while 8 hourly sampling has been carried out for SO<sub>2</sub>, NO<sub>x</sub> and CO measurement as per Central Pollution Control Board (CPCB) guidelines for National Ambient Air Quality Standard (NAAQS). Frequency of sampling has been kept twice a week at each sampling point for the complete season.

**(ix) Result and discussions :**

Ambient air quality for the core and buffer zone during the summer seasons have been presented in **Table**. Reflecting the background level of pollutants. RPM in the core zone is low due to the no industrial activity in and around the site. Concentration of SO<sub>2</sub> and NO<sub>x</sub> are not found in significant amount in the area falling under the core & buffer zone. The concentration of CO and Pb is found below the detectable limit. The average concentration during study period of SPM, RPM (2.5μ and 10 μ) SO<sub>2</sub>, NO<sub>x</sub> Pb and CO of core and buffer zone are shown in **Table**. The value of Free Silica (**Table**) is well within the permissible limit at all the sampling stations. The dust fall rate has been monitored in the area for summer, monsoon and winter seasons (**Table**).

**Ambient Air Quality Data (Average) in Area May 2015**

Location		Parameters			
		RPM (2 $\mu$ and 10 $\mu$ )	SPM	SO <sub>2</sub>	NOx
A1	Deori	12.00	61.66	11.08	13.68
A2	Sarecosh	17.00	69.82	13.30	13.80
A3	Amger	10.77	52.04	7.90	7.89
A4	Kakora	18.60	74.34	12.40	13.50

and Pb are found Below Detectable Limit

**Percentage of free silica in the RPM**

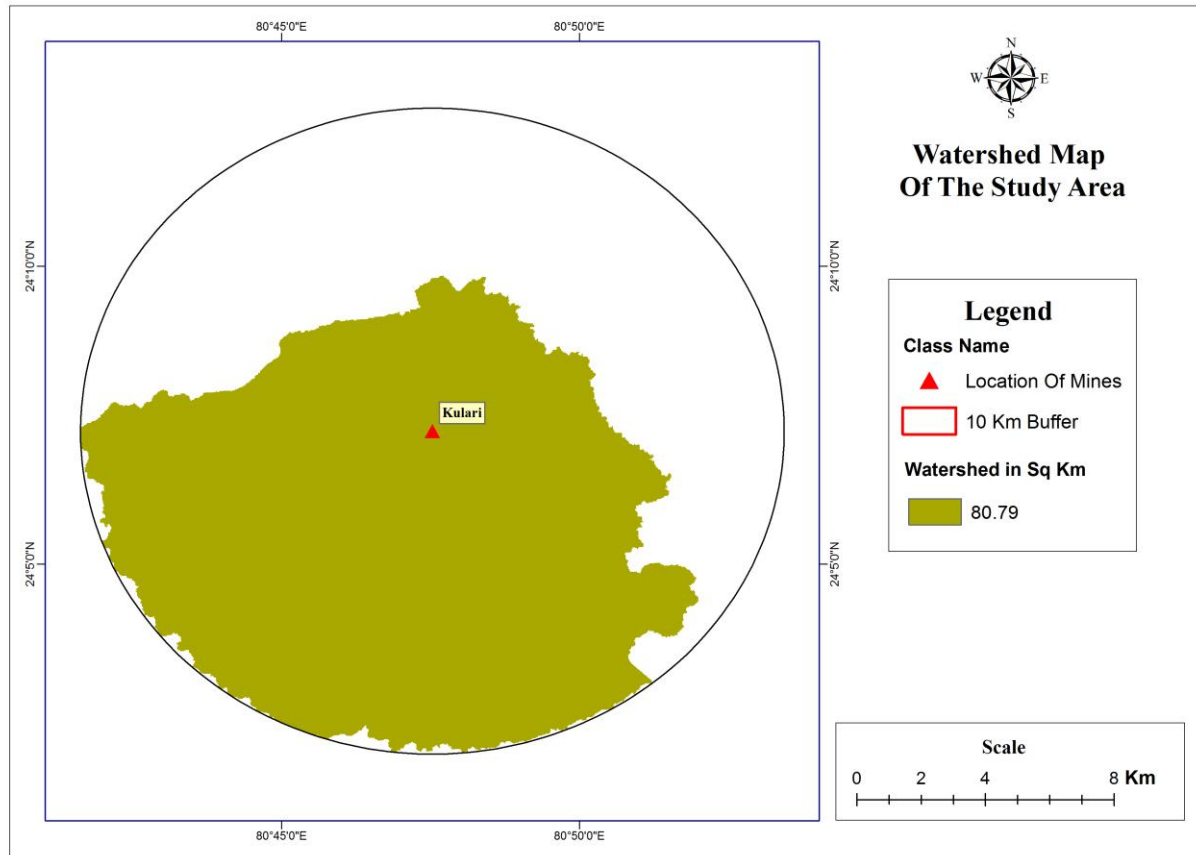
Station Code	Maximum	Minimum	Average	98 Percentile
A1	1.86	1.10	1.48	1.84
A2	1.56	0.96	1.26	1.55
A3	1.55	1.00	1.28	1.54
A4	1.75	1.20	1.48	1.74

**Dust Fall Rate of the Area**

Station Code	Location Name	Dust Fall (T/Month/Sq. Km.)
		Summer
A 1	Deori	5.00

**(x) Water Environment :**

**(a) Hydrogeology:** The district is covered by three major geological formations viz, the Precambrian crystallines, the Vindhyan and the Gondwanas. Besides, the tertiary laterite and alluvium also cover part of the district. Drainage of the area is controlled by Kansabati River. Ground water occurs mostly under phreatic condition in all the lithological units and locally under semi-confined and confined condition. The water shed map of the site is given below:



**WATER SHED MAP OF THE STUDY AREA**

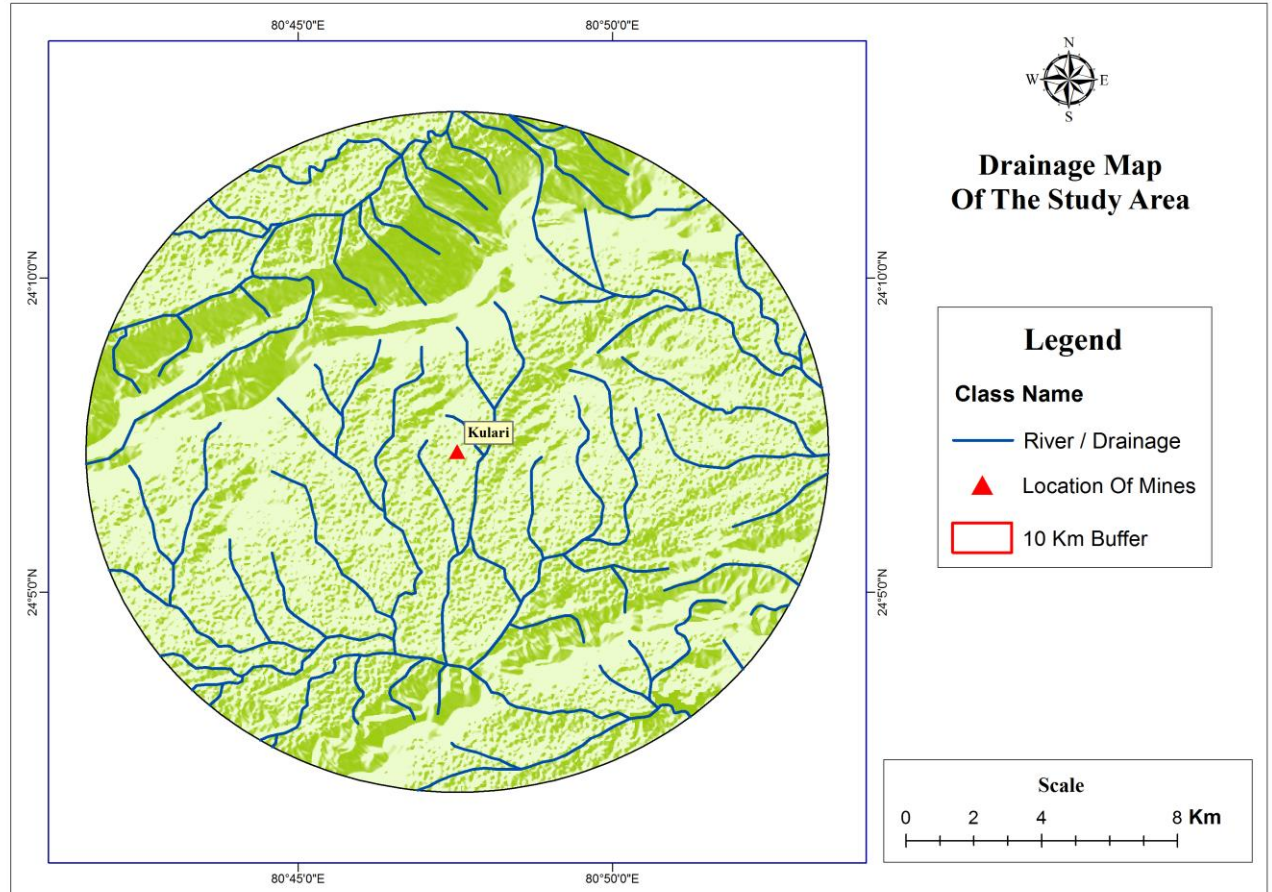
(b) **Groundwater:** Depth of water in wells located at slightly deeper aquifer ranged from 15.2 to 19.8 m bgl during post-monsoon period and 16.7 to 24.3 m bgl during pre-monsoon period. Overall stage of ground water development in the areas is 34.3% indicating sufficient scope of development. Water availability in three water shade is quite high therefore it proposed to construct with the help of government to harness rain water.

Parameter		% of Rainfall	Calculation	Values (MCM) million m <sup>3</sup>
Sub-watershed area	80.79 km <sup>2</sup>	--	80790000 m <sup>2</sup>	--
Total Precipitation	1278.0 mm	100.0	80790000X1.278m <sup>2</sup>	103.411
Evapotranspiration	805.14 mm	63.0	80790000X0.80514 m <sup>2</sup>	65.06

Total Runoff	345.06 mm	27	$80790000 \times 0.34506 \text{ m}^2$	27.87
Ground water recharge	127.8 mm	10	$80790000 \times 0.1278 \text{ m}^2$	9.69

(c) **Surface water:** There is no stream or pond within and around the leasehold area. River is located around 5 km away from the site.

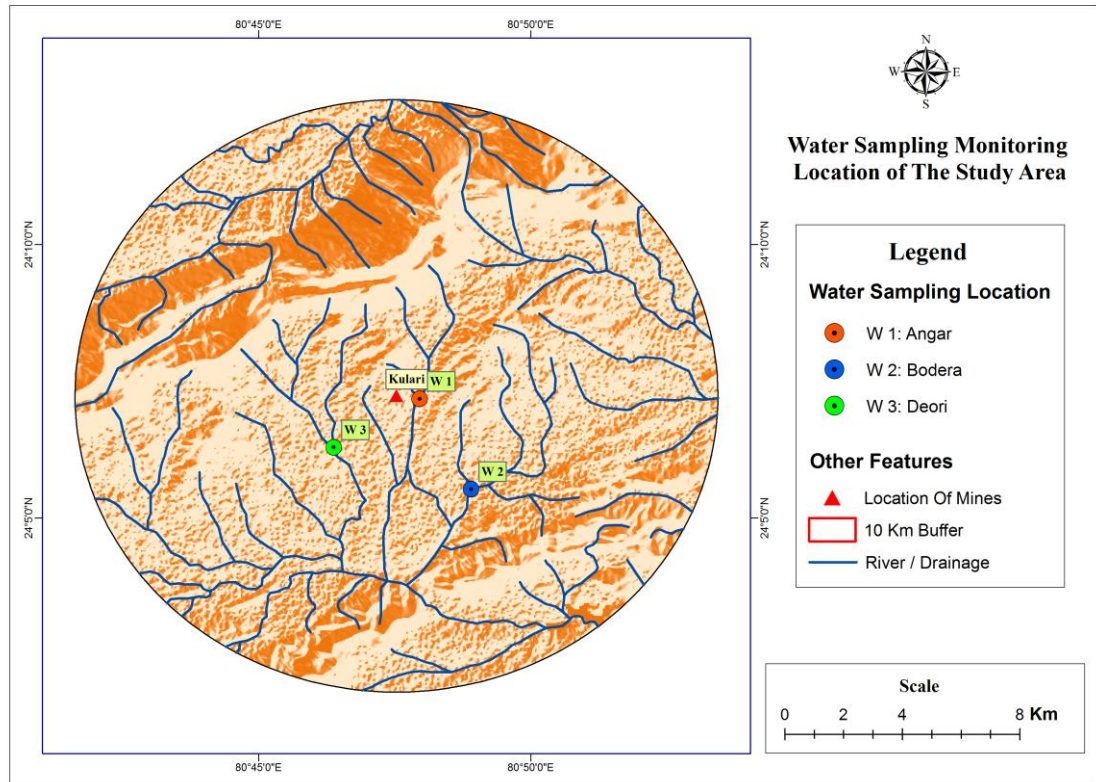
(d) **Water quality:** To assess the impact of mining on water quality, four water samples was collected from different locations. Two ground water samples were collected from villages. , whereas surface water was collected from up-stream and down-stream of River with respect to the mine lease location. Water samples were analyzed as per standards method prescribed in APHA (1992). All the measured values of well water samples were found well within drinking water standard (IS: 10500, 1991) whereas river water follows as per the classification of Inland surface water (IS: 2296, 1992) except TDS. The location of sampling location is given in figure below:



Drainage map of the study Area

No.	Parameters			
		W1	W2	W3
1	Temperature	22.7	23.5	19.1
2	pH	7.8	8.8	8.5
3	Turbidity NTU (max)	765	743	759
4	Total suspended Solid	30	135	123
5	Total Dissolved Solid	174	201	194
6	Alkalinity in M.O. (mg CaCO <sub>3</sub> /l)	78	96	87
7	Alkalinity in Phenol (mg CaCO <sub>3</sub> /l)	7.9	9.8	8.5
8	DO	7.2	8	7.6
9	BOD	2	0.9	1.6
10	COD	23	35	32.1
11	Temporary Hardness (mg CaCO <sub>3</sub> /l)	76.8	78.1	68.9
12	Permanent Hardness (mg CaCO <sub>3</sub> /l)	50.2	51.8	54
13	Nitrate (as NO <sub>3</sub> <sup>-</sup> )	1.72	4.9	2.18
14	Sulphate (as SO <sub>4</sub> <sup>2-</sup> )	12.1	11.6	12.9
15	Ammonia	0.094	0.073	0.156
16	Chloride (as Cl <sup>-</sup> )	16.4	17.1	16.6
17	Oil & Grease	nil	nil	nil
18	Fluorides as (F <sup>-</sup> )	0.7	0.8	0.6
19	Phosphate	BDL	BDL	BDL
20	Phenol	BDL	BDL	BDL
21	Iron (as Fe)	0.2084	0.4825	0.4825
22	Manganese (as Mn)	0.2085	0.0355	0.0355
23	Micro Organisms (MPN/100 ml)	1563	1624	1532

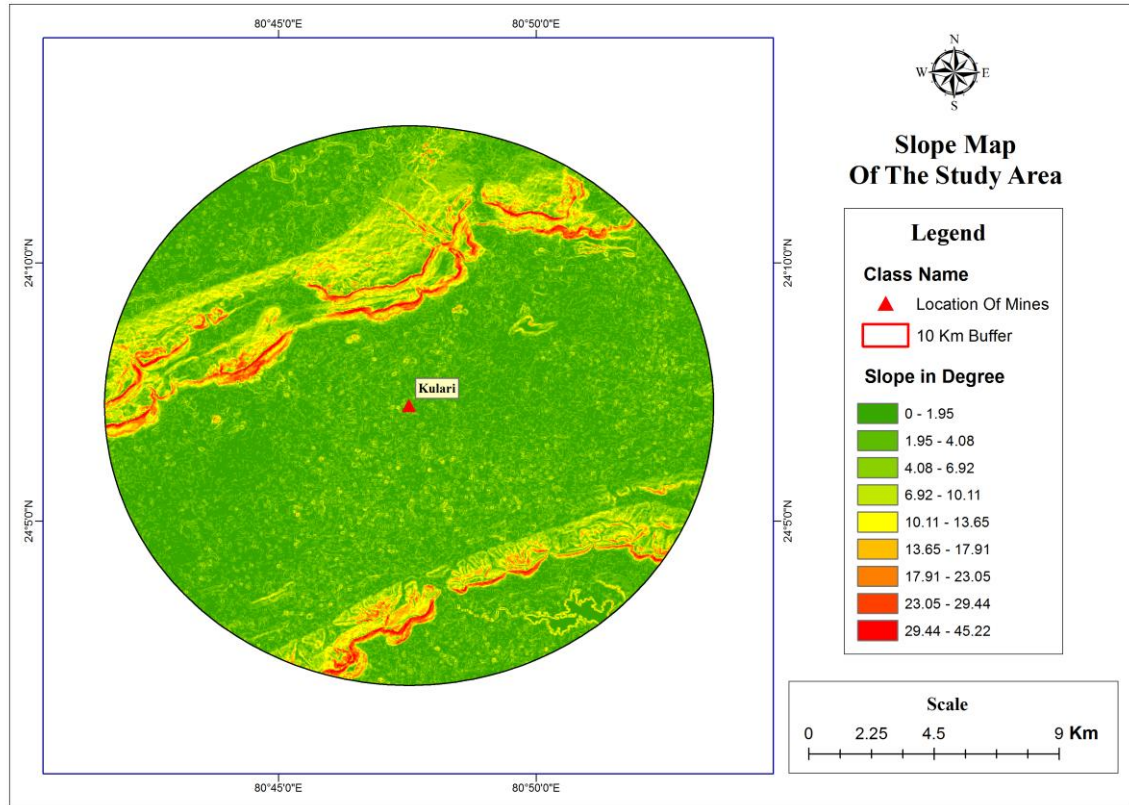
1	Anger
2	Bodera
3	Deon



### WATER SAMPLING LOCATION

**(xi) Land Environment :**

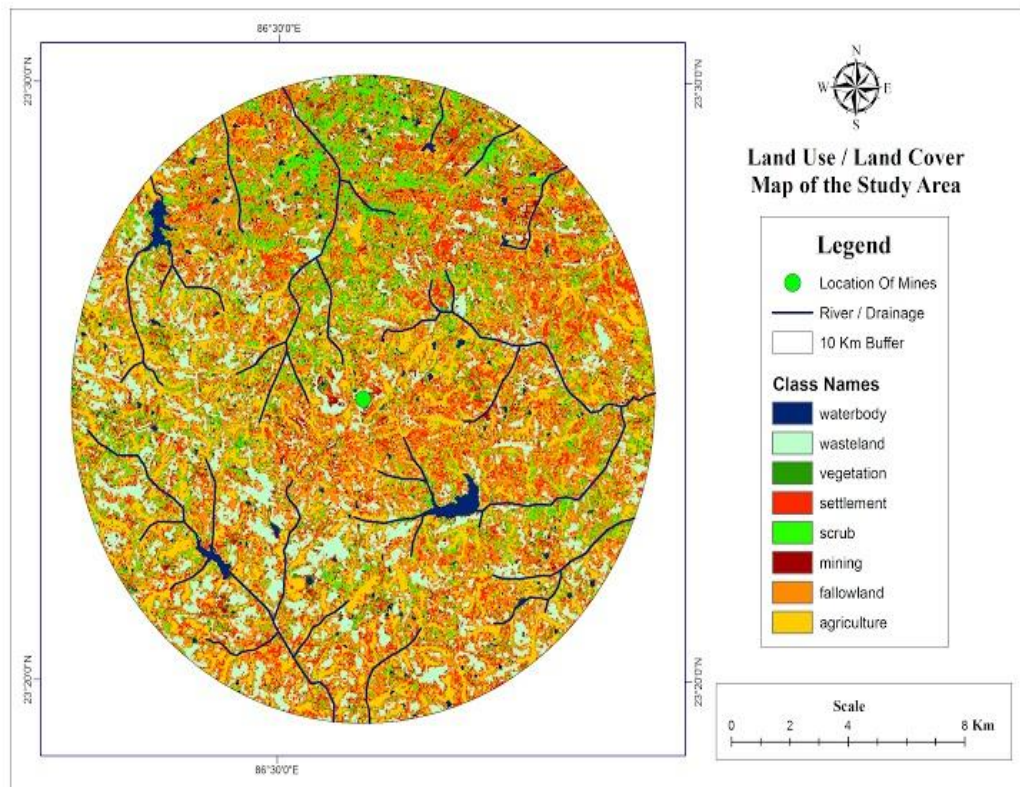
Lease hold area is barren and rock is exposed up to the surface and top soil is available only at a few places. The soil samples were collected from 3 locations, namely the mine site (S1), nearest agricultural field (S2) and nearest forest land (S3). Analysis of soil samples reveals that there was no wide variation in the natural material. Particle size analysis showed that the texture of the soil is of sandy loam in nature. The bulk density was found to vary from 1.44 to 1.76 g/cm<sup>3</sup> showing compactness while moisture content ranged from 6% to 15%. Further soils samples showed neutral pH. Electrical conductivity measurement of the samples clearly suggests that total soluble solid concentration were in the normal range and all the values were found below 1 mmoh/cm and values of EC ranged from 0.18 to 0.21 mmoh/cm. The values of organic carbon of all samples were found to be low to medium. Available potassium was found to be in the high range whereas available nitrogen was found to be low to medium and available phosphorus was observed to be deficient. The slope and elevation map of the area is given below.



### SLOPE MAP OF THE AREA

Class Name	Area in (Hect)	% of area in Total area
Vegetation	1561.46	5.13
Water body	675.43	2.22
Agriculture Land	6140.54	20.18
Settlement	5612.63	18.45
Scrub Land	4156.43	13.66
Mining	1316.21	4.33
Fallow Land	6568.20	21.59
Wasteland	4397.29	14.44
Total Area	30428.17	100

### LAND DETAIL ARROUN 10 Km. FROM PROJECT SITE



## LAND USE MAP

### (xii) Biological Environment

Proposed lease hold area is barren and rock is exposed upto the surface. There is no rare or endangered plant and animal species found in core and buffer zones of the area. There is no human settlement within the proposed lease boundary as well as within 1 km from the mine site.

#### **Flora:**

Forest areas located far away from the mine site have different tree species, namely, Sal (*Shorea robusta*), Khair (*Acacia catechu*), Asan (*Terminalia tomentosa*), Karam (*Adina cordifolia*), Juri (*Mitragynaparvifolia*), Sidha (*Lagerstroemia parviflora*), Karjali (*Cleistanthus collinus*), Kekar (*Garugapinnata*), Mahua (*Bassialati folia*), Paras (*Butea frondosa*), Gamhar (*Gmelina arborea*), Bia (*Petrocarpus marsupium*), Chilbi (*Holoptelea intergrifolia*), Sandhan (*Ougfinia dalbergiades*), Semal (*Bombax malabaricum*), Medh (*Litsaeasemifera*), Rohan (*Soymida febrifuga*), Piar (*Buchanania latifolia*), Bel (*Aegle marmelos*), Kedar (*Garugapinnata*), Ginjan (*Odinawodier*), Galgal (*Cochlospermum gosaypium*), Guri (*Mitragynaparvifolia*), Dhautha (*Anogeilastilatifolia*), Salai (*Boswellia thurifera*), Keonjhi (*Sterculia villosa*), Kend (*Diospyros tomentosa*), Bhurhul (*Chloroxylon swietenia*), Papar (*Gardenia latifolia*), Kusum (*Schleichera trijuga*), Belsai (*Limonia acidissima*), Dhola (*Alangium lamarcki*), Sissam (*Dalbergia latifolia*), Siris (*Boswellia serrata*), Bamboo (*Dendrocalamus strictus*) etc.

#### **Fauna:**

Animals and birds found within the adjacent area are of very general type reported in the locality consisting of deer, barking deer, rabbits, wild pigs, monkeys and jackals. Birds include pigeons, mourning doves, peacocks, parrots, wild fowls and owls etc.

**(xiii) Socio-Economic Environment**

There is no industry in the area. Local people are dependent on agriculture which is possible only once in a year due to lack of irrigation facility. Local people are fully dependent of daily labour job (NREGA), forest products, agriculture and employment in mines. In general, people of the region are poor and mining will help them to get job in the mine to prevent migration. According to the 2011 census Purulia district has a population of 2,927,965, The district has a population density of 468 inhabitants per square kilometre (1,210/sq mi) Its population growth rate over the decade 2001-2011 was 15.43%. Purulia has a sex ratio of 955 females for every 1000 males,<sup>[18]</sup> and a literacy rate of 65.38%

The district has a population of 2,538,233 (as per the 2001 census) out of which 19.35% is Scheduled Caste and 19.22% is Scheduled Tribes. The literacy rates of male and female are 74.18% and 37.15% of the total population.

According to the 2001 census, 83.42% of the population are Hindus, while 7.12% are Muslims.

**(xiv) Anticipated Environmental Impacts and Mitigation Measures :**

No significant impact of mining on environment over next five years is envisaged. Impact statement for different environmental aspects is described herewith:

***Air Quality:***

Mining operation and associated activities may cause air pollution and the main air pollutant is the suspended particulate matter. Most of the air pollution problems are due to fugitive dust emission. The intensity of dust generation in the mine is influenced by different factors such as hardness of rock, mining technology, material handling etc. Mining will be carried out in limited scale and loading will be done mechanically. Only source of air pollution is fugitive dust emission due to transportation of stone material by trackers. Total ground level concentration (including background concentration) of 24-hour average PM<sub>10</sub> at nearby villages (shows very less value, which will be much below the permissible limit of 100 µg/m<sup>3</sup>). Therefore, it may be concluded from the air pollution modeling study that the impact on local air quality due to the quarry operations would be within the permissible limit. Moreover, water spraying shall be done on transportation road to control fugitive dust emission, and road and tractors should be maintained properly. Green belt shall be developed around lease boundary and along both sides of transport road. Air quality shall be maintained within the permissible limit of National Ambient Air Quality Standards, 2009.

***Surface Water***

There are no surface water bodies in and around lease area. Hence, effect on surface water quality will be negligible. In order to arrest rain water flowing from the lease boundary to surrounding area, a garland drain will be constructed in the lower side of the leasehold area and runoff water will be accumulated in the settling pond/water harvesting pit. Rainwater accumulated in the mine pit shall be settled before discharging into the agricultural field during heavy rainfall. River is flowing around 1 km away from the mine site and effect on water quality of the river is not expected as no water is allowed to flow directly from the mine site. Mine pit water discharge through settling tank shall be maintained as per effluent standard as specified in Environmental Protection Rule, 1989.

***Ground Water***

The proposed mining operation will be carried out in limited scale on a small hilly area above

groundwater level. The rock formation does not contain any harmful element, hence no contamination will take place into ground water. Moreover, settling pond and pit sump will be constructed for rain water harvesting and ground water recharge. Final mine pit will be converted into pond after mine closure, which will further help in ground water recharge and utilization of pond water for irrigation and other domestic use. Water required for different mining uses will be around 8 KLD per day. This water requirement shall be met by constructing a well fitted with small diesel operated pump (3 HP) and partly from settling pond and pit sump. Change in water quality of the mining area is not envisaged.

***Noise Level:***

Noise will be created by movement of tractors. However, noise generated by this activity will be occurring at a very low level and ambient noise level in the buffer zone shall be within permissible limit of CPCB. Noise level in the core zone shall be maintained as per DGMS standard for continuous noise exposure level. Controlled blasting is proposed, hence effect of ground vibration and blasting generated noise shall be within in the DGMS standard.

***Land Environment***

The proposed mining operation will be carried out in limited scale on a small barren hilly area. Very little amount of soil is present in small patches. Small quantity of soil available at a few places within the leasehold area will be used for plantation purpose. In order to arrest siltation during rainy season, a garland drain will be constructed in the lower side of the leasehold area and runoff water will be accumulated in the settling pond/water harvesting pit. Further, plantation/green belt shall be developed along lease boundary and transport road. The open pit will be converted into pond after mine closure, which further helps in use of water for agriculture in the surrounding area. Hence, no negative impact on land environment is expected.

***Biological Environment***

The leasehold area is barren. Hence, impact on biological environment in not expected. As mentioned earlier, it is proposed to develop green belt around the lease boundary and transport road. This will help in improving biological environment of the area.

***Socio-economic Environment***

There is no habitat in the lease hold area as well as within 500km from lease boundary. There will be no adverse impact of mining but up to some extent socio-economic environment of the area will improve as, the mining activity and green belt development will create new job opportunities for the local people. The pit pond after mine closure shall be used for agricultural purpose, growing of fish, drinking water for animal and other domestic uses. Further applicant will provide the occupational health and safety by providing regular medical check-up and medicine distribution. Proposed mining operation will improve the financial status of the local people.

**4.0 Environment Management Plan :**

**(i) Management of Air :**

- ***Drilling Operation:*** Wet drilling shall be practiced.
- ***Fugitive Emission:*** Fugitive dust emissions from all the sources shall be controlled. Water spraying arrangement on transportation roads shall be made.

- ☛ ***Vehicular Emission:*** Vehicular emissions shall be kept under control and checked regularly in every six months. Vehicles used for transportation of minerals and others shall have valid permission as prescribed under Central Motor Rules, 1989 and its amendments.
- ☛ ***Transportation:*** Transportation road from the mine to main road shall be constructed properly with broken stone material of the mine. It shall be cleaned and maintained regularly. Transportation of material shall be limited to day time only and speed limit shall be maintained. No overloading of minerals for transportation shall be practiced.
- ☛ ***Road Maintenance:*** Maintenance of nearby local roads through which transportation of minerals shall be carried out by the company regularly at its own expenses.
- ☛ ***Compliance of NAAQS:*** Ambient air quality at the boundary of the mine premises shall conform to the norms prescribed in MoEF/CPCB notification: National Ambient Air Quality Standards, 2009.
- ☛ ***Green Belt Development:*** Green belt around the mining lease and along both sides of transport road shall be developed. Green belt shall be developed as per the guidelines given at the end of environmental management plan chapter. The company shall involve local people for plantation programme.

**(ii) Management of Water and Waste Water :**

- ☛ ***Groundwater Recharge:*** Arrangement shall be made for rainwater harvesting by constructing rainwater harvesting pit/sump/siltation pond (6×6×6 m).
- ☛ ***Drainage Control:*** Rain water will be collected in the sump/settling tank to be constructed in the lowest level in the lease boundary and necessary drainage shall be made to accumulate rainwater in the sump.
- ☛ ***Used Oil and Waste Water Treatment:*** The used mobile from tractors/ machines shall be sold to registered recycler. There is no waste water / used oil pollution from the mine.
- ☛ ***Hydro-geological Conditions:*** The mine is being carried out above the groundwater table. Hence, effect on ground water body due to mining is negligible. Siltation pond/ mine sump/ pond after mining would help in recharge of ground water.
- ☛ ***Mine Pit Pond:*** Water body proposed at the end of mining shall be developed as designed in the mine closure plan. Plantation shall be done on surrounding of the lease boundary and a layer soil layer shall be placed on bottom of pond for growing fish.

**(iii) Management of Dump and Waste Land :**

- ☛ ***Top Soil Management:*** Top soil (wherever available) shall be stacked separately with proper slope and adequate safeguards, and shall be utilized for biological reclamation and rehabilitation of mined out area in the later stage. A stone wall shall be constructed around the soil dump to control erosion and grass plants (Bamboo and Kashi grasses) shall be seeded in the inactive side of soil dump.

- ☛ **Overburden Material Management:** No significant quantity of overburden material is available within the lease hold area as rock is exposed upto the surface in most of the area within the lease boundary. Small quantity of overburden material available within the lease hold area shall be used for construction of transportation road from the mine to main road. Overburden material shall not be dumped.
- ☛ **Stock Yard:** The stone material shall be directly send to crushing unit located far away from the mine, hence there will not be any stock yard in the mine.
- ☛ **Plantation:** Minimum 50 plants shall be planted in each year around the lease boundary and both side of transportation road. Around 250 plants shall be planted in first five years.
- ☛ **Maintenance:** After care and watering of plants shall be continued until the vegetation becomes self-sustaining.

**(iv) Management of Noise and Vibration :**

- ☛ **Noise Level:** Measures shall be taken for control of noise levels below 85 dB(A) in the work environment as per the DGMS standard. Green belt shall be developed along lease boundary and transport road for minimizing noise level.
- ☛ **Maintenance of machines:** Machines shall be maintained in good conditions.
- ☛ **Personnel Protective Measures:** Worker engaged in operations shall be provided with ear plugs/muffs.

**(v) Health and Safety :**

- ☛ **Occupation Health:** Occupational health check-up for the workers shall be carried out periodically and records shall be maintained.
- ☛ **Health Awareness and Checkups:** Awareness programme for workers on impact mining on their health and precautionary measures, like use of helmet and mining shoes shall be carried out periodically. Review of impact various health measures shall be conducted followed by follow up action wherever required. Necessary funds for this also shall be earmarked.
- ☛ **Personnel Protective Devices:** Mine workers shall be provided with helmet and mining shoes, and they shall also be imparted adequate training and information on safety and health aspects.
- ☛ **Fencing around Pit:** Lease boundary shall be fenced with barbet wire to avoid accidents.
- ☛ **Amenities:** Various amenities like drinking water, rest shelter, toilet etc. shall be provided to the workers. A bore well shall be constructed and fitted with diesel operated pump (3 HP) for supplying water for drinking purpose, spraying on roads and watering of plants. A water storage tank (10×10×5 ft) shall be constructed on the elevated ground for storing of bore well water and using it as and when required.

**(vi) Rehabilitation & Resettlement (R&R plan)**

**(Policy to adopted (Central/State) in respect of the project affected persons including home oustees, land oustee and landless labour (A brief outline to be given).**

Human settlement is away from the applied lease area thus no impact will be anticipated on human settlement by proposed project of granite mining. So there is no need of rehabilitation and resettlement plan so far. Mining is proposed on hill. Habitation is far away from mine site about 0.5 km distance. No other land will be disturbed due to mining.

**5.0 Project Schedule and Cost Estimates :**

- (i) Likely date of start of construction and likely date of completion (time schedule for the project to be given.

Project will commence within one month after getting environmental clearance from SEIAA, West Bengal.

- (ii) Estimated project cost along with analysis in terms of economic viability of the project

The estimated cost of project is around 50 Lac. Cost for implementing Environment Management plane will be approx 1.0 Lac per Annam in addition to the contribution in District Mineral Foundation as proposed by the Government of India in MMDR (Amendment) Act 2015. The profit will depend upon the actual production obtained from the mine and demand of mineral in market.

**6.0 Concluding Remarks :**

Proposed mine is a semi mechanised mine covering leasehold area of 15.41 Hectare for duration 20 years. Proposed Granite Blocks production from the mine will be 6000 CuM per Annam. The proposed leasehold area is barren and rock is exposed up to the surface. The area is located in non-forest area and it is a government vast land. The Granite Blocks from the mine will be used as a raw material for processing plants. The waste generated mat be used for construction of roads and buildings. The Granite Blocks will be mined by drilling & cutting technology and Granite Blocks will be loaded with help of crane to the tripper trucks for transporting. Mining will be done above ground water table. No river, stream or pond is located close proximity of lease hold area. Little amount of top soil available at some locations in ML area will be stored separately in eco friendly manner for plantation. The mine is located away from habitation and any structure or place of importance.

Moreover, local people will be provided job in the mine and they will also be involved for plantation work. The pit pond after mine closure shall be used for agricultural purpose, growing of fish, drinking water for animal and other domestic uses. The area will be converted into picnic spot after closure of the mine for local people. Proposed mining operation will improve the financial status of the local people.

Thus, it may be concluded that there will not be any significant impact on environment due the proposed mining. A few measures have been suggested to control air, water, noise and land environment of the area. The mine would be operated in an eco friendly manner by implementing suggested remedial measures.

All measures proposed in Environmental Management Plan mentioned in Mining Plan and Progressive Closure Plan shall be strictly followed by the mine management. Conditions which would be given by the West Bengal State Level Environmental Impact Assessment Authority, DGMS and other concerned agencies shall be strictly followed by the mine authority.