

# EXECUTIVE SUMMARY

## **CLUSTER-4 MINE CONSTITUTED OF BICHHAKHANDI HILLOCKS OVER AN AREA OF 36.65 HECTARES**

AT VILL: BICHHAKHANDI  
TAHASIL: DHARMASALA  
DISTRICT: JAJPUR  
ODISHA

**CATEGORY OF PROJECT: B**

**BASELINE MONITORING PERIOD: MARCH 2020 TO MAY 2020**

PROJECT PROPOSED BY  
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Document No.: KLPL-EIA(MM)B <sub>1</sub> /2020-12		Document Name: EIA/EMP Report For Bichhakhandi hillocks (Cluster-4) over an area of 36.65 Hectares in Village Bichhakhandi of Dharmasala Tahasil, District Jajpur Odisha.	
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## 1.1 INTRODUCTION

This Summary is a brief outline of Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) carried out for Bichhakhandi Hillocks (Cluster 4) over an area of 36.65Ha, at Village-Bichhakhandi under Dharmasala tahasil District Jajpur, Odisha. Cluster-4 (Bichhakhandi) hillock/patch has been further sub divided to five sub-clusters, viz., Cluster- 4A comprising mineralised area over 8.08 Ha, Cluster-4B comprising mineralised area over 10.52 Ha, Cluster-4C comprising mineralised area over 6.70 Ha, Cluster-4D comprising mineralised area over 6.29 Ha & Cluster-4E comprising mineralised area over 5.06 Ha. Cluster-4 (Bichhakhandi hillock) is featured in the Survey of India Toposheet No. 73 H/13 and bounded between the latitudes 20°50'20.43" N to 20°50'57.12" N and longitudes 85°58'33.60" E to 85°59'29.23" E. Whereas, Cluster-4A (Bichhakhandi) is bounded between the latitudes 20°50'28.87" N to 20°50'37.16" N and longitudes 85°58'33.60" E to 85°58'49.12" E, Cluster-4B (Bichhakhandi) is bounded between latitudes 20°50'44.90" N to 20°50'58.02" N and longitudes 85°59'26.78" E to 85°59'10.92" E and Cluster-4C (Bichhakhandi,) is bounded between latitudes 20°50'33.27" N to 20°50'43.89" N and longitudes 85°59'13.16" E to 85°59'23.42" E, Cluster-4D (Bichhakhandi,) is bounded between latitudes 20°50'20.43" N to 20°50'45.50" N and longitudes 85°58'50.29" E to 85°59'35.92" E and Cluster-4E (Bichhakhandi,) is bounded between latitudes 20°50'26.22" N to 20°50'44.80" N and longitudes 85°58'52.63" E to 85°59'58.31" E.

## 1.2 HIGHLIGHTS

### A. The Project

Name of the Project	: Bichhakhandi Hillocks (Cluster 4)
Product	: Building Stone
Type of mine	: Semi mechanized open cast mining
Rated production capacity	: 4750000m <sup>3</sup> during Plan Period (Ten Years)

**Table 1.1: Brief profile of the project:**

Sl. No.	Salient Features	Descriptions
1	Cluster area	36.65 Ha (16 nos of mining lease.)
2	Village	Bichhakhandi
3	Tahasil	Jajpur
4	District and State	Jajpur, Odisha
5	Land category	Non forest Govt. Land
6	Toposheet No.	73H/13

7	Nearest town	Jenapur
8	Nearest road	NH:200- 3Km, E & NH:5-16Km,SE
9	River distance	Brahmani River – 4.2Km, N
12	Railway station	Jenapur Railway Station 4 Km, E
13	Jenapur	3.5 Km

**B. Environmental Aspects**

Pollution Potential: Land degradation, generation and propagation of fugitive dust, erosion of soil are the major pollutions anticipated from the proposed mining & allied activities

Environmental Impact: Marginal adverse impact on the localized air and land environment, which gets compensated by moderately beneficial impact on the human environment.

**1.3 INTRODUCTION**

Bichhakhandi Hillocks (Cluster 4) over an area of 36.65 Ha is an opencast semi- mechanized mine situated in the village Bichhakhandi, Tahasil Dhramasala, District Jajpur, Odisha. This cluster comes under ownership of Dharmasala, Tahasil, Jajpur, Odisha quarry leases for Building stone/ Road metal comprising 16nos. of lease areas covering a total mineralised area of 90.562Acres or 36.65 Hectares located in village/Mouza Sahanidiha of Dharmasala Tahasil & District Jajpur, Odisha have been proposed to be leased out to different intenders through auction. Cluster-4 constituted of Bichhakhandi building stone quarry has been approved by approved by the Deputy Directorate Mines, Jajpur Road Circle, Jajpur Road, vide memo no. 312 on dated 19.02.2020.

To obtain environmental clearance, a suitable Environmental Impact Assessment and Environmental Management Plan for the mining lease area has been prepared.

In a view to obtain environmental clearance for Cluster 4 mines, Dharmasala Tahasildar, Jajpur has entrusted the assignment to M/s Kalyani Laboratories Private Limited Bhubaneswar for preparing EIA /EMP report.

Kalyani Laboratories private limited (MoEF & CC and NABL accredited Lab) has gathered required baseline data for pre monsoon season (March to May 2020) and accordingly prepared the EIA / EMP report.

**1.4 PROJECT OUTLINE**

Cluster-4 has comprised mineralised area of Bichhakhandi hillock over 36.65 Ha. the geological reserve (Probable & Possible) for building stone/road metal has been estimated as 1588521 cum over the Cluster-4A ,1361415 cum over the Cluster-4B ,1303428cum over the Cluster-4C,1443765 cum over the Cluster-4D, & 1052167 cum over the Cluster-4E. Hence, the total

geological reserve over Cluster-4 mineralized area has been estimated as 6749196 cum.

It is evident that demonstrated the mineable reserve (Probable) for building stone/road metal worked out to be 16,03,476Cum over Cluster-8 mineralized area.

**Table 1.2 (A): Geological Reserve of Cluster**

Cluster-4A (Bichhakhandi)								
Section Considered	Length of Influence (m)	X-Area of Rock Mass (m <sup>2</sup> )	Volume of Excavation of Rock Mass(m <sup>3</sup> )	Vol. of Recoverable Building Stone (m <sup>3</sup> )	Vol. of Waste (m <sup>3</sup> )	X-Area of Soil Zone (m <sup>2</sup> )	Vol. of Soil Zone (m <sup>3</sup> )	Category
A	B	C	D=BXC	E=D X .70	E=D X .30	F	G=FXB	H
G1-G1'	485	4145	2010325	1407228	603098	159	77115	Probable
G1-G1'	485	534	258990	181293	77697	0	0	Possible
<b>Total</b>			<b>2269315</b>	<b>1588521</b>	<b>680795</b>	<b>159</b>	<b>77115</b>	
Cluster-4B (Bichhakhandi)								
G 2- G 2'	247	6531	1613157	1129210	483947	406	100282	Probable
G 2- G 2'	247	1343	331721	232205	99516.3	0	0	Possible
<b>Total</b>			<b>1944878</b>	<b>1361415</b>	<b>583463</b>	<b>406</b>	<b>100282</b>	---
Cluster-4C (Bichhakhandi)								
G 3 - G 3'	263	6281	1651903	1156332	495571	112	29456	Probable
G 3 - G 3'	263	799	210137	147096	63041.1	0	0	Possible
<b>Total</b>			<b>1862040</b>	<b>1303428</b>	<b>558612</b>	<b>112</b>	<b>29456</b>	---
Cluster-4D (Bichhakhandi)								
G 4 - G 4'	154	12021	1851234	1295864	555370	394	60676	Probable
G 4 - G 4'	154	1372	211288	147902	63386.4	137	21098	Possible
<b>Total</b>			<b>2062522</b>	<b>1443765</b>	<b>618757</b>	<b>531</b>	<b>81774</b>	---
Cluster-4E(Bichhakhandi)								
G 5 - G 5'	184	7340	1350560	945392	405168	103	18952	Probable
G 5 - G 5'	184	829	152536	106775	45760.8	102	18768	Possible
<b>Total</b>			<b>1503096</b>	<b>1052167</b>	<b>450929</b>	<b>205</b>	<b>37720</b>	---

**Table 1.2 (B): Mineable Reserve of Cluster**

Cluster-4A (Bichhakhandi)								
Section Considered	Length of Influence (m)	X-Area of Rock Mass (m <sup>2</sup> )	Volume of Excavation of Rock Mass(m <sup>3</sup> )	Vol. of Recoverable Building Stone (m <sup>3</sup> )	Vol. of Waste (m <sup>3</sup> )	X-Area of Soil Zone(m <sup>2</sup> )	Vol. of Soil Zone (m <sup>3</sup> )	Category
A	B	C	D=BXC	E=D X .70	E=D X .30	F	G=FXB	H
G1- G 1'	471	3384	1593864	1115704.8	478159.2	135	63585	Probable
Cluster-4B (Bichhakhandi)								
G2 -G2'	234	6054	1416636	991645.2	424990.8	393	91962	Probable
Cluster-4C (Bichhakhandi)								
G3 -G3'	246	5158	1268868	888207.6	380660.4	101	24846	Probable
Cluster-4D(Bichhakhandi)								

G 4 - G 4'	141	11300	1593300	1115310	477990	394	55554	Probable
<b>Cluster-4E (Bichhakhandi)</b>								
G 5 - G 5'	165	6640	1095600	766920	328680	103	16995	Probable

Method of mining will be opencast semi mechanized. Handling of rock mass will be done both manually and by excavators. Handpicks, spade, chisel, hammer will be used by manual labors for sorting and sizing. Loosening of rock mass will be done by drilling and blasting Based on the demand of building stone/road metal as revealed by the respective lessees, a maximum of 4,75,000m<sup>3</sup> of building stone/road metal will be extracted per annum from the Cluster-4 area. During next 10 years of the plan period the level of production expected is given in Table below.

**Table 1.3: Proposed Tentative Maximum Production of Building Stone/Road Metal during Plan Period (Ten Years)**

Year	Cluster-4A in cum	Cluster-4B in cum	Cluster-4C in cum	Cluster-4D in cum	Cluster-4E in cum	Total (cum)
First	110000	95000	85000	110000	75000	475000
Second	110000	95000	85000	110000	75000	475000
Third	110000	95000	85000	110000	75000	475000
Fourth	110000	95000	85000	110000	75000	475000
Fifth	110000	95000	85000	110000	75000	475000
Sixth	110000	95000	85000	110000	75000	475000
Seventh	110000	95000	85000	110000	75000	475000
Eighth	110000	95000	85000	110000	75000	475000
Ninth	110000	95000	85000	110000	75000	475000
Tenth	110000	95000	85000	110000	75000	475000
<b>Sub -Total</b>	<b>1100000</b>	<b>950000</b>	<b>850000</b>	<b>1100000</b>	<b>750000</b>	<b>4750000</b>

A total of 325 workers (Skilled-80nos., Semi-skilled-100nos. and Un-skilled-130nos & Mines Manager/Mine Permit Manager-15nos) will be employed during mining operation.

The Cluster-4 area is partly covered with soil mixed rock boulders/pebbles followed by granite gneiss/charnockite/migmatite deposit. The soil to be generated will be stacked in the earmarked temporary soil stack and will be utilised for the plantation purpose to be undertaken around the

respective hill/patch and adjacent to haul roads of the same in Cluster-4. Moreover, as envisaged, waste to the tune of about 30% of excavation will be generated during mining which will be utilised by the respective Lessee for making of mine road and allied infrastructures. These are the portions of total excavation which are not suitable for construction purpose due to weathering and softness. It will not be possible to separate the total waste from the suitable building stone/road metal at the quarry head.

It is assumed that around 2/3rd of the generated waste will be transported to the crusher site along with valuable building stone/road metal where these will be sorted out. The remaining 1/3rd of the total waste will be separated at the quarry head and will be stacked in the temporary waste dump of respective quarry lease and will be utilised by the lessee for making of mine road and allied infrastructures.

## 1.5 PRESENT ENVIRONMENTAL SETTING

To achieve these objectives of EIA/ EMP study, the EIA team members of M/s Kalyani Laboratories Private Limited, Bhubaneswar monitored different environmental parameters of the core zone (Lease area) and buffer zone (10 km. radial distance) of the project site in accordance with the Guidelines for EIA issued by the MoEF& CC, Govt. of India. The baseline study was carried during the period from March to May 2020. The baseline monitoring and analysis of different environmental parameters was conducted by M/s Kalyani Laboratories Pvt. Ltd

### 1.5.1 Land use and Topography

The project site is located in survey of India Toposheet No. 73H/13 and bounded between the latitudes 20°50'20.43" N to 20°50'57.12" N and longitudes 85°58'33.60" E to 85°59'29.23" E. Whereas, Cluster-4A (Bichhakhandi) is bounded between the latitudes 20°50'28.87" N to 20°50'37.16" N and longitudes 85°58'33.60" E to 85°58'49.12" E, Cluster-4B (Bichhakhandi) is bounded between latitudes 20°50'44.90" N to 20°50'58.02" N and longitudes 85°59'26.78" E to 85°59'10.92" E and Cluster-4C (Bichhakhandi,) is bounded between latitudes 20°50'33.27" N to 20°50'43.89" N and longitudes 85°59'13.16" E to 85°59'23.42" E, Cluster-4D (Bichhakhandi,) is bounded between latitudes 20°50'20.43" N to 20°50'45.50" N and longitudes 85°58'50.29" E to 85°59'35.92" E and Cluster-4E (Bichhakhandi,) is bounded between latitudes 20°50'26.22" N to 20°50'44.80" N and longitudes 85°58'52.63" E to 85°59'58.31" E. Lease area is accessible through NH 200 which is located at a distance of about 3Km, E & NH 5 at a distance of 16 Km, SE from the cluster 4. The area is at a distance

of 3.5km from Jenapur town. The nearest railway siding is at Jenapur railway station located at a distance of about 4 km, E from the cluster 4 area.

It is observed from the dug wells of the adjacent plain area and in the nearby villages that, the ground water table varies between 5 m to 10 m from the surface level depending upon seasonal variations. During dry season the water table falls to 10 m from the surface, whereas during rainy season the water table remains at around 5 m from the surface.

There is chance that during monsoon the run-off water may find access to some of the quarries in the Cluster-4. Therefore, it is proposed to keep one 5 HP diesel operated pump at each quarry site, particularly during monsoon to draw out the accumulated water from the quarry. The water so discharged will be routed to the natural drainage through series of drains and settling pits. Also, it is proposed to have a peripheral drain around the each pit of the individual QLS belonging to the cluster to restrict the surface runoff in to the quarry.

As per the satellite imagery data presented above it has been observed that about 2.76% of the land cover is covered under forest land, irrigated land (rabi crop land) include 44.87% and 19.36% fallow land, waste land 5.37%, scrub land 9.93% and river bed is covered under 4.06% of the total land use plan.

### **1.5. 2 Climate & Meteorology**

The climate condition of the district is generally hot with high humidity during April and May and cold during December and January. The maximum temperature in the district rises up to 46°C in the summer and falls to a minimum of 14°C in winter. The December and January are the coldest and May is the hottest month. The relative humidity is high, on an average, varies from 40 to 90% during the year. The average rainfall of the district is 1550mm. Maximum rainfall generally occurs in the month of August. Average nos. of rainy days in a year is 72. The western, south-western, eastern southern tract s receive a fairly high rainfall (>1500 mm.) which gradually decreases to 1300mm towards north-east.

### **1.5.3 Ambient Air quality**

The major contributors of air emissions are industrial emission, vehicular movement combustion of bio-fuel and other man made sources. During the study period the concentration of PM10 varies from 21.1-48.0µg/m<sup>3</sup>. The concentration of SO<sub>2</sub> varies from 5.03-10.3µg /m<sup>3</sup> and NO<sub>x</sub> concentrations vary from 12.4-20.4µg /m<sup>3</sup>. From the ambient air quality monitoring carried out for three months (March-May 2020) of the study period shows that the critical pollutants like PM<sub>10</sub>, SO<sub>x</sub> and NO<sub>x</sub> are well within the permissible limits.

### 1.5.4 Water Quality

- The pH range of the surface water samples is neutral ranging from 7.3 to 8.
- Electrical conductivity of water sample ranges from 144-480  $\mu\text{s}/\text{cm}$
- Dissolved oxygen in the surface water sample ranges from 5.6-7.2 mg/l.
- Biochemical oxygen demand of the surface water body is 3-10 mg/l. The BOD is comparatively higher in pond water as compare to river water.

From the water quality results it can be inferred that all the parameters analyzed are under the prescribed limit as per IS 2296:1982; class C and the water does not contain any pollutant which would be hazardous for human, animal or crop health.

As per the monitoring and analysis of ground water of selected sampling areas, it has been observed that,

- Water is colorless and odorless and found to be suitable for human consumption.
- The pH level of the ground water sample ranges from 6.7-7.7. This indicates that the pH of the ground water in the study area is neutral and as per the drinking water standard.
- Total hardness ranges from 144-712 mg/l, and total dissolved solid ranges from 270 to 1450mg/l.
- Alkalinity ranges from 90-469 mg/l.

From the above water quality results it can be inferred that all the parameters analyzed are under the prescribed limit specified under IS10500, 2012 for drinking water. The water is free from microscopic organism and do not contain any pollutant which would be hazardous for human, animal or crop health, So it is fit for drinking purpose.

### 1.5.5 Noise Quality

At present the area is a barren land without any human interference. So the present noise level of the area is lower comparative with the village. The noise level as measured in the core zone is 58.43 dB (A) in day time and 48.3dB (A) in the night time. In the buffer zone the noise level ranges from 48.3 to 56.4 dBA during day time and 36.6 to 41.9 dBA during night time. The noise level is below the standard as per the Noise Rule, 2000 for rural area. The lease area and all the sampling points are comes under rural area.

### 1.5.6 Soil quality

The soil analysis result shows that, the pH of the soil samples collected are mostly alkaline except the soil of Bichhakhandi and Sahanidih which are slightly acidic. Texture of the soil varies from silt loam to sandy clay loam. Electrical conductivity ranges from 48 to 323  $\mu\text{s}/\text{Cm}$ . Nitrogen content of soil varies from 1210 to 1814 Kg/Ha, Phosphorous content

varies from 13.91 to 49.99 Kg/Ha and Potassium content 134 to 482 Kg/Ha. Total organic carbon of the soil varies from 0.36 to 1.88%. From the soil analysis result it can be concluded that the soil of the area is highly fertile and suitable for agricultural purpose.

### 1.5.7 Biological environment

The area is covered with mostly scrub and open forest along with scattered vegetation near villages. The most commonly growing and economically important plant species of the forest are Kaju, Baidanka, Neem, Khajur, Teak (*Tectona grandis*; Family: Verbenaceae), Bara, Osta, Simli, Sunari, kanteikoli, Augasti, Nirgundi, Anantamala, Tal, Bamboo, Kendu (*Diospyrous kaki*; Family: Ebenaceae), Sal (*Shoria robusta*; family: Dipterocarpaceae) and due to their inexpensive utility in commercial purposes. However, over the last hundred years or so, forests are being destroyed by several natural and anthropogenic activities.

### 1.5.8 Socio Economic Environment

There are 40 villages present within the buffer zone of the project area located within 10 km radius of the project site.

**Table no.1.4 Demographic profile of the buffer zone**

Sl. No.	Attributes	Radius of 10 km
1	No. of Villages	40
2	Total Household	24269
3	Total Population	107333
4	Male Population	54749
5	Female Population	52584
6	Total ST population	11574
7	Total SC Population	22897
8	Sex Ratio ( F /M )	96 : 100
9	Population below 6 Years	13049

Out of the total population, 73387 persons are literate which contribute about 68% within the buffer zone. Out of the total literate, male literacy is contributed as 40903 i.e. 56% and female literacy is contributed as 32484 by 44%. It is observed that the literacy percentage is more among the male as compare to the female population. About 32% of the total population of the project villages is illiterate.

The work force classification in the study area helps in formulating strategies in any development programme. It also helps in identifying the potential workforce, their aptitude, skill, etc in any targeted population. As per the census 2011 the work group participation of the study villages are as follows :

- Out of the total population, 35741 persons (about 33%) are workers and 71592 (about 67%) persons are non workers. This can be inferred that more than half of the population is depending on others for their livelihood.
- Regarding workforce participation rate of both the sex, the data reveals that female workforce participation rate is comparatively low with respect to male. Out of the total working population 29885 (84%) are male and 5856 (16%) are female.
- Out of the total workers 23392 are main workers and 12349 are marginal workers. In both main and marginal workers population the male workers are overwhelmingly dominated in comparison to female workers. As per the census 2011 the work group participation of the study villages have been given below :

**Table no.1.5 Work group participation in main and marginal section**

Sl. No.	Attributes	Main	Marginal
1	Total Working	23392	12349
2	Cultivator	5792	1124
3	Agricultural labor	6572	8190
4	Household workers	1118	344
5	Other Workers	9910	2691

## 1.6 ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

### 1.6.1 Impact of Mining on Land Environment

#### 1.6.1.1 Impact on Topography

The impact on the topography is in the form of changed landscape due to the mining activities in the form of digging, leveling of lands & dumping of waste etc. There will be topographical change due to mining activity within the lease clusters. Cluster-4 (Bichhakhandi Hillock) is located within the revenue jurisdiction of Bichhakhandi village under tahasil Dharmasala of Jajpur district. The targeted area represents a hilly terrain comprising five Patches, viz., Cluster-4A, 4B, 4C, 4D & 4E with undulated topography. Cluster-4A (Bichhakhandi) displays highest altitude of 60 mRL and lowest altitude of 40mRL. Cluster-4B (Bichhakhandi) displays highest altitude of 39mRL and lowest altitude of 35mRL. Cluster-4C (Bichhakhandi) displays highest altitude of 55mRL and lowest altitude of 40mRL. Cluster-4D (Bichhakhandi) displays highest altitude of 75mRL and lowest altitude of 40mRL and Cluster-4E (Bichhakhandi) displays highest altitude of 60mRL and lowest altitude of 40mRL. However, sparse vegetation exists within the Cluster-4 area with no human settlement.

#### 1.6.1.2 Impacts due to Development of Mine & Excavation of stone

Ultimate extent of the quarry will be confined to the area of 31.97 hectares in Cluster-4 individually in Cluster-4A, 4B, 4C, 4D & 4E would be 7.08ha, 9.34ha, 5.865ha, 5.40 ha, and

4.29 ha respectively. As discussed, based upon the existing quarries as well as surface exposures total resource of the cluster has been estimated as the probable resource over the mineralized area of the respective hillock will be mined out during conceptual period. The ultimate quarry bottom will be at 20mRL as shown in the Conceptual Plan & Sections

#### 1.6.1.2 Other Impacts

The land-use pattern undergoes a change due to the use of the land for mining, dumping, and other mining and associated activities. The drainage pattern on the surface undergoes a change due to the alterations in the surface topography due to mining and associated activities.

#### 1.6.1.4 Mitigation Measures

The quarry within the lease cluster will be utilized as water reservoir. There will be construction of retaining wall along the quarry boundary and plantation will be carried out along the boundary of the quarry.

#### 1.6.2 Impact on Air Quality and Mitigation Measures:

Mining operation and its associated activities are potentially air polluting and the major air pollutant is the particulate matter. The impacts on air quality due to the proposed mining cluster are as below:

- Dust from excavation and mining of stone.
- Loading, unloading and screening.
- Vehicular movement on the haul roads.

Further mitigation measures proposed for the mining will be as blow:

- Water sprinkling on mining quarry, dumping area and haul road during dry wind periods, using a water tanker.
- Dust emissions due to vehicles can be minimized by avoiding spillage from the loaded trucks.
- Top soil or overburden is susceptible to wind erosion speeds more than 5 m/sec.
- Water sprinkling on the top soil and over burden dump to reduce wind erosion.
- Dust catching species like cassia fistula, *Bombax ceiba*, *Azadirchta indica*, *Nyctanthes arbor-tristis*, *Psidium guajava*, *tectonagrandis* etc will be planted in green belt.

#### 1.6.3 Impact on Noise Quality and Mitigation Measures

##### 1.6.3.1 Blasting Effects

The loosening of rock mass will be done by drilling and blasting. Drilling will be done either by wagon drill or jack hammer taking in to consideration the bench height varying from 3 meter to 6m. Assuming 4,75,000 m<sup>3</sup> (max) productions per annum of Cluster-4, the monthly production

target will be around 39,583 m<sup>3</sup>. To produce 39,583 m<sup>3</sup> of rock mass, tentatively 19791kg/month of explosive will be required assuming powder factor 2m<sup>3</sup>/kg.

Noise due to blasting is site specific and depends on type, quantity of explosives, dimension of drill holes, degree of compaction of explosive in the hole and rock. Blasting will be performed during the day time. Shot hole drilling & blasting will be in practice so that the effect of blasting in terms of fly rock and maximum ground vibration will be negligible. The noise produced by blasting would be for extremely short duration of around 0.5 seconds, though with a high intensity. The blasting will be conducted in the day time only and once in a week by the licensed contractor. Time of blasting will be 12 noon to 12.30 PM in day time with prior intimation to the villagers for taking shelter. The practice of regularly wetting the blasting ground and spraying water over the blasted material will be adopted to control air pollution. Proposal is to adopt wet drilling on the benches.

### 1.6.3.2 Ground Vibration

Ground vibrations are generated by travelling of shock wave into the rock mass and attenuate very quickly. Vibrations and air over pressure are moistened in trial blasts to generated sufficient statistical data that could not be used for ascertaining site constants.

### 1.6.3.3 Mitigation Measures:

- Development of green belt in the lease boundary which acts as a barrier for noise abatement
- The noise generating machineries will be properly maintained
- The workers will be provided with proper PPEs to minimize the occupational exposures of noise.

### 1.6.4 Impact on Water Quality and Mitigation measures

The there is no seasonal or perennial nalla found within the mines cluster, so there is no shifting of water course due to mining activities. The mining activities can cause adverse impacts due to mine drainage, siltation due to storm water & contaminated water from mining cluster area. 15 KLD of potable water will be required from which 12 KLD of water will be required for drinking & domestic purpose. 1.5 KLD of water is suggested to be utilized for dust suppression and 1.5 KLD for plantation purpose. Water will be sourced from ground water and rain water harvesting from the existing quarry.

During the proposed plan period no particular pit lay out will be followed for all the quarries in the respective hill/patch of the Cluster-4 area. Therefore, at the end of the plan (lease) period depth of the respective quarry over the Cluster-4 area is not possible to predict. However, after 10 years (lease period) of mining the tentative bottom RL of Cluster 4 would be 20.5m and 20 m. at the end of the conceptual period. This is above the ground water table

as the RL of ground water table is around 10 m. Therefore such depth of working would not affect the ground water table.

There is chance that during monsoon the run-off water may find access to some of the quarries in the Cluster-4. Therefore, it is proposed to keep one 5 HP diesel operated pump at each quarry site, particularly during monsoon to draw out the accumulated water from the quarry. The water so discharged will be routed to the natural drainage through series of drains and settling pits. Also, it is proposed to have a peripheral drain around the each pit of the individual QLs belonging to the cluster to restrict the surface runoff in to the quarry.

#### **1.6.4.1 Mitigation measures**

- Garland drains (1x1m), settling tank (3m x3m x3m) and check dam will be constructed along individual mining lease area. The garland drains of the individual lease will be connected to settling tank and after settling the water will be discharged out to the natural drainage.
- There will be no waste water generated due to the mining activity. The domestic effluents being generated will be discharged to soak pits through septic tank.
- The abandoned pit will be converted to rain water storage tank and the rain water stored in the pit will be utilized for plantation as well as dust suppression.

#### **1.6.5 Impact on Vegetation and Mitigation measures:**

There are few existing plantation within the lease area. The existing plantation in the roadside of the entry of lease cluster, near the rest shed, near the existing crusher and few plantations in the safety zone. The existing plantations in the lease area include Mahaneem, Neem, Teak, Chatiana, Chakunda, Bara, Mango, Sisoo, Aswastha, Sunari, Osta etc. During the conceptual period 9.34Ha of dump area will be covered with plantation of 11208 saplings.

#### **1.6.6 Impact on Socioeconomic Conditions:**

The proposed project shall have major beneficial and more or less negligible adverse impacts on the following domains.

A total of 325 workers (Skilled-80nos., Semi-skilled-100nos. and Un-skilled-130nos & Mines Manager/Mine Permit Manager-15nos) will be employed during mining operation.

The project activities shall create awareness with the local people for preferring permanent services than periodical agricultural activities. Further there will be infrastructural development in the area due to the proposed project.

For occupational health and safety PPEs will be provided to the workers and regular health check up of the workers will be carried out.

## 1.7 ENVIRONMENTAL MANAGEMENT PLAN (EMP)

### 1.7.1 Air Pollution & Control

During the mining operation there are various sources of dust emission. The measures proposed for air pollution control includes:

- Haul road within the cluster area well compacted that will reduce dust emission.
- Periodical water sprinkling on the haul road through water tanker of 10 KL capacity
- Over loading of transport equipments to be avoided to prevent spillage.
- Water sprinkling on the OB dump to reduce dust emission. About 100 water sprinklers will be installed around the dump in the individual quarry of the cluster area to reduce the dust emission.
- Three tier plantations should be done in periphery.
- Wet drilling will be in practice to reduce dust emission
- Blasting will be carried out at a particular time of the day and blasting will be carried out in the day time only.
- Regular maintenance of mining equipment and vehicle will be conducted and pollution under control certificate be obtained for the vehicles used in the mining.
- Crushing operations inside the mine lease will be prohibited and may be carried out in another demarcated area abiding with statutory regulations.

### 1.7.2 Water Management & Water Pollution Control:

- Mine water shall not be allowed to dissipate, but collected and discharged after allowing settlement of the suspended solids.
- Monitoring of the mine water as well as surface flows shall be done at close, regular intervals and records maintained.
- The surface run off from the mines will pass through the garland drain and enter to the settling tank. The silt and solids will be settled down in the tank and only water goes to the drainage.
- Precipitated rainwater should be harnessed by taking advantage of the given situation to create sufficient artificial storage capacities in natural or manmade depressions and inter-connecting them to meet afforestation and other needs.
- Garland drains along with settling tank and retaining wall shall be constructed around the quarry and dumps. While constructing drains routing and tracing shall be done maintaining the overall slope in the direction of the premising flow direction so that the runoff distribution is not affected.
- Garland drain will be developed around waste dump beyond the retaining wall to receive run-off water coming out of the retaining wall of 1m height and settling tank will be made to receive the run-off water from garland drain to settle the sediments and release clean water.

#### 1.7.2.1 Surface Water Management

To avoid surface run-off during the monsoon season peripheral/ garland drains with the settling tanks have been proposed around the dumps. Further guided channel around the quarry have

been proposed to stop the surface run-off in the quarry during monsoon. The dump and mine runoff water does not contain any chemical contaminant as the mining is only road metal/ stone, so there is no chance of contamination of the water. Further the water from the lease area after settling can be utilized for irrigation purpose.

During the rainy season the water from the lease area will be guided to the exhausted quarry within the lease area and will be utilized for water sprinkling and plantation purpose. During the conceptual period the entire quarry will converted to water reservoir and will be utilized for irrigation and pisciculture purpose.

#### **1.7.2.2 Management Plan for Ground water**

During the proposed mining plan period there is no proposal for intersecting the ground water table. Water requirement for domestic purpose will only sourced from ground water. Other required water will be sourced from rain water.

#### **1.7.3 Noise Control:**

Noise level shall be maintained below 90 dB (A) in the working zone (for 8 hr.exposure). Noise levels are expected to increase (w.r.t. present lower level) at surface work zone with commencement of mining and allied activities. The major source of noise is due to drilling, blasting and transportation of stone. The following measures will be taken up to reduce the noise level:

- Diesel powered machineries, which are major; source of noise in open cast environment will be properly maintained. Scheduled to prevent undesirable noise. Attention shall be paid towards rigorous maintenance of the silencer pipe of the diesel engines.
- All the workers working with drilling and blasting will be provided with ear muffs.
- Blasting will be carried out at a particular time of the day with proper information to the workers.
- Static diesel engines shall be housed as far as possible. If possible they will be placed on vibration isolators.
- Truck drivers will be issued ear plugs and ear muffs. Duty of the operators of the noisy machineries will be regulated to keep their noise exposures levels within the limits
- Green belt will be developed around the office building and mine to reduce noise exposure level.

#### **1.7.4 EMP Implementation and Monitoring**

To meet with the objectives of Environmental Impact and monitoring an “Environmental Management and Monitoring Department (EMMD)” will be formed mining cluster (Cluster 4) mining project area, which will be responsible for implementation of EMP and post operation monitoring. The officers of the department will meet frequently to assess the progress and analyze the data collected during the preceding fortnight/month.

## 1.8 CORPORATE ENVIRONMENTAL RESPONSIBILITY

As per the MoEF & CC OM No. 22-65/ 2017-IA II(M) dated 01.05.2018, it has been recommended that 2% of the project cost will be accorded for Corporate Environmental responsibility. The details of CER plan has been given in the table below:

**Table 1.5 Proposed CER Plan**

Sl. No.	Activities	Location	Time Frame					Allocated Budget (Rs.)
			1 <sup>st</sup> Yr	2 <sup>nd</sup> Yr	3 <sup>rd</sup> Yr	4 <sup>th</sup> Yr	5 <sup>th</sup> Yr	
<b>Pollution Control measures</b>								
1.	Installation of water sprinklers (20 Nos)	Individual leases of the cluster	**	**				10,00,000.00
2.	Construction of Garland drain and retaining wall	Individual leases of the cluster	**	**	**			10,00,000.00
3.	Water sprinkling by tanker in the village road (10 KL water tanker)	Bichhakhandi	**					10,00,000.00
4.	Plantation in the safety zone	Individual leases of the cluster	**	**	**			10,00,000.00
5.	Plantation in the village road connecting ML area	Avenue Plantation			**	**	**	5,00,000.00
6.	Rain water harvesting structure	Individual leases of the cluster		**	**			3,00,000.00
<b>Peripheral Development</b>								
1.	Development and maintenance of village road connecting individual lease of cluster	Nearby villages	**	**	**			6,00,000.00
2.	Employment opportunity for the local people including priority to youth of nearby Village.	Nearby villages	**	**	**	**	**	As per the Rule
3.	Installation of solar street light	Bichhakhandi Village				**	**	10,00,000.00
4.	Distribution of education material to the primary school	Bichhakhandi Village	**	**	**	**	**	1,00,000.00

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