

## **EXECUTIVE SUMMARY**

### **CHAPTER-I**

## **INTRODUCTION**

---

### **1.1 PURPOSE OF THE PROJECT**

Every anthropogenic activity has some impact on the environment. More often it is harmful to the environment than benign. However, mankind as it is developed today cannot live without taking up these activities for his food, security and other needs. Consequently, there is a need to harmonize developmental activities with the environmental concerns. Environmental Impact Assessment (EIA) is one of the tools available with the planners to achieve the above mentioned goal.

It is desirable to ensure that the development options under consideration are sustainable. In doing so, environmental consequences must be characterized early in the project cycle and accounted for in the project design.

Law requires that every project proponent must take Environmental Clearance as per the notification dated 14<sup>th</sup> September 2006 of the Ministry of Environment and Forests, New Delhi, before starting up any project. The conditions are applicable as per the MoEF guidelines and EIA notifications issued and amended time to time.

There are many Acts / Rules & Notifications issued by MoEF, New Delhi for keeping the environment in and around project sites congenial for healthy/better standard of living. Few of them are mentioned below:

1. Environment (Protection) Act 1986
2. Environment (Protection) Rules, 1986
3. Water (Prevention & Control of Pollution), Act 1974
4. Air (Prevention & Control of Pollution), Act 1981

5. Environment Impact Assessment (EIA) Notification, dated 14<sup>th</sup> September 2006.

M/s. Gangotri Limes Pvt. Ltd. (C/o Shri Yogesh Pritwani) has proposed limestone production of 25,650 Tonnes Per Annum from existing Limestone Mine (Area 8.144 Hect.). Matia limestone mine is located at Khasra No.540/1,540/2,541 Village - Matia, Tehsil - Raipur, Distt. - Raipur (Chhattisgarh). As per the EIA Notification 14<sup>th</sup> September, 2006, this mining project falls under Category B, Activity 1 (a) - 4 and therefore requires Environmental Clearance from State level Environment Impact Assessment Authority (SEIAA), Raipur, Chhattisgarh.

Environmental Impact Assessment (EIA) is defined as a systematic identification & evaluation of the potential impacts of the proposed projects, plans, programmes, or legislative actions related to the Physical, Chemical, Biological and Socio-economic components of the total environment. It is the evaluation of various impacts and the resultant natural and induced changes, as simply and precisely as possible, for optimizing the development to the environment. By virtue of EIA, the patterns, directions, strengths, and the causal relationships existing among all the relevant variables are studied.

It also helps in the determination of additional project components that may be required to restore, maintain or extend the resources. EIA is useful for decision making, as it is based on understanding the environmental implications including social, cultural and aesthetic concerns, which could be integrated with the analysis of the project costs and benefits.

The main purpose of Environmental Impact Assessment is to assess the beneficial and adverse impacts of the expansion project on the existing environmental systems. Thus the report is a presentation of environmental consequences of the project activity so that all the factors are considered tactfully in eventually arriving at a decision.

## **1.2 IDENTIFICATION OF PROJECT PROPONENT AND PROJECT PROPOSAL**

### **1.2.1 Introduction**

M/s. Gangotri Lime Pvt. Ltd. (C/o Shri Yogesh Pritwani) has proposed limestone production of 25,650 Tonnes Per Annum in existing Limestone Mine (Area 8.144 Hect.). This mine is located at Khasra No. 540/1, 540/2, 541, Village - Matia, Tehsil - Raipur, Distt. - Raipur (Chhattisgarh).

This report is for a part fulfillment for the process of getting Environmental Clearance for the production of 25,650 TPA of Limestone.

### **1.2.2 Name, Address & Status of Applicant**

C/o Shri Yogesh Pritwani

M/s. Gangotri Lime Pvt. Ltd.

Lakhe School Complex,

Near Gandhi Chowk,

P.O.: Raipur, District: Raipur (C.G.)

The applicant is a private individual engaged in lime making and having sufficient experience in mining and associated activities.

### **1.2.3 Status of Matia Limestone Mine**

The mining lease area was earlier granted to M/s Cement Corporation of India, Mandhar and subsequently the area was thrown open. The applicant applied for mining lease in the area and subsequently the State Govt. of MP issued LOI to applicant vide letter no. 3-59/96/12/1 dated 16.06.1997 and advised to submit the Mining Plan of the area duly approved by IBM, Nagpur.

The Mining Plan of the Matia Limestone Mine was approved by letter no. RAP/LST/ MPLN – 603/ NGP dated 12<sup>th</sup> March 1998 and the Mining lease was granted to Shri Ganagaram Sharma for the period of 30 years i.e. 3<sup>rd</sup> January 1999 to 2<sup>nd</sup> January 2029. The mining plan approved for the period of 5 years (2001 – 02 to 2005 -06) and the date of expiry of plan

period is 31<sup>st</sup> March 2006. The Mining Scheme and Progressive Mine Closure plan was prepared and approved by IBM vide letter number RAP/LST/MPLN-603/NGP dated 06.04.2009.

### 1.3 ENVIRONMENTAL SETTING

The lease area is situated at village Matia. District Headquarter Raipur is about 16.0 km from the mine site. It can be approached from Raipur by Raipur-Balodabazar tar road up to Matia Village junction which is 18.0 km from Raipur. From the diversion the proposed site is 1.0 km.

**TABLE NO: 1.3**  
**SALIENT FEATURES OF THE PROJECT**

S. NO.	PARTICULARS	DETAILS
1.	<b>Nature &amp; Size of the Project</b>	Limestone Production 25650 TPA (Mine Area 8.144 Ha.)
2.	<b>Location</b>	
	Village	Matia
	Tehsil & District	Raipur
	State	Chhattisgarh
	Latitude	21 <sup>0</sup> 19'55.17" N
	Longitude	81 <sup>0</sup> 45' 25.24" E
	Toposheet No.	64 G/11 & 64 G/15
3.	<b>Proposed project area</b>	
	Mine Area	8.144 ha.
4.	Cost of the project	Rs. 10 Lakh
5.	Cost for EMP	3.6 Lakh
6.	Water Requirement (KLPD)	2.5 KLPD
7.	Manpower Requirement	20 – 25 persons
8.	<b>Project Location Details</b>	
	General Ground Level	280 mRL
	Ground Water Table	260 mRL(20 mbgl) – 255mRL(25 mbgl)

<b>Matia Limestone Mine (ML Area – 8.144 Ha.)</b> At Village Matia, Tehsil & District Raipur (Chhattisgarh)	<b>Draft EIA/EMP Report</b>
--	---------------------------------

	Nearest Village	<ul style="list-style-type: none"> <li>• Donde-khurd at a distance of 2.0 km in SE direction</li> <li>• Donde Kalan at a distance of (1.5 km) in S direction.</li> </ul>
	Nearest City/Town	Raipur at a distance of 18.0 km in SW direction
	Nearest Railway Station	Raipur at a distance of 20 km
	National Highway	<ul style="list-style-type: none"> <li>• NH 43 (Vishakhapatnam to Raipur) at a distance of 15.0 km</li> <li>• NH 6 G E Road at a distance of 11 Kms</li> <li>• State Highway – Raipur Baloda Bazar at a distance of 160 mts.</li> </ul>
	Vidhan Sabha	<ul style="list-style-type: none"> <li>• Chhattisgarh State Vidhan Sabha at a distance of 6 km in South West direction</li> </ul>
<b>9.</b>	Nearest Police Station	Dharsinwa at a distance of 13 km in NW direction.
<b>10.</b>	<b>Environmental Setting</b>	
	Reserved Forest within 10 km. radius of the study area	None with in the 10 km radius of the study area
	Nearest River / Water Body	Kharun River (15 km)
	National Park/ Biosphere Reserve/ Wildlife Sanctuary/ Migratory Routes for birds	None with in the 10 km radius of the study area
	Seismic Zone	Zone II

Source: Field visit

### **1.3 SCOPE OF STUDY**

The project proponent presented the case before SEAC, Chhattisgarh in 44<sup>th</sup> meeting held on 03.10.2009.

The information / documents submitted by project proponent were placed before SEAC Chhattisgarh in the 51<sup>st</sup> meeting of SEAC Chhattisgarh held on 27.03.2010.

The committee suggested various additional Terms of References (ToR) for the preparation of the Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) Report through its letter no.

79/SEAC-CG/EC/Mining/RYP/120/09 dated 20<sup>th</sup> April, 2010, which are incorporated in the EIA/EMP report at their respective places.

Following are the additional Term of References issued by SEAC vide its letter no. 79/SEAC-CG/EC/Mining/RYP/120/09 dated 20<sup>th</sup> April, 2010:

<b>I</b>	<b>PROJECT DESCRIPTION</b>
<b>i.</b>	A brief description of the mine, the technology used and energy conservation.
<b>ii.</b>	The mode of transport of outgoing mined mineral
<b>iii.</b>	All the coordinates of the mine lease area with Toposheet
<b>iv.</b>	Detailed mined out material balance and water balance; break-up of top soil, overburden, mineral and all solid wastes; break-up of water requirement as per different activities in the mining operations including dust suppression.
<b>v.</b>	Source of water supplied for use in mining operations, dust suppression, sanction of the competent authority in the State Government.
<b>vi.</b>	Examine 100% recycling and reuse of the treated mine effluent, if any, in the mining operations or other uses such as irrigating the green-belt within premises etc.
<b>vii.</b>	Examine zero-effluent discharge conditions.
<b>II</b>	<b>DESCRIPTION OF THE ENVIRONMENT</b>
<b>viii.</b>	Study area should cover an area of 10 km radius around the mine site.
<b>ix.</b>	A study area map of the core zone and 10 km area of the buffer showing major topographical features such as land use, drainage, location of habitats, major construction including railways, highways, pipelines, major industries /mines and other polluting sources, which shall also indicate the migratory corridors of fauna, if any and the areas where endangered fauna and plants of medicinal and economic importance found in the area.
<b>x.</b>	Contour map along with the site plan of the mine and mine lease land use area statement including land for various mining operations, such as quarry area, overburden dumps, material handling, safety zone, building infrastructure, effluent treatment plant, stock yard, labour quarter/colony (within/adjacent to the mine lease area), greenbelt, undisturbed area, natural topographical features (such as existing roads, drains/natural water bodies if any) to be left undisturbed, natural drainage adjoining the lease area and modification thereof in terms of construction of embankments/bunds, proposed diversion/re-channeling of natural drainage or water courses, if any.
<b>xi.</b>	Details of acquisition of mine lease area.
<b>xii</b>	One complete season site specific meteorological data
<b>xiii</b>	Information regarding surface hydrology, water regime, hydrogeology and ground water regime.

<b>xiv</b>	Information regarding drainage pattern of the study area.
<b>xv</b>	Location of any National Part, Wildlife Sanctuary, Reserve Forest, Protected Forest and Eco-Sensitive Zones, Elephant/Tiger Reserve (existing as well as proposed), migratory routes, if any, within 10 km of the mine site be specified and marked on the map duly authenticated by concerned Government department
<b>xvii</b>	Map showing the core zone delineating the agricultural land (irrigated and un-irrigated), uncultivable land (as defined in revenue records), forest areas (as per records), grazing land and waste land.
<b>xviii</b>	Land use statement of the study area well as mine area.
<b>xviii</b>	Collection of one complete season (non-monsoon) primary base line data (along with dates of monitoring) on environmental quality such as air (PM less than 10 micron, PM less than 2.5 micron, SOx & NOx) as per latest national ambient air quality standards issued by Ministry of Environment & Forest, Govt. of India, New Delhi, noise, water (surface and ground water), soil.
<b>xix</b>	The monitoring be conducted as per Central Pollution Control Board's guidelines and parameters for water testing for both ground water as per IS and surface water as per Central Pollution Control Board guidelines.
<b>xx</b>	Surface water, ground water, soil, noise, and ambient air quality be monitored at-least at eight stations/locations around the mine site. At least one monitoring station in the upwind direction/downstream/non-impact non-polluting area as a control station.
<b>xxi</b>	Wind roses to determine air pollutant dispersion.
<b>xxii</b>	The location of the air monitoring station decided after taking into consideration the predominant wind direction, population zone and sensitive receptors including Reserve Forests.
<b>xxiii</b>	Details of various facilities to be provided for the personnel involved in mined out materials and all solid wastes production, transportation & handling in terms of parking, rest area, canteen, sanitation and effluents/pollution load from these activities. Effluent/ pollution load from these activities be included.
<b>xxiv</b>	Details of workshop, if any, and treatment of workshop effluents.
<b>xxv</b>	Occupational health issues, baseline data on the health of the population.
<b>xxvi</b>	Study on the existing flora and fauna in the study area carried out by an institution of relevant discipline and the list of flora and fauna duly authenticated separately for core and buffer zone, names of the species along with the classification under the Wild Life Protection Act and a statement clearly specifying whether the study area forms a part of the migratory corridor of any endangered fauna.
<b>xxvii</b>	Details of mineral reserves, geological status of the study area and the seems to be worked, ultimate working depth and stage wise working plan/scheme until end of mine life on the basis of approved rated capacity and calendar plans of production from the approved Mining Plan/Scheme, include Geological Maps also.

<b>III</b>	<b>ENVIRONMENTAL IMPACTS</b>
<b>xxviii</b>	Impact of project, if any, in the land use, in particular agricultural land, forest land, grazing land, water bodies, existing users of water bodies, drainage of the area and the surroundings.
<b>xxix</b>	Impact of choice of the selected mining technology and impact on air quality and waste generation (emission and effluents), Impact of choice if selected use of HEMM machinery, impact of blasting, noise and vibration.
<b>xxx</b>	Impacts of mined out materials and all solid wastes transportation covering the entire sequence of production, transportation, handling, transfer and storage on air quality showing in a flow chart with the specific points of fugitive emissions generation.
<b>xxxi</b>	Impact of the project on local infrastructure of the area, such as road network. Examine whether existing roads are adequate to take care of additional load of mined out materials and solid wastes transportation. Whether any additional infrastructure would need to be constructed and the agency responsible for the same with time frame?
<b>xxii</b>	Prediction of impact of project on different environmental components inter-alia (1) air including noise, (2) water (surface and groundwater regime), (3) Soil, (4) Flora and fauna and (5) Socio-Economic. Also take into account the emission from the vehicles and loading & unloading activities.
<b>xxiii</b>	The details of input data, emission factor and model used for air quality modeling. The air quality contours may be plotted on location map showing the location of project site, habitation nearby, sensitive receptors, if any. The wind roses should be shown on this map.
<b>xxiv</b>	Examine the number and efficiency of mobile/static water sprinkling system along the main haul roads, approach roads and also the frequency of their use in impacting the air quality.
<b>IV</b>	<b>MITIGATION MEASURES</b>
<b>xxv</b>	Details of pollution control measures with respect to effluent treatment, air pollutants emission control, noise control, vibration control and scientific & safe disposal of all solid wastes etc.
<b>xxvi</b>	Specific pollution control and mitigative measures for the entire mining operations, Specific pollution control/ mitigative measures proposed to be put in place at every air pollutants emission points, transfer and handling points.
<b>xxvii</b>	All solid wastes temporary storage yard/overburden dumps be provided with wind shields/wind breaking walls.
<b>xxviii</b>	Measures for occupational health and safety of the personnel and manpower for the project.
<b>xxix</b>	Compliance to the standards (effluent discharge standards, noise level standards particulate matter emission standards) prescribed by Ministry of Environment and Forests. Government of India / Central Pollution Control Board /Chhattisgarh Environment Conservation Board (which ever stringent).



<b>xxx</b>	Scheme for rainwater harvesting and ground water recharging with mined out water, if any.
<b>xxxii</b>	Details of Progressive mine closure plan and Details along-with action plan for development of greenbelt with not less than 1500 trees per ha. giving details of species, planting schedule etc. details of waste generation such as topsoil and overburden as per approved calendar programme in the approved Mining Plan/ Scheme for the rated capacity and their management shown in maps as well as in explanatory chapter with tables giving progressive Mine Development and Mine Closure Plan, greenbelt development, backfilling programme and conceptual post mining land use, overburden dumps heights and terracing based on slope stability studies with a maximum of 28 <sup>0</sup> angle as the ultimate slope; show the sections of the dumps (ultimate) (both longitudinal and cross section) with relation to the adjacent area.
<b>xxxiii</b>	Topsoil management when new land is broken.
<b>xxxiii</b>	Impacts of change in land use of agricultural land for mining operations and whether the land can be restored for agricultural use post mining also examine if, at the end of mine life, the depth of void left as water reservoir can be gently sloped to reduce risk to end users.
<b>V</b>	<b>ENVIRONMENTAL MANAGEMENT PLAN</b>
<b>xxxiv</b>	The EIA-EMP report covering the impacts and management plan of rated capacity for the project specific activities on the environment of the region, and the environmental quality - air, water, noise, land, biotic community through collection of data and information generation of data on impacts for a rated capacity.
<b>xxxv</b>	Detailed EMP to mitigate the adverse impacts due to project along-with item-wise cost of its implementation (capital and recurring) until the end of mine life.
<b>xxxvi</b>	Integrating in the EMP, measures for minimizing use of natural resources such as water, land energy, raw materials / mineral etc.
<b>xxxvii</b>	Disaster Management Plan and mitigative measures for disaster prevention and control.
<b>xxxviii</b>	Risk assessment to be undertaken, based on the same propose safeguard measures.
<b>xxxix</b>	Conceptual mine closure plan along with the fund requirement for the detailed activities proposed there under.
<b>xxxx</b>	Details along-with action plan and year wise funds to be allocated for Eco-Development/community welfare works including maintenance of roads in nearby villages/areas.
<b>VI</b>	<b>ADDITIONAL STUDIES</b>
<b>xxxxi</b>	Public Hearing details covering the notices issued in the newspaper proceedings/minutes of public hearing the points raised by the general public and commitments made in a tabular form. If the Public Hearing is in the

<b>Matia Limestone Mine (ML Area – 8.144 Ha.)</b> At Village Matia, Tehsil & District Raipur (Chhattisgarh)	<b>Draft EIA/EMP Report</b>
--	---------------------------------

	regional language, provide an authenticated English translation of the same.
<b>xxxxii</b>	Status of litigations/Court cases filed/pending against the project (all cases including environment) and / or any direction / order passed by any hon'ble court of law against the project, if so, details thereof.
<b>Besides the above, the below mentioned general points has been followed: -</b>	
<b>a.</b>	All the documents should be properly indexed, page numbered
<b>b.</b>	Period/date collection should be clearly indicated
<b>c.</b>	Authenticated English translation of all material provided in regional languages
<b>d.</b>	After the preparation of the Draft EIA Report rated capacity (as per the generic structure prescribed in Appendix-III of the EIA Notification, 2006) covering the above mentioned ToR issues, the project proponent should get the Public Hearing conducted and take further necessary action for obtaining Environment Clearance in accordance with the procedure prescribed under the EIA Notification, 2006.(as amended)
<b>e.</b>	The copy of the letter received from SEAC should be attached as an annexure to the final EIA/EMP report. The compliance statement of TOR prescribed should be incorporated.

## CHAPTER-II

### PROJECT DESCRIPTION

#### 2.1 TYPE OF THE PROJECT

As per the EIA Notification dated 14<sup>th</sup> September, 2006, this mining project falls under Category B, Activity 1(a)-4 and therefore requires Environmental Clearance from State level Environment Impact Assessment Authority (SEIAA), Raipur (Chhattisgarh).

#### 2.2 NEED OF THE PROJECT

To exploit the non-renewable natural resource available at this site, that is in demand not only for limestone production but also for supplying limestone to Cement Plant.

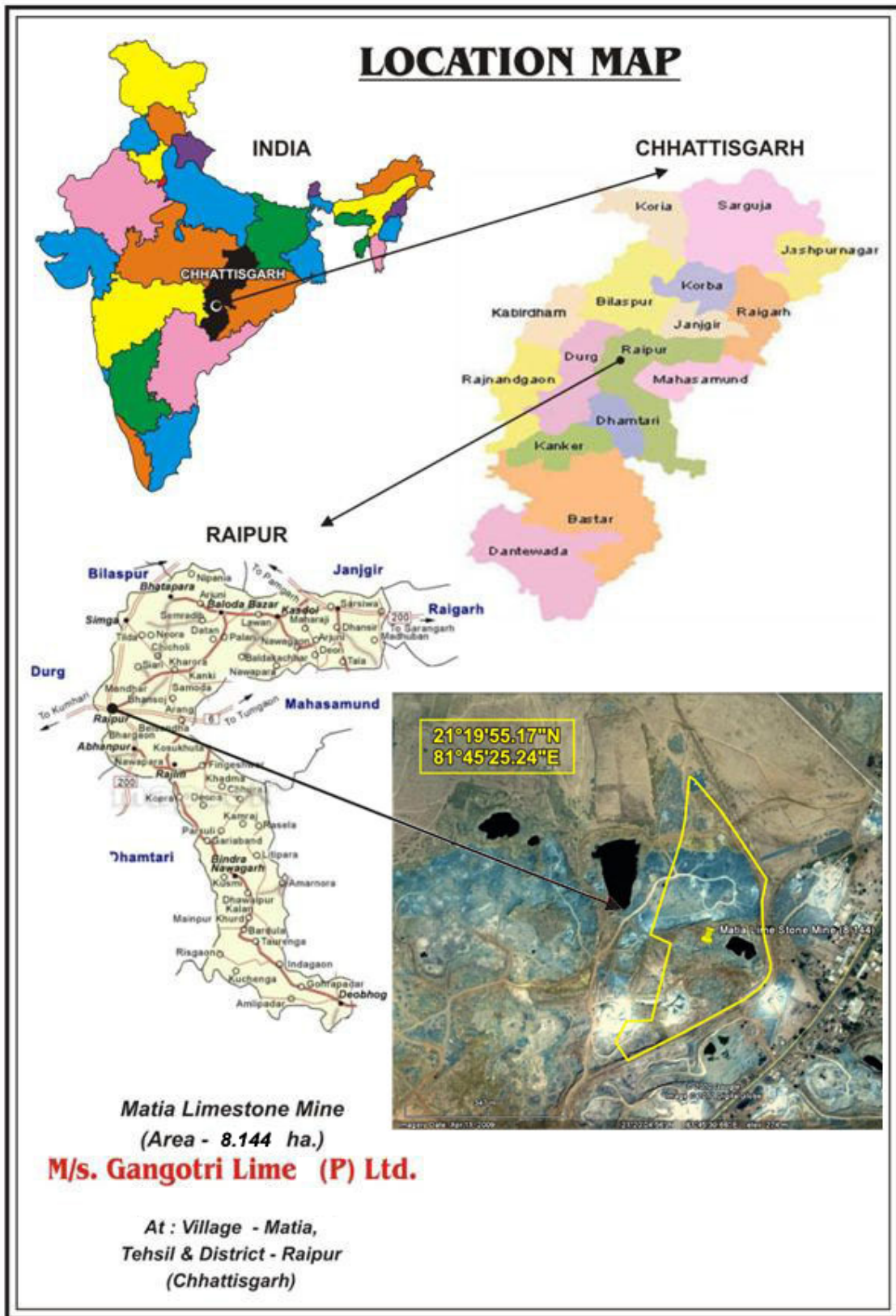
#### 2.3 LOCATION

Table No: 2.3  
LOCATION DETAILS

S. No.	Particulars	Details
1	Locations	
	A. Khasra No.	540/1,540/2,541
	B. Village	Matia
	C. Tehsil	Raipur
	D. District	Raipur
	E. State	Chhattisgarh
2	Latitude	21 <sup>0</sup> 19' 55.73" N
3	Longitude	81 <sup>0</sup> 45' 22.52" E
4	Toposheet No	64 G/11, 64G/15

Source: Field Visit

Location Map is shown in Figure 1



## 2.4 SIZE AND MAGNITUDE OF OPERATION

The mining project is proposed for production at the rate of 25,650 TPA which will be achieved by manual opencast method. Controlled blasting will be carried out, blasting parameters will be simple and the requirement of the explosives will be less.

### 2.4.1 Basic Requirements for the Project

#### 2.4.1.1 Water Requirement

Total water requirement for the project is 2.5 KLD. Details are as follows:

**TABLE – 2.4.1.1**  
**WATER REQUIREMENT**

S.No.	Details	Water Required (KLD)
1.	Water Sprinkling	0.5 (during dry season)
2.	Plantation	0.5
3.	Domestic & Drinking	1.0
4.	Mining	0.5
<b>Total</b>		<b>2.5</b>

**Source:** Rainwater collected in Old Mining pits will be used for the water sprinkling and other mining activities including greenbelt development. For domestic purpose, water will be sourced from nearby villages.

#### 2.4.1.2 Man Power

For safe and systematic mining sufficient technical & supervisory staff will be provided at the mine site which is mentioned below. Locals will be preferred:

**TABLE – 2.4.1.2**  
**MAN POWER**

S.No.	Category	Requirement
1.	Mine Manager	1
2.	Part Time Mining Engineer	1
3.	Mining Mate	1
4.	Supervisor	1
5.	Skilled Workers	4
6.	Unskilled Workers	12 - 17
<b>Total</b>		<b>20 - 25</b>

*Source: Mining Scheme*

## 2.5 PHYSIOGRAPHY

The proposed lease area is located in the village Matia in District Raipur, (C.G.). It is located in the survey of India toposheet number 64 G/11 between the latitude  $21^{\circ}19'55.73''$  N and longitude  $81^{\circ}45'22.52''$  E. The general height of the area is 280 mRL. Major part of the area were covered with soil at places, exposure of limestone were seen peeping through soil cover.

### 2.5.1 Drainage Pattern & Water Regime

The general drainage pattern of the lease area is towards north side & local slope is towards north. The depth of the water table in the area is about 20-25 m below ground level. During the summer water table goes below 25 meters and in the rainy season it comes within 20 meters. The Sheonath River is the main river of the area which is 25 kms away from the lease area in the direction of north - west. There is a Kharun river which is about 10 km in the NNW direction from the proposed site on the west of the area and its current flow is towards north-east. Kulhan nallah is at a distance of 5.5 km. No other river or nallah in the surrounding within 5 km.

There is no local water regime of any importance which is passing through the proposed lease area. Kulhan nallah is 5.5 km away from the proposed site and only active in rainy season and remain dry in other season.

### 2.5.2 Regional Geology

The proposed lease area is located in the Village Matia, District Raipur, lease area was earlier granted to M/s Cement Corporation of India, and some excavations have already been done. Due to this excavation limestone has been exposed in the area which exhibits clear nature of the deposit in the area. The limestone deposits located in this area belong to Raipur Group of Vindhyan Super Group deposited in the sedimentary basin of

Chhattisgarh. The regional succession of rocks in Chhattisgarh basin is tabulated below:

**TABLE – 2.5.2**  
**REGIONAL GEOLOGY**

<b>Group</b>	<b>Formation</b>	<b>Lithology</b>	<b>Thickness</b>
Raipur	1. Raipur Formation	Shale, limestone, dolomite	450 m
	2. Khairagarh Formation	Sandstone	Variable
	3. Gunderdehi Formation	Shale	180 m
	4. Charmuria Formation	Limestone	300 m
	5. Chandrapur Formation	Sandstone	300 m
Archaen		Granites & Dolerites etc.	

*Source: Mining Scheme*

In the above sequence, occurrence of cement grade limestone is entirely under stratigraphic control and it is intimately associated with Raipur Formation.

As observed around Matia, only the rocks of Raipur Formation i.e. Shale, limestone and dolomite are occurring. These rocks are structurally undisturbed and show gentle dips of 2° to 4° with general trend due NE-SW. The carbonate members of the above sedimentary horizon are characterised by the presence of organo-sedimentary layering, known as stromatolites exhibiting columnar structures. These stromatolites are rich in carbonate contents. The interspaces between different stromatolitic columns are occupied by argillaceous material rich in silica. That is why the limestone with dense stromatolitic columns are in carbonate percentage resulting in good quality limestone.

### **2.5.3 Local Geology**

Limestone of Matia area is purple and grey in colour, fine grained, massive, thick bedded rocks. Hardness is 4.5; specific gravity is 2.5 and break with even fractures. This type of limestone is very prominent and generally forms the upper layer of limestone forelion. It occurs in the form of bed. The limestone is predominantly grey in colour fine grained hard

and compact in nature. Locally the following lithological sequence is met within Matia area (in descending order):

1. Soil : Black & Lateritic
2. Interstitial Clay : Yellow sticky clay filled in solution channels and cavities
3. Grey limestone : Both occurring
4. Purple Limestone : Just appositionally
5. Shaley Limestone : More argillaceous
6. Shale : Also inter layered within limestone

Major part of the area is covered with soil at places, exposure of limestone are seen peeping through soil cover. Soil is lateritic type and yellowish to brown in colour, varies from 0.3 m to 0.6 m. Soil is fertile in nature and good for agriculture purpose.

#### **2.5.4 Details of Exploration**

The lease area was earlier granted to M/s Cement Corporation of India and the area was subsequently surrendered. Due to earlier exploration /mining operation there were quite good numbers of small pits, which had made for the purpose of exploration where limestone has been exposed in the area around 2.0 m to 3.0 m. The pits are scattered throughout the mining lease area. The existing exploration gives enough indication of limestone deposit in the area.

Presently no exploratory work required for this limestone mine, because the surrounding area already thoroughly prospected by Directorate of Geology and Mining and proved the existence of limestone 35 mbgl. However no borehole drilled within the mining lease area. So it is proposed to drill within the mine lease area. So it is proposed to drill 2 nos. of boreholes in prescribed place as shown in Geological plan. These 2 boreholes may be drilled the full intersection of limestone horizon so that actual potential of the limestone available in the area can be ascertained. The above 2 boreholes will drill during the 3<sup>rd</sup> and 4<sup>th</sup> years of mining scheme period. No other exploration proposed for this time.

#### **RESERVES AND GRADE**

It is observed from the geological map of the proposed lease area that it is more or less flat ground. Besides, the limestone has been abundantly exposed in the proposed lease area. The existence of limestone in the proposed lease area has been established by the old pits in the area. Though the existence of limestone has been well established in the adjoining mine of M/s. CCI mine for more than 10m;



but while estimating Geological reserves for the area, thickness of the limestone deposit is considered as 5 m.

Following points have been considered while estimating the geological reserves:

- a) The area is almost flat and it has been divided into two blocks. The reserves have been estimated block wise by calculating the area of each block by adopting graphical method and then summing up the total for complete area.
- b) The working limits are considered within 7.5 m of the proposed lease boundary.
- c) Average thickness of limestone deposit is considered up to 5.0 m for estimation of geological reserves.
- d) Bulk density of limestone is considered 2.5 tonnes/m<sup>3</sup>.

## **2.6 BASIS OF RESERVE ESTIMATION**

The reserves of limestone have been categorized as Proved, Probable and Possible types and it has been done by area of Influence Method.

### **A. PROVED RESERVES**

Limestone lies within 200 m of the old pits and up to depth of 3 m from the surface exposure will come under this category.

### **B. PROBABLE RESERVES**

Limestone lies within 200 m of the old pits and beyond 3 m depth up to 4 m depth from the surface exposure will come under this category.

### **C. POSSIBLE RESERVES**

Limestone lies within 200 m of the old pits and beyond depth of 4 m up to 5 m from the surface exposure will come under this category.

## 2.6.1 Geological Reserves

The mining lease area forms a well known Raipur limestone formation of Chhattisgarh Super Group. So many other mines are running near to this area with 200 mtrs. The area has been studied in detail by carrying out detail geological mapping, studied surrounding existing pits and exploration by digging trial pits and boreholes and analyzing the samples of limestone. On the observation of the above it is evident that the limestone continues along the depth and the quality suitable to be used with present technology. The details of the category wise reserves estimated in earlier in mining plan as on 1<sup>st</sup> Nov. 2003 and the detail table of the last five years of mining plan (2001-02 to 2005 -06) the production of limestone was 12,110 tonnes. So the depletion of reserves is

**Table: - 2.6.1 (a)**  
**Category wise reserves estimated as on 1<sup>st</sup> Nov. 2003**

Geological Reserves (in Tonnes)		Thickness of Deposit	Mineable Reserves in tonnes
Proved Reserves	6,06,000	3 Mts.	7,29,900
Probable Reserves	2,03,500	1 Mts.	
Possible Reserves	2,03,500	1 Mts.	
<b>Total Reserves</b>	<b>10,08,500</b>	--	7,29,900

*Source: Mining Scheme*

**Table No 2.6.1 (b)**  
**Updated (31.03.2006) Category wise Reserve of limestone**

Geological Reserves in Tones		Thickness of Deposit	Mineable Reserves in tones
Proved	5,93,890	3 mtrs.	7,17,790
Probable	2,03,500,	1 mtrs.	
Possible	2,03,500,	1 mtrs.	
<b>Total</b>	<b>10,00,890</b>		7,17,790

*Source: Mining Scheme*

## 2.6.2 Mineable Reserves and Anticipated Life of Mine

The mineable reserves are estimated 7,17,790 Tonnes. Proposed production is 25,650 TPA; therefore the life of the mine is anticipated as 27 years.

## **2.7 MINING**

### **2.7.1 Introduction**

It has already been mentioned that the area was under mining lease and few old pits have already been developed due to earlier mining activity. The mining in the area is being done by opencast manual method involving controlled blasting. Transportation of overburden from pit to earmarked site will be done by tractor trolley. The proposed height of bench is 3 m. Very light drilling and blasting will be carried out for production of limestone as the production is less. Heavy hammer and hardened chisel yield sufficient quantity of limestone. Large size of limestone (4 to 6 inches) turns into 60 mm to 40 mm with the help of local labour.

**TABLE – 2.7.1**  
**DETAILS ABOUT THE MINING LEASE AREA**

<b>S. No.</b>	<b>DETAILS</b>	
1.	Village	Matia
2.	Mining Method	Manual Opencast
3.	Proposed Production per year	25,650 TPA
4.	Bench Height (H)	3 m
5.	Elevation Range	280 MSL - 281 MSL
6.	General Ground Level	280 MSL
7.	Ground Water Table	20-25 mbgl
8.	Working Depth	275 mRL
9.	Ultimate Pit Slope	45°

*Source: Mining Scheme*

## **2.8 EXTENT OF MECHANIZATION**

No any kind of additional mechanization or deployment of mining machinery proposed for the mining operation. The whole mining operation is mainly manual in nature.

Air Compressor - 01 no.  
Jack Hammer - 01 no.

All the equipment will be hired from the local market.

Source: Mining scheme

## **2.9 YEARWISE PRODUCTION DETAILS**

### **2.9.1 Year wise Production Details (From Year 2001-02 – 2005-06)**

**TABLE – 2.9.1  
YEARWISE PRODUCTION DETAILS  
(FROM YEAR 2001-02 – 2005-06)**

<b>S.No.</b>	<b>Year</b>	<b>Planned Production (in Tonnes)</b>	<b>Actual Production (in Tonnes)</b>
1.	2001 – 2002	2500	300
2.	2002 – 2003	2500	3200
3.	2003 – 2004	2500	260
4.	2004 – 2005	2500	1850
5.	2005 – 2006	2500	6500
<b>Total</b>		<b>12500</b>	<b>12110</b>

Source: Mining Scheme

### **2.9.2 Proposed Year Wise Production details are as follows:**

The year wise production details for the next five years are as follows:

**TABLE – 2.9.2  
PROPOSED YEAR WISE PRODUCTION DETAILS**

<b>S.No</b>	<b>Year</b>	<b>Production in tones</b>
1.	2006 – 07	21,500
2.	2007 – 08	16,900
3.	2008 – 09	22,443
4.	2009 – 10	22,443
5.	2010 – 11	25,650

Source: Mining Scheme

### **2.9.3 Proposed Year Wise Generation of Topsoil and Overburden**

There is no any material remaining, which can be called as waste. Presently due to the last five years of mining operation, most of the mining lease area is uncovered. Soil cover can be seen only at the untouched portion falling under the mining limit, rest other part is completely uncovered. The yearly generation of waste of this mine is estimated as follows

**Table No: - 2.9.3**

<b>S. No.</b>	<b>Year</b>	<b>Topsoil (cu. m)</b>	<b>Overburden (cu. m)</b>
1.	2006 - 07	25	50
2.	2007 - 08	25	50
3.	2008 - 09	50	100
4.	2009 – 10	50	100
5.	2010 - 11	60	150
<b>Total</b>		<b>210</b>	<b>450</b>

*Source: Mining Scheme*

## **2.10 CONCEPTUAL MINING PLAN**

The mining lease is having very thin soil and there was no requirement of any additional development prior to the mining operation. Due to old mining operation there is no top soil or overburden. During the last five years no soil/overburden was generated because limited mining operation was done due to lack of demand.

The reclamation activity will be done only after attaining the optimum thickness of limestone, which is economically viable, has been extracted. The soil generated will be stacked along the lease boundary so that it can be used for the reclamation purpose, or it will be used for the afforestation. The thickness of alluvial soil is very less in the area. For this reason it may not be possible to reclaim the area fully by soil and it can be done partially.

## **2.11 SITE SERVICES**

The following site services shall be made available:-

- **Statutory requirement:** including first aid station, rest shelter, drinking water facility etc.

- **Maintenance requirement:** since the mining will be of manual nature, thus not much equipment to be used except compressor & jack hammer drill for drilling. Thus not much maintenance required.
- **Administrative requirement:** A site office for staff, supervisor, and mate.

## **2.12 MITIGATION MEASURES**

### **2.12.1 Strategy to Control Air Pollution**

#### ***A. Dust Pollution***

One of the main pollutants in air will be suspended particulate matter (SPM), which will be generated during various activities of mining such as extraction of ore and movement of vehicles. Following measures will be taken to minimize air pollution:-

- All the haul roads will be kept properly graded with sufficient width and water spraying during dry season will be done on the haul roads.
- Drilling machines will be equipped with wet drilling arrangements.
- Drilling will be done with sharp drill bits.
- The vehicles used for transportation will not be overloaded.
- Development of green belt/plantation around roads and other places to arrest dust.
- Periodic air quality survey will be carried out.
- Personal Protective Equipments like dust mask will be provided to all employees working in the likely dusty areas.
- In future, if blasting is proposed then wet drilling will be done for limestone mining with the help of jack hammer.

#### ***B. Prevention and control of Gaseous pollutants***

- Proper maintenance of vehicles will be done; this will bring reduction in pollution.

### **2.12.2 Strategy to Control Water Pollution**

- Garland drain shall be constructed on all sides of quarry. The collected water in the pit shall be used for plantation and spraying on haul roads.
- No wastewater shall be generated from the mining activities.
- Septic tanks and soak pits will be provided for the disposal of domestic effluent generated from mine office.

### **2.12.3 Noise Abatement and Control**

- Plantation will be taken up around the lease area and along haul roads. The plantation minimizes propagation of noise.
- In order to reduce the effect of noise pollution, earmuffs will be provided to all operators and employees working near the machinery.
- Proper maintenance, oiling and greasing of machines at regular intervals will be done to reduce generation of noise.
- Adequate silencers will be provided in all the diesel engines.
- The drilling will be carried out with the help of sharp drill bits which will help in reducing noise vibration.
- Periodical monitoring shall be done.

### **2.12.4 Green Belt Development**

The Green belt Development will be done all along the boundary. So far 200 saplings were planted (40 per year). The company has planned to develop greenbelt in 33% of the area. This will help in reducing the concentration of pollutants and will also be effective in attenuating noise levels.

Following be considered while selecting plant species for green belt development and tree plantation:

- Broad leaved and fast growing trees to trap maximum dust.
- To be perennial and evergreen.
- To give thick canopy cover.

<b>Matia Limestone Mine (ML Area – 8.144 Ha.)</b> At Village Matia, Tehsil & District Raipur (Chhattisgarh)	<b>Draft EIA/EMP Report</b>
--	---------------------------------

50 trees per year have been proposed under this mining scheme; proper fencing and watering etc. will be provided by the lessee to achieve minimum 70% survival rate.



## **CHAPTER-III**

# **DESCRIPTION OF THE ENVIRONMENT**

---

### **3.1 INTRODUCTION**

The main objectives of describing the environment, which may be potentially affected, are (i) to assess present environmental quality and the environmental impacts and (ii) to identify environmentally significant factors that could preclude project development. The chapter contains information on existing environmental scenario for the following parameters.

1. Water Environment
2. Micro – Meteorology
3. Air Environment
4. Noise Environment
5. Soil Environment
6. Land Environment
7. Biological Environment
8. Socio-economic Environment

To achieve these objectives, our team monitored the environmental parameters within the core zone and buffer zone (10 km. radial distance from the mine site) in accordance with the guidelines for EIA issued by the Ministry of Environment & Forests, Government of India.

This chapter and the related discussions contain the results of field studies carried out during the Post Monsoon Season (October to December 2009)

### **3.2 STUDY AREA AT A GLANCE**

#### **1. General Particulars:**

##### **Location**

- Village : Matia
- District : Raipur

<b>Matia Limestone Mine (ML Area – 8.144 Ha.)</b> At Village Matia, Tehsil & District Raipur (Chhattisgarh)	<b>Draft EIA/EMP Report</b>
--	---------------------------------

- State : Chhattisgarh
- Latitude : 21<sup>0</sup>19'55.17" N
- Longitude : 81<sup>0</sup>45'25.24" E
- General Ground Level of Area : 280 mRL

## 2. Nearest Infrastructure Feature

Nearest Highway : NH 43 (Vishakhapatnam to Raipur) at a distance of 15.0 km

NH 6 G E Road at a distance of 11 Kms

State Highway – Raipur Baloda Bazar at a distance of 160 mts.

Nearest Railway Station : Raipur at a distance of 20 km

## 3. Demography

Total Population (Raipur) : 106662 (as per 2001 Census)

Literacy Rate (%) : 66.56%

## 4. Climatology (During study period Oct. to Dec. 2009)

i) Maximum Temperature : 31.4°C

ii) Minimum Temperature. : 8.3°C

iii) Relative Humidity (%)

At 08.30 hrs : 52% to 81%

At 17.30 hrs : 43% to 60%

iv) Average annual Rainfall : 1385 mm

## 3.3 PHYSIOGRAPHY & DRAINAGE

The Mine lease area is located in the village Matia in District Raipur, (C.G.). It is located in the survey of India toposheet number 64G/11 between the latitude 21<sup>0</sup>19'55.17" N and longitude 81<sup>0</sup>45'25.24" E. The general height of the area is 280 mRL. The limestone deposits are spread over in and around few villages as continuous block in this area. They were mostly

covered with alluvial soil having thickness of 0.3 m to 0.6 m. The area is surrounded by the agricultural land having flat topography.

The general drainage pattern of the lease area is towards north side & local slope is towards north. The depth of the water table in the area is about 20-25 m below ground level. During the summer water table goes below 25 meters and in the rainy season it comes within 20 meters. The Sheonath river is the main river of the area which is 25 kms away flowing in the direction of north - west. There is a Kharun river which is about 10 km from the Mine site on the NNW of the area and its current flow is towards north-east. Kulhan nallah is at a distance of 5.5 km. in North direction. No other river or nallah in the surrounding within 10 km radius study area.

There is no local water regime of any importance which is passing through the Mine lease area. Kulhan nallah is 5.5 km away from the Mine site and only active in rainy season and remain dry in other season.

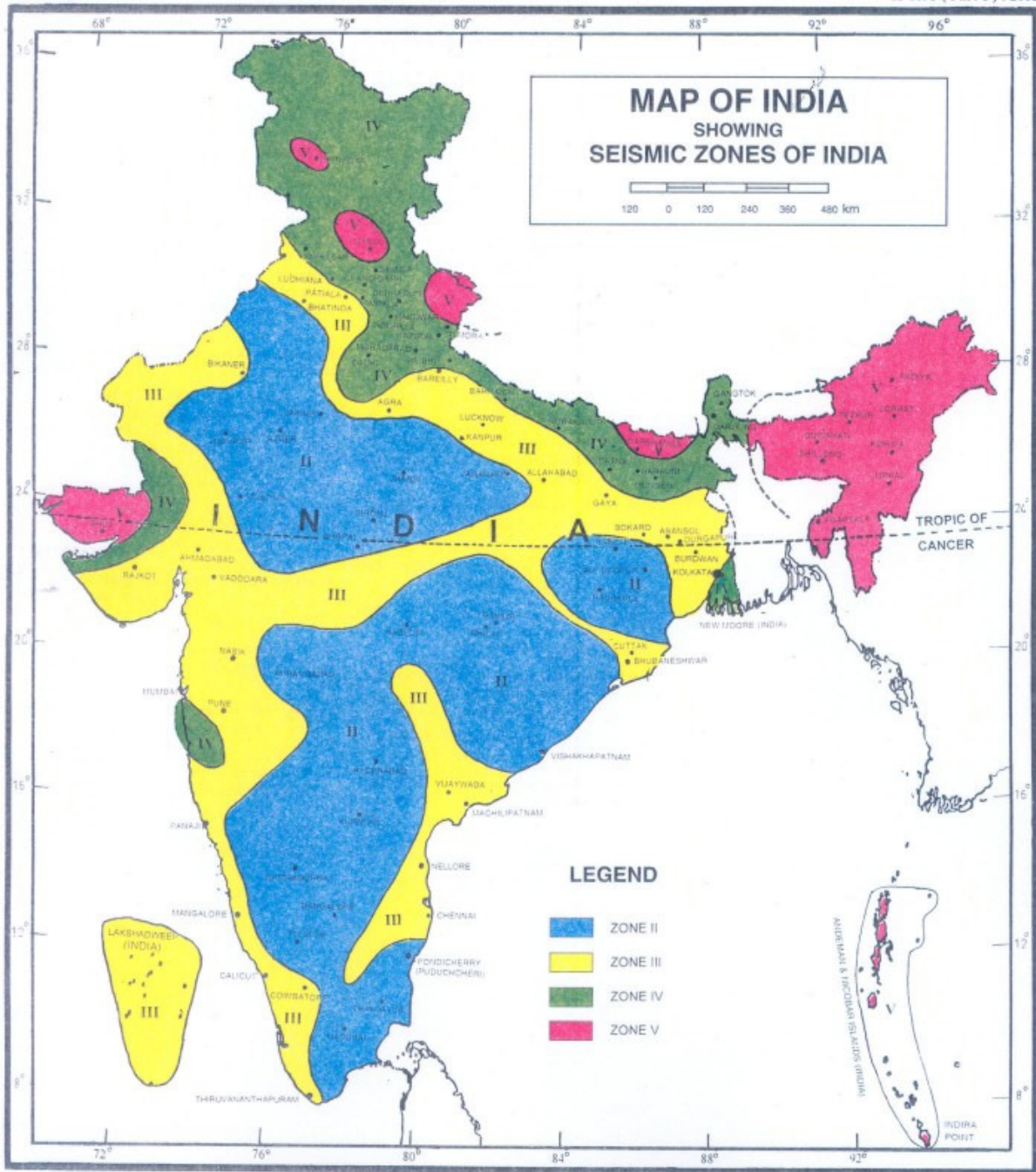
### **3.4 SEISMICITY OF THE AREA**

Many parts of the Indian subcontinent have historically high Seismicity. Seven catastrophic earthquakes of magnitude greater than 8 (Richter scale) have occurred in the western, northern and eastern parts of India and adjacent countries in the past 100 years.

By contrast, peninsular India is relatively seismic, having suffered only infrequent earthquakes of moderate. The main seismogenic belts are associated with the collision plate boundary between the Indian and Eurasian plates.

The hazard map shows contours joining locations of equal expected peak accelerations in rock expressed in percentage. The area is located in an area of low seismic risk (zone II) by national standards. Seismic Zone Map is shown as Figure below:

IS 1893 ( Part 1 ) : 2002



### 3.5 MONITORING CARRIED OUT FOR BASELINE STUDIES

#### 3.5.1 Introduction

ON THE BASIS OF THE ENVIRONMENTAL CONDITIONS AT THE MINE SITE AND THE NATURE OF ADJOINING AREA, THE PROJECT SITE WAS CONSIDERED AS CORE ZONE AND THE AREA LYING WITHIN 10 KM RADIUS FROM THE MINE SITE WAS CONSIDERED TO BE THE BUFFER ZONE WHERE SOME IMPACTS MAY BE OBSERVED ON PHYSICAL AND BIOLOGICAL ENVIRONMENT. AT THE BOUNDARY OF 10 KM RADIUS CIRCLE ONLY SLIGHT IMPACT MAY BE OBSERVED, AND THAT TOO IS OCCASIONAL.

#### 3.5.2 Data Generation

The baseline data for the project site and 10 km radius area were collected in accordance with the requirement of guidelines of MoEF. Monitoring was done for post monsoon season (Oct to Dec 2009) for the following parameters: -

TABLE NO 3.5.2  
DATA GENERATED FOR POST MONSOON SEASON

S.No.	Description
1	<b>AIR</b> Ambient air monitoring (24 hourly samples), twice a week continuously. Parameters : SPM, SO <sub>2</sub> , NO <sub>x</sub> , RPM
2	<b>Meteorological</b> parameters at hourly duration simultaneously at one air monitoring station. Parameters : Wind speed & direction, Relative humidity, Temperature , Rainfall etc.
3	<b>WATER</b> Water from various locations (Ground water samples) in core and buffer zone (10 km radius) Parameters : water : tested for physical, chemical and biological parameters, according to applicable standards
4	<b>SOIL</b> Once at various locations in core and buffer zone.

5	<b>NOISE</b> Once at various locations in core and buffer zone.
---	--

### **3.5.3 Data Collection**

**THE EIA STUDY WAS PREPARED FOR THE CORE ZONE AND AREA WITHIN BUFFER ZONE. THE FOLLOWING DATA THROUGH FIELD SURVEY AND OTHER SOURCES ARE: -**

- **DETAILS OF FAUNA & FLORA IN THIS REGION.**
- **SENSITIVE PLACES/ HISTORICAL MONUMENTS AND SANCTUARIES.**
- **LAND USE PATTERN WITHIN CORE AND BUFFER ZONE INCLUDING THE CROPPING PATTERN.**
- **DEMOGRAPHIC AND SOCIO-ECONOMIC ANALYSIS BASED ON LAST AVAILABLE CENSUS DATA FOR ENTIRE STUDY AREA.**
- **RELEVANT METEOROLOGICAL DATA FROM INDIAN METEOROLOGICAL DEPARTMENT (IMD).**

**IDENTIFICATION OF WATER BODIES, HILLS, ROADS ETC. AND COLLECTING DATA REGARDING DISCHARGE OF STREAMS ETC. FROM EXISTING RECORDS WITHIN THE STUDY AREA.**

### **3.5.4 Instrument Used**

The following instruments were used at the site for environmental baseline data collection work.

1. Respirable Dust Collector with attachment for gaseous Pollutants, Envirotech APM 460.
2. Digital D.O. Meter Model – 831 E.
3. Dry and Wet Bulb Thermometer.
4. Sound Level Meter Model SL – 4010
5. Micro Meteorological Station Model Enviro Wm 251
6. Water Level Indicator
7. GPS

In addition to the above samples collected, the data on land use, vegetation and agricultural crops were also collected by the field team by meeting with a large number of local inhabitants in the study area and different Government departments / agencies. This provided an excellent opportunity to the members of the field team for obtaining an intimate feel of the environment of the study area.

### **3.6 METEOROLOGY**

Meteorology plays a vital role in affecting the dispersion of pollutants, once discharged into the atmosphere. Since meteorological factors show wide fluctuations with time, meaningful interpretation can be drawn only from long-term reliable data. Such source of data is the Indian Meteorological Department (IMD), which maintains a network of meteorological stations at several important locations. The nearest IMD station to the study area is located at Raipur.

#### **3.6.1 Climate**

The climate of the district of Raipur is hot. The coldest month is December & January and the hottest month is May. The rainfall is mostly distributed between the months of July and August. The micro meteorological conditions at the mine site will determine the transport and diffusion pattern of air pollutants released into atmosphere. The principal variables include horizontal connective transport (average wind speed and direction) vertical convective transport (atmospheric stability) and topography of the area.

The data on various meteorological parameters at the plant site were collected with the help of a semi-automatic weather station installed at site during ambient air monitoring period. Meteorological data such as wind speed, wind direction, temperature, and relative humidity were recorded simultaneously recorded at two synoptic hours i.e. 8.30 and 17.30 hours.

The meteorological data from IMD station, Raipur regarding the maximum and minimum temperatures, relative humidity, wind speed and wind direction for the year 2009 has been collected.

#### **3.6.2 Rainfall**

The annual rainfall of the area is around 1385 mm. The rainfall generally increases from the north-west to the south-east. About 94 percent of the annual

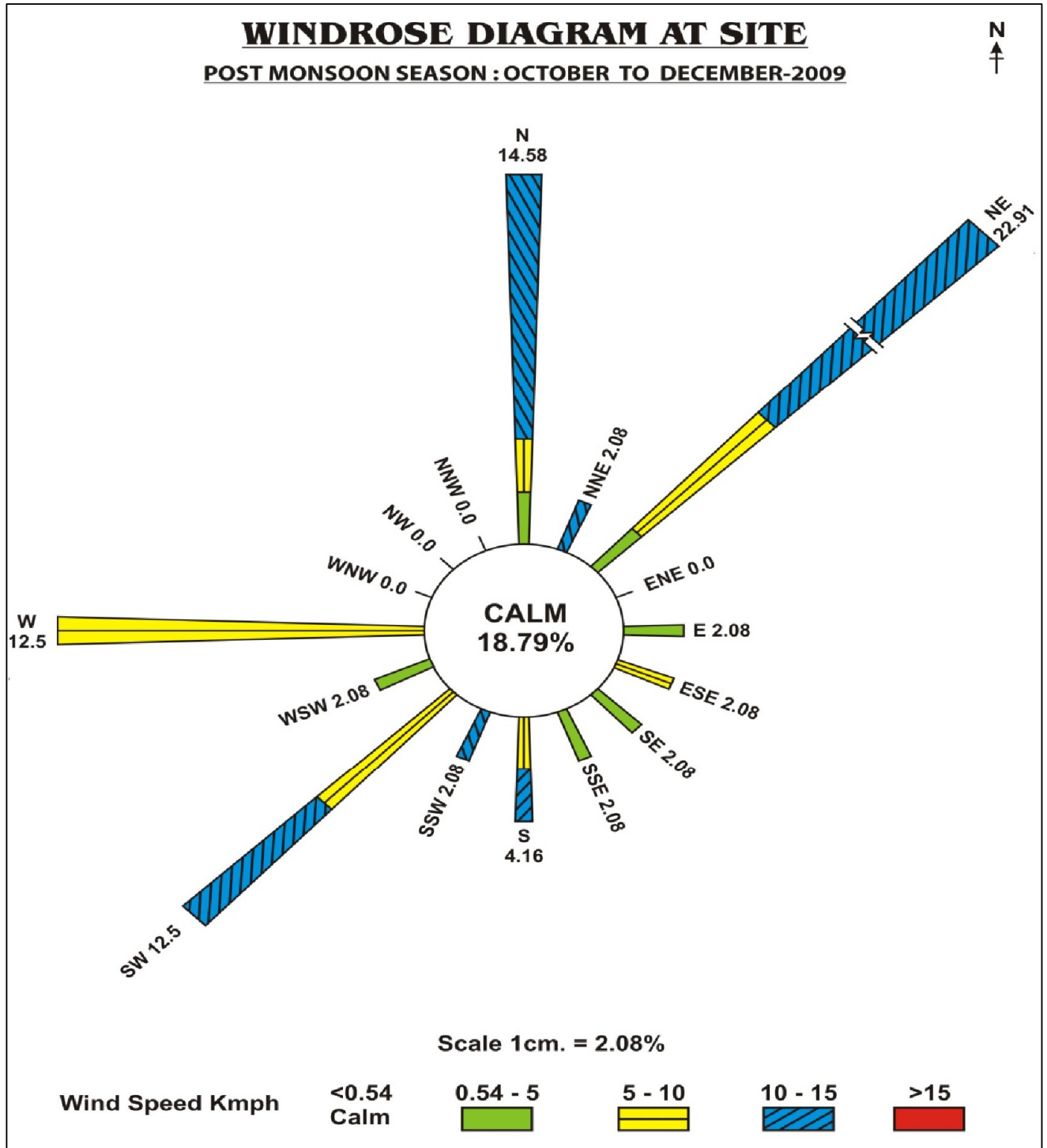
rainfall is received during the period June to October, July and August being the rainiest months. The variation in annual rainfall from year to year is very large. On an average there are 60 - 80 rainy days in a year.

### **3.6.3 Wind Speed / Wind Rose Diagram**

Wind speed and wind direction data recorded during the study period is useful in identifying the influence of meteorology on the air quality of the area. Based on the collected meteorological data, relative percentage frequencies of different wind directions are calculated and plotted as wind roses of eight directions viz., N, NE, E, SE, S, SW, W and NW for eight hourly and twenty four hour duration respectively. Maximum and minimum temperatures including percentage relative humidity were recorded simultaneously.

The wind recorded during the survey period at the site is more or less according to the trend indicated in windrose diagram. The dominant upwind direction is found to be NE to SW for the study period. Wind speed during this period varies from 4 km/hr to 15 km/hr.





### 3.6.4 Micro-Meteorology at Site

Meteorological station was set-up at site to record surface meteorological parameter during study period (October to December 2009).

The wind recorded during the survey period at the site is more or less according to the trend indicated in wind rose diagram.

**TABLE No.: 3.6.4**  
**MICRO-METEOROLOGY AT SITE DURING STUDY**  
**PERIOD**  
**(OCTOBER TO DECEMBER 2009)**

DATE					<b>WIND SPEED &amp; DIRECTION</b>			
	TEMPERATURE °C		RELATIVE HUMIDITY %		8:30 Hrs.		17:30 Hrs.	
	Max.	Min.	8:30 Hrs.	17:30 Hrs.	Direction	Speed km/hr.	Direction	Speed km/hr.
04.10.2009	31.2	19.6	062	043	W	009	CALM	000
05.10.2009	31.8	20.2	058	049	CALM	000	N	013
13.10.2009	30.6	18.5	060	045	N	005	CALM	000
14.10.2009	31.4	17.5	059	049	NE	012	CALM	000
20.10.2009	31.1	17.1	057	041	NE	008	SW	009
21.10.2009	31.3	18.2	052	047	NE	015	SW	012
27.10.2009	30.2	17.6	060	055	S	007	W	009
28.10.2009	29.8	17.9	061	057	W	010	NE	004
01.11.2009	29.3	18.2	069	056	N	007	CALM	000
02.11.2009	28.6	17.9	067	057	CALM	000	ENE	011
08.11.2009	29.4	17.8	069	054	SE	004	SSW	012
09.11.2009	28.1	15.3	065	053	WSW	007	N	013
16.11.2009	27.6	10.4	064	050	NE	012	NE	010
17.11.2009	27.8	11.2	062	053	SW	007	ESE	008
26.11.2009	27.6	12.2	063	055	NE	011	W	008
27.11.2009	24.2	13.6	061	041	CALM	000	N	008
02.12.2009	27.2	12.3	072	057	NE	014	W	008
03.12.2009	26.5	11.7	073	051	W	010	N	008
10.12.2009	21.6	11.2	072	052	NE	012	CALM	000
11.12.2009	20.3	10.6	071	053	NE	008	SW	012
16.12.2009	21.1	9.2	073	053	SSE	004	SW	011
17.12.2009	21.3	10.6	074	055	CALM	000	E	004
28.12.2009	20.9	9.5	073	054	N	011	NE	011

29.12.2009	22.3	8.3	081	058	S	012	SW	007
------------	------	-----	-----	-----	---	-----	----	-----

Source: Field Visit

### **3.7 WATER ENVIRONMENT**

#### **3.7.1 Water Regime**

The topography of the area is flat with gentle undulations. The main source of water in the area is ground water by open wells, bore wells and hand pumps. Kulhan nallah is at a distance of 5.5 km. in North direction from the Mine site and only active in rainy season and remain dry in other season.

#### **3.7.2 Ground Water Survey**

It is already mentioned that ground water is available within 20 m to 25 m of the surface level and available in nearby wells due to continuous discharge of the ground water due to drinking purpose the water table will lower down further below in the area.

The quality of ground water in the district is generally suitable for both drinking and irrigation and is within permissible limits as per the Indian Standards for water use.

#### **3.7.3 Water Quality**

The ground water available in the well, bore well etc. is of potable in nature and no adverse effect has been noticed in the past due to human consumption.

The quality of water was studied by collecting eight water samples from representative hand pumps, tube wells & river.

Standard procedures were followed for the sampling and analysis of physico – chemical parameters of water. Table 3.2 shows the details of location of water sampling stations and results of different parameters.

**Table 3.7.3 (a)**  
**LOCATION OF WATER SAMPLING STATIONS**

S.No.	Sampling Location	Source of water	Direction from Mine Site	Aerial distance in km. from Boundary of Mine Site (Km approx.)
SW1	Near Mine Site	Bore well	--	--
SW2	Matia Village	Bore well	N	2.0 km
SW3	Semaria Village	Bore well	SW	2.5 km
SW4	Pauni	Bore well	NE	8.0km
SW5	Mandhar	Bore well	WNW	5.0 km
SW6	Tarra Village	Bore well	NE	3.0 km
SW7	Chhapora Village	Bore well	WNW	1.5 km
SW8	Lalpur Village	Bore well	SW	4.0 km

*Source: (SOI) Toposheet & Site Visit*

**TABLE-3.7.3 (B)**  
**WATER QUALITY POST MONSOON SEASON (OCT. TO DEC. 2009)**

S. No	Parameters	Mine Site	Matia Village	Semaria Village	Pauni Village	Mandhar Village	Tarra Village	Chhapora Village	Lalpur Village	Specification As Per Is:10500
01.	pH (25° C)	7.88	7.50	7.48	7.77	7.58	7.46	7.42	7.44	6.5-8.5
02.	Colour (Hazen Units)	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5 ( max 25)
03.	Turbidity	< 1	< 1	< 1	< 1	<1.0	< 1.0	< 1	< 1.0	5 Max. (10)
04.	Odour	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable
05.	TDS (mg/l)	280.00	290.00	296.00	385.00	390.00	395.00	318.00	310.00	300 Max. (600)
06.	Total Hardness as CaCO <sub>3</sub> (mg/l)	202.00	225.32	206.50	209.52	218.16	205.10	246.23	195.18	300 Max. (600)
07.	Calcium as Ca <sup>2+</sup> (mg/l)	73.01	75.2	65.3	101.58	78.16	73.10	74.25	68.25	75 Max. (200)
08.	Magnesium as Mg (mg/l)	4.76	9.05	10.46	7.60	5.56	5.45	14.63	5.98	30 Max. (100)
09.	Chloride as Cl <sup>-</sup> (mg/l)	16.29	41.50	38.50	36.42	42.17	53.10	55.20	52.90	250, Max.(1000)
10.	Fluoride as F <sup>-</sup> (mg/l)	0.08	0.11	0.10	0.03	0.10	0.09	0.08	0.10	1.0, Max (1.5)
11.	Sulphate as SO <sub>4</sub> <sup>2-</sup> (mg/l)	22.10	25.65	28.15	21.91	32.17	34.50	39.40	28.50	200, Max (400)

12.	Iron as Fe (mg/l)	0.17	0.20	0.19	0.43	0.19	0.20	0.19	0.26	0.3, Max (1.0)
14.	Alkalinity as CaCO <sub>3</sub> , (mg/l)	155.52	169.00	221.6	209.52	210.10	218.40	210.21	177.75	200 ( max 600)
12.	Iron as Fe (mg/l)	0.17	0.20	0.19	0.43	0.19	0.20	0.19	0.26	0.3, Max (1.0)
14.	Alkalinity as CaCO <sub>3</sub> , (mg/l)	157.52	169.00	221.6	209.52	212.10	218.40	207.21	177.75	200 ( max 600)

**Source:** Field sampling & analysis report

A review of the above chemical analysis reveals that there is not much variation in chemical composition of water tapped from hand pumps and tube wells. The ground water from all sources still remains suitable for drinking purposes as all the constituents are within the limits prescribed by drinking water standards promulgated by Indian Standards IS: 10500.

Analysis results of ground water reveal the following: -

- pH varies from 7.42 to 7.88
- Total hardness varies from 195.18 mg/l to 246.23 mg/l
- Total dissolved solids varies from 282.00 mg/l to 395.00 mg/l

### **3.8 AIR ENVIRONMENT**

#### **3.8.1 Air Quality**

The ambient air quality with respect to the study zone of 10 km radius around the mine site forms the baseline information. The various sources of air pollution in the region are dust rising from unpaved roads, domestic fuel burning, vehicular traffic, agricultural activities, other industries, etc.

The prime objective of baseline air quality monitoring is to assess existing air quality of the area. This will also be useful in assessing the conformity to standards of the ambient air quality during the operations.

The baseline status of the ambient air quality has been assessed through scientifically designed ambient air quality network. The design of monitoring network in the air quality surveillance program has been based on the following considerations:

- Meteorological conditions.
- Topography of the study area.

- Likely impact area.

### 3.8.2 Ambient Air Monitoring

Ambient air monitoring was carried out regularly i.e. on monthly basis in the surrounding areas of mine site to assess the ambient air quality at the source. The results show that the air qualities of the immediate surroundings of the project site area are well within the permissible limit.

However, to know the ambient air quality at a larger distance i.e. in the study area of 10 km. radius, air quality survey has been conducted at 10 locations over a period of post monsoon season (Oct to Dec 2009). The AAQ monitoring stations were set up at the following locations which are shown in key plan & their direction & distance are shown in Table below.

**Table-3.8.2**

#### **LOCATIONS OF AAQ MONITORING STATIONS**

<b>Station</b>	<b>Sampling Location</b>	<b>Direction from Mine Site</b>	<b>Aerial distance in km. from Boundary of Mine Site (Km approx.)</b>
SA1	Mine Site	--	--
SA2	Matia Village	N	2.1 km
SA3	Semaria Village	SW	2.5 km
SA4	Pauni	NE	8.0 km
SA5	Mandhar	WNW	5.0 km
SA6	Tarra Village	NE	3.0 km
SA7	Town Mowa	SW	9.0 km
SA8	Chhapora Village	SW	3.0 km

<b>Matia Limestone Mine (ML Area – 8.144 Ha.)</b> At Village Matia, Tehsil & District Raipur (Chhattisgarh)	<b>Draft</b> <b>EIA/EMP Report</b>
--	---------------------------------------

SA9	Lalpur Village	WNW	1.5 km
SA10	Bhurkoni Village	SW	3.5 km

Source: SOI Toposheet & Field Visit

### 3.8.3 Sampling Programme

As stated earlier, the sampling at the above 10 stations were carried out during Post Monsoon Season (Oct to Dec 2009) an average ambient air quality is given below in table no. 3.6 and details are enclosed as **Annexure**.

The stations were selected and located with due consideration to the meteorological conditions of the region. Major air pollutants viz, Suspended Particulate Matter (SPM), Respirable Suspended Particulate Matter (RSPM), Sulphur Dioxide (SO<sub>2</sub>), Nitrogen Dioxide (NO<sub>x</sub>), representing the basic air pollutants in the region were identified for Ambient Air Quality Monitoring (AAQM). The samples were collected as per the CPCB norms during study period. SPM was collected as 24 hours average through Glass Micro Fiber Filter Paper make Wattman. The samples for gaseous pollutants as well as for SPM were collected as per the prescribed standard procedures.

**Table-3.8.3 (a)**

#### **PROCEDURE FOR DETERMINING**

#### **VARIOUS AIR QUALITY PARAMETERS**

<b>Parameters</b>	<b>Testing Procedure</b>
<b>SPM &amp; RSPM</b>	Gravimetric Method using high volume air samplers IS: 5182 (Part-IV), 1973
<b>NO<sub>x</sub></b>	Absorption in dilute NaOH and then estimated colorimetrically with sulphanilamide and N (I-Nephthyle) Ethylene diamine Dihydrochloride and Hydrogen Peroxide (IS: 5182 1975, Part-VI).
<b>SO<sub>2</sub></b>	Absorption in Sodium Tetra Chloromercurate followed by Chlorimetric estimation using P-Rosaniline hydrochloride and Formaldehyde (IS: 5182 Part - II, 2001).

Major air pollutants viz. SPM, RSPM, SO<sub>2</sub> and NO<sub>x</sub> were monitored to establish the baseline air quality. An air pollution source common to many projects and activities are unpaved roads, for example, dust plumes behind vehicles moving on unpaved roads. The ambient air qualities results are shown in Table 3.6 and the standards of ambient air quality are given in Table 3.7 Detailed Ambient air Quality details are incorporated as Annexure 1 in Draft EIA/EMP Report.



### **Table-3.8.3 (b)**

**AMBIENT AIR QUALITY MONITORING  
POST MONSOON SEASON (OCT to DEC 2009)**

(Unit in  $\mu\text{g}/\text{m}^3$ )

STATION CODE	SAMPLING LOCATION	SPM		SO <sub>2</sub>		NO <sub>x</sub>		RSPM	
		Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
SA1	Mine Site	162.7	108.8	10.3	5.5	12.2	8.4	57.98	33.16
SA2	Matia Village	177.6	111.9	10.8	6.9	13.6	8.3	58.60	40.17
SA3	Semaria Village	185.9	113.7	10.1	7.6	15.4	8.1	61.34	36.10
SA4	Pauni	175.8	114.6	11.5	7.2	14.8	7.8	53.01	34.41
SA5	Mandhar	186.7	109.9	11.9	6.4	13.1	8.6	61.61	36.16
SA6	Tarra Village	172.9	102.8	12.0	7.6	11.9	8.2	52.05	38.80
SA7	Town Mowa	183.8	101.8	10.1	6.9	14.2	8.8	57.64	41.12
SA8	Chhapora Village	179.6	106.8	12.3	6.4	13.5	7.3	59.26	43.14
SA9	Lalpur Village	168.6	99.8	10.5	5.9	12.2	6.2	58.28	40.82
SA10	Bhurkoni Village	162.5	98.3	9.9	5.9	12.5	6.2	51.89	38.05

Source: Air Quality Monitoring

#### **3.8.4 Result & Conclusion**

Ambient air quality monitoring has been carried out at 10 stations in the study area on 24 hourly basis. The average concentration for all the 10 AAQM stations of SPM ranges between 98.3 to 186.7  $\mu\text{g}/\text{m}^3$ , RSPM ranges between 33.16 to 61.61  $\mu\text{g}/\text{m}^3$ , SO<sub>2</sub> ranges between 5.5 to 12.3  $\mu\text{g}/\text{m}^3$  and NO<sub>x</sub> ranges between 6.2 to 15.4  $\mu\text{g}/\text{m}^3$ .

The results of Ambient air monitoring shows that quality of air of Mine site is far better than that of Raipur town due to the increased population which increases the vehicular traffic density and other associated activities which increases the level of SPM at the town area. All the results are within prescribed norms and will be maintained in the future also.

**Table-3.8.4**  
**NATIONAL AMBIENT AIR QUALITY STANDARDS**

Pollutant	Time Weighted Average	Concentration in Ambient Air			Method of measurement
		Industrial Area	Residential Rural & Other Areas	Sensitive Area	
Sulphur Dioxide (SO <sub>2</sub> )	Annual Average * 24 hours **	80 µg/m <sup>3</sup> 120 µg/m <sup>3</sup>	60 µg/m <sup>3</sup> 80 µg/m <sup>3</sup>	15 µg/m <sup>3</sup> 30 µg/m <sup>3</sup>	Improved West and Gacke method. Ultraviolet fluorescence
Oxides of Nitrogen as NO <sub>2</sub>	Annual Average * 24 hours **	80 µg/m <sup>3</sup> 120 µg/m <sup>3</sup>	60 µg/m <sup>3</sup> 80 µg/m <sup>3</sup>	15 µg/m <sup>3</sup> 30 µg/m <sup>3</sup>	Jacob & Hochheiser (Na-Arsenite) Method Gas phase Chemil-uminescence
Suspended Particulate Matter (SPM)	Annual Average * 24 Hours **	360 µg/m <sup>3</sup> 500 µg/m <sup>3</sup>	140 µg/m <sup>3</sup> 200 µg/m <sup>3</sup>	70 µg/m <sup>3</sup> 100 µg/m <sup>3</sup>	High volume sampling (Average flow rate not less than 1.1 m <sup>3</sup> /minute)
Respirable Particulate Matter (size less than 10 microns) (RPM)	Annual Average* 24 Hours **	120 µg/m <sup>3</sup> 150 µg/m <sup>3</sup>	60 µg/m <sup>3</sup> 100 µg/m <sup>3</sup>	50 µg/m <sup>3</sup> 75 µg/m <sup>3</sup>	Respirable particulate matter sampler
Lead (Pb)	Annual Average * 24 Hours **	1.0 µg/m <sup>3</sup> 1.5 µg/m <sup>3</sup>	0.75 µg/m <sup>3</sup> 1.00 µg/m <sup>3</sup>	0.50 µg/m <sup>3</sup> 0.75 µg/m <sup>3</sup>	AAS Method after sampling using SPM 2000 or equivalent filter paper.
Carbon Monoxide (CO)	8 Hours** 1 Hours	5.0 mg/m <sup>3</sup> 10.0 mg/m <sup>3</sup>	2.0 mg/m <sup>3</sup> 4.0 mg/m <sup>3</sup>	1.0 mg/m <sup>3</sup> 2.0 mg/m <sup>3</sup>	Non Depressive Infrared Spectroscopy (NDIR)
Ammonia	Annual Average* 24 hours **	0.1 mg/m <sup>3</sup> 0.4 mg/m <sup>3</sup>	0.1 mg/m <sup>3</sup> 0.4 mg/m <sup>3</sup>	0.1 mg/m <sup>3</sup> 0.4 mg/m <sup>3</sup>	

**Source: NAAQS**

- \* Annual Arithmetic mean of minimum 104 measurements in a year taken twice a week 24 hourly at uniform interval.
- \*\* 24 hourly / 8 hourly values should be net 98% of the time in a year. However 2% of the time, it may exceed but not on two consecutive days.

### **3.9 NOISE ENVIRONMENT**

Noise often defined as unwanted sound, interferes with speech communication, causes annoyance, distracts from work, disturb sleep, thus deteriorating quality of human environment. Noise Pollution survey has therefore been carried out.

Noise levels were measured near highways, residential areas and other settlements located within 10 km radius around the mine site.

In order to know the baseline noise levels, in and around the mine site, noise levels were measured at the mine site and also at villages in the study area. Table 3.8 shows the locations of the noise monitoring stations of the study area.

TABLE-3.9 (A)  
NOISE MONITORING STATIONS

Station	Sampling Location	Direction from Mine Site	Aerial distance in km. from Boundary of Mine Site (Km approx.)
SN1	Mine Site	--	--
SN2	Matia Village	N	2.0 km
SN3	Semaria Village	SW	2.5 km
SN4	Pauni	NE	8.0 km
SN5	Mandhar	WNW	5.0 km
SN6	Tarra Village	NE	3.0 km
SN7	Town Mowa	SW	9.0 km
SN8	Chhapora Village	SW	3.0 km
SN9	Lalpur Village	WNW	1.5 km
SN10	Bhurkoni Village	SW	3.5 km

**Source:** Toposheet & Site Visit

There are several sources in the 10 km radius of study area, which contributes to the local noise level of the area. Traffic, activities at stone quarries as well as activities in nearby villages and agricultural fields add to the ambient noise level of the area. Noise monitoring data along with relevant standards is given in following tables.

**Table-3.9 (b)**  
**AVERAGE NOISE LEVEL**  
**POST MONSOON SEASON (OCT. to DEC. 2009)**

S.No.	LOCATIONS	NOISE LEVEL Leq. dB (A)	
		Day Time	Night Time
SN1	Mine Site	49	41

<b>Matia Limestone Mine (ML Area – 8.144 Ha.)</b> At Village Matia, Tehsil & District Raipur (Chhattisgarh)	<b>Draft EIA/EMP Report</b>
--	---------------------------------

SN2	Matia Village	52	42
SN3	Semaria Village	50	39
SN4	Pauni	52	41
SN5	Mandhar	54	42
SN6	Tarra Village	49	40
SN7	Town Mowa	54	47
SN8	Chhapora Village	51	39
SN9	Lalpur Village	51	42
SN10	Bhurkoni Village	52	41

*Source: Noise Monitoring*

**Table-3.9 (c)**  
**CPCB NOISE STANDARDS**

AREA CODE	CATEGORY OF AREA	LIMITS IN Leq. dB (A)	
		DAY TIME 06.00 am–10.00 pm	NIGHT TIME 10.00 pm–6.00 am
(A)	Industrial Area	75	70
(B)	Commercial Area	65	55
(C)	Residential Area	55	45
(D)	Silence Zone	50	40

During the baseline study it was seen that in day time noise level varies from 49 to 54 Leq. dB (A) and in night time 39 to 47 Leq. dB (A).

### **3.10 SOIL ENVIRONMENT**

#### **3.10.1 Soil Quality and Characteristics**

Agriculture is the main occupation of people in the study area, hence it is essential to determine the soil quality in the area and identify the impact of urbanization and industrialization on this area.

The information on soils has been collected from various secondary sources and also through primary soil sampling analysis of which is described in this section.

The sampling locations have been finalized with the following objectives:

- To determine the baseline soil characteristics of the study area; and
- To determine the impact of industrialization on soil characteristics.

Representative soil samples were collected from five different specified locations within the study area of the project site. Standard procedures were followed for the sampling and analysis of physico – chemical parameters. Table 3.10.1 shows the location of soil sampling stations.

**Table-3.10.1 (a)**  
**SOIL SAMPLING STATIONS**

<b>S. No.</b>	<b>Sampling Stations</b>	<b>Direction w.r.t. Mine Site</b>	<b>Distance from the Boundary of Mine Site (km approx.)</b>
SS1	Mine Site	--	--
SS2	Matia Village	N	2.0 km
SS3	Semaria Village	SW	2.5 km
SS4	Pauni	NE	8.0 km.
SS5	Mandhar	WNW	5.0 km.
SS6	Tarra Village	NE	3.0 km
SS7	Chhapora Village	WNW	3.0 km
SS8	Lalpur Village	SW	1.5 km

*Source: Toposheet & Site Visit*

The analysis results of the soil samples collected from the core zone and buffer zone are given in **Table 3.10.1 (b)**.

Table-3.10.1 (B)  
SOIL ANALYSIS REPORT  
POST MONSOON Season (OCT TO DEC 2009)

S. NO.	Parameter	Mine Site	Matia Village	Semaria Village	Pauni Village	Mandhar Village	Tarra Village	Chhapora Village	Lalpur Village
1	PH	7.70	7.40	7.00	7.80	7.50	7.40	7.50	7.60
2	BULK DENSITY, GM/CC	1.36	1.32	1.28	1.37	1.31	1.29	1.30	1.32
3	WATER HOLDING CAPACITY (%)	28.56	32.17	35.30	30.20	29.26	33.98	34.13	31.50
4	SOIL TEXTURE	SANDY LOAM	SANDY LOAM	SANDY LOAM	SANDY LOAM	SANDY LOAM	SANDY LOAM	SANDY LOAM	SANDY LOAM
5	SOIL COLOUR	Blackish brown	Yellowish brown	Blackish brown	Blackish brown	Blackish brown	Blackish brown	Blackish brown	Blackish brown
6	AVAILABLE NITROGEN AS N (KG/HA)	386.26	395.16	398.10	366.78	370.48	396.10	405.60	392.60
7	AVAILABLE PHOSPHORUS AS P (KG/HA)	10.19	13.09	12.50	10.60	11.60	12.40	14.58	13.58
8	POTASSIUM AS K (KG/HA)	86.10	92.40	97.60	81.65	82.50	87.80	92.60	89.50
9	CALCIUM AS CA (MG/100GM)	17.16	18.63	17.23	13.40	14.60	12.80	14.20	13.45
10	MAGNESIUM AS MG (MG/100GM)	1.93	1.85	2.3	1.70	1.60	2.15	1.89	1.89
11	SODIUM AS NA (MG/100GM)	0.92	1.74	1.52	0.62	0.60	0.66	0.59	0.55
12	CONDUCTIVITY (MS/CM)	0.23	0.14	0.11	0.19	0.21	0.18	0.20	0.16
13	ORGANIC MATTER (%)	0.80	0.97	0.99	0.78	0.79	0.96	0.98	0.95
14	CHLORIDE AS CL (MG/100GM)	8.62	11.92	11.3	9.77	11.2	12.2	10.2	16.2

**Source:** Soil Analysis

TABLE-3.10.1 (C)  
STANDARD SOIL CLASSIFICATION

S. No.	Parameters	Classification
1.	pH	<4.5 extremely acidic 4.51 – 5.0 very strong acidic 5.01 – 5.5 strongly acidic 5.51-6.0 moderately acidic 6.1 – 6.5 slightly acidic 6.51-7.3 Neutral 7.31-7.8 slightly alkaline 7.81-8.5 moderately alkaline 8.51 – 9.0 strongly alkaline >9.0 Very strongly alkaline
2.	Salinity Electrical Conductivity (mho/cm) 1 mho/cm = 640 ppm	Up to 1.0 average 1-2 harmful to germination 2-3 harmful to crops
3.	Nitrogen (kg/ha)	Up to 50 very less 51-100 less 110-150 good 151-300 better >300 sufficient
4.	Phosphorus (kg/ha)	Up to 15 very less 15 – 30 less 31-50 medium 51-65 on average sufficient 66-80 sufficient >80 more than sufficient
5.	Potassium (kg/ha)	0-120 very less 120-180 less 180-240 medium 241-300 average 301-360 better >360 more than sufficient

Soil is the media for supplying the nutrients for plant growth. Nutrients are available to plants at certain pH and pH of soils can reflect by addition of pollutants in it either by air, or by water or by solid waste or by all of these. In order to establish the baseline status of soil characteristics, soil samples were collected at 8 sampling locations. The analysis results show that soil is slightly alkaline, pH value ranging from 7.00 to 7.80, with organic matter from 0.78 % to 0.99 %. Soil texture is mostly Sandy Loam; hence this type of soil is average. Available nitrogen ranges from 366.78 - 405.60 kg/ha, indicates that sufficient amount of N is present in this soil. Available Phosphorus ranges from 10.19 - 14.58 kg/ha, indicates that medium amount of Phosphorus is present in the soil. Range of Potassium varies from 81.65 - 97.60 kg/ha which indicates that very less amount of Potassium is present in this soil.

### **3.11 BIOLOGICAL ENVIRONMENT**

#### **3.11.1 Introduction**

Anthropogenic activities tend to bring instability in the species composition and functioning of ecosystem. The first component to be affected directly as well as indirectly and in a short, medium and long time span would be the biotic component of the area. This sets a cyclic process, which may aggravate the situation unless corrective measures are adopted.

#### **3.11.2 National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Tiger / Elephant Reserves**

There are no National Parks/ Wildlife Sanctuary/ Eco-sensitive zone Reserved Forests/ Protected forests with in the 10 km radius of the study area.

#### **3.11.3 Ecological Information**

An ecological study of the ecosystem is essential to understand the impact of industrialization and urbanization on existing flora and fauna of the study area. Studies on various aspects of ecosystem play an important role in identifying sensitive issues for under taking appropriate action to mitigate the impact, if any.

The biological study was under taken as a part of the EIA study report to understand the present status of ecosystem prevailing in the study area, to compare it with past condition with the help of available data, to predict changes



in the biological environment as a result of present activities and to suggested measures for maintaining its health.

A survey was conducted to study the flora around 10 km radius. Some of the information was gathered from the local habitants. All the collected data were classified to interpret the impact of pollution on the flora and fauna of that region. Survey of the mild plants as well as cultivated crop plants was made and all the available information was recorded.

### 3.11.3.1 Flora

Ecological study of the project area was conducted to list the presence of various Flora and Fauna in the core & buffer zone as shown below.

**TABLE: 3.11.3.1**  
**PLANT SPECIES FOUND IN STUDY AREA**

S. No.	Botanical Name	Common Name
<b>Core Zone</b>		
1.	<i>Acacia arabica</i>	Babul
2.	<i>Ziziphus mauratiana</i>	Bar
3.	<i>Terminalia tomentosa</i>	Saja
4.	<i>Acacia catechu</i>	Kher
<b>Buffer Zone</b>		
5.	<i>Acacia arabica</i>	Babul
6.	<i>Tectona grandis</i>	Sagwan
7.	<i>Terminalia tomentosa</i>	Saja
8.	<i>Emblica officialis</i>	Amla
9.	<i>Acacia catechu</i>	Kher
10.	<i>Terminalia arjuna</i>	Arjun
11.	<i>Terminalia tomentosa</i>	Saja
12.	<i>Ficus religiosa</i>	Pipal
13.	<i>Albizia procera</i>	Safed siris
14.	<i>Anogeissus latifolia</i>	Dhaora
15.	<i>Tamarindus indica</i>	Imli

<b>Matia Limestone Mine (ML Area – 8.144 Ha.)</b> At Village Matia, Tehsil & District Raipur (Chhattisgarh)	<b>Draft</b> <b>EIA/EMP Report</b>
--	---------------------------------------

16.	<i>Dalbergia latifolia</i>	Sisam
17.	<i>Dalbergia sissoo</i>	Sisam
18.	<i>Ficus bengalensis</i>	Bargad
19.	<i>Azadirachta indica</i>	Neem
20.	<i>Boswellia serrata</i>	Salai
21.	<i>Eucalyptus sp.</i>	Safeda, nilgiri
22.	<i>Mangifera indica</i>	Mango
23.	<i>Ziziphus mauritiana</i>	Bar
24.	<i>Hibiscus rosa sinensis L.</i>	Gurhal
25.	<i>Delonix regia</i>	gulmohar

### 3.11.3.2 Fauna

The area hosts foxes, jackals, rabbits and other domestic animals. There are no endangered species in this area. Domesticated animals of the area includes: cattle, buffaloes, goats, cats, dogs etc. Cows and ducks are also common. All the fauna found in the study area are of common variety such as hares, jackals and wild boars. The species of fauna generally found in the area are given in table:

**TABLE No.: 3.11.3.2**  
**FAUNA OF STUDY AREA**

S. No.	English Name	Zoological Name	Hindi/Local Name	Schedule as per Wild life Act 1972
<b>CORE ZONE</b>				
1.	Blue bull	<i>Boselaphus tragocamelus</i>	Nilgai	Schedule III
2.	Hare	<i>Lepus nigricollis F. cuvier</i>	Khargosh	Schedule IV
3.	Rat	<i>Ratus rattus</i>	Chuha	Schedule V
4.	Pigeon	<i>Columba livia</i>	Kabutar	Schedule IV
5.	<b>INDIAN MYNA</b>	<b>ACRIDOTHERES TRISTIS</b>	<b>KOYAL</b>	<b>SCHEDULE IV</b>
<b>BUFFER ZONE</b>				
6.	<b>FIVE STRIPED SQUIRREL</b>	<b>FUNAMBULUS PENNANTI</b>	<b>GILHARI</b>	<b>SCHEDULE IV</b>

S. No.	English Name	Zoological Name	Hindi/Local Name	Schedule as per Wild life Act 1972
7.	Hare	<i>Lepus nigricollis F. cuvier</i>	Khargosh	Schedule IV
8.	Blue bull	<i>Boselaphus tragocamelus</i>	Nilgai	Schedule III
9.	Hare	<i>Lepus nigricollis F. cuvier</i>	Khargosh	Schedule IV
10.	Rat	<i>Ratus rattus</i>	Chuha	Schedule V
11.	<b>MOUSE</b>	<b>MUS SP.</b>	Chuha	<b>SCHEDULE V</b>
12.	<b>TOADS</b>	<b>BUFO MALANOSTICTUS</b>	<b>MENDHAK</b>	<b>SCHEDULE IV</b>
13.	<b>BULL FROG</b>	<b>RANA TIGRINA</b>	<b>MENDHAK</b>	<b>SCHEDULE IV</b>
15.	Dove	<i>Streptopelia senegalensis</i>	Fakhta	Schedule IV
16.	House crow	<i>Corvus splendens</i>	Kaua	Schedule V
17.	Owl	<i>Asio flammeus</i>	Ullu	Schedule IV
18.	Partridge	<i>Francolinus pondicerianus</i>	Teetar	Schedule IV
19.	Pigeon	<i>Columba livia</i>	Kabutar	Schedule IV
20.	Red-vented Bulbul	<i>Pycnonotus cafer</i>	Bulbul	Schedule III
21.	Sparrow	<i>Passer domesticus</i>	Gauriyya	Schedule IV
22.	Weaver bird	<i>Ploceus philippinus</i>	Baya	Schedule IV
23.	Woodpecker	<i>Dendrocopos naharattensis</i>	Kathphora	Schedule IV
24.	<b>INDIAN MYNA</b>	<b>ACRIDOTHERES TRISTIS</b>	<b>KOYAL</b>	<b>SCHEDULE IV</b>
25.	<b>dOG</b>	<b>CANIS LUPUS</b>	-	<b>SCHEDULE IV</b>
26.	<b>gOATS</b>	<b>CAPRA AEGAGRUS HIRCUS</b>	<b>BAKRI</b>	<b>SCHEDULE IV</b>
27.	<b>cAT</b>	<b>FELIS CATTUS</b>	<b>BILLI</b>	<b>SCHEDULE IV</b>
28.	<b>bUFFALOES</b>	<b>BUBALUS BUBALIS</b>	-	<b>SCHEDULE IV</b>

## **3.12 CROPPING PATTERN**

### **3.12.1 Cropping Pattern of the Study Area**

Chhattisgarh is known as the "rice bowl. Apart from paddy, cereals like maize, kodo-kutki and other small millets, pulses like tur and kulthi and oilseeds like groundnut, soyabean, niger and sunflower are also grown. Chhattisgarh produced nearly half of all food grains, and one third of all major crops grown during the kharif season. The main rabi crops of Chhattisgarh are jowar, gram, urad, mong and month. Chhattisgarh produces very little wheat.

### **3.12.2 Irrigation**

Average rainfall in the state is around 1385 mm and the entire state falls under Rice-agro-climatic zone. 80% population of the state is rural and the main livelihood of the villagers is agriculture and agriculture based small industry. Large variation in the yearly rainfall directly affects the main crop i.e. Paddy. Obviously, irrigation is the prime need of the state for its overall development and therefore the state government has given top priority to development of irrigation potential. Net sown area of the Chhattisgarh state is 4.828 Million hectares and the gross sown area is 5.788 Million hectares. Paddy is the principal crop and the central plains of Chhattisgarh are known as rice bowl of central India. Other major crops are coarse grains, wheat, maize, groundnut, pulses and oilseeds. The state is also suitable for growing mango, banana, guava & other fruits and a variety of vegetables with 44 percent of its area under forests it has one of the richest bio-diversity areas in the country. It has abundant minor forest produce like Tendu leaves, Sal seed, etc. Medicinal plants, bamboo, lac and honey are other potential money earners for the state. Chhattisgarh has embarked on a concerted plan to increase double cropped areas, diversify the cropping pattern and improve incomes from agro-based small-scale enterprises. In order to unlock the true potential of agriculture sector in the state, government is paying special attention towards better management of its water resources. To reduce the farmers dependence on rainfall, government is working towards increasing the irrigation potential of the state. It is estimated that approximately 43 lakh hectares can be potentially irrigated covering 75 percent of the entire cropped area in the state.

### 3.13 SOCIO-ECONOMIC ENVIRONMENT

The village economy of India is mainly based on agriculture sector and the main activity of rural population being agriculture; the entire infrastructure is oriented towards this activity. Following are some of the demography details for Study area:

**Table: - 3.13**  
**Demography Details**

S. No.	Name	Total Population	Total SC Population	Total ST Population	Total Working Population	Total Main Worker	Total Marginal Worker	Number of Household	Literacy Rate (%)
1.	Tarra-1	1792	132	22	843	676	167	348	64.2
2.	Jaranda	2205	91	42	995	640	355	356	66.1
3.	Pauni	1900	129	16	864	561	303	341	64.1
4.	Saragaon	3247	60	32	1409	1167	242	553	67.6
5.	Akoli-1(Akoli)	623	40	17	318	209	109	116	61.6
6.	Munrethi-2 (Munrethi)	1234	0	6	604	449	155	216	51.2
7.	Siltara	4834	785	290	1913	1445	468	1033	66.9
8.	Godhi-2 (Godhi)	1731	12	25	840	641	199	294	60
9.	Tanda	1569	278	0	700	512	188	316	74.7
10.	Akoli-2 (Akoli)	1262	46	127	521	407	114	217	69.6
11.	Barbanda	1538	240	105	668	276	392	288	70.6
12.	Neurdih	894	578	16	351	101	250	165	64.1
13.	Lalpur	756	330	34	348	332	16	145	69.2
14.	Matiya	1280	315	23	616	527	89	235	69.5
15.	Donde Kalan	2164	905	104	824	640	184	362	70.7
16.	Donde Khurd	2655	1366	232	1052	679	373	455	62.7
17.	Chhapora	2522	845	129	920	620	300	421	67.8
18.	Bhurkoni	670	518	0	202	64	138	94	73
19.	Barauda	2419	574	40	992	975	17	424	65.3
20.	Mandhar	5765	700	179	1881	1382	499	1030	72.9

S. No.	Name	Total Population	Total SC Population	Total ST Population	Total Working Population	Total Main Worker	Total Marginal Worker	Number of Household	Literacy Rate (%)
21.	Tekari-2 (Tekari)	4595	424	137	1592	1186	406	865	74
22.	Dhaneli-1 Dhaneli)	3406	267	42	1302	992	310	615	70.1
23.	Giraud	2547	252	15	1127	926	201	513	69.5
24.	Chandanidih	2143	229	146	1025	874	151	460	56.5
25.	Sardhoo (Sardhu)	3003	397	39	939	636	303	522	66.4
26.	Pirda-2 (Pirda)	2312	1137	215	1025	261	764	330	52.1
27.	Tulsi -2 (Tulsi)	2920	483	76	991	732	259	454	57.2
28.	Jora	3968	723	98	1254	943	311	674	79.8
29.	Serikhedi	4035	1324	218	1534	1107	427	691	61.3
30.	Labhandih	3949	1238	68	1649	987	662	678	50.4
31.	Dhaneli-2 (Dhaneli)	1365	312	0	636	219	417	200	43.6
32.	Kandul	1743	21	108	878	520	358	284	64.1
33.	Tikrapara (Lalpur)	6444	475	372	2009	1478	531	1207	73.9
34.	Sankara	3085	1218	10	1175	944	231	648	69
35.	Mangasa	763	63	0	290	153	137	125	70.5
36.	Gidhauri	467	433	0	209	11	198	103	72.9
37.	Mohadi-1 (Mahadi)	1878	43	9	925	484	441	352	76
38.	Charoda-1 (Charoda)	3273	128	156	1154	719	435	627	79.7
39.	Mowa (CT)	13706	2355	615	4236	3697	539	2790	77.1
<b>TOTAL</b>		<b>106662</b>	<b>19466</b>	<b>3763</b>	<b>40811</b>	<b>29172</b>	<b>11639</b>	<b>19547</b>	<b>66.56</b>

An area is said to be developed, if it contains the facilities like pakka houses, metalled roads, hospitals, qualified private doctors, higher secondary schools and degree colleges, adequate water supply, electric supply, easily available transport and recreational facilities.

### **3.13.1 Gross Economic Products of the Study Area**

The economic production of an area is often expressed as a rupee value called the Gross Economic Products, which includes the gross value of all consumables or saleable materials, livestock and services generated per year in the area. It is very difficult to have a rupee value of every item; hence approximate rupee value estimation is made for the agriculture based primary production as well as that of milk, fruits, meat, wool, hides and animals sold outside the study area. The gross economic production can be subdivided as under:

- i. Gross Economic Production from Agriculture.
- ii. Gross Economic Production from Livestock.
- iii. Gross Economic Production from Industries other than mine.
- iv. Gross Economic Production from mine.

#### **3.13.1.1 Gross Economic Production from Livestock**

The role of animals is an agriculture-based country, like India has been a major factor in the prosperity of rural people. In India, farmers use livestock in their efforts to augment their income and to generate local resources of animal power to meet agriculture and transport needs. As a supplement to agriculture, villagers usually keep drought animals, sheep and goats for meat supply, and poultry for eggs. Majority of animals help human beings in one-way or the other. The substantial economic yields are obtained from these animals in terms of milk from cows, buffaloes and goats, meat from goats, fowls, sheep and bull, he-buffaloes, horses and camels as drought animals. Hides and bones of buffaloes, cows, bulls, goats, and sheep also contribute economic yields, as does the sale of live animals outside the study area for slaughter and other use.

#### **3.13.1.2 Industries**

Raipur district is the main centre of industrial activity where many industries are developing. Raipur has many heavy and medium range industries. There is ample scope for the development of industries in the district.

#### **3.13.1.3 Living Standards and Infrastructure**

In India it is not possible to set up a primary standard of living because of wide variations in terms of income, economic conditions, social customs, employment opportunities and pattern of spending. Amenities like education, medical, water supply, communication, road network, electricity, etc. significantly reflect the standard of living the area. Information available for amenities in the study area is extracted from the Census record (2001 Census) of Raipur district.

#### **3.13.1.4 Educational Facilities**

There are many educational institutions up to Senior Secondary level in the district, which includes many primary Schools, middle Schools, secondary Schools and Senior Higher Secondary Schools. Many Adult Education Centre are operative in the district, in which basic knowledge about the letters to many persons was given.

For the higher education there are colleges in the district. Among them, some are aided colleges and the few government college. In Government College the education is imparted in Arts, Science and Commerce faculties' up to post-graduate level. Law classes are also running. The district has professional colleges also.

#### **3.13.1.5 Medical and Health Facilities**

There are many allopathic and Ayurvedic institutions. Among allopathic institutions there are Primary Health Centers at block level, Community Health Centers, Maternity and Child Welfare Centers. The district also had Aidposts and post-mortem centres. Unani Dispensaries are also functioning in the district. Besides it, Homeopathic Hospitals are also extending medical facilities. There are family welfare centres in the district.

Due to inadequate availability of pure potable water especially during floods, drought famine and other natural calamities, different types of diseases are always feared to spread.

#### **3.13.1.6 Post and Telegraph**



There are post offices in the district, of which general post offices, departmental post offices, additional department post offices, branch post offices and joint post and telegraph offices are connecting people. Apart from this the district had many call offices and telephone exchanges. Electronic Exchanges, S.T.D. and P.C.O. facilities are available at all villages mostly.

#### **3.13.1.7 Transport and Communications**

The district is well connected by the Railway. There are many Railway stations in the district. State Highways traverse the Raipur district at different points. Besides it major district roads also running across Raipur. State Public Works Department maintains the National Highway, State highways and the major roads.

Chhattisgarh State Road Transport Corporation operates buses on the route. Raipur is well connected to other parts both by Roads and Railway.

#### **3.13.1.8 Approach to Village**

Out of the total inhabited villages only few villages are approachable by pucca road. Many villages have communication facilities like Bus Stand/Railway Station. The people residing in other villages have to travel certain distance to avail the facility of a train or bus in order to reach their desired destination.

#### **3.13.1.9 Power and Electricity**

Most of the villages of Raipur District are electrified, though there is little power shortage.

#### **3.13.1.10 Bazaar and Market**

There are some villages in which a village bazaar or special market is organized once a week. From these markets or bazaars, villagers fulfill their domestic and other needs.

### **3.14 CONCLUSION**

The environment baseline study was conducted in the project area by both secondary data & primary data collection. Abiotic factors including air, water, and soil were studied for the core & buffer zone. It was found that most of the

parameters were within the limits as per the Indian Standards. In general there is no major threat to the quality of these parameters. Similarly the study for the biotic factors was conducted. It was found that no forests falls in the study area.

The socio economic study conducted in the project area shows presence of enough infrastructural facilities like hospitals, transportation, banks, schools, etc. Presence of some Industrial firms in the area is also found. Hence it can be concluded that the present environment status of the study area is good enough for the project activity. Adoption of enough pollution control measures will not significantly harm the project area.

# **CHAPTER-IV**

## **ENVIRONMENTAL IMPACT ASSESSMENT**

### **AND MITIGATION MEASURES**

---

#### **4.1 ENVIRONMENTAL IMPACT ASSESSMENT**

Opencast mining involves extraction of underneath minerals, its dumping, and dumping of waste along with other operations viz. traffic network and vehicular movement along with blasting. All the operations can disturb the eco-system in various ways, such as removal of mass, change of landscape, displacement of flora and fauna of the area, change in surface drainage, change in air, water and soil quality of the area. Any development activity having an adverse impact on environment and eco-system may defeat the objective as it may destroy the resources base of future generation. However, socio economic benefits can be maximized, if environmental concerns are integrated in the mine planning and development of the project, i.e. by eco-friendly mining. The environmental parameters likely to be affected by this mining project are discussed below:

#### **4.2 IMPACT ON SOIL AND LAND USE PATTERN AND MITIGATION MEASURES**

In open cast mining, the top crust of earth i.e. top soil / sub soil is completely removed below which exist mineral deposits. The earth rock and other strata, called overburden are to be completely removed to provide access to the mineral deposit. In this manner land use pattern of an area always changes in the form of voids formed due to excavation of mineral and waste dumps left after mining. The soil cover available in the area is disturbed which is the source of vegetation of the area.

Soil is available in the form of scree at the surface, which will be removed. The spread of planned mining activities will be mainly confined within the working pits, that too at mineral bearing zones only. The impact on soil has restricted in the core zone of lease area only. The plantation proposed in the area will also increase the moisture level in the atmosphere and arrest the dust generated during mining.

##### **4.2.1 Impact on Agriculture**

As the working will be done within the existing area, therefore, mining operations shall not cause any detrimental impact on agriculture.

##### **(ii) Aesthetic Environment**

The mining lease area is located in rural area. There is neither wild life nor forest land and vegetation in and around the lease area therefore the aesthetic beauty of the area will not be disturbed. The proposed plantation and rain water harvesting will improve aesthetic beauty of the area.

##### **(iii) Ecology and Monuments and Place of interest**

No monument exists in and around the lease area, therefore impact is not anticipated. No wildlife life sanctuary or national park, forests or biospheres reserves are located around the site. The normal diversity of flora & fauna is present in & around the site. No medicinal or other economically important plant or crop species are present in the study area. Hence there will be practically no impact on the surrounding ecology due to mining.

### **4.3 IMPACT ON AIR QUALITY AND MITIGATION MEASURES**

The sources of air pollution due to mining is during drilling, blasting, excavation and loading of mineral by excavator and its unloading and movement of trucks and dumpers. The gaseous emission is from the diesel engines of mine machineries.

The dust generated during mining operations can be injurious to health of employed persons as well as persons residing near the mining site, if mitigative measures are not taken at the generating source.

#### **(A) AIR QUALITY PREDICTIONS THROUGH MATHEMATICAL MODELLING**

Impact assessment is an important part of Environmental Impact Assessment Study. There are various techniques available to predict the impacts. Mathematical modelling is an established and accepted technique to predict the impacts. The open cast mines are potential sources of air pollution.

In this section impact on air environment due to emissions generated from Limestone Mine of M/s Gangotri Lime Pvt. Ltd. is assessed. The mine is located at Village Matia in Raipur district of Chhattisgarh State.

#### **(B) EMISSION RATES**

The emissions in the present case have been computed using Environmental Protection Agency (EPA), USA established emission factors. The details of emissions computed from various sources are given below:

Mineral Output per Annum	:	25650 TPA
Total tonnage of excavation	:	85.5 TPD (Limestone)

#### **(C) EMISSION SOURCE COORDINATES**

The centre of mine was assumed (0, 0) in the mathematical modelling.

#### **(D) MATHEMATICAL MODEL FOR POLLUTANTS DISPERSION**

In the present case ISCST (Industrial Source Complex-Short Term ISC-3) model has been used to predict the impacts. This ISC model for area sources uses the steady state Gaussian plume equation for a continuous source.

Further the model has following specialties:

- ❖ Simulates dispersion from single/multiple/area/line/volume sources.
- ❖ Allows calculations to be made at a user specified regular rectangular / radial grid or at specified special receptors.
- ❖ Provides estimates of concentrations for any averaging time period for the entire period of input meteorology.
- ❖ Allows calculations to be underwritten for source groups as selected by the user.
- ❖ Uses Pasquill-Gifford or Briggs dispersion curves (for urban areas) as selected by the user, to derive the plume spread parameters.
- ❖ Adjusts dispersion curves to account for user specified information on aerodynamic roughness.
- ❖ Adjusts for wind speed variation with height, using user specified default urban/rural power law coefficients.
- ❖ Simulates dispersion from buoyant, non-buoyant point sources, non-buoyant area, non-buoyant volume sources and non-buoyant line sources.
- ❖ Simulates dry deposition using a simple tilted plume model with user specified reflection coefficients.
- ❖ Simulates building wake effects.
- ❖ Can include the effects of exponential decay.
- ❖ Uses Briggs' 1975 plume rise algorithm to calculate plume height.

The ground level concentration at a receptor located downwind of all or a portion of the source area is given by a double integral in the upwind (x) and crosswind (y) directions as:

$$x = \frac{Q_A K}{2\pi U_{s x}} \frac{VD}{\sigma_y \sigma_z} \exp[-0.5(\frac{y}{\sigma_y})^2] dy] dx \quad (2)$$

Where,

- Q<sub>A</sub> = Area source emission rate (mass per unit area per unit time)
- K = units scaling coefficient
- V = Vertical term.

- D = Decay term as a function of x  
 $\sigma_y, \sigma_z$  = standard deviation of lateral and vertical concentration distribution (m)  
 $U_s$  = mean wind speed at release height

### (E) VERTICAL TERM

The vertical term includes the effects of source elevation, receptor elevation, plume rise, limited mixing in vertical and gravitational settling and dry deposition of particulates (with diameters greater than about 0.1 micron).

In the present case effects on an ambient air concentration due to gravitational settling and dry deposition have been neglected. The vertical term without deposition effects is given by:

$$V = (1 + \gamma) \exp - \frac{H_e^2}{2\sigma_z^2} + \sum_{i=1}^{\infty} \frac{n-1}{\gamma} \exp - \frac{(2n hm - H_e)^2}{2\sigma_z^2} + \exp \frac{(2n hm + H_e)^2}{2\sigma_z^2} \quad (3)$$

Where,

- H = effective release height of emissions (plume rise + physical stack height)  
Hm = Mixing height  
 $\gamma$  = reflection coefficient

The infinite series term in equation accounts for the effects of restrictions on vertical plume growth at the top of mixing layer. Complete reflection from earth surface has been assumed ( $\gamma = 1$ ). For number of sources more than one simulation is done for each individual source and then added. In order to calculate  $\sigma_y$  and  $\sigma_z$  for various receptor points for given wind direction following equations are used.

$$x = (X(R) - X(S)) \sin (WD) - (Y(R) - Y(S)) \cos (WD) \quad (4)$$

$$y = (X(R) - X(S)) \cos (WD) - (Y(R) - Y(S)) \sin (WD) \quad (5)$$

where X(R), Y(R) are receptor point coordinates and X(S) and Y(S) are source coordinates and WD is wind angle from north.

### (F) DISPERSION COEFFICIENTS

Equations that approximately fit the Pasquill-Gifford curves (Turner, 1970) are used to calculate  $\sigma_y$  and  $\sigma_z$  in meters for rural area. The equations used to calculate  $\sigma_y$  are of the form

$$\sigma_y = 465.11628 (x) \tan (TH) \quad (6)$$

Where,

$$TH = 0.017453293 [c-d \ln (x)] \quad (7)$$

In the above equations down wind distance 'x' is in kilometers and coefficients 'c' and 'd'. The equation used to calculate  $\sigma_z$  is of the form:

$$\sigma_y = ax^b \quad (8)$$

### (G) METEOROLOGICAL CONDITIONS USED IN PREDICTIONS

The hourly meteorological data has been generated at the site and the same has been used in the predictions. The hourly wind speed, temperature, direction and stabilities have been used.

### (H) Atmospheric Stability

Many alternative models are developed by different authors to relate  $\sigma_y$  and  $\sigma_z$  with down wind distance  $x$  under different atmospheric stability conditions. Unfortunately none of these have been found to be comprehensive enough to be applicable under all types of topographic and meteorological conditions. On the basis of available information, ISI adopted “Pasquill Gilford” stability classification system for flat terrains and “Me Elroy” stability classification system for non-smooth and uneven areas such as urban and other undulating areas.

The study area is flat in present case therefore Pasquill Gifford stability classification system will be applicable in accordance with ISI recommendations. The Pasquill Gifford stability classification divides atmospheric stability into six classes based on solar insolation/cloud cover conditions.

### (I) AMBIENT AIR QUALITY AND BACKGROUND CONCENTRATIONS

Ambient air quality standards promulgated by Central Pollution Control Board (CPCB) for different areas are as follows:

Area	Concentration ( $\mu\text{g}/\text{m}^3$ )			
	SPM	RPM	SO <sub>2</sub>	NO <sub>x</sub>
Industrial and Mixed Use	500	150	120	120
Residential and Rural	200	100	80	80
Sensitive	100	75	30	30

The above standards are for a sampling period of 24 hours. The maximum values of background concentrations monitored at mining site are as follows:

Pollutant	Season	Background Concentration ( $\mu\text{g}/\text{m}^3$ )
SO <sub>2</sub>	Post Monsoon	10.3
NO <sub>x</sub>	Post Monsoon	12.2
SPM	Post Monsoon	162.7
RPM	Post Monsoon	57.98

### (J) SELECTION OF LOCATIONS

The locations have been selected around the mining area covering an area of 10 km radius from lease boundary.

### (K) PLAN OF COMPUTATION

The emission rate, dispersion coefficients and other input data being now available it was planned to compute the following:

- ❖ The 24 hourly averaged incremental concentration with hourly data and averaged seasonal data.
- ❖ The identification of grid point having peak concentration for the incremental values.
- ❖ Preparation of isopleths of different averaging periods and seasons.

**(L) PEAK 24 HOURLY INCREMENTAL CONCENTRATIONS**

As mentioned earlier peak incremental 24 hourly SPM concentrations have been computed using averaged hourly data; peak hourly incremental concentration computed using meteorological data is 6.4  $\mu\text{g}/\text{m}^3$ . This concentration occurs in post monsoon season.

**(M) PREDICTED AMBIENT AIR QUALITY**

With a wide fluctuation in meteorological parameters it is a complex task to predict post project ambient air quality. With available ambient air quality data and incremental concentrations computed through mathematical modelling the following post project ambient air quality has been predicted.

**Prediction of Incremental concentration**

<b>Pollutant</b>	<b>Maximum Background value (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Predicted Incremental Concentration (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Post Project Air Quality (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>*NAAQS (<math>\mu\text{g}/\text{m}^3</math>)</b>
SPM	162.70	6.4	169.1	500
RPM	57.98	2.7	60.68	150
NO <sub>x</sub>	12.20	1.1	13.3	80
SO <sub>2</sub>	10.30	0.6	10.36	80

*Source: National Ambient Air Quality Standards*

It is clear from the predicted values that the concentrations of SO<sub>2</sub> and NO<sub>x</sub> are below the limits of NAAQS (for Rural and Residential category) and SPM and RPM concentrations are exceeding the limits. This is due to higher background concentrations recorded. The incremental value due to mine operation is marginal.

**COEFFICIENTS USED TO CALCULATE LATERAL VIRTUAL DISTANCES**



$\sigma_y = \frac{\sigma_{y0}^{1/q}}{P}$		
<b>Pasquill Stability Category</b>	<b>P</b>	<b>Q</b>
A	209.14	0.890
B	154.46	0.902
C	103.26	0.917
D	68.26	0.919
E	51.06	0.921
F	39.92	0.919

### 4.3.1 GASEOUS POLLUTION

The gaseous pollutants (SO<sub>2</sub> & NO<sub>x</sub>) are anticipated from diesel engines of machineries and other transport vehicles. The ambient air quality was measured on 24 hourly basis and it is observed that the gaseous pollutants are within limits.

## 4.4 IMPACT OF NOISE

### 4.4.1 Noise and Vibration Problems

Major noise generating sources of the mining activity is drilling, blasting and trucks movement used for transportation of limestone. Drilling is being carried out by compressed jack hammer. There is not be any heavy deployment of machines in the area for mining operation as the mining will be in very small scale. There will not be any appreciable impact of noise pollution.

The proposed plantation will also check propagation of noise in the surrounding areas.

#### 4.4.1.1 Vibrations

Very light and shallow blasting proposed with the help of low explosives. No any kind of remarkable effect due to vibration was seen during the last 5 years.

#### 4.4.2 Noise Abatement and Control

- i) Plantation will be taken up around the lease area and along haul roads. The plantation minimizes propagation of noise.
- ii) The drilling will be carried out with the help of sharp drill bits which will help in reducing noise.
- iii) Periodical monitoring of noise will be done.

## **4.5 IMPACT ON WATER ENVIRONMENT**

### **4.5.1 Impact on Ground Water**

Mining in the area will be done well above the water table therefore impact on water regime is not anticipated. The general ground level in the area is 280 mRL. The ground water table is at 20 - 25 mbgl. There will be no beneficiation process involved, so there will not be any toxic discharge or dump which can contaminate the surface water or ground water bodies. There will be no discharge of mine water. Hence, no negative impact is envisaged on ground water. In monsoon, garland drains will collect surface run off and will be diverted towards pit. So no outside discharge will occur.

### **4.5.2 Impact on Surface Water**

No water reservoir is present in the mining lease area. Within 10 km periphery of lease area, Kulhan nallah is at a distance of 5.5 km. No other river or nallah within 10 km surrounding area of the site.

There is no discharge of liquid effluent from the mine which may cause pollution.

Therefore, no significant impact on surface water bodies is anticipated due to mining operations.

### **4.5.3 Strategy to Control Water Pollution**

- Garland drain will be constructed on all sides of quarry. The collected water shall be used in plantation and spraying on haul roads.
- No wastewater will be generated from the mining activities.
- Septic tanks and soak pits will be provided for the disposal of domestic effluent generated from mine office.

## **4.6 IMPACT ON BIOLOGICAL ENVIRONMENT**

### **4.6.1 Impact on Flora and Fauna**

No adverse impact is envisaged on the existing flora, as there would be no deforestation by mining operation. Mining is being carried out on flat terrain where no vegetation is observed. The mining area will have green belt development in general and plantation will be done at mine site. These activities will help to improve the floral cover of the area.

#### **4.6.2 Impact on Fauna**

No endangered species is found in and around lease area. There will be no adverse impact on faunal environment.

#### **4.6.3 Impact on Ecosystem**

No rare species of ecosystem inhabit this lease area. As core area has no significant flora and fauna, the enhanced production is not likely to have any adverse impact on them. There are no endangered species in the core/buffer zone. The management will develop green belt around the mine area, and this shall add to improved aesthetics and would cause positive impact.

#### **4.6.4 Measures for Minimizing Impact on Flora**

##### **Green Belt Development**

The proposed green belt in the lease area will be designed taking into consideration the availability of area as the efficiency of green belt in pollution control mainly depends on its width of green belt, distance from pollution sources, site of the habitat from working place and tree height. While considering the above aspects due care will be taken for selecting the suitable characteristics plant species as those fast growing and evergreen trees, trees with large leaf area, locally suitable plant species, those resistant to specific pollutant and those which would maintain the regional ecological balance, soil and hydrological conditions.

The plantation work for green belt development will be carried out under guidelines of plantation expert which will help minimizing adverse impact on the flora found in the area.

#### **4.6.5 Measures for Minimizing Impact on Fauna**

Following measures will be adopted to minimize the impact of mining on faunal environment of the area.

- Measures will be taken to curb pollution due to air, water, land and noise environment.
- Greenery development around mine area will help in creating habitats for local faunal species and to create better environment for various fauna.
- Improve the tree plantation to create favourable condition for living.

#### **4.7 SOCIO-ECONOMIC ENVIRONMENT**

The mining activity will improve the economic status of the people around the mine area. Continued mining activities will benefit the local people in terms of employment. Since the extraction of the reserves of this mineral is economically viable, their proper utilization will improve the economic status of the people nearby and the country as a whole.

The project proponent has already employed labours from the nearby village.

## **4.8 OCCUPATIONAL HEALTH AND SAFETY**

The method of mining will be in small scale and of manual in nature. There will not be any deployment of heavy machines in the area for carrying out mining operation which will create noise pollution, air pollution or any other operational hazards due to presence of machines. Precaution is required to be observed during drilling with jack hammers against dust or during blasting to be in the safe distance. Apart from these no other factors are envisaged during future mining operation.

During mining activities, the workers will be exposed to dust, noise and vibrations which will be generated by the operation of machines and equipments and by undertaking blasting. In addition, the traffic hazards will also be increased due to movement of dumpers. All these parameters may lead to adverse working conditions, which is liable to have adverse impact on the health of workers. Proper attention and appropriate measures will be taken to combat these effects.

- The mine workers will be provided with all necessary Personal Protective Equipments (PPE), especially Dust Masks for their safe guard from dust, Ear Plug/Ear Muffs for noise and measures for other hazards.
- Periodical medical check up for the workers will be conducted as per Mines Rules.

## **4.9 ENVIRONMENTAL IMPACT ASSESSMENT**

### **4.9.1 Mitigation measures for Air Pollution**

The following remedial measures will be taken for air quality management in the area.

- The drilling machines will be equipped with wet drilling arrangement.
- The haul roads in the lease area will be made compact and water spraying will be done. The tar road passes through the lease area therefore, generation of dust by movement of truck which carry limestone outside the lease area will be less.
- The trucks carrying the limestone from the lease area will be covered with tarpaulin.
- The diesel engines of mine machineries will be properly maintained to minimize generation of gaseous emissions.
- Air quality monitoring for SPM, RSPM, NO<sub>x</sub> and SO<sub>2</sub> will be done as per guidelines of Central Pollution Control Board.

- Regular water spraying will be done on haul roads.

#### **4.9.2 Mitigation measures for Noise Pollution**

- A proper preventive maintenance of all machines is being carried out, which help in reducing generation of noise during operations.
- The drilling with sharp drill bits reduces generation of noise during drilling.
- In order to reduce the adverse effect due to higher noise level near machines, earmuffs are provided to all operators and employees.
- Periodical monitoring of noise level near vicinity of operating mining machines and at some other designated locations will be done with the help of noise level meter and records will be maintained.

#### **4.9.3 Mitigation measures for Water Pollution**

- No toxic substance will be generated during the mining operation which may affect the quality of surface water. No waste water will be discharged outside the lease area which may affect the quality of surface water bodies.
- However, protective measures are proposed to be taken by making garland drain all around the working pits in order to control sedimentation and siltation etc. of the water bodies and water courses.
- Thus the impacts are negligible on either ground water resources or surface water resources.
- No surface water or ground water pollution is expected as the mine working does not intersect the ground water table.

#### **4.10 SOLID WASTE MANAGEMENT**

Limestone of this mine not covered with alluvial soil which can be called as waste. However, if some quantity of topsoil is generated, than it will be stacked along the lease boundary. Some quantity of small chips generated during the sizing of limestone not recoverable can be called as waste which is very small in quantity say not more than 450 m<sup>3</sup>. So no question arises of waste management with specific attention. The mining lease area is already free from top soil. The quantity of top soil will be generated during the period of mining scheme is estimated about 210 m<sup>3</sup>. The dumping site of the alluvial soil in barrier zone along lease boundary is proposed.

## **CHAPTER-V**

# **ENVIRONMENTAL MONITORING PROGRAMME**

---

### 5.1 INTRODUCTION

**Post Project Monitoring is an essential part to check the negative impact of any project activity. Hence monitoring of various environmental parameters will be carried out on a regular basis to ascertain the following:**

- ❖ State of Pollution within the project site and in its vicinity.
- ❖ Generate data for predictive or corrective purpose in respect of pollution.
- ❖ Examine the efficiency of pollution control system adopted at the site.
- ❖ To assess environmental impacts.
- ❖ M/s. Gangotri Lime Pvt. Ltd. will undertake monitoring at the site as per the norms of CPCB. The various environmental components and pollution sources, which would be monitored under Environmental monitoring programme, would be ambient air quality and noise levels. Details of the Environmental Monitoring programme, which would be undertaken for various environmental components, are detailed below:

**TABLE No.: 5.1  
POST PROJECT MONITORING**

<b>S. No.</b>	<b>DESCRIPTION</b>	<b>FREQUENCY OF MONITORING</b>
1.	Ambient Air Quality at project site	Quarterly
2.	Water Quality	Quarterly
3.	Noise Level Monitoring	Quarterly
4.	Soil Quality	Quarterly

## 5.2 METHODOLOGY ADOPTED

ON THE BASIS OF THE ENVIRONMENTAL CONDITIONS AT THE MINE SITE AND THE NATURE OF ADJOINING AREA, THE PROJECT SITE IS CONSIDERED AS CORE ZONE AND THE AREA LYING WITHIN 10 KM RADIUS FROM THE MINE SITE IS CONSIDERED TO BE THE BUFFER ZONE WHERE SOME IMPACTS MAY BE OBSERVED ON PHYSICAL AND BIOLOGICAL ENVIRONMENT. IN THE BUFFER ZONE SLIGHT IMPACT MAY BE OBSERVED AND THAT TOO IS OCCASIONAL.

## 5.3 DATA COLLECTION

As given in Chapter III, the baseline data for the project site and 10 km radius area were collected in accordance with the requirement of guidelines of Ministry of Environment & Forests, New Delhi. Monitoring was done during study period (October 2009 – December 2009). Similarly the post project monitoring once project operation phase begins will be done to study the impact of project activity on the surrounding environment and concerned people. The data will be collected on following parameters:

TABLE NO.: 5.3  
DATA TO BE COLLECTED

S. No.	Description	Location
1.	Ambient Air Quality	Project site, Villages in Buffer Zone
2.	Meteorological data	Project site
3.	Noise Level Monitoring	Project Boundary, Villages in Buffer Zone
4.	Health Check-up	Workers

## 5.4 MONITORING

THE PROJECT MONITORING WOULD INCLUDE DETAILS OF ANY MAJOR/ MINOR IMPACT IN THE CORE ZONE AND AREA WITHIN BUFFER ZONE FOR THE FOLLOWING PARAMETERS: -

- FAUNA & FLORA IN THIS REGION.

- **SENSITIVE PLACES/ HISTORICAL MONUMENTS AND SANCTUARIES.**
- **LAND USE PATTERN WITHIN CORE ZONE AND BUFFER ZONE INCLUDING THE CROPPING PATTERN.**
- **DEMOGRAPHY AND SOCIO-ECONOMIC ANALYSIS BASED ON LAST AVAILABLE CENSUS DATA FOR ENTIRE STUDY AREA.**
- **WATER BODIES, HILLS, ROADS ETC.**

## **5.5 INSTRUMENT TO BE USED**

**THE FOLLOWING INSTRUMENTS WILL BE USED FOR DATA COLLECTION WORK IN THE MONITORING SCHEDULE:**

8. Respirable Dust Sampler with attachment for gaseous Pollutants, Envirotech APM 460.
9. Digital D.O. Meter Model - 831 E.
10. Dry and Wet Bulb Thermometer.
11. Sound Level Meter Model Lutron SL - 4010
12. Micro Meteorological Station Model Enviro - WM 251
13. Water Level Indicator
14. GPS Model GPS Map76CSx

**IN ADDITION TO THE ABOVE INSTRUMENTS, THE DATA ON LAND USE, VEGETATION AND AGRICULTURAL CROPS TO BE COLLECTED BY THE FIELD TEAM BY MEETING WITH A LARGE NUMBER OF LOCAL INHABITANTS IN THE STUDY AREA AND DIFFERENT GOVERNMENT DEPARTMENTS / AGENCIES.**

## **5.6 SELECTION OF MONITORING STATIONS**

Monitoring has to be done in the core and buffer zone of the project site.



## **5.7 PROCEDURE FOR DETERMINING VARIOUS AIR QUALITY PARAMETERS**

The procedure for determining various air quality parameters has been given by MoEF and the same will be used for the project monitoring of the project.

**TABLE NO.: 5.7**  
**TESTING PROCEDURE**

<b>Parameters</b>	<b>Testing Procedure</b>
<b>PM<sub>10</sub> &amp; PM<sub>2.5</sub></b>	Gravimetric Method using Respirable Dust Sampler Envirotech RDS - APM 460 IS: 5182 (Part-IV)
<b>NO<sub>x</sub></b>	Absorption in dill NaOH and then estimated colorimetrically with sulphanilamide and N (I-Nephthyle) Ethylene diamine Dihydrochloride and Hydrogen Peroxide (CPCB Method).
<b>SO<sub>2</sub></b>	Absorption in Potassium Tetra Chloromercurate followed by Colorimetric estimation using P-Rosaniline hydrochloride and Formaldehyde (IS: 5182 Part - II).

**TABLE No.: 5.7 (A)**  
**GUIDANCE FOR ASSESSMENT OF REPRESENTATIVENESS AND RELIABILITY**  
**OF BASELINE ENVIRONMENTAL ATTRIBUTES**

<b>Attributes</b>	<b>Sampling</b>		<b>Measurement Method</b>	<b>Test Procedure</b>
	<b>Network</b>	<b>Frequency</b>		
<b>A. Air Environment</b>				
<b>Meteorological</b>				-
<ul style="list-style-type: none"> <li>Wind speed</li> <li>Wind direction</li> <li>Dry bulb temperature</li> <li>Wet bulb temperature</li> <li>Relative humidity</li> <li>Rainfall</li> </ul>	Minimum 1 site in the project impact area	Regularly in one season by Weather Monitoring Station	Mechanical/automatic weather station	
<b>Pollutants</b>				-
<ul style="list-style-type: none"> <li>PM<sub>10</sub></li> </ul>	4 to 6 locations in the project impact area (Minimum 2 locations in upwind side, more sites in downwind side / impact zone)	Revised National Ambient Air Quality Standards (NAAQS) vide MoEF circular, dated 16.11.2009	Gravimetric method	
<ul style="list-style-type: none"> <li>PM<sub>2.5</sub></li> </ul>			Gravimetric method	-
<ul style="list-style-type: none"> <li>SO<sub>2</sub></li> </ul>			EPA Modified West & Geake method	Absorption in Potassium Tetra Chloromercurate followed by Colorimetric estimation using P-Rosaniline hydrochloride and Formaldehyde (IS: 5182 Part - II).
<ul style="list-style-type: none"> <li>NO<sub>x</sub></li> </ul>			Arsenite modified Jacob & Hochheiser	Absorption in dill NaOH and then estimated colorimetrically with sulphanilamide and N (I-

				Nephtyle) Ethylene diamine Dihydrochloride and Hydrogen Peroxide (CPCB Method).
• CO			Non Dispersive Infra Red (NDIR) Spectroscopy	-

**Note:** For Rapid Environmental Impact Assessment one complete season data except monsoon is adequate while the comprehensive Environmental Impact Assessment Resources coverage of three seasons.

## 5.8 Water Regime

THE QUALITY OF GROUND WATER WILL BE STUDIED BY COLLECTING WATER SAMPLES FROM REPRESENTATIVE HAND PUMPS AND TUBE WELLS.

### 5.8.1 Locations of Water Monitoring Stations & Parameters to be analyzed

MONITORING WILL BE DONE IN THE CORE AND BUFFER ZONE OF THE MINE SITE. THE PARAMETERS THAT WILL BE ANALYZED ARE MENTIONED IN THE TABLE GIVEN BELOW:

**TABLE NO.: 5.8.1 (A)**  
parameters to be ANALYSED

S. No	Parameters	<u>Permissible limits as per IS: 10500</u>
1.	pH	6.5 – 8.5
2.	Odour	Unobjectionable
3.	Turbidity (NTU)	5 (max 10)
4.	Total hardness as CaCO <sub>3</sub> (mg/l)	300 (max 600)
5.	Calcium as Ca (mg/l)	75(max 200)
6.	Sulphate as SO <sub>4</sub> (mg/l)	200(max 400)
7.	Total dissolved solid (mg/l)	500(max 2000)
8.	Alkalinity as CaCO <sub>3</sub> (mg/l)	200(max 600)
9.	Iron as Fe (mg/l)	0.3(max 1.0)
10.	Fluoride as F (mg/l)	1.0(max 1.5)
11.	Magnesium as Mg <sup>+2</sup> (mg/l)	<b>30 (MAX.100)</b>
12.	Chloride as Cl, mg/l	<b>250, (MAX 1000)</b>
13.	Nitrate as NO <sub>3</sub> mg/l	<b>45, (MAX 100)</b>
14.	Sodium as Na (mg/l)	\$

15.	Potassium as K (mg/l)	\$
-----	-----------------------	----

**TABLE NO.: 5.8.2 (B)**  
**GUIDANCE FOR ASSESSMENT OF REPRESENTATIVENESS AND RELIABILITY**  
**OF BASELINE ENVIRONMENTAL ATTRIBUTES**

<b>ATTRIBUTES</b>	<b>SAMPLING</b>	<b>MEASUREMENT METHOD</b>	<b>REMARKS</b>
<b>Water</b>			
<b>Parameters for water quality</b> <ul style="list-style-type: none"> <li>• pH, turbidity, magnesium hardness, total alkalinity, chloride, sulphate, nitrate, fluoride, sodium, potassium, salinity</li> <li>• Total nitrogen, total phosphorus, DO, BOD, COD, Phenol</li> <li>• Heavy metals</li> <li>• Total coliforms, faecal coliforms</li> <li>• Phyto plankton</li> <li>• Zoo plankton</li> </ul>	<ul style="list-style-type: none"> <li>• Set of grab samples during pre and post-monsoon for ground and surface water for 10 km distance</li> </ul>	Diurnal and Season wise	Samples for water quality should be collected and analyzed as per : <ul style="list-style-type: none"> <li>• IS : 2488 (Part 1-5) methods for sampling and testing of Industrial effluents</li> <li>• Standard methods for examination of water and wastewater analysis published by American Public Health Association.</li> </ul>

## **5.9 NOISE ENVIRONMENT**

### **5.9.1 Base Line Data**

Noise levels will be measured at in the study area to establish present scenario. Noise monitoring will be done in the core and buffer zone of the project site.

Noise level standards are presented in table below.

**TABLE: 5.9.1**  
**CPCB NOISE STANDARDS**

Category of Zones	Leq in dB(A)	
	Day	Night
Industrial	75	70
Commercial	65	55
Residential	55	45
Silence Zone	50	40

1. Day Time is from 6.00 AM to 10.00 PM.  
2. Night Time is reckoned between 10.00 PM to 6.00 AM  
3. Silence Zone is defined as an area up to 100m around premises of Hospitals, Educational Institutions and Courts. Use of vehicle horn, loudspeaker and bursting of crackers is banned in these zones.  
Note: Mixed categories of areas be declared as one of the four above mentioned categories by the competent Authority and the corresponding standards shall apply

## 5.10 SOIL ENVIRONMENT

Soil is the media for supplying the nutrients for plant growth. Nutrients are available to plants at certain pH and pH of soils can be affected by addition of pollutants in it either by air, or by water or by solid waste or by all of these. In order to study any impact of project activity on soil, samples will be collected from the core and buffer zone of the mine site.

## 5.11 BIOLOGICAL ENVIRONMENT

There are no national parks, wild life sanctuaries / biosphere reserves within 10 km radius of the study area. The soil in the area is low to medium fertile with reference to its agriculture potential. No rare, endangered and critically endangered species have been found during the baseline study for the project, which shows there will not be any significant impact on the biological environment of the area.

The following mitigation measures will be taken up for protection of fauna in the study area:

- Improvement of habitat that includes augmenting water sources, water regime development, eradication of weeds, and development and restoration of grasslands.

- Educate the local people to develop awareness to protect the animals;
- Protect and regulate the herbivorous animals in the forest area as well as near to the project area; and
- Mitigation of man-animal conflicts,
- Inoculation of domestic cattle against contagious diseases.

## 5.12 SOCIO-ECONOMIC ENVIRONMENT

There will be only positive impacts on the socio- economic environment of the project area, with the employment opportunities and other activities as Corporate Social Responsibility of M/s. Gangotri Limes Pvt. Ltd. This Group is in the area around the mines in Village Matia has taken up Social Activities in various fields, some of which are briefed below:

The mine management has contributed substantially to the overall economy and social development of the area. It will provide direct employment to about 20 - 25 people.

## 5.13 DETAILED BUDGET

- The capital Cost of the project is Rs 10,00,000/-
- For Economic development and for Community Welfare :Rs. 3.0 Lakh/Annum

**TABLE – 5.12**

### **COST OF ENVIRONMENT PROTECTION MEASURES (IN RS)**

S. No.	Details	Capital Cost		Annual Recurring Cost	
		Existing	Proposed	Existing	Proposed
1.	Pollution Control a) Air (Water spraying) b) Water (Water analysis) c) Noise (monitoring & PPE)	--	1,00,000	--	50,000
2.	Pollution Monitoring	--	1,00,000	--	30,000

<b>Matia Limestone Mine (ML Area – 8.144 Ha.)</b> At Village Matia, Tehsil & District Raipur (Chhattisgarh)	<b>Draft EIA/EMP Report</b>
--	---------------------------------

	a) Air sampling stations & analysis b) Water Quality c) Noise & Vibration Monitoring				
3.	Occupational Health (Periodic medical checkup)	--	50,000	--	20,000
4.	Green Belt (ML) a) Mine b) Township	--	10,000	--	10,000
5.	Reclamation / Rehabilitation of mined out area	--	50,000	--	5000
6.	Fencing etc	--	50,000	--	5000
<b>Total</b>			<b>3,60,000</b>		<b>1,20,000</b>

## CHAPTER–VI

# ADDITIONAL STUDIES

---

### 6.1 INTRODUCTION

As per the EIA notification dated 14.09.2006, the first technical presentation has been done. The committee has suggested various additional Terms of Reference (ToR) for the preparation of the Environmental Impact Assessment (EIA) Report and Environmental Management Plan (EMP) through its Letter No. 79/SEAC–CG/ EC/ Mining/ RYP/120/09 on dated 20.04.2010. The following Additional Studies were done in reference to the additional Terms of References;

- A) Biological Study
- B) Risk Assessment

### 6.2 BIOLOGICAL STUDY REPORT

#### 6.2.1 Introduction

The baseline study for the evaluation of the floristic and faunal diversity of the terrestrial environment of the study area within the 10 km radius from Limestone mine located near village Matia in Tehsil Raipur Dist. Raipur (Chhattisgarh) was conducted.

A natural ecosystem is a structural and functional unit of nature. It has components, which exist in harmony and survive by interdependence. Ecosystem has self – sustaining ability and controls the number of organisms at any level by cybernetic rules. The effect of this is that an ecosystem does not become imbalanced.

The biological survey was conducted considering the rich bio-diversity of organisms and their role in productivity and their importance for human livelihood, it is vital to protect and safeguard these dynamic ecosystems.

#### 6.2.2 Objectives of the Study



The present study was undertaken with the following objectives:

- To assess the nature and distribution of vegetation in and around the proposed activity;
- To study forest composition in the study area;
- To assess the biodiversity and to understand the resource potential;
- To ascertain migratory routes of fauna if any;
- Ethno botanical survey in the villages to assess the usage of plants;
- Possibility of presence of breeding grounds.

### **6.2.3 Methodology**

To study the fauna and flora systematically from terrestrial locations in particular and from the study area (within 10 km. radius), following methodology was adopted.

#### **A. For Flora**

List of all plants from the study area was prepared and their habitats recorded. The associations of plants and animals in communities were noted.

- To study herbaceous and woody vegetation systematically, standard methods of analyzing vegetation i.e. quadrant of different dimensions and line transect of appropriate lengths were employed. Their numbers (quadrant) depend upon the requirement in specific cases.
- Identification of plants was done by referring to standard floras and consulting the experts when needed.
- The samples (specimen) were individually stored in separate blotting papers and put in the polythene bags. Each specimen carried the name of the species, time and date of collection and locations.

#### **B. For Fauna**

Animals were studied by following means:

- ❖ Actual sighting
- ❖ Pug marks
- ❖ Calls
- ❖ Droppings, burrows etc.
- ❖ By inquiring local people.

Larger animals and common birds in and around the study area were visually observed and recorded.

#### **6.2.4 Floral Diversity of the Study Area**

The climatic, edaphic and biotic variations with their complex interrelationship and composition of species, which are adapted to these variations, have resulted in different vegetation cover. The following account of floral diversity, based on field survey conducted, is not very comprehensive data and is aimed only to give a general pattern of vegetation of this region during the study period as a baseline data. Further, there is severe threat to the natural vegetation owing to the biotic pressure. Listing of the endangered, threatened and endemic species of flora in a locality and drawing the attention to the occurrence of such species, would aid in creating awareness amongst the local people as a whole to protect such species from extinction, and to take necessary measures for their conservation. This type of floristic study is an inventory for such purpose and their necessity.

##### **A. Aquatic flora**

No aquatic flora in the core zone was observed as no major water body is found in the core zone.

##### **B. Trees & Shrubs**

Raipur has a sub-tropical climate; temperatures remain moderate for most of the year, apart from the summer from March to June, which can be extremely hot. Winters last from November to January and are mild. Most commonly found tree species in the area are

*Acacia Arabica*(Babul), *Ziziphus mauratiana* (Ber), *Acacia catechu* (Khair), *Tectona grandis* (Sagaon), *Terminalia tomentosa* (Saja), *Emblica officialis* (Amla), *Ficus religiosa* (Pipal), *Tamarindus indica* (Imli), *Ficus bengalensis* (Bargad), *Azadirachta indica* (Neem) etc.

S.No.	Common Name	Scientific Name
<b>Core Zone</b>		
1.	Ber	<i>Ziziphus mauritiana</i>
2.	Neem	<i>Azadirachta indica</i>
3.	Bargad	<i>Ficus bengalensis</i>
4.	Pipal	<i>Ficus religiosa</i>
5.	Babool	<i>Acacia nilotica</i>
<b>Buffer zone</b>		
1.	Babool	<i>Acacia arabica</i>
2.	Khair	<i>Acacia catechu</i>
3.	Haldu	<i>Adina cordifolia</i>
4.	Safed siris	<i>Albizzia procera</i>
5.	Sitafal/ Sharipha	<i>Anona squamosa</i>
6.	Dhawada	<i>Anogeissus latifolia</i>
7.	Neem	<i>Azadirachta Indica</i>
8.	Kachnaar	<i>Bauhinia variegata</i>
9.	Salai	<i>Boswellia serrata</i>
10.	Shisham	<i>Dalbergia latifolia</i>
11.	Dhobin	<i>Dalbergia paniculata</i>
12.	Sisso	<i>Dalbergia sissoo</i>
13.	Gulmohar	<i>Delonix regia</i>
14.	Amla	<i>Emblica officinalis</i>
15.	Neelgiri	<i>Eucalyptus spp.</i>
16.	Bargad	<i>Ficus bengalensis</i>
17.	Pipal	<i>Ficus religiosa</i>
18.	Aam	<i>Mangifera indica</i>
19.	Aal	<i>Moringa tinctoria</i>
20.	Jaam/ Bihi	<i>Psidium guava</i>
21.	Sagaon	<i>Tectona grandis</i>
22.	Imli	<i>Tamarindus indica</i>
23.	Kahua/ Arjun	<i>Terminalia arjuna</i>
24.	Saja	<i>Terminalia tomentosa</i>
25.	Ber	<i>Zizyphus mauratiana</i>

### **C. Cultivated Crops**

Raipur has traditionally been an agricultural town which was famous for agricultural processing and saw milling. The survey of the area and a dialogue with the local farmers revealed that the following crops are mainly grown in these fields.

- ❖ Paddy,
- ❖ Wheat,
- ❖ Groundnut and
- ❖ Maize

Due to its supremacy in rice production, Chhattisgarh is known as the rice bowl of central India. Chhattisgarh also produces cereals like maize, kodo-kutki and other millets; pulses like tur and kulthi and oilseeds like groundnut, Niger, sunflower and soybean.

#### **D. Endangered Species**

The study area did not record the presence of any critically threatened species.

### **6.2.5 Faunal Diversity of the Study Area**

#### **A. Wildlife Sanctuaries and National Parks in the study area**

There is not any National Park or Wildlife Sanctuaries in the study area. In addition no Biosphere reserves, Wildlife corridors, Tiger/Elephant reserves (existing as well as proposed), exist within 10 km of the project area.

#### **B. List of Fauna observed near Mine area**

S.NO.	ENGLISH NAME	ZOOLOGICAL NAME	HINDI/LOCAL NAME	SCHEDULE AS PER WILD LIFE ACT 1972
<b>CORE ZONE</b>				
1.	Blue Bull	<i>Boselphus tragocamelus</i>	Nilgai	Schedule III
2.	Hare	<i>Lepus nigricollis fcuvier</i>	Khargosh	Schedule IV
3.	Rat	<i>R. rattus</i>	Chuha	Schedule IV

4.	Pigeon	<i>Columba Livia</i>	Kabutar	Schedule V
5.	Indian Myna	<i>Acridotheres tristis</i>	Koyal	Schedule IV
<b>BUFFER ZONE</b>				
6.	Five Stripped Squirrel	<i>Funambulus pennanti</i>	Gilhari	Schedule IV
7.	Mouse	<i>Mus. Sp.</i>	Chuha	Schedule V
8.	Toads	<i>Bufo malanostictus</i>	Mendhak	Schedule IV
9.	Bull Frog	<i>Rena tigrina</i>	Mendhak	Schedule IV
10.	Dove	<i>Streptopelia senegalensis</i>	Fakhta	Schedule IV
11.	House Crow	<i>Corvus splendens</i>	Kaua	Schedule V
12.	Owl	<i>Asio flammeus</i>	Ullu	Schedule IV
13.	Partridge	<i>Francolinus pondicerianus</i>	Teetar	Schedule IV
14.	Red vented Bulbul	<i>Pycnonotus cafer</i>	Bulbul	Schedule III
15.	Sparrow	<i>Passer domesticus</i>	Gauriyya	Schedule IV
16.	Weaver Bird	<i>Ploceus phillippinus</i>	Baya	Schedule IV
17.	Woodpecker	<i>Dendrocopos naharattensis</i>	Kathphora	Schedule IV
18.	Dog	<i>Canis lupus</i>	Kutta	Schedule IV
19.	Goats	<i>Capra aegagrus hircus</i>	Bakri	Schedule IV
20.	Cat	<i>Felis cattus</i>	Billi	Schedule IV
21.	Buffaloes	<i>Bubalus bubalis</i>	Bhes	Schedule IV
22.	Indian myna	<i>Acridotheres tristis</i>	Koyal	Schedule IV
23.	Hare	<i>Lepus nigricollis F. cuvier</i>	Khargosh	Schedule IV

No endangered species have been sighted in the area.

### **B. Other Fauna**

Though the large fauna like mammals, birds, reptiles and amphibians, which are found in the area and are known adequately but this cannot be said of the invertebrates, which are equally important for any ecosystem. For example, the aquatic habitat although limited in its extent, the village ponds and pools, tanks and ditches in season show

up variety of animals. These water bodies do provide favourable habitats for the breeding of sponges, coelenterates, aquatic arthropods like crustaceans, mosquitoes, arachnids, etc.

### **6.2.6 Plant-Animal Relation**

The animal-plant interrelationship is unique in this habitat. The area exhibit a variety of animal-plant community living in a complementary manner for their survival. The inhospitable, dry-arid and moisture deficit area apparently look barren and devoid of animals. But, a through day-night investigation suggest that the life forms have developed extraordinary system for survival. The animals get food backup from plant material and plants get manure due to decomposition and biodegradation as a self sustainable biome. The herbivores found in the study area depend on native trees, shrubs and grasses for their food requirements in different seasons. During crop season they make best use of crop parts and its residual matter for survival.

### **6.2.7 Wildlife Conservation**

The schedules of Wildlife Act (1972) classify the species such as rare, endangered, threatened, vulnerable etc. According to degree of threat of extinction Schedule – I contains those species, which need topmost priority, while II, III, IV and V have correspondingly lesser degree of threat. Most of the avifauna is listed in Schedule – IV. No Schedule- I is observed in the study area. There are no migratory paths reported in the study area.

The following mitigation measures will be taken up for protection of fauna in the study area:

- Improvement of habitat that includes augmenting water sources, water regime development, eradication of weeds, and development and restoration of grasslands.
- Educate the local people to develop awareness to protect the animals;

- Formulate wild life protection committees in near by villages to control the poaching and hunting;
- Protect and regulate the herbivorous animals in the forest area as well as the project near to plant area; and
- Formulate a wild life patrolling committee to monitor the wild animals' movement.
- Mitigation of man-animal conflicts,
- Inoculation of domestic cattle against contagious diseases.

### **6.3 DISASTER MANAGEMENT PLAN**

#### **6.3.1 OBJECTIVE**

The objective of Disaster Management Plan is to localize emergency and to eliminate, if possible or to minimize the effects of accident on people and property. Various disasters such as fire, explosion in explosives, accident (mine) can occur at work place. The hazardous effects can be minimized by rescue, first-aid, evacuation, rehabilitation and giving information's promptly to people living nearby.

#### **6.4 HAZARDS/RISKS**

The scientific mining shall ensure the prevention of risks/ disasters involved, however following risks / hazards are assessed:-

- Use of explosive and blasting indicating vibrations
- Slope failures in pits
- Solid waste generation
- Risk during handling of equipments / machinery
- Risk of fire

The risks should be identified and addressed before hand as under:

##### **6.4.1 Use of Explosive and Conducting of Blasting Operations**

Since the small quantity of explosive to be exploded through delay detonation shall not involve vibration of large magnitude. However, all the precautions as warranted under rules shall be undertaken.

#### **6.4.2 Slope Failure**

The mining is proposed from bench manner. Height of the benches shall be kept 3 m. Soil shall be spread over worked out benches for plantation to ensure slopes stability.

#### **6.4.3 Handling of equipments / machinery**

Mine Machinery shall be involved in mining operations and these shall be operated by trained and licensed personal. Proper training shall be given to the personal before to be engaged in handling of equipments.

#### **6.4.4 Code of Practice in Case of Fire**

##### **A. Sources of Fire**

In mine the source of fire could be oil/diesel storage, explosives handling etc.

##### **B. Line of Action**

- (i) Any person notices any sign of fire shall immediately take steps to give warning by blowing horn continuously and take steps to extinguish the fire by using appliances available near the fire.
- (ii) Arrangement of water and fire extinguisher shall be kept there in the area to immediately deal with such hazard.
- (iii) Immediate steps shall be taken by the officials/persons on the spot to remove men and machinery and take steps to tackle the fire according to fire fighting instructions, inform hospital to get Ambulance, if required.
- (iv) On receiving warning, a team shall reach the site of fire and shall take steps to extinguish it depending on its nature, class and extent and rescue the persons involved in fire.
- (v) Proper training to the employees / operators shall be given to deal with such risks in case if any.

### **6.5 SAFETY AND SECURITY**



The benches / pits shall be dressed as per the plan and these shall be reclaimed by way of spreading soil on the exposed surface, plantation conducted. Maximum efforts shall be made to ensure the stability of slopes. However, for mine workers helmets, disposal respirators, pair of safety shoes, safety belts (wherever needed) shall be provided to ensure safety. The mining operations shall be carried out as per MMR 1961 for safety considerations.

## **6.6 PRECAUTIONS**

To avoid all these disasters at working place and to minimize their effects following precautions shall be taken and arrangement shall be made at the working place.

- (i) Periodical maintenance of mine machineries.
- (ii) The persons shall be trained properly to handle the situation.
- (iii) A warning system shall be maintained at the mine.
- (iv) Proper arrangements shall be made for treatment of injured person, if any.
- (v) All the first aid equipments shall be available at the mine.

M/s. Gangotri Lime Pvt. Ltd. shall form a disaster management committee to be headed by Manager Mines to evolve a mechanism for disaster management and risk assessment. The first and foremost priority must be given to Human safety and health. Acute problems should be adhered before long term problems. Priority should be given to measures affecting large population over benefiting smaller ones.

## **6.7 POST DISASTER ANALYSIS AND EVALUATION**

When the emergency is over, the team will carry out a detailed analysis of cause of accident/occurrence, evaluate the influence of various factors and find out the procedures to minimize them in future. At the same time adequacy of disaster management plan shall be evaluated and shortcomings shall be rectified to improve the plan.

## **CHAPTER-VII**

### **PROJECT BENEFITS**

---

#### **7.1 INTRODUCTION**

M/s. Gangotri Lime Pvt. Ltd. is very much conscious of its obligations to society at large. The company will help in overall socio economic development of the area. The company will spend Rs. 3.0 lakh per annum for eco-development and community welfare purposes.

#### **7.2 PROMOTION OF SOCIAL & ECONOMIC STATUS**

- M/s. Gangotri Lime Pvt. Ltd has contributed substantially to the overall economy and social development of the area. It will provide direct employment to about -20 - 25 people and indirect employment to many more.
- The company's management recruits the semi skilled & unskilled workers from the nearby villages thus increasing the social status of the villagers.
- Environmental awareness is also created among people by organizing awareness camps, and rallies by school children.
- The company believes in the philosophy to provide better health and medical facilities not only to their employees and their families but also to villagers.

#### **7.3 EMPLOYMENT POTENTIALS**

The manpower required for the project will be 20-25 nos. approx. including skilled and unskilled. This strength is considered to be adequate for operation of the project. The labour force comprising of skilled/ semiskilled workmen are available in the nearby areas and within the state itself.

#### **7.4 CONCLUSION**

The project activity and the management will definitely support the local Panchayat and provide other form of assistance for the development of public amenities in this region.

M/s. Gangotri Lime Pvt. Ltd. management will recruit the semi-skilled & unskilled workers from the nearby villages due to local labours rapidly increasing the social status of the villagers.

Plantation will be developed in and around the mine site. So the project will definitely help in improving the overall status of the area.

The overall effect will improve buying power of employees and thus a higher standard of living viz. better education, improved health and sanitation facilities housing and acquisition of consumer durable. Housing, transport, medical, educational and other civic amenities will get a boost in future. This is envisaged as a major positive benefit.

## **CHAPTER–VIII**

# **ENVIRONMENTAL MANAGEMENT PLAN**

---

### **8.1 INTRODUCTION**

The mining in the area has been proposed with time bound Management Plan so that impacts on different environmental parameters are least at every stage of mining. For this, following management is proposed.

The lessee has already allocated funds for EMP measures comprising of Rs 3,60,000 as capital expenditure and Rs 1,20,000 recurring expenditure. The company will spend Rs 3.0 lakh per annum for eco-development and community welfare purposes.

### **8.2 ENVIRONMENTAL MANAGEMENT PLAN**

Environmental Management Plan of this limestone mine explains the environmental quality control measures which are proposed in the mining scheme to achieve for production of 25,650 TPA of limestone by complying with the stipulated standard limits specified by Central Pollution Control Board (CPCB).

In order to minimize impacts of mining on different environmental parameters and to keep air and water quality within prescribed limits of CPCB, an Environmental Management Plan (EMP) has been prepared. This will help in resolving all environmental and ecological issues due to mining in the area. The environmental management plan includes all preventive as well as mitigation measures to minimize impact on environment along-with reclamation and rehabilitation measures for mined out land.

Environmental Management Plan, which is to be implemented in the project detailed under the following heads:

- ❖ Air Pollution Control
- ❖ Noise Mitigation
- ❖ Wastewater Management
- ❖ Solid Waste Management

- ❖ Greenbelt Development
- ❖ Implementation of EMP and Monitoring Programme

### **8.2.1 Air Environment**

The mining activities in the area involve drilling, blasting, excavation, loading and transportation of limestone. These activities lead to generation of air borne dust, which causes air pollution in and around the mining lease area in absence of appropriate pollution control measures.

The individual operations, which generate particulate matter, are drilling, blasting, excavation, loading, unloading and transportation etc. The general air pollution in case of mining operation include dust, smoke, sulphur dioxide, nitrates etc.

Gaseous emission due to blasting and exhaust from diesel engines of the machinery deployed also pollute the atmosphere marginally. These can have adverse effects on the human health conditions, depending upon the concentration, particle size and duration of exposure with the above pollutants.

However, proper precautions will take to minimize the adverse impact due to air pollution.

#### **8.2.1.1 Prevention and Control of Air Pollution**

##### **A. Dust Pollution**

The main pollutant in air is Particulate Matter (PM), which is generated due to various mining activities. However, to reduce the impact of dust pollution the following steps have been taken during various mining activities.

##### **a) During drilling operations**

- i) Sharp drill bits will be used for drilling.
- ii) The drill machines will be kept leakage free and equipped with wet drilling arrangements.
- iii) Drill operators will be equipped with Personal Protective Equipment.

##### **b) During blasting operation**

- i) Blasting will be done in controlled manner.

ii) Competent persons will carry out blasting and all the precautions lay down under MMR - 1961 circulars and directions of DGMS issued from time to time will be followed.

**c) During loading operation**

i) This is complete manual mining and the loading will also be done manually.

**d) During Transport operation**

i) All the haulage roads in the area will be kept wide, leveled, compacted and properly maintained and water sprayed regularly during the shift operation to prevent generation of fugitive dust due to movement of truck or tractors.

**e) Plantation work carried out**

In order to reduce spread of air pollution in the surroundings, green belt will be developed around the mines office, mine approach road, along mine boundary, etc to control dust pollution.

**f) Monitoring of air pollution**

Periodic air quality survey will be carried out to monitor the quality and for timely corrective actions.

**B. Prevention and control of Gaseous Pollution**

There shall not any kind of deployment of Heavy Earth Mining Machinery, as the method of working will be completely manual

Controlled blasting and optimization of use of explosive energy help in reducing the above emissions.

Proper maintenance of machines improves combustion process and brings the reduction in pollution.

Good maintenance and monitoring of fuel and oil will not allow the gaseous emissions to be appreciably higher than the ambient condition.

The effect of these gases will be limited to the surrounding of the equipment in operation only and will not affect the human being residing at distance in buffer zone.

## **8.2.2 Noise Environment and Ground Vibration**

### **8.2.2.1 Noise Abatement and Control**

- iv) Proper maintenance of all machines will be carried out, which help in reducing generation of noise during operations.
- v) The drilling with sharp drill bits reduces generation of noise during drilling.
- vi) Low intensity and shallow blasting will be carried out for the mining.
- vii) Ear plugs and ear muffs will be provided to the workers working in high noise area.
- viii) Periodical monitoring of noise level near vicinity of operating mining machines and at some other designated locations will be done with the help of noise level meter and records maintained.
- ix) Vehicular movement on the village roads specifically during night time will be avoided.

### **8.2.2.2 Vibration Abatement**

Sources of vibration due to mining activity in the area are anticipated mainly due to blasting. However, following precautions will be taken for abatement of vibration due to blasting.

#### **Ground Vibration due to Blasting**

Depending on the type of structures and the dominant excitation frequency, the peak particle velocity (ppv) on the ground adjacent to the structures shall not exceed the values as per the DGMS guidelines.

To keep ground vibration due to blasting well within the above mentioned prescribed limits of DGMS, following measures have been taken.

- i) Drilling and blasting operations will be carried out under the supervision of qualified persons.

- ii) Blast holes will be always initiated by delay detonators, rather than adopting instantaneous detonation.
- iii) Number of holes per delay, per blast and charge per delay will be kept to minimum to keep the vibration fly rock and noise to minimum.
- iv) Since small diameter holes and maximum depth of holes as 3 m only considered, it does not give an adverse vibration impact.

### **8.2.3 Solid Waste Management**

Limestone of this mine is not covered with alluvial soil which can be called as waste. However, if some quantity of topsoil generated, than it will be stacked along the lease boundary. Some quantity of small chips generated during sizing of limestone are not recoverable, which can be called as waste and are in very small quantity say not more than 450 m<sup>3</sup> during the mining scheme period. So, no question arises of waste management with specific attention. The mining lease area is already free from top soil. The quantity of top soil generated during the period of mining scheme is estimated about 210 m<sup>3</sup>.

### **8.2.4 Top Soil Management**

The mining lease area is already free from Top soil. The quantity of top soil generated during the period of mining scheme period is estimated about 210m<sup>3</sup>. The dumping site of alluvial soil in barrier zone along lease boundary is already proposed. It is proposed to stack along the southern lease boundary till reclamation and secure from washing with water during rainy season by plantation of grass and bushes.

### **8.2.5 Water Environment**

The liquid effluents can contaminate surface and ground water bodies, soil and biological environment, when proper care is not taken. The rain water shall be used for the different purpose like dust suppression, irrigation etc. The following measures will be taken at mine to minimize adverse impacts owing to this account.

#### **8.2.5.1 Water Regime**



- (i) Garland drains will be provided around the working pits to channelize entry of rainwater to pit. The rainwater will not be diverted into any natural water channel. We will keep zero discharge even during monsoon.
- (ii) No nallah except seasonal drains around the lease area
- (iii) Periodical testing of mine water will be carried out to check its quality. The results will be properly maintained.

#### **Leachate / wash-offs from waste rock/low grade mineral dumps**

There are no seasonal drains in the area, which may get affected by waste dumps. Water table in the area is at the depth of 20-25 mbgl. Ultimate working depth 269 mRL(11 m). Workings will not intersect the water table. So there will be no disturbance to underground water regime.

The following measures have been planned to minimize the effect of leachates / wash-offs from waste dumps on the environment.

- i) Selection of waste dumps site has been done by keeping distance from watercourses in the area
- ii) Garland drains will be provided to channelize entry of water to pits during monsoon to ensure zero discharge.
- iii) Garland drains with on route silt check pit will be provided around dumps to arrest the silt from water coming from waste dumps.
- iv) Maintaining proper slope & compaction of dumps also help in quick flow of water pouring on dumps without giving much time to percolate inside the dumps, which will minimize the wash-offs & leachate.
- v) The external dump is temporary, which will be re-handled when backfilling is started in worked out portion of pit.

#### **(C) Domestic Sewage Water**

Domestic sewage water is generated from office toilet which is disposed in soak pits via septic tank.

#### (D) Awareness Programme

Awareness programmes for the conservation of water will be conducted in nearby villages.

### 8.2.6 Land Environment

#### 8.2.6.1 Handling of Soil/Alluvium

The limestone of this mine is not covered with alluvial soil or overburden; however some quantity of soil will be generated from the joints and pockets. During the mining operation about 10% mine waste will be generated as small chips. Then as proposed in the mining plan the waste will be stacked along the lease boundary in the mining limit and used for the reclamation purpose. The estimated quantity of top soil generation from the mining operations during the mining scheme period will be 290 m<sup>3</sup>, which will be stacked along the lease boundary, for future use (backfilling, plantation purpose, etc.).

#### 8.2.6.2 Reclamation Plan for Land use in Mining

The thickness of alluvial soil is too less compared to the thickness of limestone deposit. For this reason it may not be possible to reclaim the mined out land fully by alluvial soil/waste, it can be done partially. Reclamation operation will be commenced only after attaining the optimum depth in phased pattern after getting proper clearance from the competent authority IBM. There is no proposal of reclamation & rehabilitation for the period of 2008-09 to 2012-13.

For stabilization of the dump it is proposed to grow grass over the dump. About 25 nos. of sapling per year are proposed for afforestation along the lease boundary.

#### 8.2.6.3 Environmental Management Plan to minimize impact on agricultural practice of the area

- ◆ Care has been taken not to disturb agricultural land during planning stage itself i.e. while preparing conceptual plan of the mining lease area.

- ◆ All possible measures will be taken to control pollution to air, water and land.
- ◆ Plantation work will be carried out in the area for green belt development which will help in retention of water in the area and will also help in increase in moisture level of the atmosphere.

## **8.2.7 Biological Environment**

### **8.2.7.1 Green Belt Development**

The proposed green belt in the lease area is to be designed taking into consideration the availability of area as the efficiency of green belt in pollution control mainly depends on its width, distance from pollution sources, side of the habitat from working place and tree height. The proposed green belt has been designed to control SPM, gaseous pollutants, noise, surface run off and soil erosion etc. While considering the above aspects due care will be taken for selecting the suitable characteristics plant species as those fast growing, locally suitable plant species, those resistant to specific pollutant and those which would maintain the regional ecological balance, soil and hydrological conditions.

The plantation works for green belt development will be carried out under as per CPCB guidelines.

### 8.2.7.2 General Guidelines for Green Belt Development

- i. Trees growing upto 5 m. or more in height will be planted around the installation.
- ii. Plantation of trees will be done alongside of road and mine offsite.
- iii. Trees will be planted along roadsides, to arrest auto-exhaust and noise pollution, and in such a way that there is no direct line of sight to the installation when viewed from a point out side the foliage perimeter.
- iv. Since tree trunks are normally devoid of foliage (upto 3 mt.), it will be appropriate to have shrubbery in form of such trees to give coverage to trunk portion of these trees.
- v. Fast growing trees with thick perennial foliage will be grown, as it will take many years for trees to grow to their full height.

In order to facilitate the proper growth of vegetation, limited measures involving preparation of seedbed with suitable amount of fertilizers and treatment with mulches will be taken. The topsoil will be used for green belt development / revegetation.

Vegetation covers in and around the mine workings generally helps in:

- i. Stabilizing erodible slopes to minimize pollution.
- ii. Control of dust.
- iii. Enhancement of aesthetic value.
- iv. Maximizing evapo-transpiration, which helps minimizing run off.
- v. Reducing noise.

For revegetation, the plants and saplings suitable for the existing soils and site conditions may be considered. It is recommended to plant fast growing local plant species, which can adapt to the local climate.

This has to be done in consultation with local government horticulturist.

The following plant species will be planted according to CPCB guidelines:

#### **HERBS**

*Cestrum nocturnum, Liliium species, Tegetes patula, Pothus aureus*

### **SHRUBS**

*Hibiscus rosa sinensis, Rauwolfia serpentine, Withania somnifera, Nerium indicum, Boganvillia glavera, Ipomea nil,*

### **TREES**

*Cassia fistula, Dalbergia sissoo, Mangifera indica, Acacia species, Acacia nilotica, Ficus religiosa, Polyalthia longifolia, Tectona grandis, Shorea robusta, Azadirachta indica, Albizzia lebbek, Terminalia arjuna etc.*

#### **8.2.7.3 Measures for Minimizing Impact on Flora**

The core area is mostly rocky with very poor density of flora. However, all possible steps will be taken to prevent pollution to air, water and soil environment due to mining activity in the area.

Plantation will be carried out for developing green belt in and around the mines site to arrest spread of dust. Under green belt development programme, those botanical species, which are locally suitable, will be planted. This green belt will add to the floral environment of the area and at the same time it will help in preventing environmental pollution which will help in reducing adverse impact on the indigenous plant species found in the area.

#### **8.2.7.4 Measures for Minimizing Impact on Fauna**

The mining lease area is in non-forest land and inland bereft of vegetation and surface water bodies so the presence of fauna is very rare. As such, there will be no adverse impact of the mining activity on animals found beyond the mining lease area. However, following measures will be taken to minimize the impact of mining on faunal environment of the area.

- i) Precautions will be taken to curb pollution to air, water, land & noise environment.

- ii) Greenery development in mines area will help in future for creating habitats for local faunal species and to attract birds, insects and reptiles from distant places.

## **8.2.8 Socio-Economic Environment**

### **8.2.8.1 Management plan for Socio-Economic Environment**

In general, socio-economic environment will have positive impact due to the mining project in the area. In order to further improve the socio-economic conditions of the people of the area development works will be taken in hand in consultation with local bodies.

M/s. Gangotri Lime Pvt. Ltd. proposes to spend approx. Rs 3.0 lakh per annum on Eco- development and community welfare purposes.

### **8.2.8.2 Employment**

In the recruitment process of the organization, local people will be given preferences. Most of the deserving candidates have already been absorbed.

## **8.2.9 Industrial Hygiene, Occupational Hazards and Safety**

The working conditions in the mines are governed by the enactments of the Director General of Mines Safety (DGMS) and Indian Bureau of Mines (IBM). As per the guidelines of the Mines Act, the management has taken all necessary precautions. Normal sanitary, facilities have been provided within the lease area. The management carries out periodic health check up of workers of all sections. Till date in the entire medical check ups, no abnormal disease, which is caused due to mining activities, has been noticed.

Occupational hazards involved in mines are related to dust pollution, noise pollution, blasting and injuries from moving belt conveyors, equipment, and fall from high places. DGMS has given necessary guidelines for safety against these occupational hazards. The management strictly follows these guidelines.

All necessary first aid and medical facilities will be provided to the workers. The mine will be well equipped with proper fire protection and fire fighting equipment. All operators and mechanics will be trained to handle fire-fighting equipments. Further all the necessary protective equipments such as helmets, safety shoes, earplug, earmuff, etc. will be provided to persons working in hazardous areas.

### **8.3 ENVIRONMENTAL MONITORING**

#### **8.3.1 Air Pollution Monitoring**

Ambient air quality monitoring will be carried out as per State and Central Pollution Control Board's guidelines by the following methods:

1. Particulate Matter : By Respirable Dust Sampler  
(ISI 5182 Part IV)
2. Sulphur Dioxide (SO<sub>2</sub>) : ISI 5182 Part II Method 2
3. Nitrogen Oxides (NO<sub>x</sub>) : ISI 5182 Part VI

#### **8.3.2 Water Quality Monitoring**

Monitoring and testing of mines sump water and water from designated bore/dug wells will be done to ascertain change in quality of water due to project activities & for taking necessary corrective measures as may be required.

#### **8.3.3 Noise Pollution Prevention & Control**

Monitoring of noise level at mine site and other stations will be carried out as may be suggested by concerned Regional Officer of State Pollution Control Board or other Government agencies viz. IBM, DGMS etc

### **8.4 CONCLUSION**

As discussed, it is safe to say that the project is not likely to cause any significant impact on the ecology of the area, as adequate preventive measures will be adopted to contain the various pollutants within permissible limits. Green belt development around the area would also be

taken up as an effective pollution mitigative technique, as well as to control the pollutants released due to mining.



## CHAPTER-IX

### SUMMARY & CONCLUSION

#### 9.1 PROJECT DESCRIPTION

#### 9.2 INTRODUCTION

M/s Gangotri Lime Pvt. Ltd. is a private organization engaged in lime making having sufficient experience in mining and associated activities.

The information / documents submitted by project proponent were placed before SEAC Chhattisgarh in the 51st meeting of SEAC Chhattisgarh held on 27.03.2010.

The committee suggested various additional Terms of References (ToR) for the preparation of the Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) Report through its letter no. 79/SEAC-CG/EC/Mining/RYP/120/09 dated 20<sup>th</sup> April, 2010 which are incorporated in the EIA/EMP report at their respective places.

#### 9.3 DETAILS OF THE PROJECT

TABLE – 9.3  
PROJECT SITE DETAILS

S. NO.	PARTICULARS	DETAILS
1.	<b>Nature &amp; Size of the Project</b>	Limestone Production 25650 TPA (Mine Area 8.144 Ha.)
2.	<b>Location</b>	
	Village	Matia
	Tehsil & District	Raipur
	State	Chhattisgarh
	Latitude	21 <sup>0</sup> 19'55.17" N
	Longitude	81 <sup>0</sup> 45'25.24" E
	Toposheet No.	64 G/11 & 64 G/15
3.	<b>Proposed project area</b>	
	Mine Area	8.144 ha

<b>Matia Limestone Mine (ML Area – 8.144 Ha.)</b> At Village Matia, Tehsil & District Raipur (Chhattisgarh)	<b>Draft</b> <b>EIA/EMP Report</b>
--	---------------------------------------

<b>4.</b>	Cost of the project	Rs. 10 Lakh
<b>5.</b>	Cost for EMP	3.6 Lakh
<b>6.</b>	Water Requirement (KLPD)	2.5 KLPD
<b>7.</b>	Manpower Requirement	20 – 25 persons
<b>8.</b>	<b>Project Location Details</b>	
	General Ground Level	280 mRL
	Ground Water Table	260 mRL(20 mbgl) – 255mRL(25 mbgl)
	Nearest Village	<ul style="list-style-type: none"> <li>• Donde-khurd at a distance of 2.0 km in SE direction</li> <li>• Donde Kalan at a distance of (1.5 km) in S direction.</li> </ul>
	Nearest City/Town	Raipur at a distance of 18.0 km in SW direction
	Nearest Railway Station	Raipur at a distance of 20 km
	National Highway	<ul style="list-style-type: none"> <li>• NH 43 (Vishakhapatnam to Raipur) at a distance of 15.0 km</li> <li>• NH 6 G E Road at a distance of 11 Kms</li> <li>• State Highway – Raipur Baloda Bazar at a distance of 160 mts.</li> </ul>
	Vidhan Sabha	<ul style="list-style-type: none"> <li>• Chhattisgarh State Vidhan Sabha at a distance of 6 km in South West direction</li> </ul>
<b>9.</b>	Nearest Police Station	Dharsinwa at a distance of 13 km in NW direction.
<b>10.</b>	<b>Environmental Setting</b>	
	Reserved Forest within 10 km. radius of the study area	None with in the 10 km radius of the study area
	Nearest River / Water Body	Kharun River (15 km)
	National Park/ Biosphere Reserve/ Wildlife Sanctuary/ Migratory Routes for birds	None with in the 10 km radius of the study area
	Seismic Zone	Zone II

Source: Field visit

## 9.4 MINING LEASE STATUS

The mining lease area was earlier granted to M/s Cement Corporation of India, Mandhar and subsequently the area was thrown open. The applicant was applied for mining lease in the area and subsequently the State Govt. of MP issued LOI to applicant vide letter no. 3-59/96/12/1 dated 16.06.1997 and advised to submit the Mining Plan of the area duly approved by IBM, Nagpur but there were some confusion in the State Govt. level regarding availability of land in the area and subsequently the area was revised and revised LOI vide its letter no. 3-59/96/12/1 dated 27.11.1997.

The Mining Plan of the Matia Limestone Mine was approved by letter no. RAP/LST/ MPLN – 603/ NGP dated 12th March 1998 and the Mining lease was granted to Shri Ganagaram Sharma for the period of 30 years i.e. 3rd January 1999 to 2nd January 2029. The mining plan approved for the period of 5 years (2001 – 02 to 2005 -06) and the date of expiry of plan period is 31st March 2006. As per the rule 12(3) and 23 B (2) of MCDR 1988, Mining Scheme and Progressive Mine Closure Plan to be prepared 120 days before the ending of plan period. Earlier 5 years of mining operation of this mine was not regular due to lack of demand and financial problem.

## 9.5 MINING DETAILS

**Table – 9.5**  
**DETAILS ABOUT THE MINING LEASE AREA**

<b>S. No.</b>	<b>DETAILS</b>	
1.	Mining lease area	8.144 Ha
2.	Mining Method	Manual Opencast method of Mining
3.	Mineable reserves	7,17,790 Tonnes
4.	Proposed Production	25,650 TPA
5.	Life of mine	27years
6.	General Ground Level	280 mRL
7.	Ground water level	20-25 m bgl
8.	Working Depth	Ultimate : 269 mRL
9.	Bench Height (H)	3.0 m

10.	Ultimate Pit Slope	45 <sup>0</sup>
11.	Total waste generation	450 m <sup>3</sup>

### 9.5.1 Method of Mining

Proposed method of mining is Manual opencast mining and it is in small scale. Very light drilling and blasting carried out for the production of limestone carried out for production of limestone. The height of bench will be 3m.

### 9.5.2 Extent of Mechanization

List of mine machinery is given as under:

**TABLE-9.5.2**

S. No.	Type of machine	Numbers
1.	Jack Hammer	1
2.	Air Compressor	1

*Source:* Scheme of Mining

### 9.5.3 Water Requirement

Total water requirement for the proposed project will be 2.5 KLPD.

**TABLE – 9.5.3  
WATER REQUIREMENT**

S. No.	Details	Water Required
1.	Water Sprinkling	0.5 KLD during dry season
2.	Plantation	0.5KLD
3.	Domestic & Drinking	1.0 KLD
4.	Mining	0.5KLD
<b>Total</b>		<b>2.5 KLD</b>

**Source:** Rainwater collected in Old Mining pits will be used for the water sprinkling and other mining activities including greenbelt development. For domestic purpose water will be sourced from nearby villages.

### 9.5.4 Man Power Requirement

For safe and systematic mining, technical & supervisory staff will be provided at the mine site, detailed below in the table. Employment opportunities will be given to locals.

**TABLE – 9.5.4**  
**MAN POWER REQUIREMENT**

<b>S. No.</b>	<b>Category</b>	<b>Requirement</b>
1.	Mine Manager	1
2.	Part Time Mining Engineer	1
3.	Mining Mate	1
4.	Supervisor	1
5.	Skilled Workers	4
6.	Unskilled Workers	12 - 17
	<b>Total</b>	<b>20 - 25</b>

## **9.6 DESCRIPTION OF THE ENVIRONMENT**

### **9.6.1 Climatic Condition**

Raipur has a sub-tropical climate; temperatures remain moderate for most of the year, apart from the summer from March to June, which can be extremely hot. Winters last from November to January and are mild, although lows can fall to 5 °C (42 °F). The annual rainfall of the area is around 1385 mm. The rainfall generally increases from the north-west to the south-east. About 94 percent of the annual rainfall is received during the period June to October, July and August being the rainiest months. The variation in annual rainfall from year to year is very large. On an average there are 60 - 80 rainy days in a year.

### **9.6.2 Other Baseline Details**

During the study period, ambient air quality and noise level monitoring was done at 10 locations whereas water sampling and soil sampling was done at 8 locations.

TABLE – 9.6.2  
ENVIRONMENTAL BASELINE DATA  
STUDY PERIOD – OCTOBER TO DECEMBER, 2009

<b>S. No.</b>	<b>Particulars</b>	<b>Details</b>
---------------	--------------------	----------------

<b>A.</b>	<b>Ambient air quality</b>	
	SPM	98.3 to 186.7 µg/m <sup>3</sup>
	RSPM	33.16 to 61.61 µg/m <sup>3</sup>
	SO <sub>2</sub>	5.5 to 12.3 µg/m <sup>3</sup>
	NO <sub>X</sub>	6.2 to 15.4 µg/m <sup>3</sup>
<b>B.</b>	<b>Noise level</b>	
	Day time	45 to 52 Leq. dB (A)
	Night time	39 to 47 Leq. dB (A).
<b>C.</b>	<b>Water quality</b>	
	pH	7.42 to 7.88
	TDS	280.00 mg/l to 395.00 mg/l
	Total Hardness	195.18 mg/l to 246.23 mg/l
<b>D.</b>	<b>Soil quality</b>	
	Texture	Loamy Sand
	pH	7.00 to 7.80
	Organic matter	0.78% to 0.99%

### 9.6.3 Biological Environment

**Flora:** Tree species which are most commonly found in the area are *Acacia arabica* (Babool), *Acacia catechu* (Khair), *Embllica officinalis* (Amla), *Dalbergia sissoo* (Shishum), *Ficus bengalensis* (Bargad), *Terminalia arjuna* (Arjun) etc.

**Fauna:** Commonly found animal in the study area are Hare (*Lepus nigricollis*), Rat (*R.rattus*), Sparrow (*Passer domesticus*), Indian Myna (*Acridotheres tristis*), House crow (*Corvus splendens*), Pigeon (*Columba livia*) etc.

## 9.7 SOCIO-ECONOMIC ENVIRONMENT

The population as per 2001 Census records is 106662 (for 10 km radius study area). Scheduled Caste fraction of the population of the study area (10 km) is 19466 and Scheduled Tribe 3763. Literacy rate is 66.56%. Whereas Out of the total Working population of 40811, Main Workers are 29172.

## 9.8 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

- **Impact on air** – No any kind of air pollution pointed out. The method of mining is manual in nature and the operation is very small. Drill hole will be flushed with water
- **Impact on water environment** – There is no surface water bodies available in the lease area. There will be no beneficiation process is envisaged, so no question is arise of any toxic discharge or dump which contaminate the water.
- **Impact of noise** – As there is no any noise level pointed out which crossing the limit. Drilling will be done with the help of Jack Hammer which will be done on small scale and water used for flushing.
- **Impact on land environment** – As this is an existing mine thus no constructional activities will be involved whereas Backfilling will be done after attaining the optimum thickness of limestone and it will take more than 20 years.

## 9.9 POST PROJECT MONITORING PROGRAMME

Table – 9.9  
POST PROJECT MONITORING PROGRAMME

S. No.	DESCRIPTION	FREQUENCY OF MONITORING
5.	Ambient Air Quality at Mine site	Quarterly/ Half Yearly
6.	Water Quality	Quarterly/ Half Yearly
7.	Noise Level Monitoring	Quarterly/ Half Yearly
8.	Soil Quality	Half Yearly/yearly

## 9.10 ADDITIONAL STUDIES

The Additional Studies are conducted as per the additional Terms of References which are issued vide State Level Expert Appraisal Committee vide letter no.: **79/SEAC-CG/EC/Mining/RYP/120/09 dated 20<sup>th</sup> April, 2010**

## 9.11 PROJECT BENEFITS

Better education facilities, proper health care, road infrastructure and drinking water facilities are basic social amenities for better living standard of any human being **M/s. Gangotri Lime Pvt. Ltd.** will initiate the above amenities either by providing the facility or by improving the facilities in the area, which will help in uplifting the living standards of local communities.

## **9.12 ENVIRONMENT MANAGEMENT PLAN**

### **9.12.1 Land Use Management**

The mining lease is having very thin soil and there was no requirement of any additional development prior to the mining operation. Due to old mining operation there is no top soil or overburden. During the last five years no soil/overburden was generated because limited mining operation was done due to lack of demand.

The reclamation activity will be done only after attaining the optimum thickness of limestone, which is economically viable, has been extracted. The soil generated will be stacked along the lease boundary so that it can be used for the reclamation purpose, or it will be used for the Afforestation. The thickness of alluvial soil is very less in the area. For this reason it may not be possible to reclaim the area fully by soil and it can be done partially.

### **9.12.2 Air Management**

- All the haul roads will be kept properly graded with sufficient width and regular water spraying will be done on the haul roads.
- Drilling machines will be equipped with wet drilling arrangements
- Personal Protective Equipments like dust mask will be provided to all employees working in the likely dusty areas.
- Development of green belt/plantation periphery of the mining lease area to arrest dust.

### **9.12.3 Water Management**



- Garland drains will be constructed on all sides of quarry. The collected water in the pit will be used for plantation and spraying on haul roads.
- No wastewater will be generated from the mining activities.
- Septic tanks and soak pits will be provided for the disposal of domestic effluent generated from mine office.

#### **9.12.4 SOLID WASTE MANAGEMENT**

Limestone of this mine not covered with alluvial soil which can be called as waste. However, if some quantity of topsoil is generated, then it will be stacked along the lease boundary. Some quantity of small chips generated during the sizing of limestone not recoverable can be called as waste which is very small in quantity say not more than 450m<sup>3</sup>.

#### **9.12.5 Noise Management**

- Plantation will be taken up all around the lease area. The plantation minimizes propagation of noise.
- Proper maintenance, oiling and greasing of machines at regular intervals will be done to reduce generation of noise.
- The drilling will be carried out with the help of sharp drill bits which will help in reducing noise vibration.

### **9.12.6 Socio-Economic Environment**

Mine management will recruit the semi skilled & unskilled workers from the nearby villages thus increasing the social status of the villagers.

### **9.12.7 Greenbelt Development and Plantation Programme**

At the end of life of mine, it is proposed to develop green belt on about 0.749 ha of the mine area.

Preference will be given to the following species under Green cover *Cassia fistula*, *Dalbergia sisso*, *Mangifera indica*, *Acacia species*, *Acacia nilotica*, *Ficus religiosa*, *Polyalthia longifolia*, *Tectona grandis*, *Shorea robusta*, *Azadirachta indica*, *Albizia lebbek*, *Terminalia arjuna* etc. Plantation shall be carried out as per CPCB guidelines.

### **9.13 CONCLUSION**

As discussed, it is safe to say that the project is not likely to cause any significant impact on the ecology of the area, as adequate preventive measures will be adopted to contain the various pollutants within permissible limits. Green Belt Area development around the mining lease would also be taken up as an effective pollution mitigative technique, as well as to control the pollutants released from the mining lease of **M/s Gangotri Lime Pvt. Ltd.**

## **CHAPTER-X**

# **DISCLOSURE OF CONSULTANTS ENGAGED**

---

### **10.1 DISCLOSURE OF CONSULTANTS ENGAGED**

J.M. EnviroNet Pvt. Ltd. (JMEPL) was established in the year 1993. 'JM' in the name of the Company is derived from the name of 'Lord Shiva' - the Temple of 'Jharkhand Mahadev' (JM). The Temple is located at Queens Road, Vaishali Nagar, Jaipur.

The Registered office of JMEPL is at 7-CH-10, Jawahar Nagar, Jaipur. Its Delhi-NCR Corporate office is at SCO-16, Sector 10A, Gurgaon (Haryana). JMEPL has a Branch office at Goa also.

J.M. EnviroNet Pvt. Ltd. is accredited with ISO-9001: 2000 for EIA Division. The Company has its own Environmental Laboratory at Gurgaon (Haryana) approved under EPA (Environment Protection Act) From the Ministry of Environment & Forests, Govt. of India, New Delhi vide notification No.865E dated 11.04.2008 published in the Gazette of India dated 11.04.2008. The EIA Division is also approved by National Registration Board for Personnel & Training (NRBPT) (Quality Council of India) with Registration No. EIA 81004. The Environmental Laboratory is also approved by the National Accreditation Board for Testing and Calibration Laboratories, Govt. of India (NABL) (Registration No.NABL-T-1327), as also ISO-17025: 2005.

The Company's work is spread over 20 States viz.:- Andhra Pradesh, Kerala, Gujarat, Maharashtra, Orissa, Tamil Nadu, Goa, Jammu & Kashmir, Himachal Pradesh, Punjab, Haryana, Delhi, Rajasthan, Uttar Pradesh, Madhya Pradesh, Chhattisgarh, Assam, West Bengal. Karnataka & Uttarakhand.

JMEPL is offering Environmental Consultancy Services in various sectors viz Industrial Projects / Chemical Industries / Cement Plants / Thermal Power Plants / Mining Projects / Real Estate Projects / Distilleries / Steel Plants etc.

In the Mining sector, JMEPL is covering mines of minerals viz. Limestone, Bauxite, Chromite, Coal, Zinc, Copper, Gypsum, Soapstone, Iron & Manganese ore, Clay, Silica Sand, Feldspar, Quartz etc.

Besides this, its MoEF and NABL approved Environmental Laboratory at Gurgaon is also providing Analytical Laboratory Services of various elements and environmental parameters.

Annual monitoring as per MoEF / CPCB / SPCB guidelines, Risk Assessment and Disaster Management Plan, consultancy for Rain Water Harvesting Plan, detailed Hydro-geological Study for major mining projects, preparation of Environmental Statement Reports (Environmental Clearance Compliance Conditions), etc. are amongst the various other consultancy services offered by the Company.

JMEPL has a highly qualified team of Subject Experts. As Faculty Heads of the EIA Division we have Ex-chairman State Pollution Board, Retd. General Managers of the Reputed Cement Companies, Ex-Head EIA Division of big Business Group, STP & ETP designing experts, Retd. Mining and Geology Experts with vast experience in their respective fields.

JMEPL has already conducted EIA studies and prepared EIA / EMP reports for nearly 500 projects under various sectors.

