

**BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL  
PRINCIPAL BENCH, NEW DELHI**

**OA NO. 289 OF 2024**

**IN THE MATTER OF:**

**ABHISHEK SHUKLA**

**... APPLICANT**

**VERSUS**

**SANGRAM SINGH**

**...RESPONDENT**

**NDOH : 02.08.2024**

**INDEX**

<b>S.NO.</b>	<b>PARTICULARS</b>	<b>PG NO.</b>
<b>1.</b>	Copy of Environment Impact Assessment Report (EIA) along with necessary Annexures, in compliance with the order dated 20.05.2024 passed by this Hon'ble Tribunal.	1-160

**RESPONDENT**



**S. C. LADIAND COMPANY**

Deeksha L. Kakar and Dhruv Kakar

ADVOCATES

B-6/58, LGF, SAFDARJUNG ENCLAVE

NEW DELHI — 110029

Ph. 9313119255|deeksha.kakar@scladi.com

Enrol.No.D/1154/2008

Place: New Delhi

Dated: 23.07.2024

**FINAL ENVIRONMENTAL IMPACT  
ASSESSMENT**

**&**

**ENVIRONMENT MANAGEMENT  
PLAN**

**FOR**

**BUILDING STONE (KHANDA, GITTI,  
BOULDERS) MINE (2.02 HA)**

**OF**

**SHRI SANGRAM SINGH**

**S/O SHRI JAIWANT SINGH,**

**AT GATA NO.- 1876, KHAND NO.- 01,**

**VILLAGE- GIRWAN, TEHSIL- NARAINI,**

**DISTRICT- BANDA, U.P.**

**PREPARED BY:**

**PARAMARSH**

**(Servicing Environment and Development)**

**(Accredited by QCI / NABET)**

**ADDRESS**

**M.S.-1/10 Sector A, Sitapur Road Yojna, Aliganj,**

**Lucknow, Uttar Pradesh 226024**

**ENVIRONMENT**  
**IMPACT ASSESSMENT**  
**REPORT**

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**CHAPTER -1:**  
**INTRODUCTION**

# 1. INTRODUCTION

## 1.1 Preamble

Environmental Impact Assessment (EIA) is the management tool to ensure the sustainable development and it is a process, used to identify the environmental, social and economic impacts of a project prior to decision-making. It is a decision making tool, which guides the decision makers in taking appropriate decisions for any project. EIA systematically examines both beneficial and adverse consequences of the project and ensures that these impacts are taken into account during the project designing. It also reduces conflicts by promoting community participation, information, decision makers, and helps in developing the base for environmentally sound project. The Ministry of Environment and Forests, Govt. of India, through its EIA notification No. SO1533 (E) of Sept. 14th 2006 and its subsequent amendments later under the Environment Protection Act, 1986, classified the projects under two categories – A (more than 50 ha) and B (>5 ha but <50 ha) for mining sector. Category-A projects (including expansion and modernization of existing projects) require Environmental Clearance from Central Government (Ministry of Environment and Forests, Govt. of India, New Delhi) while category – B projects are considered by State Level Environmental Impact Assessment Authority (SEIAA), constituted by MoEF, New Delhi. If in case, any category “B” project attracts the “general condition” given in the EIA notification, it shall be treated as category “A” and will be considered at MOEF, New Delhi.

**The proposed project is categorized under category “B” Activity 1(a) (Open cast mining of minerals, mining lease area <05 hectare) as the lease area is 2.02 ha. However the GOI order dated 12th Dec. 2018 states that any mining area less than 5 ha. making a cluster of above 5.0 ha within 500 mt. radius the project will be treated as B-1.**

In order to assess the likely impacts arising out of the project, the Environmental Impact Assessment (EIA) study is undertaken, which will be followed by preparation of a detailed Environmental Management Plan (EMP) to minimize those adverse impacts.

## 1.2 Identification of Project Proponent

The project is being proposed by **Shri Sangram Singh S/o Shri Jaiwant Singh**. Shri Sangram Singh has been progressing forward not only in its financial aspect but also has taken a big leap in the direction of diversification of its activities. The basic details are being furnished herewith-

## 1.3 Details of Mining Activity

Applicant, Shri Sangram Singh S/o Shri Jaiwant Singh, R/o- Vill- Pahara, Tehsil- Mahoba, District- Mahoba, U.P. has been given the consent for an area of **2.02 Ha.** for extraction of **20,200 m<sup>3</sup>/ year** Building Stone (Khanda, Gitti Boulders), in Gata No.- 1876, Khand No.- 01, Village- Girwan, Tehsil- Naraini, District- Banda, U.P. This area has been granted LOI in favour of applicant vide letter no. 3909/khanij-30, Banda, dated 23<sup>rd</sup> February 2019, for a period of ten years. (**Annexure -III**)

Mine Plan and Progressive Mine Closure Plan: Approved Mining Plan of proposed mining lease area was submitted to the Director General of Mines and Geology Department, Uttar Pradesh and they have approved the mining plan vide letter no. 2903/M.Plan/2016, dated 28<sup>th</sup> March 2019 (**Copy enclosed as Annexure-II**).

## 1.4 Brief Description of Project

The proposed project is to mine minor mineral Building Stone (Khanda, Gitti, Boulders) and the estimated project cost is Rs 65.0 lakhs. The proponent has applied for mining lease over an area of 2.02 Hectare at Gata No.-1876, Khand No.- 01, Village- Girwan, Tehsil- Naraini, District- Banda, U.P.

The lease area is 2.02 Hect. with mineable reserve of **7,06,009 m<sup>3</sup>** out of which approx. **20,200 m<sup>3</sup>/ 54,540 Tonnes Per Annum** will be mined out, making the life of mine approx. **35 year** at the same rate of production.

### Proposed Production-

Year	Proposed Production (in m <sup>3</sup> )	Proposed Production (in tonnes)
I	20,200	54,540
II	20,200	54,540
III	20,200	54,540
IV	20,200	54,540
V	20,200	54,540

## 1.5 Project Nature, Size & Location:

### Nature

The proposed project is Building Stone (Khanda, Gitti, Boulders) mining project.

### Size

It has been proposed to collect approximately 20,200 m<sup>3</sup>/ 54,540 Tonnes Per Annum of Building Stone (Khanda, Gitti, Boulders) annually over an area of 2.02 Hectare.

### Location

The mining area is located at Gata No.-1876, Khand No.- 01, Village- Girwan, Tehsil- Naraini, District- Banda, Uttar Pradesh. The mining lease / proposed project area falls in Survey of India Toposheet No. 63C/07. The mine lease area is located between:

Latitude	25° 18' 28.85"N to 25° 18' 32.55"N
Longitude	80° 23' 03.47"E to 80° 23' 12.41"E
Nearest Railway Station	Banda Railway Station – 20.50 km* (NW) direction. *Aerial Distance in Approximation
Nearest Airport	Khajuraho Airport 72.0 km* (SW) direction. *Aerial Distance in Approximation
Nearest Highway	NH 76- 10.50 km (E) direction.

## 1.6 Project Importance

The economy of India is the eleventh largest in the world by nominal GDP and the third largest by purchasing power capacity. The primary reason for the economic growth can be attributed to the growth in infrastructure. Infrastructure growth is directly proportional to the availability of raw materials such as brick, stone, cement and sand etc. with the growing infrastructural requirement of the India, the demand of raw materials have increased geometrically. In Banda district of Uttar Pradesh, a number of stone mines are there. There is abundance of stone buried in the area hence; it has become a major source of raw material for construction industries. Raw material for the infrastructure development is at high demand in the U.P. & northern India. In Banda district of Uttar Pradesh, numbers of stone mines are there. There is abundance of stone buried in the area; it had become a major raw material for the infrastructure development and is at high demand in the north-west U.P. The mineral-rich colors, and the hardness & density, makes it useful for many applications. The proposed mining project will fulfill its end uses in buildings and construction, paving, monuments and

many other exterior projects. Polished slabs and tiles are used in countertops, flooring, retaining walls and landscaping around a center fountain / pond, staircase and many other design elements (residential and commercial applications).

The project directly generates the employment for the local people and indirectly for the others. Also the marketing of the product generates the employment for peoples. By this project, approximately 33 persons employed directly on project site.

### 1.7 Terms of Reference

The scope of the study includes a detailed characterization of the environment in an area of 10 Km. radius of the Mine Lease Area for various environmental parameters like Air, Water, Noise, and Land, Biological and Socio-economic aspects.

The **State Level Environment Impact Assessment Authority (SEIAA)** for mining projects considered the project during its meeting. Based on the information contained in the documents submitted and the presentation made, the SEAC-Uttar Pradesh prescribed the Terms of Reference (TOR) vide Letter no. : **197/Parya/SEAC/4782/2019 dated 31<sup>st</sup> July, 2019** attached as **Annexure-I**. The points have been raised by the SEAC-Uttar Pradesh in the TOR and its compliance are as under:-

**Table 1.1:Point-wise compliance of prescribed ToR**

	<b>TOR POINT</b>	<b>COMPLIANCE OF TOR</b>
1.	The lease area, its address and production per annum should match with as mentioned in DSR and LoI. In case there is any difference clarification / amendment letter from competent authority shall be submitted along with EIA. EIA and public hearing shall be conducted as per the lease area, its address and production per annum mentioned in DSR and LoI.	The land documents depicting the correct address and lease area. The copy of DSR, LoI and EIA report matches properly. The relevant documents are attached as annexure- III.
2.	All Pages of technical documents/ EIA/ EMP etc. should be signed by the consultant and project proponent both.	Shall be complied.
3.	Copy of all the analysis reports signed by analyst approved by NABL or MoEF & CC shall be annexed with the EIA report and original analysis reports should be presented at the time of presentation.	Baseline data has been collected by NABL/MoEF Accredited lab of study area within 10 Km radius of the project site was collected during One (Non Monsoon) season (Mar.- May, 2019). Detail discussed in Section-3.
4.	MOU signed between the project proponent and the consultant should be submitted.	Shall be complied.
5.	A certificate that there is no other mining area within 500 m other than the areas mentioned in the applications as above.	Certificate issued by Mining Officer attached as <b>Annexure IV</b> .
6.	A copy of document in support of fact that the proponent is the rightful lessee of the mine should be given.	Applicant, <b>Shri Sangram Singh S/o Shri Jaiwant Singh</b> , has been granted the consent from the office of District Magistrate Banda (Mining Section) vide letter no. 3909/ khanij-30, Banda, dated

## FINAL EIA REPORT FOR BUILDING STONE(KHANDA, GITTI, BOULDER) MINE

		23 <sup>rd</sup> February, 2019 for an area of 2.02 ha. for the extraction of minor mineral Building Stone (Khanda, Gitti & Boulders) Mining in Village- Girwan, Gata No.- 1876, Khand No.- 01, Tehsil- Naraini, District- Banda, U.P. for a period of Ten years <b>(Annexure -III)</b>
7.	Approved mining plans for all the mining projects.	Same has been already submitted with EC application.
8.	All documents including approved mine plan, EIA and public hearing should be compatible with one another in terms of the mine lease area, production level, waste generation and its management and mining technology and should be in the name of the lessee. The mine plan should take into account the conditions of the mine lease, if any, in terms of distance to be left un-worked from the river flowing nearby.	All the concerned documents are in the name of lessee. Mine plan is prepared by RQP. All the documents are compatible with one another in terms of the mine lease area, production levels, waste generation and its management and mining technology. Lessee Name: <b>Shri Sangram Singh S/o Shri Jaiwant Singh,</b> Mine Lease Area: 2.02 ha. Proposed Capacity: 20,200 cubic meter per annum
9.	The study area will comprise of 10 km zone around the mine lease from the lease periphery and the data contained in the EIA such as waste generation etc should be for the life of the mine/ lease period.	The study area comprises of 10.0 km zone around the mine lease periphery as shown in the study area Map is given in Figure 3.1 of Chapter 3. No solid waste will be generated. No municipal waste other than domestic sewage shall be generated. Mobile toilets and dustbin will be made available at the mine site. Lease period is 10 years.
10.	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary and national park, migratory route of	Map delineating all the features such as Agricultural Land, water bodies and other features present within 10 km radius has been prepared and given in <b>Figure 3.1of</b>

## FINAL EIA REPORT FOR BUILDING STONE(KHANDA, GITTI, BOULDER) MINE

	fauna, water bodies, human settlements and other ecological features should be indicated.	<b>Chapter 3.</b> Land use classification of 10 Km radius study area around the mine site, is given in <b>Section 3.1.3 of Chapter 3.</b>
11.	Land use plan of mine lease area should be prepared to encompass pre-operational, operational and post operational phases and submitted.	Impact of change of land use has been given in <b>Section 4.1 of Chapter 4</b> , along with the mitigation measures.
12.	Location of National Parks, Sanctuaries, Biosphere Reserves, wildlife Corridors, Tiger/Elephant Reserves (existing as well as proposed), if any, within 10 km of the mine lease should be clearly indicated supported by a location map duly authenticated by Chief Wildlife Warden necessary clearance, if any, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above should be obtained from the state Wildlife Department / Chief Wildlife Warden under the Wildlife (Protection) Act, 1972 and copy furnished	No National Parks, Sanctuaries, Biosphere Reserves Wildlife Corridors, Tiger/Elephant Reserves are falling within 10 Km of the study area. The location map is shown in <b>Figure 2.1.</b> NOC from Forest Department has also been obtained.
13.	A detailed biological study for the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] shall be carried out covering both terrestrial and aquatic flora and fauna. Details of flora and fauna, duly authenticated, separately for core and buffer zone should be furnished based on field survey clearly indicating the Schedule of the fauna	A detailed biological study (of 10 Km radius study area) was conducted by Ecology and Biodiversity Expert and the details are incorporated in the EIA/EMP Report. Detailed study for biological environment is carried out and detail of flora and fauna in core and buffer zone is given in <b>Chapter 3</b> under <b>Point 3.6</b> Biological Environment.

## FINAL EIA REPORT FOR BUILDING STONE(KHANDA, GITTI, BOULDER) MINE

	present.	
14.	Impact of change of land use should be given.	By the end of conceptual period benches 153-111 mRl shall be mine out by the end of conceptual period. Whereas, bottom bench of 111 mRL shall be left open to percolate water to recharge local water table
15.	Impact of mining on the hydrology of the area including water flow in the river adjoining the mine lease. It should also take into account the inundation of mined out area due to flow of water from the river.	No such impact is envisaged as the proposed mining method. As no water body is present in core or buffer zone of 500 mt. and the underground water is much deeper than the proposed depth of mining.
16.	R & R plan /compensation details for the project affected people should be furnished. While preparing the R & R plan, the National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs / STs and other weaker sections need based sample survey, family wise, should be undertaken to assess their requirement and action programmes prepared accordingly integrating the sectoral programme of line departments of the State Governments.	The mining lease area is Government land and as per the Socio-Economic Survey, There is no Project Affected Person (PAP) by the proposed mining activities. Hence, no R&R Plan is envisaged; as there is no displacement of people from their respective areas.
17.	02 km kachcha haul road to be made motorable. Submit Plan.	The unmetalled road is of 0.60 km. The same will be implemented in consultation with local authorities.
18.	One season (Non Monsoon) primary baseline data on ambient air quality (PM2.5, PM10, SOx and NOx), water quality, noise level, soil and flora and fauna shall be collected and the AAQ	Primary baseline data has been generated for a period of summer season (March 2019 - May 2019). The results of the same have been incorporated in the tabular form in <b>Chapter 3.</b>

## FINAL EIA REPORT FOR BUILDING STONE(KHANDA, GITTI, BOULDER) MINE

	<p>data so collected presented data-wise in the EIA and EMP report. Site specific meteorological data should also be collected. The location of the monitoring stations should be justified.</p> <p>There should be at least one monitoring station within 500 m of the mine lease in the pre-dominant downwind direction. The mineralogical composition of PM<sub>10</sub> particularly for free silica should be given.</p>	<p>Monitoring location map incorporated in <b>Chapter no. 3, Figure no. 3.5.</b></p> <p>Monitoring locations are decided considering the pre-dominant wind direction. Free Silica is analysed in Air Quality Parameters.</p>
19.	<p>Air quality modeling should be carried out for prediction of impact of the project on the air quality of the area. It should also take into account the impact of movement of vehicle for transportation of mineral. The details of the dispersion model used and input parameters used for modeling should be provided. The air quality contours may be may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any and the habitation. The wind rose showing pre-dominant wind direction may also be indicated on the map. The impact of stone crusher nearby should also be taken into account.</p>	<p>Air quality modeling was carried out and impact of Air quality has been incorporated in the EIA/EMP report. Max. Predicted cumulative ground level concentration (GLC) of PM<sub>10</sub>, SO<sub>x</sub>, NO<sub>x</sub>. The predominant over all wind patterns for the study period is from West to East direction as per Wind rose diagram <b>Figure 3.9</b></p>
20.	<p>The water requirement for the project, its availability and source to be furnished. A detailed water balance should also be provided.</p>	<p>Water requirement in this project site is 4.95 KLD. Water will be taken from existing water sources from nearby villages or tanker supplier. The details are</p>

## FINAL EIA REPORT FOR BUILDING STONE(KHANDA, GITTI, BOULDER) MINE

	Fresh water requirement for the project should be indicated.	incorporated in the EIA/EMP report. <b>Total Water Requirement= 4.95 KLD</b> Dust Suppression = 3.60 KLD Plantation= 1.0 KLD Domestic Purpose= 0.35 KLD
21.	Necessary clearance from the competent Authority for drawl of requisite quantity of water for the project should be provided.	The total water requirement will be met through nearby existing borewells/private tankers. Water will be purchased from nearby sources, so clearance for drawl of water is not required.
22.	Details of water conservation measures proposed to be adopted in the projected should be given.	Details of Mitigation measures for protecting the water quality in nearby areas, are given in <b>Chapter 2.</b>
23.	Impact of the project on the water quality both surface and groundwater should be assessed and necessary safeguard measures, if any required should be provided.	<b><u>Surface Water</u></b> No permanent infrastructure will be developed. The proposed granite (minor mineral) mining will not be done in rainy days hence there will not be any adverse impact on nearby surface water. <b><u>Ground Water</u></b> The ground water quality will not be changed because mining activity will not intersect the ground water table as it is restricted to 12.0m depth in plan period which does not intersect the ground water table. Impact of the project on the water quality and its mitigation measures has been incorporated in the EIA/EMP report.
24.	Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect groundwater table, a detailed	Groundwater will not be disturbed by the mining activities of the proposed project. The maximum working depth of mining will be 12.0 m bgl in plan period. So mining depth will not intersect the ground water table. Hence permission is not required from CGWA.

## FINAL EIA REPORT FOR BUILDING STONE(KHANDA, GITTI, BOULDER) MINE

	hydro geological study should be undertaken and report furnished. Necessary permission from Central Ground Water Authority for working below ground water and for pumping of groundwater should also be obtained and copy furnished.	Water requirement will be met by tanker supply therefore permission from Central Ground Water Authority for pumping of groundwater is not required.
25.	Details of first order stream, if any passing through lease area and modification diversion proposed, if any and the impact of the same on the hydrology should be brought out.	The proposed project is for the "Building Stone (Gitti & Boulder) Mine" Project. No diversion or modification of water channel is proposed or expected due to mining activities from the proposed project.
26.	Details of rainwater harvesting proposed, if any, in the project should be provided.	In the end of the conceptual period bottom bench of 111 mRL shall be left open to percolate water to recharge local water table.
27.	Information on reduced levels site elevation, working depth, ground water table etc. below natural surface level should be provided. A schematic diagram may also be provided for the same.	Site Elevation: Highest 162 m amsl Lowest: 138.0 m amsl Ultimate depth 141.0 m amsl Ground water depth at project site: 85.0 m amsl.
28.	Quantity of solid waste generated to be estimated and details for its disposal and management should be provided. The quality, volumes and methodology planned for removal and utilization (preferably concurrently) of top soil should be indicated. Details of backfilling proposed, if any, should be given. It may be clearly indicated that out of the total waste generated during the mine life, how much quantity would be backfilled and how much quantity would be disposed off	Negligible amount of solid waste is expected to be generated during daytime by activities of labours. The solid waste generated will be taken care of properly. The area is devoid of top soil and no waste will be generated during the mining activities.

## FINAL EIA REPORT FOR BUILDING STONE(KHANDA, GITTI, BOULDER) MINE

	in the form of external dump (number of dumps, their height, terraces etc. to be brought out)	
29.	The reclamation plan, post mine land use and progressive green belt development plan shall be prepared in tabular form and submitted.	Land use plan and green belt development plan is discussed in detail in <b>Chapter 4</b> .
30.	Impact on local transport infrastructure due to the project should be indicated. Projected increase in truck traffic as a result of the project in the present road network (including those outside the project area) should be worked out, indicating whether it is capable of handling the increased load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State government) should covered.	Excavated material will be carried to NH 76 via unnamed connecting road. These may be reinforced to facilitate easy and smooth moving heavy duty trucks. Traffic analysis is given in <b>Section 4.10</b> of <b>Chapter 4</b> .
31.	Details of the infrastructure facilities to be provided for the mine workers should be included in the EIA report.	No such infrastructure facility is proposed as local labour will be employed for the project.
32.	Conceptual post mining land use and Reclamation and Rehabilitation of mined out area (with plans and with adequate number of sections) should be given in the EIA Report	By the end of conceptual period 153-111 mRl benches shall be mine out by the end of conceptual period for reclamation. Whereas, bottom bench of 111 mRL shall be left open to percolate water to recharge local water table.. Afforestation of local species shall be undertaken over approach road in 3m x 3m grid pattern.
33.	Phase-wise plan of green belt development, plantation and compensatory afforestation should	The details of proposed plantation is given in <b>Chapter 6 at 6.2</b>

## FINAL EIA REPORT FOR BUILDING STONE(KHANDA, GITTI, BOULDER) MINE

	be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given.	
34.	Occupational health impact of project should be anticipated and preventive measures initiated. Details in this regard should be provided. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. Special attention should be in view of the stone crusher nearby.	There are no adverse impacts of the proposed activities on human health. All safety measures prescribed under mining laws will be followed. Regular health checkups will be conducted at site. Budgetary provision has been given in EMP in <b>Chapter 9 of Section 9.2</b> . The Details of Occupational health impacts have been discussed in <b>Chapter 6 of Section 6.3</b> .
35.	Measures of social-economic significance and influence to the local community proposed to be provided by project proponent should be indicated. As far as possible, quantitative dimensions may be given with time frame for implementation	Measures of socio-economic significance and influence to the local community provided by lessee during the project duration is mentioned in <b>Chapter 10 of Section 10.11</b>
36.	Detailed environmental management plan to mitigate the environmental impacts which, should inter-alia should include the impact due to change of land use, due to loss of agricultural land and grazing land, if any, occupational health impacts beside other impacts of the projects. It should also take into account the impacts due to stone crusher nearby and also provide for preventing the silt from going into the river	Environmental management plan to mitigate the environmental impacts which inter-alia included the impacts of change of land use, loss of agricultural and grazing land, is discussed and given in <b>Chapter 9 of Section 9.3</b> . No stone crusher installed nearby the proposed project site so prevention of silt flowing in the river is not applicable.

## FINAL EIA REPORT FOR BUILDING STONE(KHANDA, GITTI, BOULDER) MINE

37.	Risk assessment and disaster management plan due to inundation of mine as a result of its location close to the river should also be examined and addressed.	There is no such risk due to this mining activity because the nearest river Ken – 5.0 Km (West) away from the lease area. Risk Assessment and Disaster Management Plan are discussed in <b>Chapter 7 of Section 7.2.</b>
38.	Public hearing points raised and commitment of the project proponent on the same along with the time bound action plan to implement the same should be provided.	The public hearing points will be discussed in Chapter 7 of Final EIA report.
39.	Details of litigation pending against the project, if any, with direction / order passed by any Court of Law against the project should be given.	There is no litigation pending against this project.
40.	The cost of project (capital cost and recurring cost) as well as the cost towards implementation of EMP should clearly be spelt out.	Proposed detailed recurring & non-recurring cost for the project is discussed in <b>Chapter 2.</b> Budgetary provision has been given in EMP in <b>Chapter 9 of Section 9.4.</b>
41.	Present position of distances of railway lines, National Highway including culverts and bridges, Reservoir, lake, Canal, Road including culverts & bridges, Soil conservation works, nursery plantation, check dams, water supply schemes & irrigation schemes, water sources such as Springs, Infiltration galleries, Percolation wells, Hand pumps, Tube wells and existing flood control / protection work should be included and indicated in location map.	<p>Features Distance Direction</p> <p>a) Railway Station: Khurhand Railway Station- 11.50 km* in NE direction.</p> <p>b) Roads: NH- 76- 10.50 km. in East direction. Haulage Route : 0.60 km</p> <p>a) Settlements: Nearest City: Banda (approx. 20.50 km in North-West direction)</p>
42.	Proponent should submit attested photocopy of the sanction of mining lease by the State Government	The proposed project pertains to new mining lease. Applicant, <b>Shri Sangram Singh S/o Shri Jaiwant Singh</b> , has been granted the consent from the office of

## FINAL EIA REPORT FOR BUILDING STONE(KHANDA, GITTI, BOULDER) MINE

		District Magistrate Banda for an area of 2.02 ha. for the extraction of minor mineral Building Stone (Khanda, Gitti Boulders) in Village- Girwan, Gata No.-1876, Khand No.- 01, Tehsil- Naraini, District- Banda for a period of Ten years ( <b>Annexure -III</b> )
43.	a. The Company will have a well laid down Environment Policy approved by its Board of Directors and it may be detailed in EIA report	Details Environment Management cell of <b>Shri Sangram Singh S/o Shri Jaiwant Singh</b> , is discussed in <b>Chapter 6</b>
	b. The Environment policy must prescribe for standard operating process/procedures to bring into focus any infringement/ deviation/ violation of the environment or forest norms/ conditions and it may be detailed in EIA.	Detailed Environment Policy stating SOPs in case of any violations/deviation of the environment or forest norms given in <b>Chapter 6.</b>
44.	The hierarchical system or Administrative order of the company to deal with the environmental issues and for ensuring compliance with the EC conditions and details of this system may be given.	Detailed Administrative order to deal with environmental issues given in <b>Chapter 6.</b>
45.	The company must have system of reporting of noncompliance /violations of environmental norms to the Board of directors of the company and/or shareholders or stakeholders at large. This reporting mechanism should be detailed EIA reports.	The same has been discussed in <b>Chapter 6.</b>

**CHAPTER 2:**  
**PROJECT**  
**DESCRIPTION**

## 2. PROJECT DESCRIPTION

### 2.1 General

The proposed project is for opencast mining of Building Stone (Khanda, Gitti, Boulders) by semi-mechanized means with drilling and blasting. The project will include of mining of Building Stone (Khanda, Gitti, Boulders). The Project aims to augment supply of Building Stone (Khanda, Gitti, Boulders) for its customers. The mine lease area falls in Gata No.-1876, Khand No.- 01, Village- Girwan, Tehsil- Naraini, District- Banda. It is located at about 20.50 km to the NW of Banda. From Girwan mine leases site are approached by motorable road.

### 2.2 Brief description of the project

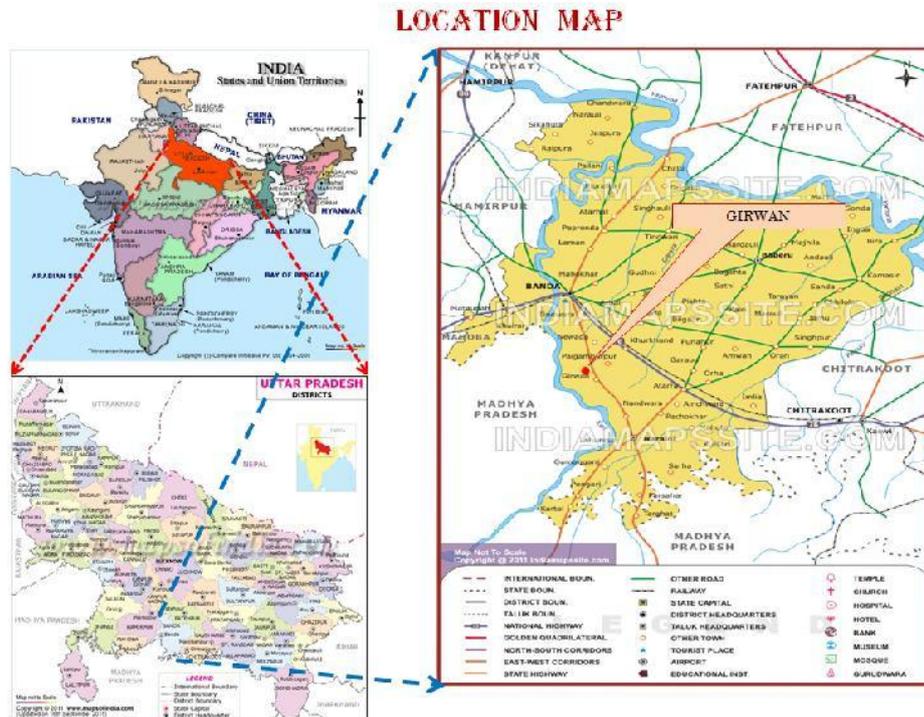
The proposed project is for Building Stone (Khanda, Gitti, Boulders) production from 20,200 m<sup>3</sup> or 54,540 MT / annum by open cast semi-mechanized method. The lease area is 2.02 ha which comprises totally of Govt. waste land. The total geological reserves are 17,91,072 m<sup>3</sup> or 48,35,894 MT and mineable reserves are 7,06,009 m<sup>3</sup> or 19,06,224 MT. The expected life of the mine is approx. 35 years.

#### 2.2.1 Location details

The mine is situated near in Gata No.-1876, Khand No.- 01, village Girwan, Tehsil- Naraini of Banda District (U.P.). Lease area is connected by Banda - Naraini State Highway by metalled road. The lease area is about 20 Km. from Banda up to Girwan and lease area is about 900m further west along Girwan –Khohi link road, 600 kacha road leads to the area. Location of the mine lease area is given in **Figure 2-1**. The geographical location of the lease area is as under:-

Pillars	Latitude (N)	Longitude (E)
A	25° 18' 29.38"	80° 23' 04.27"
B	25° 18' 32.55"	80° 23' 03.47"
C	25° 18' 31.93"	80° 23' 12.41"
D	25° 18' 28.85"	80° 23' 10.14"

Figure 2- 1: Location of mine site



### 2.2.2. Leasehold Area

The lease area is a government wasteland which falls under the revenue limit of Girwan village. There is no reserve forest or protected forestland within the lease area. There is no village or hutment within the lease area. Existing land use pattern is given in Table 2-1.

Table 2- 1 Present land use pattern of the lease area

Particulars	Girwan 2.02 Ha Mine Area (ha.)		
	Preoperational phase	Operational Phase (after 5 Years)	Post Mining (Conceptual phase) at the end of Mine Life
Mining and Existing pits	Nil	0.963	1.558
Waste dumps	Nil	Nil	Nil
Road	Nil	Nil	0.345
Infrastructure facilities	Nil	Nil	Nil
Afforestation	Nil	0.10(Along approach road )	0.10 (Along approach road)
Balance undisturbed land	2.020	1.057	0.462
<b>Total</b>	<b>2.02</b>	<b>2.02</b>	<b>2.02</b>

## 2.3 GEOLOGY

### Geography, Topography & Physiography

The area lies in Survey of India's Topo sheet No. 63C/07 in village Girwan. The conspicuous feature of topography of the area is elliptically isolated hills with gentler to sudden steep slope. The area is dominated by boulders and in situ outcrops of Bundelkhand granite. The general slope of lease area is from North to South directions. No seasonal perennial drainage exists within the lease area, however, Ken Nadi flows 2.5 Km. away in west direction. There are several canals drawn from Ken river within the 5 Km periphery.

Area is devoid of any mining activity. The highest points in the lease hold is 162.0 mRL in North along boundary pillar "B & C" while lowest 138 mRL at South at pillar, "D". The existing land use and break-up of the lease area is given in **Table2-2**:

**Table 2- 2 Area Break-up of Mining Lease**

<b>Particulars of Mining Activity</b>	<b>Present Site Landuse in Ha.</b>
Mining and Existing pits	Nil
Waste dumps	Nil
Road	Nil
Infrastructure facilities	Nil
Afforestation	Nil
Balance undisturbed land	2.02
<b>Total</b>	<b>2.02</b>

### 2.3.1 Regional Geology

The regional stratigraphic sequence is given in **Table 2-3**

**Table 2- 3 Regional Stratigraphic Sequence**

The general succession of the area is as follows:

Quarternary Deposits	Alluvium
----- Unconformity -----	
Bijawar and Gwalior Group	
Bijawar and Gwalior Group	
Morar (Middle Proterozoic)	Dolerite sill, Green shale Subgroup Limestone, shale conglomerate
Par Sub group	Sand stone, shale conglomerate
----- Unconformity -----	
Bundelkhand Granite Complex	Quartz reefs Granites Pink; Grey

The Middle Proterozoic formations deposited over Bundelkhand Massif along its southeastern and northwestern margin are known as Bijawar Group and Gwalior Groups respectively. Bundelkhand Granite of the above succession are exposed in the region of the Precambrian shield are usually considered to be older than 2500 million year in age comprises a complex igneous suit. Sharma in Prof. Misra's commemoration volume described the litho-stratigraphy using a new nomenclature is given below:-

Group	Formation	Lithology
<b>BUNDELKHAND GROUP</b>	Madaura Ultrabasics	Pyroxinite, Gabbro, serpentinite. Metabasites
	Mahoba Dolerite	Dolerite dykes, keratophyre, lamprophyres
	Matatila Granite	cabonnetites, Pink granites, coarse-fine grained
	Gorhmau Granite	and massive (antextite). Gray, Coarse-fine
	Paron Meta-acid	grained & massive porphyroblastic gneisses.
Volconics Palar Formation	(antextite) Porphyroblastic, compact sheet like granitic rocks (antextite). Quartzites, phyllites, spotted phyllites, blackshale limestone, ferrugineous quartzite with traces of chalcopyrites, galena, malachite, secondary quartz veins, magnetite schists, at the base pyrophyllite-Diaspore deposits, banded haematite and quartzite	
----- UNCONFORMITY -----		
	Kuraicha Formation	Migmatite, gneisses, paraaugen gneisses amphibolites chlorite and biotite schist quartzite, meta-arkose, garnet biotite gneisses

### 2.3.2 Local geology

In geological sequence the granitic exposures of village Jarar, Girwan & around Naraini is correlated with Kamtanath formation of chitrakoot formation of Bundelkhand Group of rocks which is un-conformably rest over Archeans formation and well exposed around Kamtanath hills, Bharatkoop & Rauli kalyanpur of Chitrakoot district in U.P under thin layer of semi-weathered granite with morram and boulders up to 3-5m.and further solid compact granite exposures persist in deep. The granite in isolated hilly exposure has no soil cover except 1m thick semi-weathered granite cover over the main exposure. The granite exposure in running pits trending NW-SE are of dark grey in colour, coarse to medium grained showing porphyritic texture. The following join sets have been measure in granite.

### 2.4 Proposed rate of production and expected life of mine

The proposed rate of production for the next five years as per the approved mine plan is given as under:

**Table 2- 4 Proposed rate of production in Cubic meter per Annum**

Year Wise Production of Building Stone (Khanda, Gitti, Boulders) (in m <sup>3</sup> )	First Year	Second Year	Third Year	Fourth Year	Fifth Year
	20,200	20,200	20,200	20,200	20,200

As per the latest mining plan, approved by the Directorate of Geology & Mines, U.P. (DGM),

**Table 2- 5 Estimation of Mine life**

S.No.	Particulars	Details
1.	Total mineable reserves of Building Stone (Khanda, Gitti, Boulders)	7,06,009 cubic meter
2.	Total production in next five year	1,01,000 cubic meter
3.	Remaining reserves at the end of lease period	6,05,009 cubic meter
4.	Rate of production per year	20,200 cubic meter
5.	Life of mine at the end of five year period (approx.)	30 years
6.	Total life of mine	35 years

### 2.5 Mining

### 2.5.1 Details of Mining process-

Mining shall be done by opencast semi-mechanized means confined within ultimate pit limit demarcated. Road, habitation etc. will require diversion from mining area for the safety of workings. Details of the area are as follows:

1,01,000 m<sup>3</sup> OR 2,72,700 MT quantities of khanda, gitti, boulders shall be exploited by for the period of five years at the rate of 20,200 m<sup>3</sup> or 54,540 MT/Year & mining pit shall reach up to a depth 12 m in five years plan. Therefore five years development composite plan and &conceptual plan have been made separately. The geometry of pit as on date & at the end of plan period & at the end of conceptual period is given below in **table no.2.6**.

**Table 2- 6 Geometry Of Pit As On Date & At The End Of Plan Period & At The End Of Conceptual Period**

Period	Pit No	Pit dimension (average in m.)	Shape	Area Broken in ha.
As on date	Nil	Nil	Nil	Nil
At the end of plan period		205m x 47 m x 12m	Spindle shape	0.963
At the end of conceptual Period		190m x 82 m x 36m	Rectangular shape	1.558

- a) **Plan period:** - Whole the lease area within 7.5m barrier shall be developed in five pit by bench formation during plan periods & dimension of pit will be 205m x 47 m x 12m The depth of the pit will be confined to 141 mRL. The height & width of benches shall be kept 6.0 m. slope of faces shall be kept 60°. with over all pit slope of 45°. 1,01,000 m<sup>3</sup> or 2,72,700 Granite shall be generated during plan period at the rate of 20,200 m<sup>3</sup> or 54,540 MT/Year . The minor mineral exists within the entire lease area shall be used in making aggregate, therefore generation of waste shall be nil.
- b) **Conceptual plan:** During conceptual period, Whole the lease area within 7.5m barrier shall be developed in five pit by bench formation during plan periods & dimension of pit will be 190m x 82 m x 36m. The depth of the pit will be confined to 111mRL. The height & width of benches shall be kept 6.0 m. slope of faces shall be kept 60°. with over all pit slope of 45°. 7,06,009 m<sup>3</sup> or 19,06,224 M.T Granite shall be generated during conceptual period at the rate of 20,200 m<sup>3</sup> or 54,540 MT/ Year. The minor mineral exists within the entire lease area shall be used in making aggregate, therefore generation of waste shall be nil.

### 2.5.2 Anticipated life of mine

Total mineable reserves as on date are of the tune of 7,06,009 m<sup>3</sup> or 19,06,224 M.T., with proposed rate of production of 20,200 m<sup>3</sup> or 54,540 MT/Year of khanda, gitti, boulders per

annum. The expected life of mine with above proposed target comes out approximately 35 years.

## 2.6 Extent of mechanization

The requirement of mining equipment is calculated at its maximum production capacity as below

**Table 2- 7 Mining Machinery Details**

S. No.	Machinery	Quantity
1.	Wagon drill	1
2.	Compressor	1
3.	Excavator	1
4.	Tippers	2

## 2.7 Employment Potential

The local labours shall be engaged for sizing of Building Stone (Khanda, Gitti, Boulders) and loading and handling of mineral in mining area, besides, watch and ward and plantation activity with proper maintenance. On assumption that one man on and average can size 2 to 3 tonnes of material per man day. The total manpower required for material handling and loading works out to 33. Beside this, proponent Shall engage skilled and managerial staff to meet the statutory requirement under MMR 1961 and MCDR 1988. At present, the mine is not functional. The following skilled / unskilled and semi-skilled workers besides managerial and administrative staff shall be employed at the time of re-opening of mine.

**Table 2- 8: Manpower Details**

1.	First Class Mines Manager	:	1
2.	Machanical Engineer( Part Time)	:	1
3.	Mines mate / Blaster	:	1
<b>Skilled:</b>			
	Excavator Diver	:	2
	Dumper Drivers	:	4
	Drillers	:	1
	Supervisor	:	2
	Office Assistant/Dispatch Supervisor	:	2
<b>Semiskilled:</b>			
	Time Keeper	:	2
	Compressor operator	:	1
	Drill operator/helper	:	1

**Un-skilled:**

Piece rated workers	:	15
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<b>Total:</b>	:	<b>33</b>
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**2.7.1 Mineral Beneficiation**

Except manual / semi- mechanized sizing and sorting of the Building Stone (Khanda, Gitti, Boulders), no other processing is proposed for the ROM Building Stone (Khanda, Gitti, Boulders) at the mines

**2.8 Site Facility****2.8.1 Mines Office**

Mine office and rest room will be provided at a center area of Girwan lease. Specifically the following facilities will be provided to mine workers at the mines' office and in conformance with the Mines Rules, 1952:

- Canteen cum Rest room
- Toilet
- First Aid

**2.8.2 Rest Shelter**

Rest shelters along with first-aid station, complying with relevant provisions of Mines Rules will be provided at mine.

**2.8.3 Blasting Shelter**

A portable blasting shelter will be provided for the mine employees to take shelter during blasting operations. Blasting operations will be usually carried out during lunch hours.

**2.9 Utilities required****2.9.1 Power Supply**

The mine will work in day shift only, so lighting arrangement will not be required.

**2.9.2 Workshop and Stores**

No major additional facilities will be required to be installed.

The following site services will be provided:

- |      |                     |   |
|------|---------------------|---|
| i)   | Office              | 1 |
| ii)  | Drinking water shed | 2 |
| iii) | Rest shelter        | 2 |

iv)	First Aid Centre	1
v)	Store	1
vi)	Blaster Shelter	2

## 2.10 Disposal of Waste

Mining faces shall be opened from top to downward. It will be advance from west to west directions & orientation benches shall be in same direction. Approach road shall be produced to each mining faces for transportation of mineral. High faces of pre-existing deep pits shall be protected by leaving in-situ embankment (1m thick) during working towards steep slope.

No waste shall be generated during plan period therefore, no proposed has been for its separate staking.

## 2.11 Mine Drainage

a) Likely depth of water table based on observations from nearby wells and water bodies:

One dug well is situated at east of lease area along road side. The top ground level of the surface is 138 mRL & water table encountered in the well is about 53 m. deep and the expected depth of water table in the region is about 85 mRL. During summers the water table further goes down about 1.0m. and in winters, the water table goes down about 1.0m. During rainy season the water level further rises about 2.0 m.

b) Working expected to be 56 m above the water table during plan period. During plan period, the mine working will be confined up to 141 mRL. Water table will not be intersected by the mining operations.

c) Quantity and quality of water likely to be encountered, the pumping arrangement and places where the mine water is finally proposed to be discharged.

The mining operations will be limited in the upper levels & the lowest bench will be formed at 141 mRL up to conceptual period, hence water table will be not be encountered by mining activities during plan as well as in conceptual period.

## 2.12 Water & wastewater management

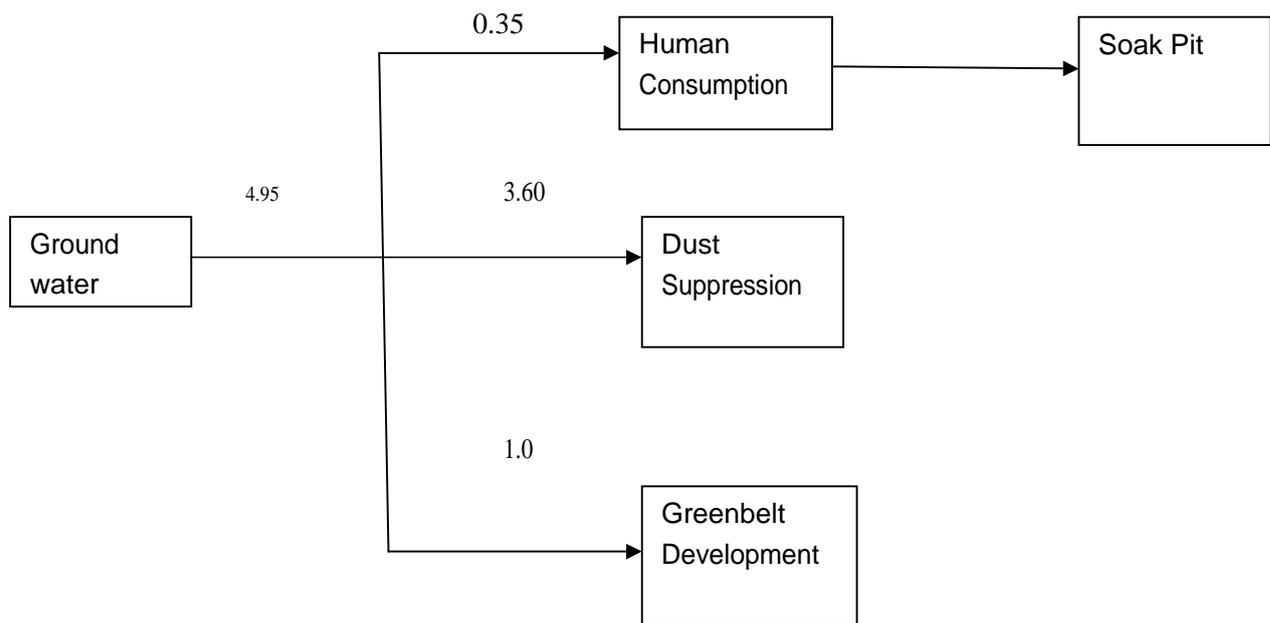
### 2.12.1 Water Supply & Sanitation

The Girwan mine plans to abstract water from nearby privately owner dug well located near Girwan mine lease area.

### 2.12.2 Water Source & Requirement

The projected water requirements for the mine site are likely to be in the range of 4.95 KLD. The major areas of water consumption are dust suppression (3.60 KLD), for domestic purposes (0.35 KLD) and green belt development (1.0 KLD). Most of the water consumption proposed will be for dust suppression. It is to be noted that due to mechanical nature of mining in this lease the water requirement for the dust suppression will be optimal. Sprinkling will be done by using truck mounted sprinkler system. The detailed water balance is shown **Figure 2-2**.

Figure 2- 2: Water Balance Diagram (KLD)



### 2.12.3 Waste water generation & disposal

There will be no wastewater generation from Building Stone (Khanda, Gitti, Boulders) mining activities; however, marginal quantities of domestic wastewater will be generated, which will be disposed in soak pits.

**CHAPTER 3:**  
**DESCRIPTION OF**  
**ENVIRONMENT**

## **3.0 DESCRIPTION OF ENVIRONMENT**

### **3.1 Introduction**

This chapter presents a regional background to the baseline data at the very onset, which will help in better appreciation of micro-level field data, generated on several environmental and ecological attributes of the study area. The baseline status of the project environment is described section wise for better understanding of the broad spectrum conditions. 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 Mine development. This chapter discuss about the present scenario of the study area with reference to the prominent environmental attributes. The study area covers 10 Km radius of the mine lease area. Baseline data has been collected out during the Winter Season by NABL Accredited Lab in accordance with the Guidelines for EIA issued by the Ministry of Environment Forests and Climate Change, Govt. of India and CPCB, New Delhi.

The baseline environment quality represents the background environmental scenario of various environmental components such as Land, Water, Air, Noise, Biological and Socio-economic status of the study area. Field monitoring studies to evaluate the base line status of the project site were carried out covering March 2019 to May 2019 with CPCB guidelines. Environmental data has been collected with reference to proposed mine for:-

- Land
- Water
- Air
- Noise
- Biological
- Socio-economic status

### 3.1.1 Study Area

Study area of Building Stone (Khanda, Gitti, Boulders) Mine for baseline study covers the total area covering a 10 Km radius from the mine lease periphery. Further the study area has been divided into two zones namely “Core Zone” and “Buffer Zone”. Core zone comprises of the mine lease area within the mine lease boundary while the area around the mine lease periphery covering 10 Km radius area constitutes the Buffer Zone. Map showing study area of the proposed project.

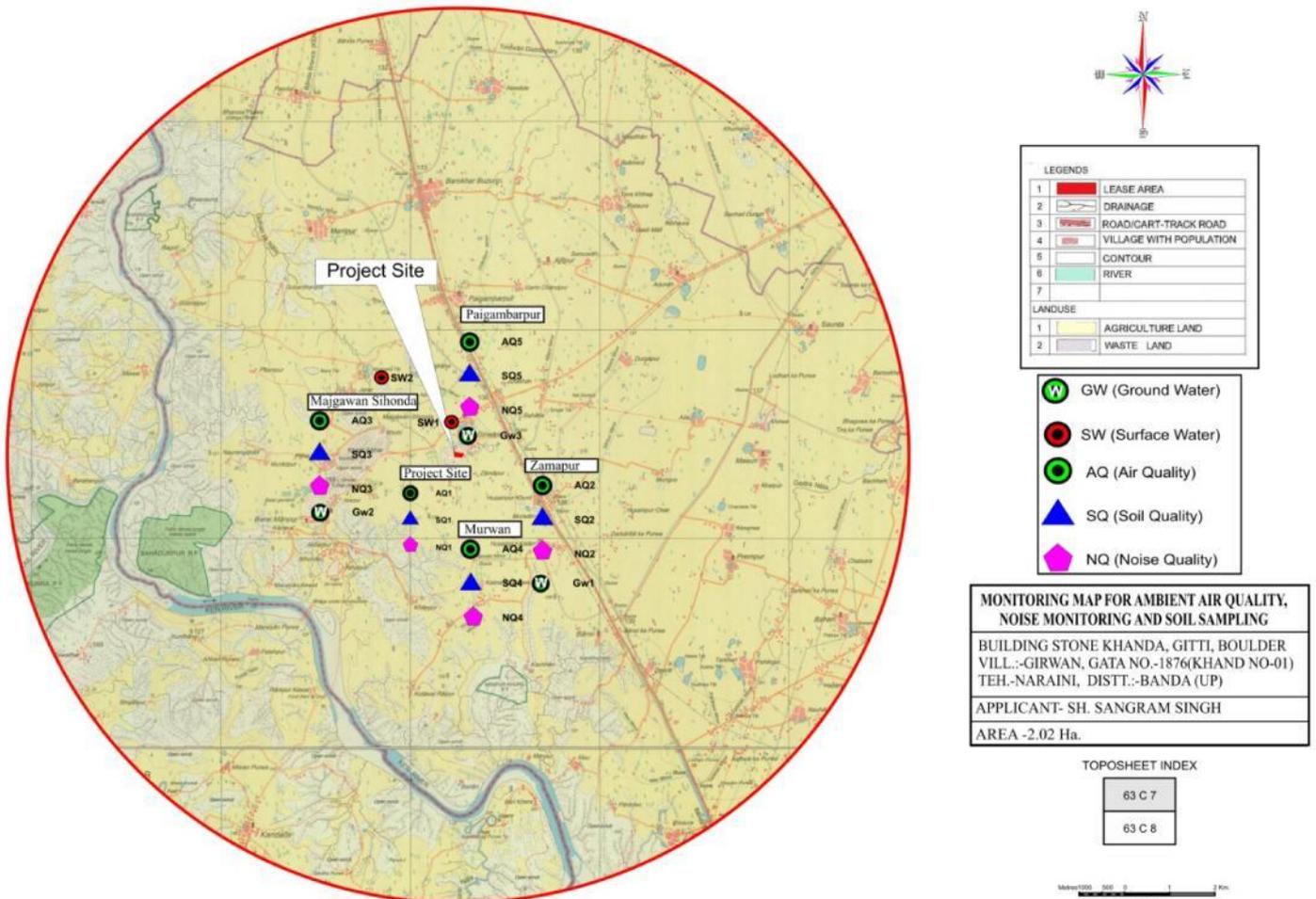


Figure 3- 1: 10 Km. Radius map showing the monitoring Stations.

### **Geographical location of the study area**

The study area comprises of 10 Km radius area around Building Stone (Khanda, Gitti, Boulders) Mine of 2.02 ha at Village- Girwan, Tehsil - Naraini, Distt. -Banda (U.P.) and the total geographical area of study area is  $\approx$ 31,428 ha.

### **3.1.2 Methodology adopted for Baseline Study**

The methodology for conducting the baseline environmental survey considered the guidelines given in the EIA Manual of the MoEF. Baseline information with respect to Land, Water, Air, Noise, Biological and Socio-economic quality status in the study area were collected by conducting primary sampling / field studies during winter season March, 2019 to May, 2019. The characteristics of baseline status of study area with respect to the parameters are discussed.

## **3.2 LAND ENVIRONMENT**

Since the mining is carried out by opencast mining method, studies on land environment of eco-system play an imperative role in identifying susceptible issues and taking appropriate action to uphold ecological equilibrium in the region. The main objective of this section is to provide a baseline status of the study area covering 10km radius around the proposed mine site so that temporal changes due to the mining activities on the surroundings can be assessed in future.

### **3.2.1 Methodology**

Land use / Land cover map preparation, Base map creation; Geometric and Radiometric correction of satellite image has been processed using ERDAS Imagine 9.2 Software.

The methodology used for present LU/LC of study area is shown in **Figure 3-2** and is detailed below:

#### **Methodology adopted for thematic data extraction from the satellite imageries:**

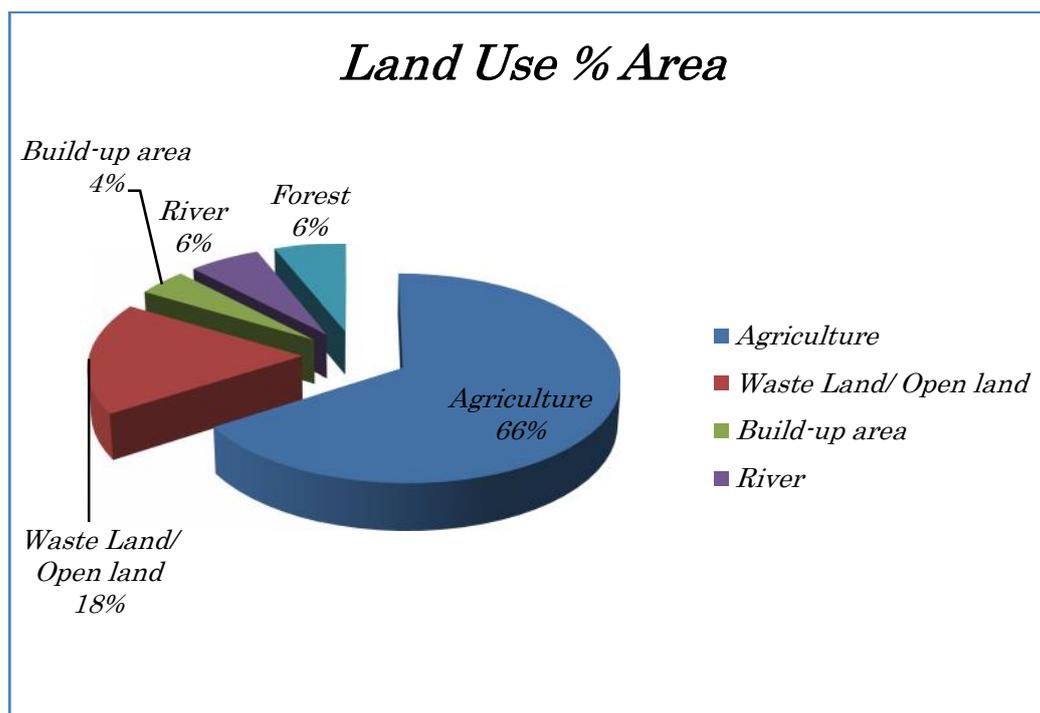
ERDAS image processing software and ARC/GIS Software were used for the project. Erdas 9.2 Image Processing Software was used for digital processing of the spatial data. Digital image processing techniques were applied for the mapping of the land use/land cover classes of the provided area from the satellite data.

### 3.2.2. Land Use/ Land Cover

The existing land use pattern of the study area based on the latest satellite imagery is given in **Table 3-1** as follows and is shown in **Figure 3-3**

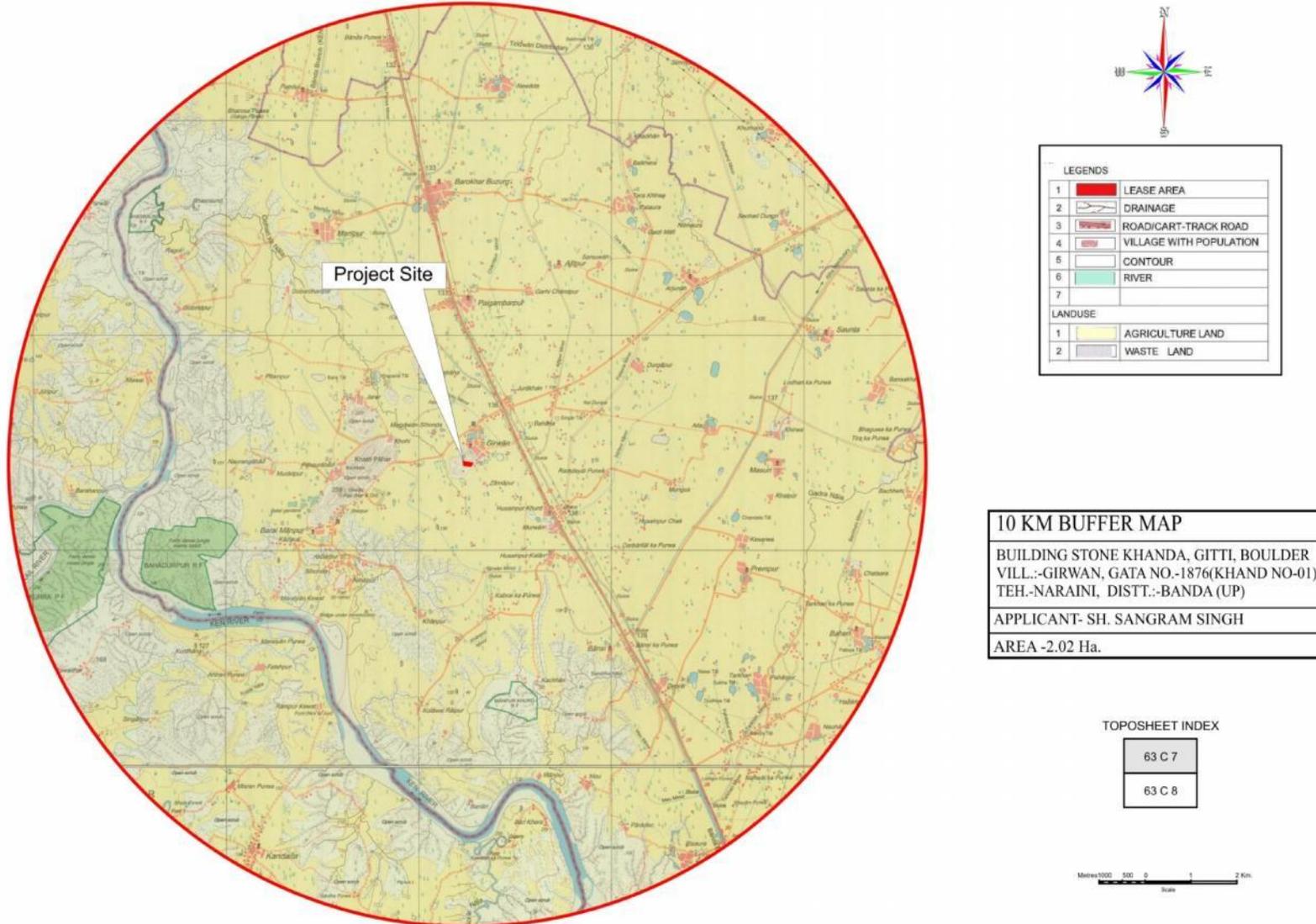
**Table 3- 1: Land use pattern of the study area**

S. no	Land Category	Area (Ha)	%Land Cover
1.	Agriculture	20717.33	65.92
2.	Waste Land/ Open land	5543.90	17.64
3.	Build-up area	1332.55	4.24
4.	River	1910.82	6.08
5.	Forest	1923.40	6.12
Total		31428	100



**Figure 3- 2: Landuse Pattern of the area under study in district Banda, U.P.**

Figure 3- 3: Land use/ Land cover Map of study area



### 3.2.2.1 Description of land use

The study area is prominently covered by agricultural land (65.92 %). The drainage & water bodies are covering 6.08 % while built-up area covers 4.24 % of the study area. Forest Area along with vegetation and land with semi-arid vegetation covers 6.12 % of the study area.

17.64 % of land is occupied by the waste barren land and the mine area is also covered in that share. The wheat and maize are main crops of the study area and opium cultivation was also reported in the study area. The above land use analysis indicates that a healthy distribution exists in the area.

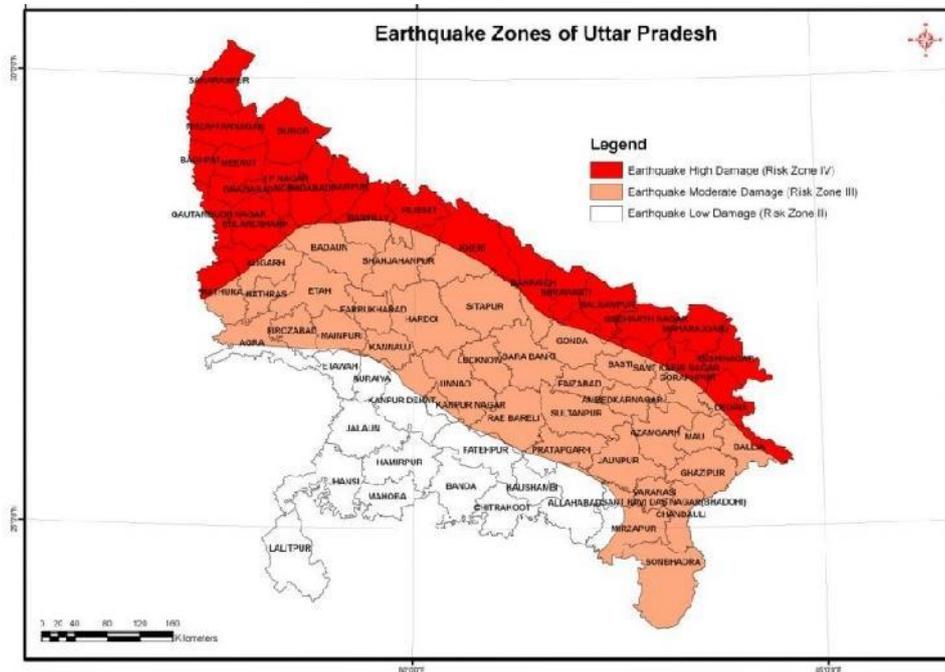
### 3.2.2.2 Physiography

The area lies in Survey of India's Topo sheet No. 63C/07 in village Girwan. The conspicuous feature of topography of the area is typical Bundelkhand landscape of elliptically isolated hills with gentler to sudden steep slope. The area is dominated by boulders and in situ outcrops of Bundelkhand granite. The general slope of lease area is from North to South directions.

### 3.2.2.3 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 less seismic, having suffered only infrequent earthquakes of moderate strength. The main seismogenic belts are associated with the collision plate boundary between the Indian and Eurasian plates. The project site as well as study area lies in Zone-II of Seismic Zoning Map, and thus can be said to be located in an area of low seismic hazard by national standards. Hence the risk of earthquake at the site persists though there has to be no incident in the near past.

Figure 3- 4: Seismic Zone Map of U.P.



### 3.2.3 Soil Characteristics

Soil may be defined as a thin layer of earth's crust, which serves as a natural medium for the growth of plants. The soil characteristics include both physical and chemical details. The soil survey was carried out to assess the soil characteristics of the area. The soil survey and soil samples were carried out / collected to assess the soil characteristics of the study area. Soil samples were collected from 5 locations.

### 3.2.3.1 Methodology of baseline data generation

Soil samples have been taken from 5 sites within the study area. Direction of soil sampling station from the mine site have been given in **Table 3-2** & same is shown in **Figure 3-1**

**Table 3- 2: Details of Soil monitoring locations**

S.No.	Location code	Location Name	Direction
1.	S1	Girwan (Near Mine site)	SW
2.	S2	Village Zamapur	SE
3.	S3	Village Majgawan Sehonda	NW
4.	S4	Village Murwan	SE
5.	S5	Village Paigambarpur	NE

The sample was collected by driving an auger into the soil up to the depth of 90 cm. The present study on the soil quality establishes the baseline characteristics and identifies the incremental concentrations if any, due to the proposed project. The objective of the sampling is:-

- To determine the baseline soil characteristics of the study area;
- To determine the impact of proposed activity on soil characteristics and;
- To determine the impact on soil more importantly agriculture production point of view.

The soil sample is collected from three different depths viz. 30cm, 60cm and 90cm. The sample was then packed in polythene plastic bags and sealed. The sample from three different depths is homogenized and is then analyzed. Main test methodologies used for analysis of Soil are given in **Table 3-3** :

Table 3- 3: Methodologies used for Soil Analysis

Sampling Parameters	Sample collection and Frequency	Sample Analysis		Methodology
		Analytical Equipment	Sensitivity / Detection Limit	
Texture	Manual sample collection using hammer and container tube for collecting undisturbed top soil and will be collected once in season	As per	As per	IS: 2720 Part 4
Water holding capacity		As per HMSO, UK	As per HMSO, UK	HMSO, UK
Porosity		As per IS: 2720	As per IS: 2720	IS: 2720 Part VII
Permeability		Falling Head Method		IS: 2720 Part XVII
Moisture		Electronic Balance	0.001 mg	IS: 2720 Part 2
Particle size distribution		As per IS: 2720	As per IS: 2720	IS: 2720 part 4
Cation Exchange Capacity		As per IS: 2720	As per IS: 2720	IS: 2720 part 24
Electrical Conductivity		As per IS: 14767-2000	As per IS: 14767-2000	IS: 14767-2000
pH		pH Meter		4500 H+B
Calcium		EDTA Titration	-	3500 Ca B
Magnesium		EDTA Titration	-	3500 Mg B
Sodium (Na)		Flame Photometer	100 µg/l	3500 Na B
Potassium		Flame Photometer	100 µg/l	3500 K B

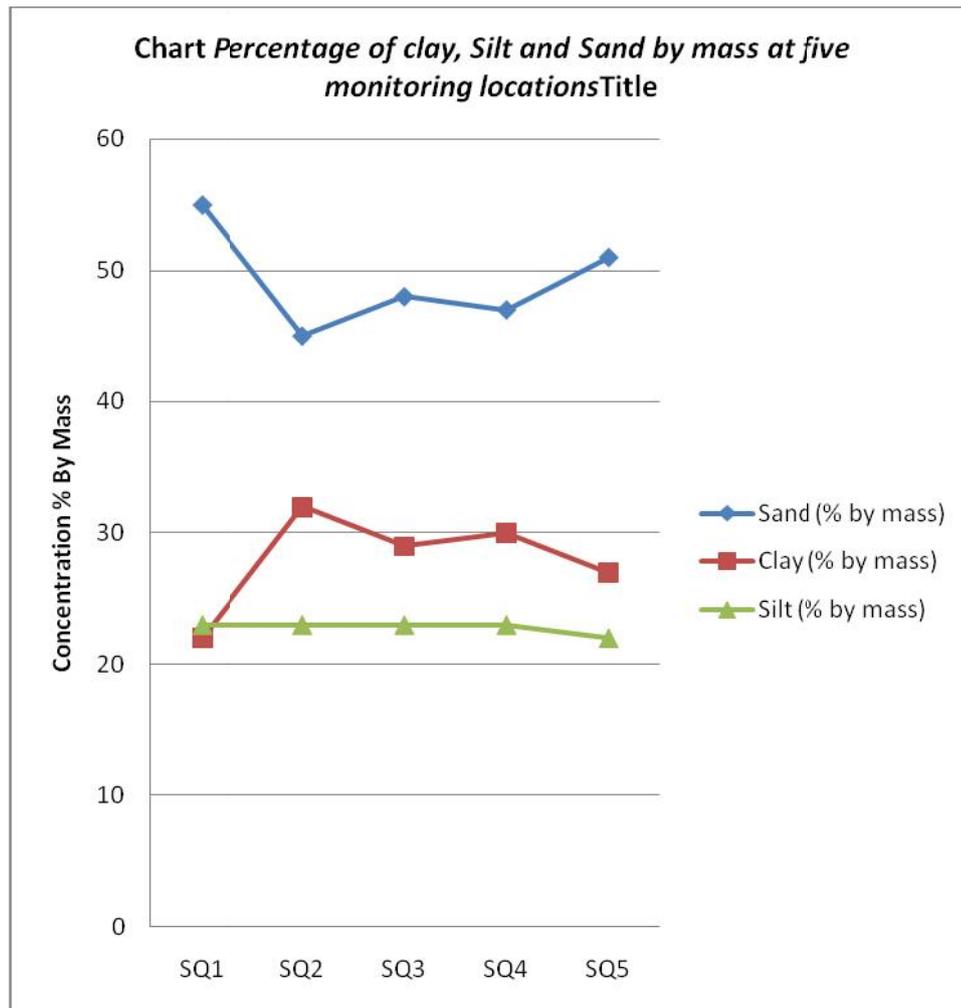
### 3.2.3.2 Baseline data status

The results of soil analysis are given below in **Table 3-4** collected from five different locations.

**Table 3- 4: Soil Quality Analysis results (March-2019 to May-2019)**

S. No.	Parameters	Units	Location				
			S1	S2	S3	S4	S5
1	pH	-	7.57	7.69	7.6	7.67	7.6
2	Conductivity	( $\mu$ mhos/cm)	364.31	364.43	365.4	364.41	366.4
3	Sodium (as Na)	(mg/kg)	44.44	44.56	43.19	44.54	46.43
4	Water holding capacity	%	42.46	42.58	41.21	42.56	44.45
5	Potassium (as K)	(mg/kg)	244.9	245.02	244.65	245	246.89
6	Texture	-	Sandy Loam				
7	Sand	%	55	45	48	47	51
8	Clay	%	22	32	29	30	27
9	Silt	%	23	23	23	23	22
10	Calcium (as Ca)	(mg/kg)	157.45	158.8	154.93	157.45	157.45
11	Magnesium (as Mg)	(mg/kg)	68.16	69.03	66.64	68.03	69.06
12	SAR	-	1	1	1	1	1
13	CEC	(meq/100gm)	3.48	3.43	3.71	3.71	3.58
14	Available Phosphorus (as P),	(mg/kg)	11.67	11.62	11.67	11.79	11.75
15	Organic carbon	%	0.93	0.98	0.92	0.92	0.88
16	Porosity	(% by mass)	45.68	44.52	44.48	44.52	44.71
17	Permeability	(cm/hr)	1.59	1.32	1.49	1.46	1.51
18	Bulk Density	(kg/cm <sup>3</sup> )	2.06	1.79	1.85	1.84	1.97
19	TKN	%	0.08	0.08	0.09	0.1	0.1

From the above results it may be concluded that texture of the soil in the study area is sandy loam with conductivity ranging from 364.31 to 366.4 Micro mhos/cm at village Girwan and Paigambarpur respectively. Soil has Water holding capacity in the range of 41.21 to 44.45.



**Figure 3- 5: Graph showing content of Percentage of clay, Silt and Sand by mass at five monitoring locations**

### Observations:

Monitoring data shows that the texture of soil at all locations is Sandy Loam. The monitoring sites have sand ranging from 45% to 55% in soil samples. Silt content varies from 22% to 23%, while Clay content varies from 22% to 32% in the soil samples.

- ✓ The data shows that value of pH ranges from 7.57 at Girwan to 7.69 at Zamapur indicating that all soil samples are neutral.
- ✓ Girwan shows minimum conductivity of 364.31  $\mu\text{mhos/cm}$ , while village Paigambarpur shows maximum conductivity of 366.4  $\mu\text{mhos/cm}$ .
- ✓ Values of CEC ranges from 3.43 meq/100g as lowest at Zamapur and 3.71 meq/100g as maximum at Murwan.
- ✓ Magnesium values ranges from 66.64 meq/100g as lowest at Majgawan Sehonda and 69.06 meq/100g as highest at Paigambarpur.

- ✓ The average concentration of Phosphorus and Potassium in the soil samples varies from 11.62 to 11.79 mg/kg and 244.65 to 246.89 mg/kg.

### 3.3 WATER ENVIRONMENT

The general water table depth of study area falls between 53-50 m AMSL during pre-monsoon and post-monsoon periods.

#### 3.3.1 Water consumption & Sources

The projected water requirements for the mine site are likely to be in the range of 4.95 Kld. The major areas of water consumption are dust suppression (3.60 KLD), for domestic purposes (0.35 KLD) and green belt development (1.0 KLD). Most of the water consumption proposed will be for dust suppression. It is to be noted that due to mechanical nature of mining in this lease the water requirement for the dust suppression will be optimal.

#### 3.3.2 Methodology of Baseline data generation

The assessment of present status of water quality within the study area was conducted by collecting water from ground water sources and surface water sources during the period of March-2019 to May-2019. The sampling locations were identified on the basis of their importance. Three ground water samples and two surface water samples were collected during the monitoring period. The locations of sampling stations for ground water and surface water are shown in **Figure 3-1** and details are given in **Table 3-5**

**Table 3- 5: Location of water monitoring station**

S.No.	Type of sample	Location code	Location Name	Direction
1.	Ground water	GW1	Village Zamapur	SE
2.	Ground water	GW2	Village Majgawan Sehonda	NW
3.	Ground water	GW3	Village Paigambarpur	NE
4.	Surface water	SW1	Pond near Village Girwan	N
5.	Surface water	SW2	Khaparia Tal near Vill. Jarar	NW

Water samples were collected from all the sampling locations and analyzed for relevant physical, chemical and bacteriological parameters. Collection and analysis of the samples was carried out as per established standard methods and procedures, prescribed by CPCB, relevant IS Codes and Standard Methods of Examination of Water.

Analyses of the parameters like temperature; pH, dissolved oxygen and alkalinity were carried out at the sampling stations immediately after collection of samples with the help of Field Analysis Kits. For analysis of other parameters, the samples were preserved and brought to laboratory at Noida. The metallic constituents like arsenic, mercury, lead, cadmium, chromium, copper, zinc, selenium, iron and manganese were analyzed with Atomic Absorption Spectroscope.

### 3.3.3 Ground water quality

The ground water analysis data for the monitoring period i.e. March-2019 to May-2019 is presented in Table 3-8 respectively. The physico-chemical characteristics of Ground water are analyzed with the drinking water standards, prescribed in IS: 10500 (Test Characteristics for Drinking Water).

**Table 3- 6: Ground water quality Analysis results for March-2019 to May-2019**

Physico-chemical properties of ground water					
MICROBIOLOGICAL REQUIREMENT RESULT					
S.No	Parameter	Requirements as per IS- 10500:2012	Results		
			GW1	GW2	GW3
1.	Escherichia coli	Absent/100ml	Absent	Absent	Absent
2.	Coliform Bacteria	Absent/100ml	Absent	Absent	Absent

## ORGANOLEPTIC &amp; PHYSICAL PARAMETERS

S. No	Parameter	Requirement (Acceptable Limit)	Permissible Limit in absence of alternate source	Unit	Result		
					GW1	GW2	GW3
1.	Colour	5	15	Hazen	<1.00	<1.00	<1.00
2.	Odour	Agreeable	Agreeable	-	Agreeable	Agreeable	Agreeable
3.	Taste	Agreeable	-	-	Agreeable	Agreeable	Agreeable
4.	Turbidity	1	5	NTU	<1.00	<1.00	<1.00
5.	pH value	6.5-8.5	-	-	7.15	7.18	7.39
6.	Total dissolve solid ( TDS)	500	2000	mg/l	456	446.0	458

## GENERAL PARAMETERS CONCERNING SUBSTANCES UNDESIRABLE IN EXCESSIVE AMOUNTS

S. No	Parameter	Unit	Requirement (Acceptable Limit)	Permissible Limit in absence of alternate source	Result		
					GW1	GW2	GW3
1.	Aluminium (as Al)	mg/l	0.03	0.2	<0.01	<0.01	<0.01
2.	Total Ammonia	mg/l	0.5	No Relaxation	<0.10	<0.10	<0.10
3.	Anionic Detergents (as MBAS)	mg/l	0.2	1.0	<0.10	<0.10	<0.10
4.	Barium (as Ba)	mg/l	0.7	No Relaxation	<0.10	<0.10	<0.10
5.	Boron (as B)	mg/l	0.5	1.0	<0.10	<0.10	<0.10
6.	Calcium (as Ca)	mg/l	75	200	38.4	40	35.3
7.	Chloramines (as Cl <sub>2</sub> )	mg/l	4.0	No Relaxation	<1.00	<1.00	<1.00
8.	Chloride (as Cl)	mg/l	250	1000	64	72.2	75.32
9.	Copper (as Cu)	mg/l	0.05	1.5	<0.05	<0.05	<0.05
10.	Fluoride (as F)	mg/l	1.0	1.5	0.3	0.44	0.32
11.	Free Residual Chlorine	mg/l	0.2	1.0	BDL	BDL	BDL
			To be applicable only when water is chlorinated. Tested at consumer end. When protection against viral infection is required, it should be minimum 0.5 mg/l.				

## FINAL EIA REPORT FOR BUILDING STONE (KHANDA, GITTI, BOULDERS) MINE

12.	Iron (as Fe)	mg/l	0.3	No Relaxation	0.12	0.15	0.17
13.	Magnesium (as mg)	mg/l	30	100	14	20.4	18
14.	Manganese (as Mn)	mg/l	0.1	0.3	<0.10	<0.10	<0.10
15.	Mineral Oil	mg/l	0.5	No Relaxation	<0.50	<0.50	<0.50
16.	Nitrate (as NO <sub>3</sub> )	mg/l	45	No Relaxation	7.01	7.63	7.36
17.	Selenium (as Se)	mg/l	0.01	No Relaxation	<0.01	<0.01	<0.01
18.	Silver (as Ag)	mg/l	0.1	No Relaxation	<0.05	<0.05	<0.05
19.	Sulphate (as SO <sub>4</sub> )	mg/l	200	400	29.37	31.82	33.92
20.	Sulphide(as H <sub>2</sub> S)	mg/l	0.05	No Relaxation	<0.05	<0.05	<0.05
21.	Alkalinity ( as Ca CO <sub>3</sub> )	mg/l	200	600	189.3	180.67	177.3
22.	Total Hardness (as CaCO <sub>3</sub> )	mg/l	200	600	169.2	187	167.32
23.	Zinc (as Zn)	mg/l	5.0	15	BDL	BDL	BDL
24.	Phenolic Compound as (C <sub>6</sub> H <sub>5</sub> OH)	mg/l	0.001	0.002	BDL	BDL	BDL

## Parameters Concerning Toxic Substances:

S.NO.	Parameter	Unit	Requirement (Acceptable Limit)	Permissible Limit in absence of alternate source	Result		
					GW1	GW2	GW3
1.	Cadmium (as Cd)	mg/l	0.003	No Relaxation	<0.001	<0.001	<0.001
2.	Cyanide (as CN)	mg/l	0.05	No Relaxation	<0.01	<0.01	<0.01
3.	Lead ( as Pb)	mg/l	0.01	No Relaxation	<0.01	<0.01	<0.01
4.	Mercury (as Hg)	mg/l	0.001	No Relaxation	<0.001	<0.001	<0.001
5.	Molybdenum (Mo)	mg/l	0.07	No Relaxation	<0.05	<0.05	<0.05
6.	Nickel (as Ni)	mg/l	0.02	No Relaxation	<0.01	<0.01	<0.01
7.	Poly Nuclear Aromatic Hydrocarbons	mg/l	0.0001	No Relaxation	<0.0001	<0.0001	<0.0001
8.	Poly Chlorinated biphenyls	mg/l	0.0005	No Relaxation	<0.0001	<0.0001	<0.0001
9.	Total Arsenic (as As)	mg/l	0.01	0.05	<0.01	<0.01	<0.01
10.	Total Chromium (as Cr)	mg/l	0.05	No Relaxation	<0.05	<0.05	<0.05

BDL: Below Detection limit.

The value of pH ranges from 7.15 to 7.39, indicating that water is alkaline in the study area. Total hardness of ground water ranges from 167.32 to 187.0 mg/l. Observed values of Chloride vary from 64.0 mg/l at Zamapur village to 75.32 mg/l at Paigamberpur village. The ground water quality is in general poor (brackish to saline) at deeper levels at mostly all locations.

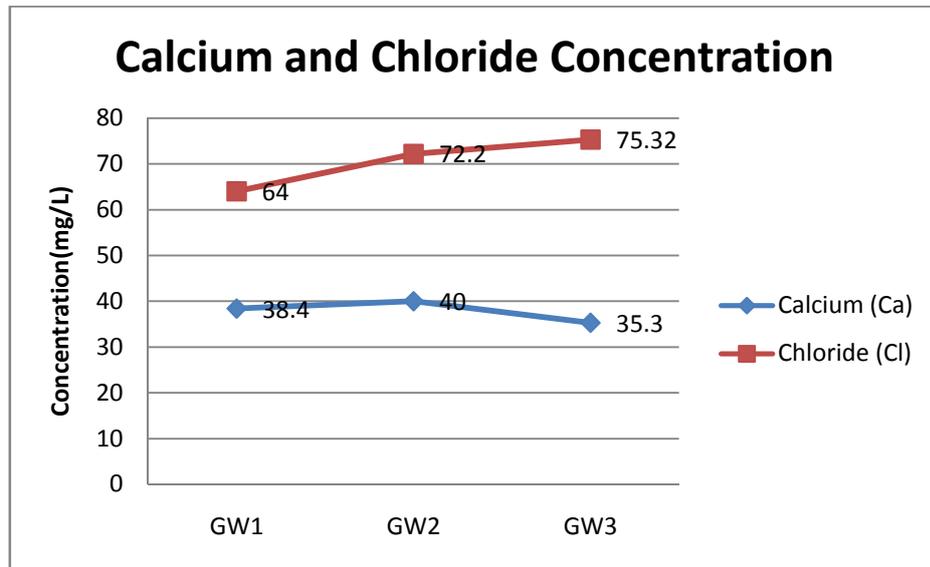


Figure 3- 6: Calcium and Chloride content at three monitoring location in ground water

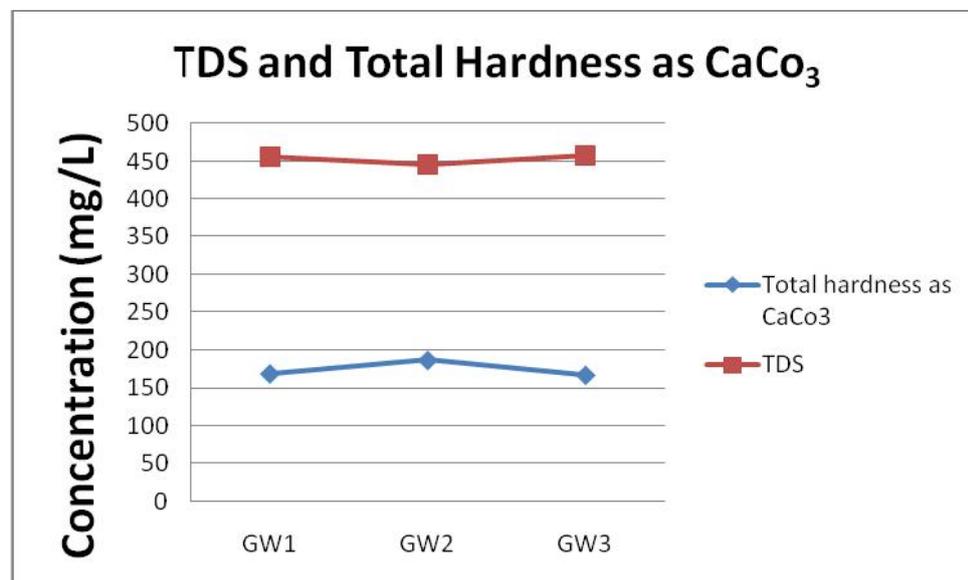


Figure 3- 7: TDS and Total hardness(as CaCO<sub>3</sub>) value at three monitoring location in ground water

**Observation:**

Analysis of results of ground water reveals the following: -

- pH varies from 7.15 at GW-1 to 7.39 at GW-3.
- Total hardness varies from 167.32 mg/l at GW-3 to 187.0 mg/l at GW-2.
- Total dissolved solids vary from 446 mg/l at GW-2 to 458.0 mg/l at GW-3.

The ground water from all sources remains suitable for drinking purposes as all the constituents are within the limits prescribed by drinking water standards promulgated by Indian Standards IS: 10500.

### 3.3.4 Surface Water

The samples of surface water have been collected from two surface water bodies and analyzed for parameters prescribed as per IS 10500.

#### 3.3.4.1 Existing drainage pattern

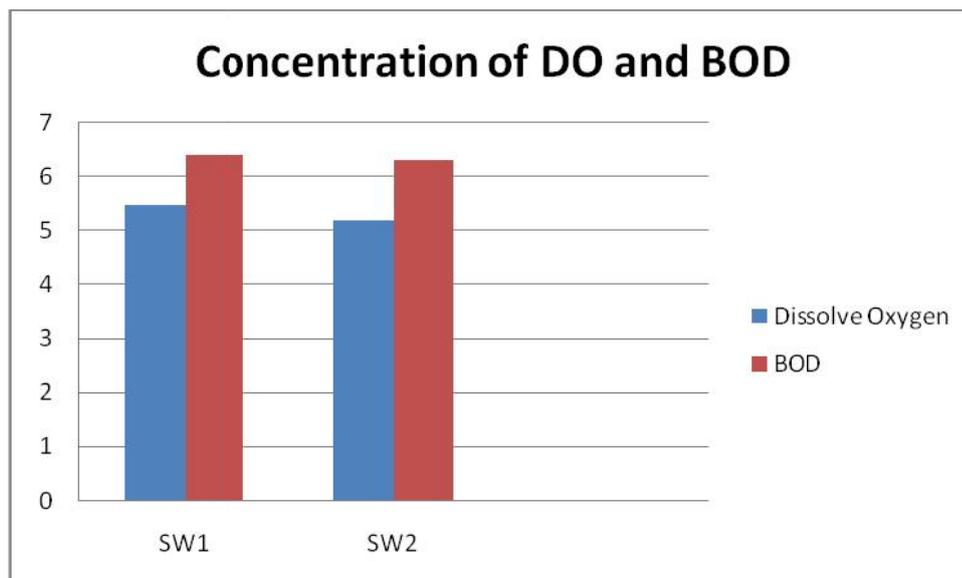
No prominent water course or nallah occur in the lease area. The general slope of lease area is from North to South directions. During rainy season the surface runoff follows the natural contour and flows in the same direction.

#### 3.3.4.2 Surface water quality

The surface water analysis data for the monitoring period i.e. March-2019 to May-2019 is presented in **Table 3-7**. The physico-chemical characteristics of Surface water are found within the limits, prescribed by CPCB. The surface water quality is in general poor (brackish to saline) at mostly all locations.

Table 3- 7: Surface water analysis results (March-2019 to May-2019)

S. No.	Parameter	Unit	Test Method	S.W. 1	S.W. 2
1	pH	-	IS:3025(Part-11)	7.24	7.54
2	Temperature (°C)	-	IS:3025(Part-9)	28	28
3	Turbidity	NTU	IS:3025(Part-10)	<1.0	<1.0
4	Conductivity @250C	µS/cm	IS:3025(Part-14)	388	444
5	Sulphate (as SO <sub>4</sub> )	mg/l	IS:3025(Part-24)	23	23
6	Nitrate (as NO <sub>3</sub> )	mg/l	IS:3025(Part-34)	2.1	2.3
7	Total Hardness (as CaCO <sub>3</sub> )	mg/l	IS:3025(Part-21)	260	254
8	Chloride (as Cl)	mg/l	IS:3025(Part-32)	86.91	87.93
9	Fluoride (as F)	mg/l	APHA 4500F	0.06	0.05
10	COD	mg/l	APHA-5220 B	22.5	21.8
11	Iron (as Fe)	mg/l	IS:3025(Part-53)	0.21	0.23
12	Dissolved oxygen	mg/l	IS-3025(Part-38)	5.48	5.20
13	Total Dissolved Solids (TDS)	mg/l	IS:3025(Part-16)	274.6	302.8
14	BOD (3 Days at 27°C)	mg/l	IS:3025 (P-44)	6.40	6.30
15	Calcium (as Ca)	mg/l	IS:3025(Part-40)	29.18	30.98
16	Magnesium (as Mg)	mg/l	IS:3025(Part-46)	11.18	11.39
17	Arsenic (as As)	mg/l	IS:3025(Part-37)	BDL	BDL
18	Lead (as Pb)	mg/l	IS:3025(Part-47)	BDL	BDL
19	Copper (as Cu)	mg/l	IS:3025(Part-42)	BDL	BDL
20	Zinc (as Zn)	mg/l	IS:3025(Part-49)	1.34	1.33
21	Manganese (as Mn)	mg/l	IS:3025(Part-59)	BDL	BDL
22	Total Chromium (as Cr)	mg/l	IS:3025(Part-52)	BDL	BDL
23	Sodium (as Na)	mg/l	IS:3025(Part-45)	28.1	24.5
24	Potassium (as K)	mg/l	IS:3025(Part-45)	2.4	1.9
25	Total Alkalinity (as CaCO <sub>3</sub> )	mg/l	IS:3025(Part-23)	153.11	140.8
26	Phosphate (as PO <sub>4</sub> _P)	mg/l	IS:3025(Part-31)	0.12	0.09
27	Nitrate (as NO <sub>3</sub> )	mg/l	IS:3025(Part-34)	BDL	BDL
28	Total Suspended Solid	mg/l	IS:3025(Part-17)	4.27	4.3
29	Faecal Coliform	>1600MPN/100ml	IS-1622	1.6×10 <sup>3</sup> no./100 ml	1.6×10 <sup>3</sup> no./100 ml
30	Total Coliform	MPN/100ml	IS-1622	1.9×10 <sup>3</sup> no./100 ml	1.9×10 <sup>3</sup> no./100 ml



**Figure 3- 8: Graph showing concentration of Dissolved Oxygen and Biochemical Oxygen Demand at two monitoring location**

#### **Observation:**

The analysis results indicate that the pH ranges between 7.24 to 7.54. Dissolved Oxygen (DO) was observed in the range of 5.20 to 5.48 mg/l against the minimum requirement of 4 mg/l. BOD values were observed to be in the range of 6.30 to 6.40 mg/l.

The chlorides and Sulphates were found to be in the range of 86.91 to 87.93 mg/l and 23.0 to 23.0 mg/l respectively.

Bacteriological examination of surface water samples revealed the presence of total coliform in range of  $1.6 \times 10^3$  no/100 ml to  $1.9 \times 10^3$  no/100 ml.

Based on the results it is evident that most of the parameters of the samples comply with 'Category 'B' standards of CPCB indicating their suitability for Outdoor Bathing.



### 3.4.3 Climatology

A hot summer and general dryness prevail during the year except, the South west monsoon season. The year may be divided into four seasons. The cold season December to February is followed by hot season from March to middle of June. The period from middle of June to September is the south west monsoon season. October and November are the post monsoon or transition period.

The normal maximum temperature received during the month of May is 42.3°C to 48.1°C & minimum during the month of January is 7.1°C to 4.3°C the normal annual means maximum & minimum temperature of Banda district is 32.7°C and 18.1°C respectively

### 3.4.4 Ambient Air Quality

The prime objective of the baseline study with respect to ambient air quality is to establish the present air quality and its conformity to ambient air quality standards. This section describes the sampling locations, frequency of sampling and methodology adopted for monitoring ambient air quality. The results of monitoring during the study period (March-2019 to May-2019) are presented in the report. The study area represents mostly rural environment. The sources of air pollution in the region are vehicular traffic, dust arising from unpaved village roads and domestic fuel burning.

#### 3.4.4.1 Methodology adopted for the study

##### Sampling locations, parameters and frequency

Calibrated Respirable Dust Samplers were used for the sampling of PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub> and NO<sub>x</sub>. Ambient air sampling for PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, and NO<sub>x</sub> was performed continuously for 24 hours to determine 24-hour average concentrations. Ambient air quality monitoring was carried out with a frequency of two days per week at all five locations. The sampling was performed at a height of 1.5 m (approximately) from the ground level. Standard methods specified under "National Ambient Air Quality Standards" notification G.S.R. 176(E) were adopted for sampling and analysis. Five locations within the study area were scientifically selected and are based on the following considerations:

- Meteorological conditions;
- Topography of the study area;
- The direction of the wind;

- Representation of the region for establishing baseline status; and
- Representation with respect to likely impact areas.

The location of the monitoring stations with reference to the proposed plant site is given in **Table 3-8** and shown in **Figure 3-1**.

**Table 3- 8: Details of Air Monitoring locations**

S.No.	Location code	Location Name	Direction
1.	A1	Girwan (Near Mine site)	SW
2.	A2	Village Zamapur	SE
3.	A3	Village Majgawan Sehonda	NW
4.	A4	Village Murwan	SE
5.	A5	Village Paigambarpur	NE

### Sampling and analytical techniques

#### Particulate Matter (10), (2.5)

Calibrated 'Respirable Dust Samplers' with Whatman GF/A microfibre filter paper (size: 8" X 10") was used for the collection of PM (10). APM- 151 air sampler was attached with Respirable Dust Sampler for monitoring particulate matter of size <2.5 microns. A known volume of ambient air is passed through the cyclone to the initially preprocessed filter paper. The centrifugal force in cyclone acts on particulate matter to separate them into two parts and collected as followings: -

1. Particles <10  $\mu$  size (Respirable) : GF/A Filter Paper
2. Particles >10  $\mu$  size (Non Respirable) : Cyclone Cup
3. Particles <2.5  $\mu$  size : Teflonfilter paper 47mm

The differences in final and initial weight of filter paper and cyclone cup are used in estimation of particulate matter. The mass of particulates collected on the GF filter, divided by the volume of sampled air, gives the concentration of PM (10) whereas the mass of particulates collected on the Teflon filter, divided by the volume of sampled air,

gives the concentration of PM (2.5). The results are expressed in  $\mu\text{g}/\text{m}^3$ .

### Sulphur Dioxide

Sampling and analysis of ambient  $\text{SO}_2$  was performed by adopting the 'Improved West and Gaeke Method'. The ambient air, drawn through the draft created by the RDS, is passed through an impinger, containing a known volume of absorbing solution of *sodium tetrachloromercurate*, at a pre-determined and measured flow rate of 1 liter/minute (L/min).  $\text{SO}_2$  in ambient air reacts with the *tetrachloromercurate* to form a stable complex, *dichlorosulphito mercurate*. On reacting with *formaldehyde* and *p-rosaniline hydrochloride*, the sulphite ion forms an intensely coloured compound, *p-rosaniline methyle sulphonic acid*. The intensity of the colour developed is estimated by spectrophotometer at 560 nm wave length. The measured Optical Density (OD) is used to determine the concentration of  $\text{SO}_2$  from the calibration curve already prepared against known concentrations of sulphite ion. The mass of  $\text{SO}_2$  in the absorbing reagent, divided by the volume of sampled air provides the concentration of  $\text{SO}_2$ , which is expressed as  $\mu\text{g}/\text{m}^3$ .

### Nitrogen Oxides

Sampling and analysis of ambient  $\text{NO}_x$  was performed by adopting the 'Jacob Hochheister Modified' (Na arsenite) method. Ambient air is drawn through an impinger at a pre determined flow rate of 1 ppm. The impinger contains known volume of absorbing solution of *sodium arsenite* and *sodium hydroxide*. Oxides of nitrogen react with the absorbing reagent to form a stable solution of *sodium nitrite*. The nitrate ion produced during the sampling is estimated calorimetrically, after reacting with *phosphoric acid*, *sulphanilamide* and *naphthyl ethylenediamine dihydrochloride* (NEDA), using spectrophotometer at 540 nm wavelength. The measured Optical Density is used to determine the concentration of  $\text{NO}_x$  from the calibration curve already prepared against known concentrations of nitrite ion. The mass of  $\text{NO}_x$  in the absorbing reagent, divided by the volume of sampled air provides the concentration of  $\text{NO}_x$ , which is expressed as  $\mu\text{g}/\text{m}^3$ .

Table 3- 9: Techniques Used for Ambient Air Quality Monitoring

Parameters	Technique	Technical Protocol	Minimum Detectable Limit (ug/m <sup>3</sup> )
PM <sub>10</sub>	CPCB Guideline (Gravimetric method)	IS-5182 (Part-IV)	1.0
PM <sub>2.5</sub>	Gravimetric	As per CPCB Guideline	1.0
Sulphur Dioxide	West and Gacke (Modified)	IS-5182 (Part-II)	5.0
Nitrogen Oxide	Jacob & Hochheiser (Improved)	IS-5182 (Part-VI)	9.0

### Air Quality Standards

National Ambient Air quality standards (18 June 2009) along with the prescribed method of measurement is given in **Table 3.10**

**Table 3- 10: National Ambient Air Quality Standards**

Pollutants	Time-weighted average	Concentration in Ambient Air		Method of measurement
		Industrial Areas, residential, rural and other area	Ecologically Sensitive Areas (notified by Central Government)	
Sulphur Dioxide (SO <sub>2</sub> )	Annual Average*	50 µg/m <sup>3</sup>	20 µg/m <sup>3</sup>	- Improved West and Geake Method -Ultraviolet fluorescence
	24 hours**	80 µg/m <sup>3</sup>	80 µg/m <sup>3</sup>	
Oxides of Nitrogen as (NO <sub>2</sub> )	Annual Average*	40 µg/m <sup>3</sup>	30 µg/m <sup>3</sup>	- Modified Jacob & Hochheiser (Na-Arsenite) Method - Gas Phase Chemiluminescence
	24 hours**	80 µg/m <sup>3</sup>	80 µg/m <sup>3</sup>	
Particulate Matter (Size less than 10µm) or PM <sub>10</sub> µg/m <sup>3</sup>	Annual Average*	60 µg/m <sup>3</sup>	60 µg/m <sup>3</sup>	- Gravimetric -TOEM -Beta attenuation
	24 hours**	100 µg/m <sup>3</sup>	100 µg/m <sup>3</sup>	
Particulate Matter (size less than 2.5 microns) PM <sub>2.5</sub> µg/m <sup>3</sup>	Annual Average*	40 µg/m <sup>3</sup>	40 µg/m <sup>3</sup>	- Gravimetric -TOEM -Beta attenuation
	24 hours**	60µg/m <sup>3</sup>	60 µg/m <sup>3</sup>	

\*Annual arithmetic mean of minimum 104 measurements in a year at a particular site taken twice a week: 24 hourly at uniform intervals.

\*\*24 hourly or 08 hourly or 01 hourly monitored values, as applicable, shall be complied with 98% of the time in a year. 2% of the time, they may exceed the limits but not on two consecutive days of monitoring.

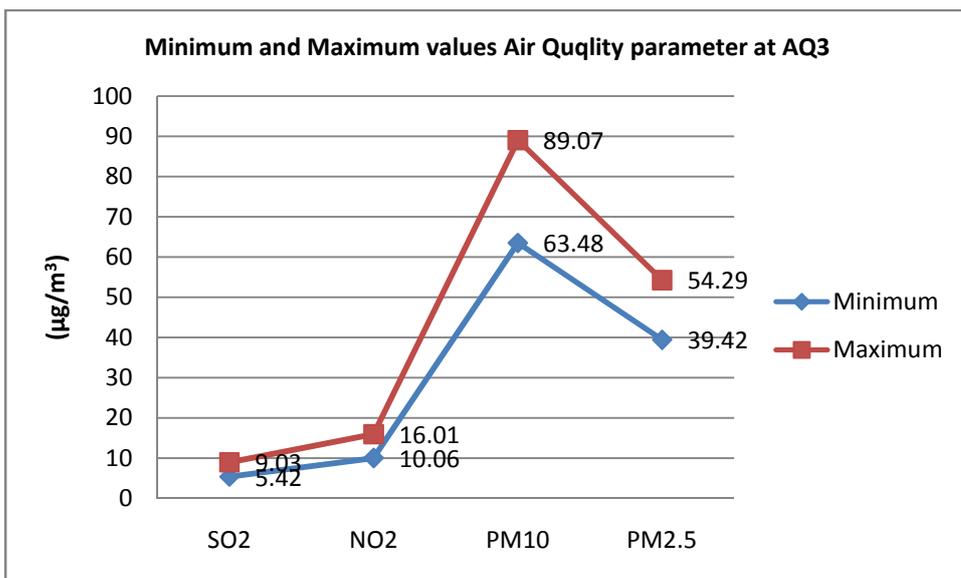
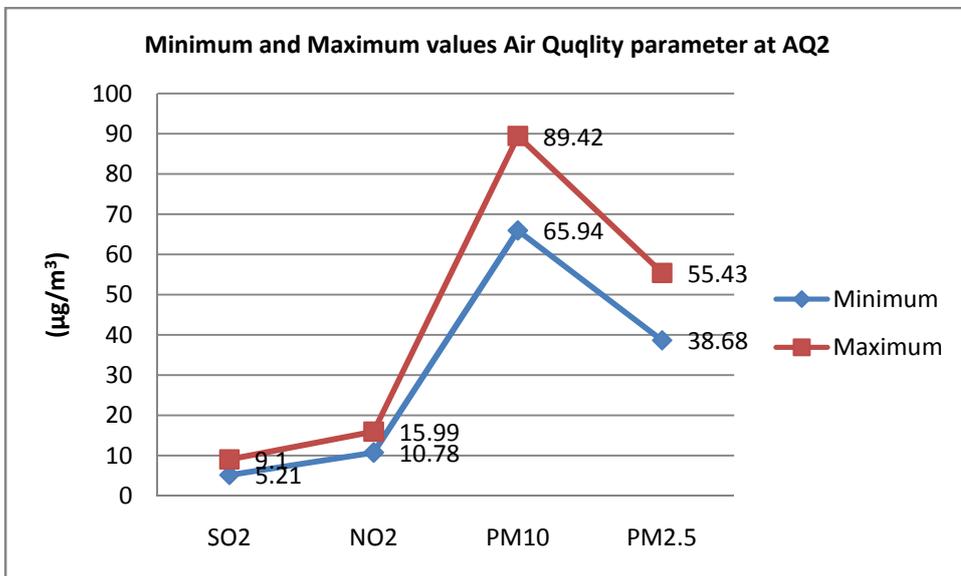
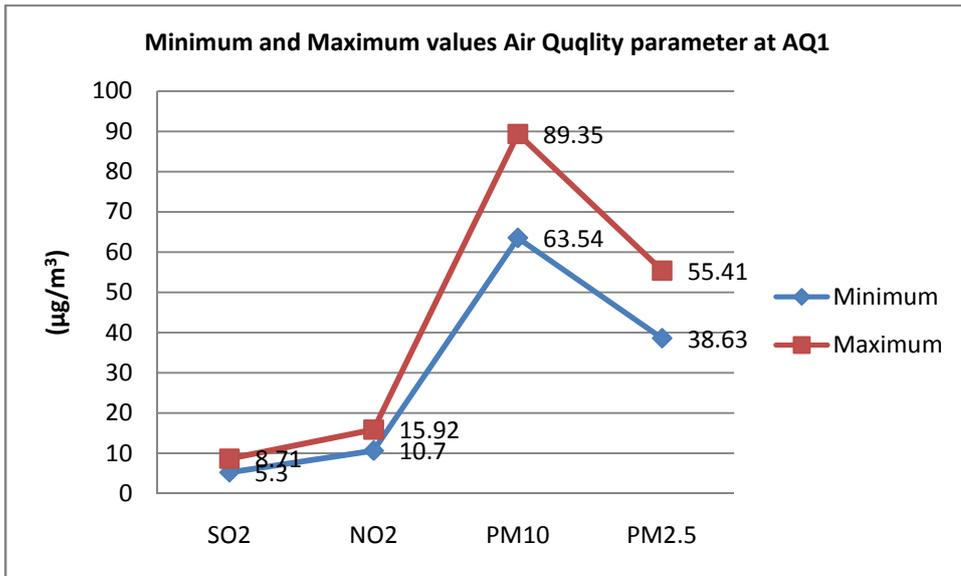
#### 3.4.4.2 Ambient air quality results

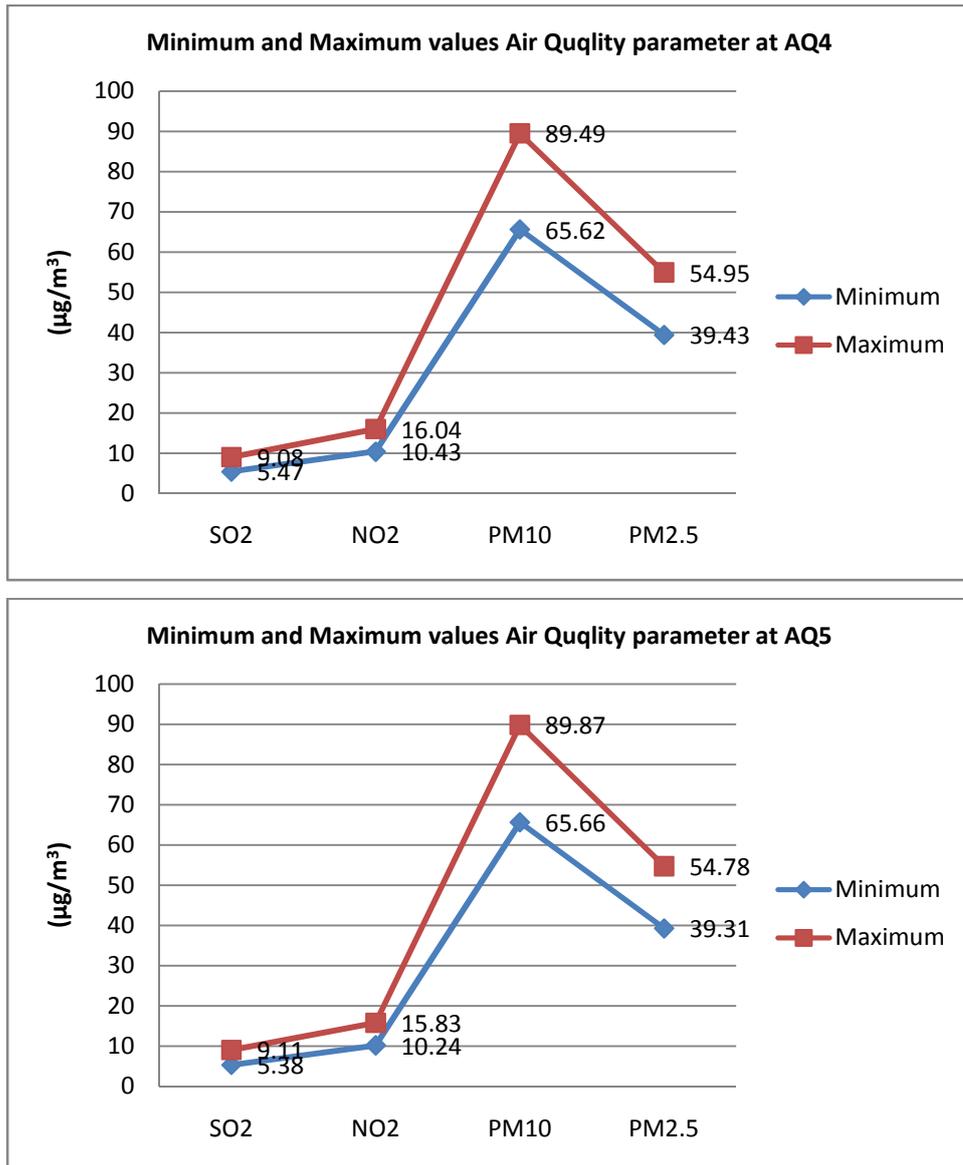
The results of ambient air quality monitoring for the period (March-2019 to May-2019) are presented in the report. Data has been compiled for three months. Various parameters monitored during the study have been described by their maximum, minimum and average values from their study site locations. The results for five locations have been discussed under the following pages.

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S. No.	Pollutant	Location	No. of observation	Minimum	Maximum	Average	CPCB Standards
1.	SO <sub>2</sub> (µg/m <sup>3</sup> )	AQ1	24	5.30	8.71	7.11	80.0
		AQ2		5.21	9.10	7.19	
		AQ3		5.42	9.03	7.08	
		AQ4		5.47	9.08	7.20	
		AQ5		5.38	9.11	6.88	
2.	NO <sub>2</sub> (µg/m <sup>3</sup> )	AQ1	24	10.7	15.92	13.18	80.0
		AQ2		10.78	15.99	13.10	
		AQ3		10.06	16.01	13.09	
		AQ4		10.43	16.04	13.22	
		AQ5		10.24	15.83	13.17	
3.	PM <sub>10</sub> (µg/m <sup>3</sup> )	AQ1	24	63.54	89.35	76.54	100.0
		AQ2		65.94	89.42	77.16	
		AQ3		63.48	89.07	76.07	
		AQ4		65.62	89.49	75.88	
		AQ5		65.66	89.87	77.45	
4.	PM <sub>2.5</sub> (µg/m <sup>3</sup> )	AQ1	24	38.63	55.41	47.76	60.0
		AQ2		38.68	55.43	48.81	
		AQ3		39.42	54.29	46.82	
		AQ4		39.43	54.95	47.08	
		AQ5		39.31	54.78	47.70	
5.	Free Silica	AQ1	24	1.20	1.96	1.59	-
		AQ2		0.86	1.62	1.25	
		AQ3		0.83	1.59	1.22	
		AQ4		0.59	1.35	0.98	
		AQ5		0.62	1.38	1.01	

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**Figure 3- 9: Graphs of SO<sub>2</sub>, NO<sub>2</sub>, PM<sub>10</sub>, PM<sub>2.5</sub> concentration at five Air Quality monitoring locations**

#### Observations:

Ambient Air Quality Monitoring reveals that the minimum & maximum concentrations of PM<sub>10</sub> for all the 5 AQ monitoring stations were found to be 63.48 µg/m<sup>3</sup> at AQ-3 and 89.87 µg/m<sup>3</sup> at AQ-5, respectively.

As far as the gaseous pollutants SO<sub>2</sub> and NO<sub>x</sub> are concerned, the prescribed CPCB limit of 80 µg/m<sup>3</sup> for residential and rural areas has never surpassed at any station. The minimum & maximum concentrations of SO<sub>2</sub> were found to be 5.21 µg/m<sup>3</sup> at AQ-2 & 9.11 µg/m<sup>3</sup> at AQ-5, respectively. The minimum & maximum concentrations of NO<sub>x</sub> were found to be 10.06 µg/m<sup>3</sup> at AQ-3 & 16.04 µg/m<sup>3</sup> at AQ-4 respectively. The air environment around this area is also affected by agriculture activities in the area.

#### Free Silica

The NAAQ standards prescribed for Industrial, Residential, Rural and other areas do not define limits for standards of free silica in ambient air. Silica is a component of PM<sub>10</sub>, standards for which are prescribed under the NAAQ. Crystalline silica is composed of SiO<sub>2</sub> whereas SiO<sub>2</sub> in the pure form (not combined with cations) is free silica.

Rock quarries, sand /minerals mining and rock crushing are potential crystalline silica sources. The size of crystalline silica particles is smaller than 4 µm (PM<sub>4</sub>). There are no generally accepted methods of monitoring in ambient PM<sub>4</sub> air.

Inhaling finely divided crystalline silica dust in very small quantities overtime can lead to silicosis, bronchitis or cancer. The American Conference of Governmental Industrial Hygienists recommends 0.1 mg/m<sup>3</sup> (10 µg/m<sup>3</sup>) crystalline silica as respirable free silica as exposure limits.

The maximum & minimum concentrations of Free Silica were found to be 1.96 µg/m<sup>3</sup> at AQ-1 & 0.59 µg/m<sup>3</sup> at AQ-4, respectively. Free silica content should not exceed 5% as prescribed by Directorate General of Mines Safety.

### 3.5 Noise Environment

Noise is said to be defined as an unwanted sound. It is, therefore, necessary to measure both the quality as well as the quantity of environment noise in and around the mining site.

**Types of Sound Fields** Based on the distance from the source of sound generation, the types of sound field are identified. They are of three type's viz. (i) Free Field (ii) Near Field and (iii) Far Field.

#### I. Free Field

The sound waves that propagate without obstruction from source to the receiver are free field. The sound waves obey the inverse square law so that sound pressure level decreases by 6 dB (A) as the distance is doubled. Such a field is known as free field.

#### II. Near Field

This field is located within a few wavelengths of the source and it is also influenced by the dimensions of the source. The inverse square law does not apply in this field.

### III. Far Field

The far field has two parts one is known as free part and the other as reverberation part. In the free part of the far field, the sound pressures level obeys the inverse square law and propagate without obstruction from source to the receiver. The reverberant part of the field exists for enclosed situation where the reflected sound waves are superimposed on the incident sound waves. If there are many reflected waves from all possible direction, a diffuse sound field exists. The intensity of sound energy in the environment is measured in a logarithmic scale and is expressed in a decibel (dB) scale. Ordinary sound level meter measures the sound energy that reaches the microphone by converting it into electrical energy and then measures the magnitude in dB. In a sophisticated type of sound level meter, an additional circuit (filters) is provided, which modifies the received signal in such a way that it replicates the sound signal as received by the human ear and the magnitude of sound level in this scale is denoted as dB (A). The sound levels are expressed in dB (A) scale for the purpose of comparison of noise levels, which is universally accepted by the international community.

Noise levels were measured using an Integrating sound level meter manufactured by Cygnet (Model No. 2031). It has an indicating mode of Lp and Leq. Keeping the mode in Lp for few minutes and setting the corresponding range and the weighting network in "A" weighting set the sound level meter was run for one hour time and Leq was measured at all locations. The day noise levels have been monitored during 6.00am to 10.00pm and night noise levels, during 10.00pm to 6.00am at all the ten locations covered in 10 km radius of the study area.

The L10, L50, L90, Leq, Ld and Ln were computed based on the sound pressure level recorded.

- Leq - 24 Hourly equivalent continuous noise levels
- Ld - Daytime Leq that has computed from 6.00 a.m to 10.00 pm
- Ln - Nighttime Leq that is computed from 10.00 p.m. to 6.00 a.m

#### 3.5.1 Noise Level Survey

A preliminary reconnaissance survey was undertaken to identify the major noise generating sources in the area. The noise survey was conducted in the month of May-2019 to assess the background noise levels in different zones viz. industrial, commercial, and residential and silence zones.

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The sampling locations for noise are confined to residential, commercial and sensitive areas; however, no industrial area is present within the 10 km radius of the project site. 05 sampling locations were selected for the sampling of noise and are shown in **Figure 3-1** and also given in **Table 3-11**.

**Table 3- 11: Details of Noise Monitoring Locations**

S.No	Location code	Category	Location Name	Direction
1	NQ1	Residential	Girwan (Near Mine site)	SW
2	NQ2	Residential	Village Zamapur	SE
3	NQ3	Residential	Village Majgawan Sehonda	NW
4	NQ4	Residential	Village Murwan	SE
5	NQ5	Residential	Village Paigambarpur	NE

### 3.5.2 Ambient Noise Standards

Ministry of Environment & Forests (MoEF) has notified the noise standards vide gazette notification dated February 14, 2000 for different zones under the Environment Protection Act (1986). These standards are given in **Table 3-12**

**Table 3- 12: Ambient Noise Quality Standards in respect of Noise**

Area Code	Category of Area	Noise dB (A) $L_{eq}$	
		Daytime*	Night time*
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

**Note:**

1. Daytime from 6.00am to 10.00pm and Night time from 10.00pm to 6.00a m.
2. Silence zone is defined as area up to 100 meters around premises of hospitals, educational institutions and courts. Use of vehicle horns, loud speakers and bursting of crackers are banned in these zones

### 3.5.3 Noise Quality

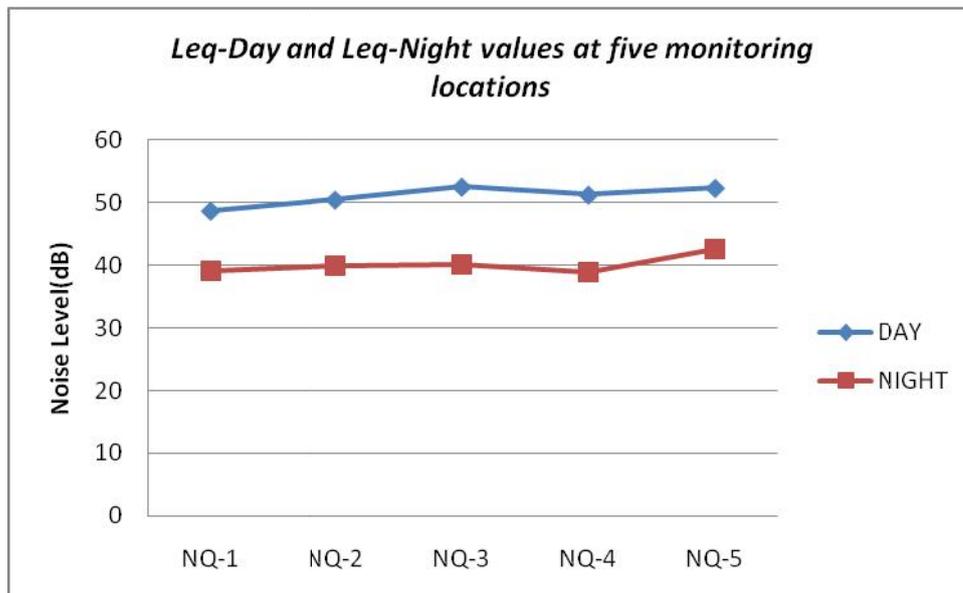
The noise data compiled on noise levels for May. - 2019 is presented in **Table 3-13**. It can be observed from the table that the noise levels ranges from 38.9 to 42.6 dB (A) during daytime and 48.6 to 52.5 dB (A) during night time.

**Table 3- 13: Noise quality results of the study area**

S. No.	Project Site	Zone	Leq LIMIT (as per CPCB Guidelines), in dB(A)		Leq Value monitored, in dB(A)	
			DAY*	NIGHT*	DAY*	NIGHT*
1	NQ1	Girwan (Near Mine site)	55	45	48.6	39.1
2	NQ2	Village Zamapur	55	45	50.4	39.9
3	NQ3	Village Majgawan Sihonda	55	45	52.5	40.2
4	NQ4	Village Murwan	55	45	51.2	38.9
5	NQ5	Village Paigamberpur	55	45	52.3	42.6

\* Day Time Leq in dB(A) (6.00AM TO 10.00PM)

Night Time Leq in dB(A) (10.00PM TO 6.00AM)



**Figure 3- 10: Graph of Leq-Day and Leq-Night values at five monitoring locations**

## Results

Noise monitoring reveals that the minimum & maximum noise levels at day time were recorded as 48.6 dB (A) at NQ-1 & 52.5 dB (A) at NQ-3, respectively. The minimum & maximum noise levels at night time were found to be 38.9 dB (A) at NQ-4 & 42.6 dB (A) at NQ-5.

There are several other sources in the 10 km radius of study area, which contributes to the local noise level of the area. Traffic activities as well as activities in nearby villages and agricultural fields add to the ambient noise level of the area.

## 3.6 Biological Environment

Biological environment of any area constitute all living beings of that area, it is an integral part of the environment. Hence, any change in the surrounding environment could cause loss of species or decrease in biodiversity of the area. Therefore, the present study is proposed to assess the impact of the proposed projects on biological environment of the project site and surrounding area within 10km radius. Accordingly, mitigation measures are evolved to sustain the biological diversity. In general biological environment is represented by flora and fauna. Flora constitutes the herbs, shrubs and trees and fauna constitutes the mammals, birds, reptiles, arthropods, amphibians, fishes etc.

### 3.6.1 Objectives of the study

The ecological study of the area has been conducted in order to understand the existing status of the flora and fauna to generate baseline information and evaluate the possible impacts on biological environment. The present study highlights the various issues pertaining to floristic diversity and faunal wealth in the surrounding area up to 10km radius of the proposed project sites.

### 3.6.2 Biogeography and Physiography of the study area:

Biological diversity comprises the variability of genus, species and ecosystems and is very crucial for maintaining the basic processes on which the life depends. Broadly it can be divided in two types i.e. the floral biodiversity and faunal biodiversity. It is a key to the sustainable development as it not only provides the food, fodder, medicine products of commercial and noncommercial use but also provides essential environmental services (Air, water quality, soil fertility, pest & disease control etc).

Biological components are one of the most important constituent of our environment.

They are the integral part of our life as they provide raw materials for livelihoods, trade, medicines and industrial development. Their conservation and sustainable use is very much essential in today's developmental process. Developmental processes are today's demand and cannot be stopped as such. It has been observed in past that most of our developmental process cost our environment. In order to keep them unaffected or minimum affected while our developmental activity, it is always necessary to know the background of the area from biological point of view. After getting such information we can estimate the impact on the environment by the proposed activities and mitigate them. Similar approach has been adopted for conducting the Biological Environment study for the proposed Project.

### 3.6.3 Study Approach & Methodology adopted

The baseline data for the proposed project was collected during the period of March-2019 to May-2019. A participatory and consultative approach was followed. Field visits were undertaken for survey of the vegetation and animals in the study area. The study area has been divided in to two parts as core area consisting of project site and the buffer area as the 10 km radius of the project site.

#### Sampling Methodology

**Flora** Floral status was assessed in different habitat types and project site of the study area. Quantitative data was collected using standard methods of quadrat method. Floral enumeration was done following standard sampling techniques. Random quadrates were laid in order to quantify the vegetation of the study area. Quadrat size for trees was 100 x 100 m, for shrubs it was 5 x 5 m and for herbs it was 1 x 1m. Plots of 1 x 1 m were laid within the tree quadrat at each corner to record grasses. In each of the quadrates, species and their number were recorded.

**Fauna Avifauna:** Standard methods were followed to survey the avifauna. The point count method was followed for counting the birds. Opportunistic surveys were also carried out with respect to avifaunal checklist. Identification by calls was also made for species which were not directly encountered or were hidden in the vegetation or canopy (Sridharan 1989, Bhupathy 1991, Bibby et al., 1992 and Hutto et al., 1986).

**Herpetofauna:** Area searches were done in the circular plots of 10 m radius to inventory all terrestrial habitats for reptiles and amphibians. Area searches consisted of turning cover objects like logs, boulders etc (Welsh, 1987). Sampling for these species involved capturing individuals by hand or observation through binoculars and aural surveys.

**Mammals:** Presence of mammals was documented by using both direct and indirect evidences. Opportunistic sightings were also included. Circular Plots were used to search indirect evidence i.e. animal burrows / holes, scat, pellets, feeding signs, and tracks. Photographic (colored pictorial guide) field guide were used for interviews with local residents (Burnham et al. 1980, Rodgers 1991, Sale and Berkmuller, 1988, Daniel, 1992) The data collected in the field was analyzed for secondary parameters such as density, frequency and abundance following standard phyto-sociological methods.

**Table 3- 14: Estimation of Phyto-sociological parameters**

Estimation of Phyto-sociological parameters	
Frequency (%)	= $\frac{\text{(No. of quadrates of occurrence of the species X 100)}}{\text{Total No. of quadrates sampled}}$
Abundance	= $\frac{\text{Total No. of individuals of the species}}{\text{No. of quadrates of Occurrence}}$
*Density	= $\frac{\text{Total No. of individuals of the species}}{\text{Total No. of quadrates sampled}}$
Relative Frequency	= $\frac{\text{(Frequency of the given species X 100)}}{\text{Sum of all frequencies}}$
Relative Density	= $\frac{\text{(Density of the given species X 100)}}{\text{Sum of all densities}}$
Relative Abundance	= $\frac{\text{(Abundance of species X 100)}}{\text{Sum of all abundances}}$
Basal Area	= $\frac{(\text{GBH})^2}{4\pi}$
Dominance	= $\frac{\text{Total Basal Area}}{\text{Total area sampled}}$
Relative Dominance	= $\frac{\text{(Dominance of given species X 100)}}{\text{Dominance of all species}}$
Important Value Index (I.V.I.)	= Relative Density+Relative Frequency+Relative Dominance
Note: *Density refers to the number of individuals per unit area of a site.	

### Statistical Analysis

Shannon-Wiener diversity index (Shannon and Wiener, 1963) was calculated for all life forms following:

Shannon- Wiener Information Function:  $D = -\sum p_i \ln p_i$

Where:  $i$  = an index for the number of species sampled,

$p_i = n_i/N$  =percentage of species  $i$  in the entire sample ( $N$ ) of individuals, and

$\ln$  = natural log. Multiply the percentage (or proportion) of each species in the sample times the natural log of that same value, sum the products across all species, and then multiply by minus 1.

### Threat Status Assessment/evaluation Criteria:

The biodiversity aspects in the form of endemic status, conservation status and life form have been enumerated for all the plant species found in the area during ecological survey. The Red Data Book of the Botanical survey of India has been screened to verify their conservation status. For wild animal species schedule of the Wildlife Protection Act (1972) has been screened.

### Ecosystems/ Habitat & Vegetation of the study area:

Based on the Survey of India 1:50,000 Toposheet (63 C/12& 63 C/16), the area falling within 10 km radius (Buffer Zone) from the Girwan (2.02 ha) mining site was predominately dominated by three major habitat types such as: agricultural land (Agro-ecosystem), wastelands and forest areas. However, for the study purpose they have been delineated into six sub-habitat types according to the nature of vegetation existing in the area.

1. **AGRO-ECOSYSTEM:** It consists of areas currently under intensive agriculture use (irrigated lands, un-irrigated lands/rain fed irrigation) and its surrounding hedge vegetation (locally known as 'wadis') owned by the private people. Since these areas are rich in moisture availability due to continuous cultivation it supports diverse floral and faunal species and formed major habitat of the buffer zone of the study area.
2. **WASTE LAND WITH OPEN SCRUB FOREST:** These are mainly small patches of waste lands (Gauchar lands, cultivable waste) with wild species of scrub vegetation and scattered tree species which belong to revenue /government or private. These patches are not purely designated forest areas.

3. **WASTE LAND WITH PROSOPIS SCRUB:** All the categories of waste lands (Gauchar land, permanent fallow lands) but purely dominated with *Prosopis juliflora* (gandobaval) and *Lantana* belongs to revenue or government.
4. **STREAM BEDS:** This includes the area on the banks of seasonal rivers, streams and small nallahs.
5. **WATER BODIES:** This habitat type includes: village ponds, dams, perennial rivers and streams located within the study area of covering 10 km radius from the core zone of the proposed mine project site.
6. **FOREST LAND:** This includes the forest area of the Barda Sanctuary which is overlapping with the buffer zone of the concerned mine lease project area. This sanctuary area has three major forest types like: *Acacia senegal* dense thorn forest, riverine forest with mixed tree species and mixed forest with *Euphorbia* domination.

### 3.6.4 Status of Flora

#### 3.6.4.1 Taxonomic Status of plant species:

**STUDY AREA:** The floral species in Nahari mine lease (2.02 ha) study area covering 10 km radius is reported as listed in table 3.15.

**Core Zone:** The core zone comprises of barren stony waste land, where mining operation is proposed. Shrubs on the mining site are naturally occurring but are very few in number. Most among them are weeds. No ecologically sensitive plant species has been reported from this area. The faunal variety is rather poor.

**Buffer Zone:** Buffer zone of the proposed project is mainly agricultural land. The flora of buffer zone comprises of plants growing on the edges of agricultural land, village woodlots and trees planted along the roads. Many tree species are planted in the area because of their usefulness, economic and aesthetic values. Many important species such as Neem (*Azadirachta indica*), Sisam (*Dalbergia sissoo*), *Terminalia tomentosa* (T. elliptica), and Khair (*Acacia catechu*) with other associated tree species like Palash (*Butea monosperma*), *Bombax ceiba*, *Aegle marmelos*, *Adina cordifolia*, *Syzigium cumini*, *Azadirachta indica*, etc. The area is also characterized by tall grasses like *Saccharum spontaneum*, and *Vetiveria zizanioides*. In waste land and along the road side weeds like *Argemone mexicana*, *Cannabis sativa*, *Cenchrus ciliaris*, *Heteropogon contortus*, *Parthenium hysterophorus*, etc. are very common.

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Table 3- 15: Overall taxonomic status of Flora in the study area

S.N.	Botanical Name	Common Name	Family Name
<b>TREES</b>			
1.	<i>Acacia nilotica</i> (Wild)	Babool	Fabaceae
2.	<i>Acacia catechu</i>	khair	Fabaceae
3.	<i>Adina cordifolia</i>	Kadam	Rubiaceae
4.	<i>Aegle marmelos</i>	Bael	Rutaceae
5.	<i>Albizia lebeck</i> (Bensh)	Kala Siras	Fabaceae
6.	<i>Azadirachta indica</i> A. (Juss)	Neem	Meliaceae
7.	<i>Bombax ceiba</i>	Semal	Bombacaceae
8.	<i>Dalbergia sissoo</i> (Roxb)	Shisham	Fabaceae
9.	<i>Ficus benghalensis</i>	Bargad	Moraceae
10.	<i>Ficus religiosa</i> (Linn)	Pipal	Moraceae
11.	<i>Flacourtia indica</i> (Eurm.F) Merr.	Kakar	Salicaceae
12.	<i>Pithecellobium dulce</i> (Benth)	Jangal Jalebi	Fabaceae
13.	<i>Shorea robusta</i>	Sal	Dipterocarpaceae
14.	<i>Syzigium cumini</i>	Jamun	Myrtaceae
15.	<i>Terminalia tomentosa</i> W. & A.	Arjun	Combretaceae
16.	<i>Terminalia bellirica</i>	behera	Combretaceae
17.	<i>Toona ciliata</i> (Roen).	Tun	Meliaceae
18.	<i>Ziziphus xylopyra</i> (Retz.) Willd.	Katber	Rhamnaceae
<b>HERBS AND SHRUBS</b>			
1.	<i>Achyranthes aspera.</i>	Chirchita	Amaranthaceae
2.	<i>Berberis</i> spp.	Kinjora	Berberidaceae
3.	<i>Calotropis procera</i> R.Br. <i>Capparis deciduas</i> (Forsk) Edgw.	Aak Kareel	Apocynaceae Brassicaceae
4.	<i>Cassia alata</i> (Linn).	Dadmari	Fabaceae
5.	<i>Cassia occidentalis</i> (Linn).	Chakunda	Fabaceae
6.	<i>Clerodendron viscosum</i> (Vent)	Bhat	Verbenaceae
7.	<i>Lantana camara</i> (Linn)	Kuri	Verbenaceae
8.	<i>Ocimum sanctum</i> (Linn)	Tulasi	Lamiaceae
9.	<i>Smilax prolifer</i>	Ramdaton	Liliaceae
10.	<i>Zizyphusnummularia</i> (Surm.f.)W.& A.	Kharbair	Rhamnaceae
<b>CLIMBERS</b>			
1.	<i>Asparagus racemosus</i> (Willd)	Satawar	Asparagaceae
2.	<i>Caesalpinia decapetala</i>	Alai	Fabaceae
3.	<i>Coccinea indica</i> W. & A.	Kundaru	Rubiaceae
4.	<i>Combretumdecandrum</i> (Roxb)	Kali bel	Combretaceae
5.	<i>Cryptostegiagrandiflora</i> (Roxb.) R.Br.	Chabukchari	Apocynaceae
6.	<i>Cymbopogon martini</i> (Roxb.)	Mahur	Poaceae
7.	<i>Phragmiteskarka</i> (Trin)	Beensa	Poaceae
8.	<i>Smilax prolifer</i> (Roxb)	Ramdatun	Smilacaceae
9.	<i>Vitis repanda</i> W. & A	Panibel	Vitaceae
10.	<i>Zizyhpus oeonoplia</i> (Mill).	Makoha	Rhamnaceae
<b>GRASSES</b>			
1.	<i>Cenchrus ciliaris</i> (Linn).	Anjan	Poaceae
2.	<i>Chrysopogon fulvus</i>	Kush	Poaceae
3.	<i>Cymbopogon martini</i> (Roxb)	Saidar	Poaceae

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4.	<i>Cynodon dactylon</i> (Linn.) Perp.	Dub	Poaceae
5.	<i>Desmostachya bipinnata</i> (Stapf).	Dab	Poaceae
6.	<i>Imperata cylindrica</i> (Linn) P.Beauv	Siru	Poaceae
7.	<i>Saccharum munja</i> (Roxb) Jesweit.	Mung	Poaceae
8.	<i>Saccharum spontaneum</i> (Linn)	Kansa	Poaceae
9.	<i>Setaria nervosum</i> (Rott) Stapf.	Sain/Seta	Poaceae
10.	<i>Setariaglauca</i> (Linn.) P. Beauv.	Vindra	Poaceae
11.	<i>Sporbolum marginatus</i> (Hochst). ex. A. Rich.	Usari	Poaceae
12.	<i>Vetiveria zizanioides</i> (Linn) Nash	Khas	Poaceae
<b>BAMBOO</b>			
1.	<i>Dendrocalamus strictus</i> (Roxb)	Bans	Poaceae
2.	<i>Bambusa arundinacea</i> (Willd)	Burma	Poaceae

**STATUS OF CROP SPECIES**

Status of agriculture crops was assessed only in the buffer zone covering outside the sanctuary area. The list of species was prepared based on the casual observation while collecting data in and around the agriculture habitat. Based on the survey a total of 36 crop species were reported in the study area of Nahari mine lease area and based on their use value they have been grouped into four categories. Among the species list 8 species fall under grain crops, 10 species fruit crops, 11 vegetable crops and 6 commercial crops of the study area. Within the grain crops, Bajri, Juwar, Makai and Arenda were cultivated extensively. Though, 10 fruit yielding species were reported, they grown in small extent of areas along the agricultural hedges and mainly for local use and market. All the six commercial crops cultivate extensively and they for major income of the local agriculturalists (Table 3-16).

Table 3- 16: List of cash crops in the study area

S. No.	Botanical Name	Family	Local Name	Habit
<b>Grain crops</b>				
1	<i>Pennisetum typhoides</i> A. Rich.	Poaceae	Bajra	Herb
2	<i>Sorghum bicolor</i> (L.) Moench.	Poaceae	Jawar	Grass
3	<i>Cajanus cajan</i> (L.) Millsp.	Fabaceae	Tuver	Herb
4	<i>Triticumaes tibvum</i> L.	Poaceae	Wheat	Grass
5	<i>Vigna radiate</i> (L.)wilczek.Var. <i>radiata</i>	Fabaceae	Udad	Herb
6	<i>Vigna trilobata</i> (L.) Verdcourt	Fabaceae	Mung	Herb
7	<i>Zea mays</i> L.	Poaceae	Makai	Grass
<b>Fruit crops</b>				
1	<i>Annona squamosa</i> L.	Annonaceae	Sitafal	Small Tree
2	<i>Psidium guajava</i> L.	Myrtaceae	Jamphal	Tree
3	<i>Citrus aurantifolia</i> (Chr.) Swingle	Rutaceae	Kag Ji Limbu	Small Tree
4	<i>Citrus limon</i> (L.) Burm. f.	Rutaceae	Limbu	Shrub
5	<i>Musa paradisiaca</i> L.	Musaceae	Kela	Small Tree
6	<i>Punica granatum</i> L.	Punicaceae	Anaar	Small Tree
7	<i>Phyllanthus embelica</i>	Euphorbiaceae	Amala	Small tree
<b>Vegetable Crops</b>				
1	<i>Abelmoschus esculentus</i> (L.) Moench	Malvaceae	Bhindi	Under Shrub
2	<i>Capsicum annuum</i> L. var <i>acuminatum</i> Fingerh.	Solanaceae	Marchi	Herb
3	<i>Cucumis sativus</i> L.	Cucurbitaceae	Kakadi	Climber
4	<i>Lageneria leucantha</i> (Duch.) Rusby.	Cucurbitaceae	Dudhi	Herb
5	<i>Cicer arietinum</i> L.	Fabaceae	Chana	Herb
6	<i>Momordica charantia</i> L.	Cucurbitaceae	Karela	Climber
7	<i>Allium sativum vineale</i>	Liliaceae	Lahsun	Herb
8	<i>Moringa oleifera</i> Lam.	Moringaceae	Drumstick	Tree
9	<i>Lycopersicon lycopersicum</i> (L.) Karst.	Solanaceae	Tamatar	Herb
10	<i>Solanum melongena</i> L.	Solanaceae	brinjal	Under Shrub
11	<i>Daucus carota</i> L. var. <i>sativa</i>	Apiaceae	Gajar	Under Shrub
<b>Cash/Commercial crops</b>				
1	<i>Saccharum officinarum</i> L.	Poaceae	Ganna	Grass
2	<i>Arachis hypogea</i> L.	Fabaceae	Mungphali	Herb
3	<i>Mangifera indica</i> L.	Anacardiaceae	Aam	Tree

### 3.6.5 Status of Fauna

This section includes the discussion of major faunal groups like amphibians, reptiles, birds (terrestrial and aquatic) and mammals. Among the groups, due to taxa specific nature of life, direct sightings of herpetofauna and mammalian fauna are always lower than the avifauna which is comparatively more active. Therefore status of herpetofauna and mammals groups were discussed at species richness and abundance levels predominately based on indirect evidences for mammals reported within the sample area.

**STATUS OF HERPETOFAUNA:****TAXONOMIC STATUS-AMPHIBIANS:**

During the study period only three species of amphibians were reported from the study area. They belong to three genus under single family. Within buffer zone the area falling inside the sanctuary had these species. Due to the absence of perennial water resources within the core zone resulted no amphibian species within the proposed mine lease area. Below table represents the status of the Amphibian's in the study area.

**Table 3- 17: Status of amphibian species in the study area**

S.No	Zoological name	Common Name	WL Act, 1972 Schedule	Presence in Core Zone	Presence in Buffer Zone
1.	<i>Euphlyctis cyanophlyctis</i>	Indian skipping frog	IV	-	√
2.	<i>Fejervarya limnocharis</i>	Cricket frog	IV	-	√
3.	<i>Hoplobarachus tigerinus</i>	Indian bull frog	IV	-	√

**TAXONOMICAL STATUS – REPTILES:**

Status of Reptiles in the study area shows moderate species richness with overall 10 species belonging to 08 genera and 05 families. Core zone area identifies only two reptilian species. However all 10 species were reported from the buffer zone. *Hemidactylus flaviviridi*, *Calotes versicolor*, *Mabuya carinata*, *Mabuya macularia*, is some common reptiles of the area. Detailed status of the reptiles is given in the table below.

**Table 3- 18: Status of reptiles in the study area**

S. No.	Zoological name	Common Name	WL Act, 1972 Schedule	Presence in Core Zone	Presence in Buffer Zone
1.	<i>Calotes Sp.</i>	-	-	-	√
2.	<i>Calotes versicolor</i>	Indian garden lizard *	-	√	√
3.	<i>Cyrtopodion Sp.</i>	-	-	-	
4.	<i>Echis carinatus</i>	Indian saw scaled viper	IV	-	
5.	<i>Hemidactylus flaviviridis</i>	Yellow-green house gecko *	-	-	√
6.	<i>Mabuya carinata</i>	Keeled grass skink *	-	√	√
7.	<i>Mabuya macularia</i>	Common bronze-back skink	-	-	√
8.	<i>Naja naja</i>	Spectacled cobra	II	-	√
9.	<i>Ptyas mucosa</i>	Indian rat snake	II	-	√
10.	<i>Sitana ponticeriana</i>	Fan-throated lizard		-	√

(\*)- Direct evidence during survey

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**STATUS OF AVIFAUNA**

The study area covering both the core and buffer zone represents a total of 21 bird species under 21 genera. Out of these 21 species, 05 were reported from the core area during the survey.

**Table 3- 19: Status of avifauna reported from the study area**

Sl. No	Zoological name	Common Name	Presence in Core Zone	Presence in Buffer Zone
1.	<i>Acridotheres tristis</i>	Common Myna	√	√
2.	<i>Alcede atthis</i>	Small Blue Kingfisher	-	√
3.	<i>Anas strepera</i>	Gadwall	-	√
4.	<i>Columba livia</i>	Rock Pigeon	√	√
5.	<i>Dendrocygna javanica</i>	Lesser Whistling Duck	-	√
6.	<i>Eudynamys scolopacea</i>	Asian Koel	-	√
7.	<i>Francolinus pondicerianus</i>	Grey Francolin	-	√
8.	<i>Grus grus</i>	Common Crane	-	√
9.	<i>Halcyon smyrensis</i>	White-throated Kingfisher	-	√
10.	<i>Lanius schach</i>	Long-tailed Shrike	-	√
11.	<i>Lonchura malabarica</i>	Indian Silverbill	-	√
12.	<i>Merops orientalis</i>	Green Bee-eater	√	√
13.	<i>Milvus migrans</i>	Black Kite	-	√
14.	<i>Nectarinia asiatica</i>	Purple Sunbird	-	√
15.	<i>Passer domesticus</i>	House Sparrow	√	√
16.	<i>Pavo cristatus</i>	Indian Peafowl	-	√
17.	<i>Ploceus philippinus</i>	Baya Weaver	-	√
18.	<i>Pseudibis papillosa</i>	Black Ibis	-	√
19.	<i>Psittacula krameri</i>	Parakeet	-	√
20.	<i>Pycnonotus cafer</i>	Red-vented Bulbul	-	√
21.	<i>Upupa epops</i>	Common Hoopoe	√	√

**STATUS OF MAMMALS**

Status of mammalian fauna in the study area shows moderate level of species richness with overall 9 species under 9 genera and 8 families. The core zone shows comparatively less no of species richness than the buffer area. It has six species under six genera and six families. The list of mammalian species is given in the following table.

**Table 3- 20: Status of the mammalian species in the area**

Sl. No	Zoological name	Common Name	WL Act, 1972 Schedule	Presence in Core Zone	Presence in Buffer Zone
1.	<i>Boselaphustragoc a melus</i>	Nilgai *	III	-	√
2.	<i>Canis aureus</i>	Jackal	II	-	√
3.	<i>Felis chaus</i>	Jungle Cat *	II	-	√
4.	<i>Funambulus pennant</i>	Five-striped Palm Squirrel *	IV	√	All around
5.	<i>Herpestes edwardsi</i>	Common mongoose*	IV	-	
7.	<i>Hystrix indica</i>	Porcupine	IV	-	√
8.	<i>Lepus nigricollis</i>	Indian Hare *	IV	-	All around
9.	<i>Rattus rattus</i>	House Rat *	IV	√	All around

(\*) Direct evidence during survey

**3.6.6 Status of threatened Biota FLORA:**

No rare, endangered or threatened (RET) plant species is reported from the study area.

**FAUNA (AMPHIBIANS):**

This group is very poorly reported from the study area. No RET species is reported from the area.

**FAUNA (REPTILES):**

No RET species belonging to reptiles is reported.

**AVIFAUNA:**

No rare, endangered or threatened (RET) plant species is reported from the study area.

**MAMMALIAN FAUNA:**

No rare, endangered or threatened (RET) plant species is reported from the study area.

### 3.7 Socio-Economic Environment

In this section of the report an attempt has been made to assess the impact of the proposed Building Stone (Khanda, Gitti, Boulders) mining project at village Girwan on Socio-economic aspect of the study area. The various attributes that have been taken into account are population composition, employment generation, occupational shift, household income, consumption pattern, ethnic issue and law & order problem.

#### 3.7.1 Objectives

The objectives of the socio-economic study are as follows:

- ✓ To study the socio-economic status of the people living in the study area of the proposed mining project.
- ✓ To assess the impact of the project on socio-economic environment in the study area.
- ✓ To assess the impact of the project on Quality of life of the people in the study area.
- ✓ To evaluate the community development measures proposed to be taken up by the project proponent, if any.
- ✓ To recommend Community Development measures needs to be taken up in the study area.

#### 3.7.2 Methodology adopted for the study

- a) A mixture of both quantitative and qualitative approach has been adopted in the current socio-economic study.
- b) The study has been conducted based on primary and secondary data. While primary data has been collected through a sample survey of selected households, the secondary data has been collected from the administrative records of the Government of U.P., Census 2011.
- c) The details regarding population composition, number of literates, workers etc have been collected from secondary sources and analyzed. Also village/city/town wise details regarding amenities available in the study area have been collected from secondary sources and analyzed.
- d) Two stage sampling design has been adopted to select the sampling units. The first stage units are census villages in the rural areas and towns/cities in urban areas. The ultimate stage units are households in the selected villages and towns/cities. Simple Random Sampling without Replacement (SRSWOR) has been adopted to select the sampling units.
- e) Estimation of various parameters has been made based on sample data and bottom top approach has been adopted.

- f) On the basis of a preliminary reconnaissance survey, two questionnaires were developed to make it suitable to fulfill the objectives of the study. The questionnaires contained both open ended and close ended questions
- g) The data collected during the above survey was analyzed to evaluate the prevailing socio-economic profile of the area.
- h) Based on the above data, impacts due to mining operation on the community have been assessed and recommendations for improvement have been made.

### 3.7.3 Concepts & Definition

- a. **Study Area:** The study area, also known as impact area has been defined as the sum total of core area and buffer area with a radius of 10 Kilometers from the periphery of the core area. The study area includes all the land marks both natural and manmade, falling therein.
- b. **QoL:** The Quality of Life (QoL) refers to degree to which a person enjoys the important possibilities of his/her life. The 'Possibilities' result from the opportunities and limitations, each person has in his/her life and reflect the interaction of personal and environmental factors. Enjoyment has two components: the experience of satisfaction and the possession or achievement of some characteristic.
- c. **Household:** A group of persons who normally live together and take their meals from a common kitchen are called a household. Persons living in a household may be related or unrelated or a mix of both. However, if a group of related or unrelated persons live in a house but do not take their meals from the common kitchen, then they are not part of a common household. Each such person is treated as a separate household. There may be one member households, two member households or multi-member households.
- d. **Sex Ratio:** Sex ratio is the ratio of females to males in a given population. It is expressed as 'number of females per 1000 males'.
- e. **Literates:** All persons aged 7 years and above who can both read and write with understanding in any language are taken as literate. It is not necessary for a person to have received any formal education or passed any minimum educational standard for being treated as literate. People who are blind but can read in Braille are also treated as literates.
- f. **Literacy Rate:** Literacy rate of population is defined as the percentage of literates to the total population aged 7 years and above.

- g. Labour Force:** The labour force is the number of people employed and unemployed in a geographical entity. The size of the labour force is the sum total of persons employed and unemployed. An unemployed person is defined as a person not employed but actively seeking work. Normally, the labour force of a country consists of everyone of working age (around 14 to 16 years) and below retirement (around 65 years) that are participating workers, that is people actively employed or seeking employment. People not counted under labour force are students, retired persons, and stay-at home people, people in prisons, permanently disabled persons and discouraged workers.
- h. Work:** Work is defined as participation in any economically productive activity with or without compensation, wages or profit. Such participation may be physical and/or mental in nature. Work involves not only actual work but also includes effective supervision and direction of work. The work may be part time, full time, or unpaid work in a farm, family enterprise or in any other economic activity.
- i. Worker:** All persons engaged in 'work' are defined as workers. Persons who are engaged in cultivation or milk production even solely for domestic consumption are also treated as workers.
- j. Main Workers:** Those workers who had worked for the major part of the reference period (i.e. 6 months or more in the case of a year) are termed as Main Workers.
- k. Marginal Workers:** Those workers who did not work for the major part of the reference period (i.e. less than 6 months) are termed as Marginal Workers
- l. Work participation rate:** The work participation rate is the ratio between the labour force and the overall size of their cohort (national population of the same age range). In the present study the work participation rate is defined as the percentage of total workers (main and marginal) to total population.

#### 3.7.4 Description of the study area

The study area covers all the villages/ part of villages located in the 10 Km radius around the mine lease periphery. In case of Building Stone (Khanda, Gitti, Boulders) mine in an area of 2.02 ha at village Girwan, the study area is spread over Banda in the state of U.P.

**BASELINE DATA OF THE IMPACT AREA****Table 3- 21 (i): Demographic Particulars of Study Area**

S. No.	Description	Number	Percentage to respective totals
1	<b>Total Population</b>	<b>86420</b>	<b>100</b>
	Male	46393	53.68
	Female	40027	46.31
2	<b>Sex ratio (No. of females per 1000 males)</b>	<b>863</b>	
3	<b>Total Literates</b>	<b>57616</b>	<b>100</b>
	Male	36171	62.78
	Female	21444	37.22
4	<b>Over all Literacy Rate</b>		<b>66.67</b>
	Male		77.97
	Female		53.58
5	<b>Gender gap in literacy rate</b>		<b>24.39</b>
6	<b>Total Workers</b>	<b>30426</b>	<b>100</b>
	Male	18538	60.92
	Female	11888	39.08
7	<b>Total Main Workers</b>	<b>18365</b>	<b>100</b>
	Male	11356	61.83
	Female	7009	38.16
8	<b>Total Marginal Workers</b>	<b>12061</b>	<b>100</b>
	Male	7182	59.54
	Female	4879	40.46
9	<b>Total Agricultural Workers</b>	<b>11320</b>	<b>100</b>
	Cultivators	7354	64.96
	Agricultural Labours	3966	35.04
	Male workers in total agricultural workers	7425	65.59
	Female workers in total agricultural workers	3895	34.41
10	<b>Total Household Industrial Workers</b>	<b>934</b>	<b>100</b>
	Male	521	55.78
	Female	413	44.22
11	<b>Total Other Workers</b>	<b>18172</b>	<b>100</b>
	Male	10592	58.29
	Female	7580	41.71

**Source: Census 2011**

**Table 3.22 (ii): Amenities Data (For Rural Area):**

S. No.	Amenities	Types	Number
1	Educational Institutions	Primary School	19
		Middle school	9
		Secondary School	2
		Senior Secondary School	1
2	Health Institutions	Allopathic Hospital	2
		Homeopathic Hospital	1
		Allopathic Dispensary	1
		Ayurvedic Dispensary	1
		Homeopathic Dispensary	1
		PHC	2
		PHSC	1
3	Drinking Water #	Tap	6
		Well	12
		Tube well	7
		Hand pump	28
4	Communication Facilities	Post Office	5
		Telephone	13
5	Transport Facilities#	Bus Service	5
		Railway Service	0
6	Banking facilities	Commercial bank	5
		Cooperative bank	2
7	Power #		29

# No. of villages provided with the facilities

Source: Census 2011

### 3.7.5 Demographic Composition

#### Population

According to Census 2011, the total population of the study area is 86420 in which 53.68 percent population is male & 46.31 percent population is female. The overall sex ratio has been worked out to 863 females per 1000 males, which is much lower than the national average of 933 females per 1000 males. Furthermore, around 25 percent of the total population belongs to Schedule Caste community and the Schedule Tribe population in the study area is very negligible as per Census 2011.

#### Number of households and household size

The entire population of the study area has been grouped into 14647 households and the average household size is 6. The household size varies between 5 and 7.

#### Literacy and Literacy rate

The total number of literates in the study area has been worked out to 57616, which is around 66.67 percent of the total population. The literacy rate of male has been worked out to 77.97 percent as against 53.58 percent for female, creating a gender gap of 24.39 percent.

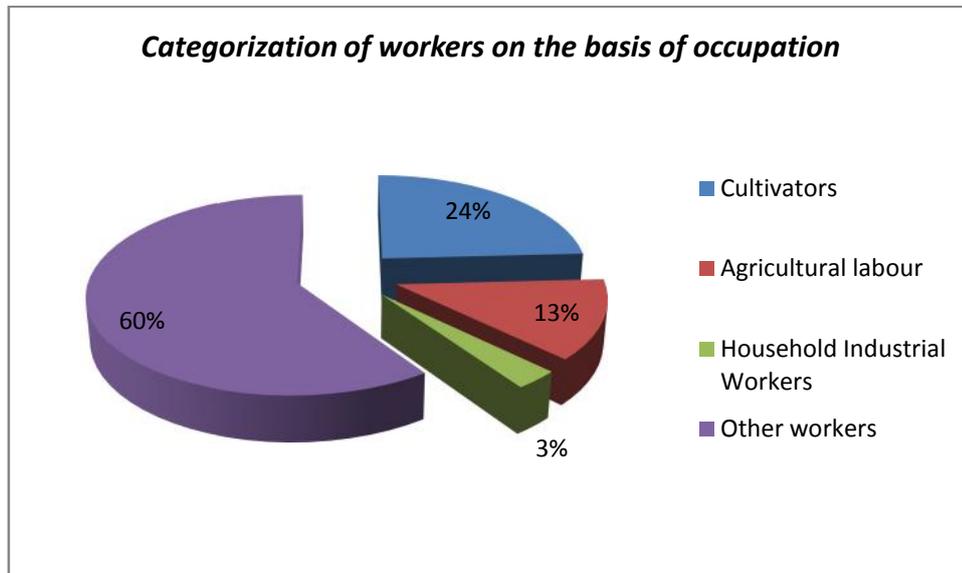
#### Workers and work participation rate

The total number of workers in the study area is 30426, which is 35.20 percent of the total population. Among the total workers 60.35 percent are main workers and the remaining 39.65 percent are marginal workers. The percentage of male in the main workers is 61.83 percent, while it is only 59.54 percent in the case of marginal workers. On the other hand, the percentage share of female in the main workers is only 38.16 percent; it is 40.46 percent in the case of marginal workers. This indicates that male dominates the main workers and female dominates the marginal workers.

The Table and the figure below indicate the categorization of workers based on occupation:

**Table 3.22 (iii): Categorization of workers on the basis of occupation**

S. No.	Worker category	Number of workers	% to total workers
(1)	(2)	(3)	(4)
<b>1</b>	Agricultural Workers	11320	37.20
	Cultivators	7354	24.17
	a) Agricultural labour	3966	13.03
<b>2</b>	Household Industrial Workers	934	3.06
<b>3</b>	Other workers	18172	59.72
<b>Total</b>		<b>30426</b>	<b>100</b>

**Figure 3.12: Categorization of workers on the basis of occupation**

The classification of workers based on occupation reveals that 37.20 percent of the total workers are Agricultural workers. The share of cultivators in the total workers is 24.17 percent and that of Agricultural labours is 13.03 percent. Barely 3.06 percent of total workers are Household Industrial Workers and 59.72 percent are 'Other workers' which includes white collar workers, professional workers, shopkeepers, traders, Mine workers and businessmen.

**CHAPTER – 4:**  
**ANTICIPATED**  
**ENVIRONMENT**  
**IMPACTS &**  
**MITIGATION**  
**MEASURES**

## **4.0 ANTICIPATED ENVIRONMENTAL IMPACT & MITIGATION MEASURES**

### **4.1 General**

Environmental impacts both direct and indirect on various environmental attributes due to proposed mining activity will be created in the surrounding environment, during the preoperational, operational and post-operational phases.

The occurrence of mineral deposits, being site specific, their exploitation, often, does not allow for any choice except adoption of eco-friendly operation. The methods are required to be selected in such a manner, so as to maintain environmental equilibrium ensuring sustainable development.

The impacts due to mining operations commence from the exploration activities, extend through extraction and processing of minerals, may continue up to post closure of the operation, with the nature and extent of impacts varying throughout the stages of project development.

In order to maintain the environmental commensuration with the mining operation, it is essential to undertake studies on the existing environmental scenario and assess the impact on different environmental components. This would help in formulating suitable management plans sustainable resource extraction.

Several scientific techniques and methodologies are available to predict impacts of physical environment. Mathematical models are the best tools to quantitatively describe the cause and effect relationships between sources of pollution and different components of environment. In cases where it is not possible to identify and validate a model for a particular situation, predictions have been arrived at based on logical reasoning / consultation / extrapolation.

The following parameters are of significance in the Environmental Impact Assessment and are being discussed in detail.

1. Land Environment
2. Water Environment
3. Air Environment
4. Noise Environment
5. Solid waste

6. Biological
7. Socio-Economic

## 4.2. Land Environment

Since mining is being carried out by opencast method, it is expected to affect the land environment essentially. Impact assessment study on land environment can be done by considering land use pattern/ land cover, Topography, Drainage pattern and geological features of the mine site as well as the study area.

### 4.2.1 Anticipated Impact

#### 4.2.1.1 Land Use /Land Cover

Land use pattern for preoperational, operational & conceptual stage of the mining as per approved mine plan for the proposed mine site is given below in **Table 4-1**

**Table 4- 1: Land use pattern of the mine site (as per mine plan)**

Particulars	Girwan 2.02 ha		
	Mine Area (ha)		
	Pre-operational phase	Operational Phase (after 5 Years)	Post Mining (Conceptual phase) at the end of Mine Life
Mining pits Quarry	Nil	0.963	1.558
Approach Road	Nil	Nil	0.345
Dumps	Nil	Nil	Nil
Office, Rest Shelter etc.	Nil	Nil	Nil
Balance undisturbed land	2.02	1.057	0.462
<b>Total area</b>	<b>2.02</b>	<b>2.02</b>	<b>2.02</b>

The existing land use / land cover pattern in the study area as studied through satellite imagery is given as follows:

**Table 4- 2: Land use pattern of the study area**

S. No.	Land Category	Area (ha)	% land cover
1.	Agriculture	20717.33	65.92
2.	Waste Land/ Open land	5543.90	17.64
3.	Build-up area	1332.55	4.24
4.	River	1910.82	6.08
5.	Forest	1923.40	6.12
	<b>TOTAL</b>	<b>31429</b>	<b>100</b>

As per the approved mine plan at conceptual stage most of the waste land will be converted into rain water harvesting pit and green belt Hence impact due to change in land use is

positive.

#### 4.2.1.2 Topography

Area is devoid of any mining activity. The highest points in the leasehold is 162.0mRL in North along boundary pillar “B & C” while lowest 138.0 mRL at South at pillar, “D”. The general slope of lease area is from North to South directions.

#### 4.2.1.3 Drainage pattern

The area is dominated by boulders and in situ outcrops of Bundelkhand granite. The general slope of lease area is from North to South directions. No seasonal perennial drainage exists within the lease area, however, Ken Nadi flows 2.5 Km. away in west direction. There are several canals drawn from Ken river within the 5 Km periphery.

#### Geology

Geology of the study area is studied to ascertain seismic sensitivity and also the effects on soil environment. The study area fall in seismic zone II i.e. Low damage risk zone. Soil samples have been taken and analysis has been carried out and is discussed earlier in Chapter 3. In the mine lease area there is practically no soil cover and overburden that requires stacking or dumping and also no overburden is generated in the form of reject from the mining activity. Hence no impact is expected on the soil cover or geology of the project.

#### 4.2.2 Mitigation Measures

Adopting suitable, site-specific mitigation measures can reduce the degree of impact of mining on land. Some of the land-related mitigation measures are as follows:

- Present land use pattern of the lease area is waste land and at the conceptual stage the land use pattern will remain the same, hence will not be changed.
- As there is no overburden generated from the mining activity

#### 4.3. Water Environment

Mining and its associated activities not only use a lot of water but also likely to affect the hydrological regime of the area. The major impact of deep and large mines (both underground and open cast) is of natural groundwater table. Lowering of water table may result in reduced groundwater availability. Extraction of different minerals is known to lead to water pollution due to heavy metal, acid discharges and increased

suspended solids. Deep underground mines directly affect the water table of the area. However, the impact of mining project on groundwater hydrology and surface water regime are site specific and depends upon the characteristics of the mineral, hydrogeology and requirement of groundwater for other uses.

#### 4.3.1 Anticipated Impact

- As there is no river or nallah passing through the mine site, hence no impact is anticipated on the hydrological regime of the area due to mining activity.
- No natural course of water stream is interrupted or diverted due to mining activity; hence no impact on natural drain is anticipated.
- Practically there is no overburden or reject generating from the mining activity, moreover the excavated mineral itself is non-toxic and hence no effect due to water flow during rains following the contours of the area is expected.
- No water is being drawn from the surface water body.
- Impact on ground water is anticipated as there is provision of consuming ground water for the purpose of various mining activities. Total water demand to be met by ground water is 4.95 KLD.
- At the end of mine life excavated pit will be converted into a water reservoir. This will help in recharging the ground water table. As the mineral is non-toxic so contamination of ground water due to leaching is not anticipated.

#### 4.3.2 Mitigation Measures

- Overall drainage planning has been done in such a manner that the existing pre-mining drainage conditions will be maintained to the extent possible so that run off distribution is not affected.
- Domestic sewage will disposed into Soak Pit.
- As there is no generation of overburden or mineral reject from the mining activity; hence the excavated pit will be converted into the water reservoir at the end of mine life. This will help in recharging ground water table by acting as a water harvesting structure.
- Ground water table will not be intersected during the mining activity.

#### 4.4 Air Environment

Mining Operation carried out by opencast semi-semi-mechanized method generate dust particles due to various activities like drilling, blasting, Loading & Unloading of Building Stone (Khanda, Gitti, Boulders), and Transportation. The air quality in the mining area depends upon the nature and concentration of emissions and meteorological conditions. Though it is an open cast semi-mechanized mine with all possible air quality

controlling measures but the major air pollutants from mining include:-

- Particulate Matter (Dust) of various sizes.
- Gases, such as, Sulphur Dioxide, Oxides of Nitrogen, Carbon Monoxide etc. from vehicular exhaust.
- Dust is the single air pollutant observed in the open cast mines. Diesel operating drilling machines, blasting and movement of machinery/ vehicles produce NO<sub>x</sub>, SO<sub>2</sub> and CO emissions, usually at low levels. Dust can be of significant nuisance to surrounding land users and potential health risk in some circumstances.

#### 4.4.1 Anticipated Impact

The major sources of air pollution in the proposed mine is dust generation due to drilling, blasting, excavation, loading and transportation of mineral & wind erosion of exposed material. In this present study, United States Environmental Protection Agency (USEPA-42 series) approved mathematical equations have been used to predict concentrations for different operations in mining including the mineral transportation.

In order to predict the particulate emissions, Aermid Cloud an interface based on ISCST3 - FDM model was used to predict changes in air quality i.e., maximum ground level concentration (GLC's) of PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>x</sub> & NO<sub>x</sub> due to the proposed mining activity. The inputs required for the model is:

- Hourly meteorological data
- Source data
- Receptor data
- Programme control parameters

The GLC's were predicted for the scenario, with EMP in the mine. The maximum incremental ground level concentrations of Total Suspended Particulate Matter from the different mining activities for study period with EMP were observed to be 11.34 µg/m<sup>3</sup>. The maximum GLC's were falling within the pit area for the given meteorological and topographical conditions.

It is seen that the GLC's obtained at various locations for the study period are well within the CPCB standards (dated 18th November, 2009).

#### 4.4.2 Mitigation Measures

**Drilling:** - To control fugitive dust at source, wet drilling will be provided. Where there is a scarcity of water, suitably designed dust extractor will be provided for dry drilling along with dust hood at the mouth of the drill-hole collar.

##### **Advantages of Wet Drilling:-**

- In this system dust gets suppressed close to its formation. Dust suppression become very effective and the work environment will be improved from the point of occupational comfort and health.
  - Due to dust free atmosphere, the life of engine, compressor etc. will be increased.
  - The life of drill bit will be increased.
  - The rate of penetration of drill will be increased.
  - Due to the dust free atmosphere visibility will be improved resulting in safer working conditions after day light hours.
- A. **Blasting:** - Establish time of blasting to suit the local conditions. Avoid blasting i.e., when temperature inversion is likely to occur and strong wind blows towards residential areas.
- B. **Haul Road:** -The long life WBM (Water Bound Macadam) haul roads will be constructed and maintained for traffic movement.
- C. **Transport:** - The speed of dumpers/ trucks on haul road will be controlled as increased speed increases dust emissions. Overloading of transport vehicles will be avoided. The trucks/ tippers will have sufficient free board. Spillage of ore on public roads will be cleared immediately and vehicles will maintain safe speed.
- D. **Green Belt:** - Planting of trees all along main mine haul road and regular grading of haul roads will be practiced to prevent the generation of dust due to movement of dumpers/trucks. Green belt of adequate width will be developed around the lease area. Plantation will also be done in dumping area, mineral stockyard.

#### 4.5. Noise Environment

Noise pollution is mainly due to operation of blast hole drilling, blasting and occasional plying of trucks. These activities will not cause any problem to the inhabitants of this area because there is no human settlement in close proximity to the lease area. Noise modeling has been carried out considering blasting and compressor operation. The result indicates that it would have minor impact on near forest and nearby villages. Noise levels at source of blasting and Compressor

operation; are 90 dB(A) and 75 dB(A) respectively.

For hemispherical sound wave propagation through homogeneous loss free medium, one can estimate noise levels at various locations at different sources using model based on first principle.

$$L_{p2} = L_{p1} - 20 \log (r_2/r_1) - A_{e1, 2}$$

Where:

$L_{p1}$  &  $L_{p2}$  are sound levels at points located at distances  $r_1$  &  $r_2$  from the source.

$A_{e1, 2}$  is the excess attenuation due to environmental conditions. Combined effect of all sources can be determined at various locations by logarithmic addition.

$$L_{p\text{total}} = 10 \log \{ 10(L_{p1}/10) + 10(L_{p2}/10) + 10(L_{p3}/10) + \dots \}$$

#### 4.5.1 Anticipated Impact & Mitigation measures

##### 4.5.1.1 Prediction of Noise quality

The noise level in the working environment are compared with the standards prescribed by Occupational Safety and Health Administration (OSHA-USA) which has been adopted and enforced by the Govt. of India through model rules framed under Factories Act, 1980 and CPCB 2000 norms. The summary of the permissible exposures in cases of continuous noise as per above rules is given below:

**Table 4- 3 Noise impact**

Total time of exposure per day in hour	Sound pressure dB(A)	Remarks
1	2	3
8.0	90	No exposure in excess of 115 dB(A) is permissible
6.0	92	--
4.0	95	For any period of exposure falling in between any figure and lower figure as indicated in column (1), the permissible sound is to be determined by extrapolation or proportionate scale.
3.0	97	
2.0	100	
1 ½	102	
1	105	
¾	107	
½	110	
¼	115	

Noise at lower levels (sound pressure) is quite acceptable and does not have any bad effect on human beings, but when it is abnormally high- it incurs some maleficent effects.

#### 4.5.1.2 a. Mitigation measures

##### i. On-site

a) **Trained drivers:** Only trained drivers will be allowed to operate vehicles during mining to reduce any chance of safety failures.

b) **Vegetation:** Plantation of trees along the haulage road will be done to dampen the noise, if possible.

c) **Hearing Protection:** Hearing protection will be given to workers working in noisy area like drilling and blasting.

d) **Phasing out** the old and worn out trucks.

##### ii. Off-site

The off-site receptors are not significantly affected as noise generated is insignificant but some disturbances due to vehicle movement may not be avoidable. However the following measures have been envisaged:

a) The vehicles will be maintained in good running condition so that noise will be reduced to minimum possible level.

b) Employing trucks which are newer or less than 15 years old. Only PUC certified vehicles will be allowed to engage in the operation.

c) In addition, trucks drivers will be instructed to make minimum use of horns at the village area.

d) Where ever space is made available by the authority's plantation will be done and also post plantation care will be provided.

#### 4.5.2 Prediction of Ground vibration

It has been mentioned that limited amount of wagon drill & blasting will be performed in one time slot with optimum hole charge under the guidance of skilled blasters therefore, no increase in vibration level is envisaged.

As the proposed method of mining is semi-mechanized open cast with limited amount of drilling and blasting shall be done under the supervision of competent experts. So the impact on this aspect would negligible.

Vibration due to explosion has been modeled using USBM empirical equation for maximum explosive quantity charged per delay.

### 4.5.3 Mitigation Measures

- a) **MAINTENANCE OF MACHINERY:** - Good and regular maintenance of machinery will be ensured to keep the noise generated at minimum. The vehicles operating will be maintained and provided with good silencers. All machines will be used at optimum capacity.
- b) **TRAINED OPERATORS:** - Only trained operators will be allowed to operate machines.
- c) **VEGETATION:** Plantation of trees around haul roads will be done to reduce the noise.
- d) **HEARING PROTECTION:** Equipment like ear-muffs, ear-plugs, etc. are commonly used devices for hearing protection. Workers and operators working at drilling sites will be provided with earmuffs.
- e) **BLASTING:** -Blasting will be avoided in the morning and evening hours, on foggy days, at night time and at times of high wind velocity and low cloud cover.
- f) **DRILLING:** -Drilling will be carried out with the help of sharp drill bits.

## 4.6. Biological Environment

The impact on biodiversity is not anticipated as the mine site is barren land having only few bushes but there is few protected forest in 10km radius which also not get affected by this mining activity as this is on a very small scale, but still the mitigation measures will be taken care for any anticipated effect. The impact on biodiversity is difficult to quantify because of its diverse and dynamic characteristics.

### 4.6.1 Anticipated Impact

Mining activities generally result in the deforestation, land degradation, water, air and noise pollution which directly or indirectly affect the faunal and floral status of the project area. However, occurrence and magnitude of these impacts are entirely dependent upon the project location, mode of operation and technology involved. Impact prediction is the main footstep in impact evaluation and identifies project actions that are likely to bring significant changes in the project environment. The present study was carried out to predict the likely impacts of the proposed Building Stone (Khanda, Gitti, Boulders) mine project at village Girwan in the surrounding environment with special reference to biological attributes covering habitats/ecosystems and associated biodiversity.

The proposed mining activity will include removal of some scattered bushes of Babool and thorny species. Although impacts on key habitat elements will occur on a local scale, but on a regional scale they would not be critical for the life cycle needs of the

species observed or expected. Moreover the successive reclamation of mined out areas, following completion of mining activities, will replace habitat resources for fauna species in this locality over a longer time. Existing roads will be used; new roads will not be constructed to reduce impact on flora.

#### 4.6.2 Mitigation Measures

Keeping all this in mind the following mitigations have been suggested under environmental management plan. With the above understanding of the role of plant species as bio-filter to control air pollution, appropriate plant species (mainly tree species) have been suggested conceding the area/site requirements and needed performance of specific species.

### 4.7. Socio-Economic Environment

The socio-economic impacts of mining are many. Impacts of a mine project may be positive or Negative. The adverse impacts attribute to physical displacement due to land acquisition, which is followed by loss of livelihood, mental agony, changes in social structure, and risk to food security etc. People are also directly affected due to pollution. Social Impact Assessment (SIA) is a process of analysis, monitoring and managing the social consequences of a project. Study on Socio-economic status has already been carried out using primary socio-economic survey for generating the baseline data of Socio-economic status.

#### 4.7.1 Anticipated Impact

From the primary Socio-economic survey & through secondary data available from established literature and census data 2011, it is found that there would be positive impact on Socio-economic condition of the nearby area.

There is no habitation in the mining lease area. Therefore, neither villages nor any part of villages will be disturbed during the entire life of the mine.

#### 4.7.2 Mitigation Measures

Mining in this lease will give 33 job opportunities to the local people. Thus, Building Stone (Khanda, Gitti, Boulders) mining will create beneficial effect on local people. With the operation of mining lease, various indirect employment opportunities will also be generated. Several persons of the neighboring villages have been benefited with contract works, employment through contractors, running jeeps, trucks, tractors and buses on hire, running canteens, different kinds of shops and transport related business avenues.

Villagers have been provided with either direct employment or indirect employment such as business, contract works and development work like roads etc. Villagers also get access to the other welfare amenities such as drinking water, foods and provisions, shed etc.

#### 4.8 Mine waste Management

Practically there is no waste generated in the form of Overburden or Mineral rejects from the mine.

#### 4.9 Mine Closure

Mine closure plan is the most important environmental requirement in mineral mining projects. The mine closure plan should cover technical, environmental, social, legal and financial aspects dealing with progressive and post closure activities. The closure operation is a continuous series of activities starting from the decommissioning of the project. Therefore, progressive mine closure plan should be specifically dealt with in the mining plan and is to review every five years in the scheme of mining. As progressive mine closure is a continuous series of activities, it is obvious that the proposals of scientific mining have included most of the activities to be included in the closure plan.

While formulating the closure objectives for the site, it is important to consider the existing or the pre-mining land use of the site; and how the operation will affect this activity. Some operations such as mining in agricultural areas have clearly defined this objective of returning the land to viable agricultural purposes or for bringing the land for economically viable productive purposes.

The primary aim is to ensure that the following broad objectives along with the abandonment of the mine can be successfully achieved:

- ✓ To create a productive and sustainable after-use for the site, acceptable to mine owners, regulatory agencies, and the public.
- ✓ To protect public health and safety of the surrounding habitation.
- ✓ To minimize environmental damage.
- ✓ To conserve valuable attributes and aesthetics.
- ✓ To overcome adverse socio-economic impacts.

#### 4.9.1 Mine Closure criteria

The criteria involved in mine closure are discussed below:

##### **Physical Stability**

All anthropogenic structures, which include mine workings, waste dumps, buildings, etc., remaining after mine decommissioning should be physically stable. They should present no hazard to public health and safety as a result of failure or physical deterioration and they should continue to perform the functions for which they were designed. The design periods and factors of safety proposed should take full account of extreme events such as floods, hurricane, winds or earthquakes, etc. and other natural perpetual forces like erosion, etc.

##### **Chemical Stability**

The solid wastes on the mine site should be chemically stable. This means that the consequences of chemical changes or conditions leading to leaching of metals, salts or organic compounds should not endanger public health and safety nor result in the deterioration of environmental attributes. If the pollutant discharge likely to cause adverse impacts is predicted in advance, appropriate mitigation measures like settling of suspended solids or passive treatment to improve water quality as well as quantity, etc. could be planned. Monitoring should demonstrate that there is no adverse effect of pollutant concentrations exceeding the statutory limits for the water, soil and air qualities in the area around the closed mine.

##### **Biological Stability**

The stability of the surrounding environment is primarily dependent upon the physical and chemical characteristics of the site, whereas the biological stability of the mine site itself is closely related to rehabilitation and final land use. Nevertheless, biological stability can significantly influence physical or chemical stability by stabilizing soil cover, prevention of erosion/wash off, leaching, etc.

A vegetation cover over the disturbed site is usually one of the main objectives of the rehabilitation programme, as vegetation cover is the best long-term method of stabilizing the site. When the major earthwork components of the rehabilitation programme have been completed, the process of establishing a stable vegetation community begins. For re-vegetation, management of soil nutrient levels is an important consideration. Additions of nutrients are useful under three situations.

- ✓ Where the nutrient level of spread topsoil is lower than material in-situ e.g. for development of social forestry.
- ✓ Where it is intended to grow plants with a higher nutrient requirement than those occurring naturally e.g. planning for agriculture.
- ✓ Where it is desirable to get a quick growth response from the native flora during those times when moisture is not a limiting factor e.g. development of green barriers.

The mine closure plan should be as per the approved mine plan.

#### 4.10 TRAFFIC ANALYSIS

Traffic analysis is carried out by understanding the existing carrying capacity of the roads near to the project site and the connecting main roads in the area. Then depending on the capacity of the mine, the number of trucks that will be added to the present scenario will be compared to the carrying capacity.

★ The vehicular movement within the site is inevitable. However, during operation phase, this activity would not cause any significant impact on the ambient air quality.

★ The noise levels are also expected to be negligible on account of onsite vehicular movement.

★ The safety issues due to onsite vehicular movement would be negligible as the onsite vehicular traffic would follow the safety sign system.

**Table 4- 4 (i): Existing Traffic Scenario & LOS**

Road	V	C	Existing V/C Ratio	LOS
MDR (Connecting Road)	135	500	0.27	B
NH-76	208	900	0.23	B

V= Volume in PCU's/hr & C= Capacity in PCU's/ hr

The existing Level of Service at MDR is "A" i.e. excellent and at highway is "A" i.e. excellent

V/C	LOS	Performance
0.0 - 0.2	A	Excellent
0.2 - 0.4	B	Very Good
0.4 - 0.6	C	Good / Average / Fair
0.6 - 0.8	D	Poor
0.8 - 1.0	E	Very Poor

Note: Capacity as per IRC: 106-1990 page no 11 table-2 for arterial road/ Highways

**During Mine operation**

Total Capacity of mine	:	20,200 m <sup>3</sup> /54,540 Tonnes Per Annum
No. of working days	:	300 days
Truck Capacity	:	10 m <sup>3</sup>
No. of trucks deployed per day	:	07 trucks
Working Hours per day	:	08 hours
No. of trucks deployed/hr	:	1 trucks
Increase in PCU/hr	:	03 PCUs

**Table 4- 5 : Modified Traffic Scenario & LOS**

Road	V	C	Modified V/C Ratio	LOS
MDR (Connecting Road)	142	500	0.28	B
NH- 76	215	900	0.24	B

**Results**

From the above analysis it can be seen that the V/C ratio is likely to change to 0.27 to 0.28 & 0.23 to 0.24 with LOS being “B” which is “very good” as per classification. So the additional load on the carrying capacity of the concerned roads is not likely to have any significant adverse affect.

**CHAPTER – 5:**  
**ANALYSIS OF**  
**ALTERNATIVES**

## 5.0 ANALYSIS OF ALTERNATIVES

### 5.1 Introduction

Consideration of alternatives to a project proposal is a requirement of EIA process. During the scoping process, alternatives to a proposal can be considered or refined, either directly or by reference to the key issues identified. A comparison of alternatives help to determine the best method of achieving the project objectives with minimum environmental impacts or indicates the most environmentally friendly and cost effective options.

### 5.2 Factor behind the Selection of Project

Building Stone (Khanda, Gitti, Boulders) Mine at village Girwan is a mining project for excavation of Building Stone (Khanda, Gitti, Boulders) deposit, which is mineral specific. The mining lease has been granted by Govt. of U.P.

The proposed mining lease area has following advantages:-

- ✓ The mineral deposit occurs in a non-forest area.
- ✓ There is no habitation within the lease area; hence no R & R issues exist.
- ✓ There are no river, stream, nallah and water bodies in the mine lease area.
- ✓ Availability of skilled, semi-skilled and unskilled workers in this region.
- ✓ All the basic amenities such as medical, fire fighting, education, transportation, communication and infrastructural facilities are accessible.
- ✓ The proposed mining operations do not intersect the ground water level. Hence, no impact on ground water environment.
- ✓ Study area falls in seismic zone – II, however there is no major history of landslides, earthquake, subsidence etc.

### 5.3 Analysis of Alternative Site

No alternatives are suggested as the mine site is mineral specific.

### 5.4 Factor behind selection of proposed technology

Semi-semi-mechanized open cast mining operation with deep hole drilling and blasting method will be used to extract Building Stone (Khanda, Gitti, Boulders) in the area. The mining lease area has following advantages:-

- There is practically very thin or negligible soil cover and overburden over the Building

Stone (Khanda, Gitti, Boulders) deposit; hence it does not require any blasting.

- As the mineral deposition is superficial and not deeply embedded, therefore opencast method of working out deposit is preferred over underground method.
- There is lesser chance of subsidence in case of opencast mining.
- The material will be loaded with the help of excavators / JCB into dumpers / trippers and transported to the desired demand market.
- Blasting and availability of drills along with controlled blasting technology gives desired fragmentation so that the mineral is handled safely and used with the minimum secondary blasting.
- Availability of power resources in the region makes mechanization a preferred technology over manual method.
- Human resource is easily available from the nearby villages because of presence of other mines in the area.

#### **IMPROVED BLASTING PRACTICES:**

These include Adoption of suitable explosive charge and short delay detonators, adequate stemming of holes at collar zone and avoiding blasting at foggy days, and at time of high wind speeds, restricting blasting to a particular time of the day i.e. at the time lunch hours, controlled charge per hole as well as charge per round of hole and Adopting muffling (i.e. covering the blast holes by sand bags) when the distance from important features is less than 500 M which will reduce dust noise and ground vibrations in vicinity area. considering the suitability of above options it is proposed controlled blasting, using Non- electric shock tube technology for the subject mine lease which is most suitable in the proposed mine. A comparative statement of Shock Tube with Conventional Blasting showing remarkably less adverse impacts on environment is detailed as below:

#### **ADVANTAGE OF SHOCK TUBE VIS-À-VIS DETONATING FUSE:**

- It's a Non-electric Initiation System.
- It consists of a hollow polymer tube of desired length containing a very small quantity of reactive explosive powder thinly layered in its annular space, approximately 15 – 20 milligram per meter. The detonation (shock wave) is contained within the tube and hence it doesn't rupture the tube. This tube is generally known as "SHOCK TUBE" or "SIGNAL TUBE" and it is the important component of the system.

- Controlled Blasting with Shock Tube gives “Down The Hole” Initiation.
- On the other hand, Detonating Fuse (DF) with Electric Detonator (ED) used in Conventional Blasting gives “Above The Hole” Initiation. As ED is initiated, detonation passes through DF from above to bottom of the hole and detonates the primary explosive charge placed at the bottom of the hole. In this process it makes a relief in the entire hole before actual blasting. Thus, it creates air blast, fly rock and poor fragmentation.

#### **ADVANTAGE OF DOWN THE HOLE DELAY DETONATOR (DTH)**

- 450 ms & Trunk Line Delay Detonator (TLD) - 25ms vis-à-vis Electric delay detonator
- The factory assembled delay detonator is fixed at one end of the tube. The other end is sealed to prevent ingress of moisture and other foreign matter. Plastic connectors are provided at the free end of the tube.

##### **a. Down the Hole Initiation**

It gives True Bottom Initiation. The detonation (shock wave) is contained within the tube and hence it doesn't rupture the tube.

##### **b. Adequate Delay Timing**

The delay is provided such that each hole breaks the burden rock in front of it and the broken rock moves out before the hole behind it detonates. In case of Conventional Blasting the inter – row delay is too short, the movement of row burdens is restricted which causes excessive burden in the second and subsequent rows and the rock tends to move vertically because of insufficient relief. This causes poor fragmentation, tight muck piles, high ground vibrations and fly-rock generation.

- c. So, the Controlled Blasting using Shock Tube Technology remarkably reduces the adverse effects on environment than the Conventional Blasting generally practiced in mining operations country wide.

### Comparison of Shock Tube with Conventional Blasting

S. No.	Feature	Shock Tube technology	Conventional blasting Electric Detonator & DF
1	Air pollution	Low	High
2	Fragmentation/ Fly-Rock generation	Excellent / contained within 75 m from blast site (mainly towards open face)	Average / extends up to 300 mtr radius from blast site
3	Ground Vibration / No. of holes per delay	Very Low / max. 3	High / max. up to 12
4	Air pollution	Low – Nearly entire gaseous energy under pressure remains confined within the hole to dislodge the in-situ rock strata and fragment it to the desired level.	High – nearly 40 % of gaseous energy gets released through the hole under high pressure creating huge cloud of dust and nitrogenous gas causing high air pollution
5	Air Blast / Noise pollution	Non – existent / low	Average /high
6	Initiation	Down the Hole	Above the Hole
7	Blasting Capacity	Unlimited	Unlimited
8	External Electric Hazard	None	Electricity & Radio Energy

**CHAPTER – 6:**  
**ENVIRONMENT**  
**MONITORING**  
**PROGRAMME**

## **6.0 ENVIRONMENTAL MONITORING PROGRAMME**

### **6.1 General**

Regular monitoring of environmental parameters is of immense importance to assess the status of environment during project operation. With the knowledge of baseline conditions, the monitoring programme will serve as an indicator for any deterioration in environmental conditions due to operation of the project, to enable taking up suitable mitigatory steps in time to safeguard the environment. Monitoring is important to measure the efficiency of control measures. An environmental impact assessment study is carried over for a specified period of time and the data cannot bring out all variations induced by the natural or human activities. Therefore, regular monitoring programme of the environmental parameters is essential to take into account the changes in the environmental quality. The objectives of monitoring are to:-

- Verify effectiveness of planning decisions;
- Measure effectiveness of operational procedures;
- Conform statutory and corporate compliance; and
- Identify unexpected changes.

#### **6.1.1 Environmental Monitoring & reporting Procedure**

Monitoring will conform that commitments are being met with. This will take the form of direct measurement and recording of quantitative information, such as quantity and concentrations of discharges, emissions and wastes, for measurement against corporate or statutory standards, consent limits or targets. It may also require measurement of ambient environmental quality in the vicinity of a site using ecological/ biological, physical and chemical indicators. Monitoring may include socioeconomic interaction, through local liaison activities or even assessment of complaints.

The preventive approach by management may also require monitoring of process inputs, for example, type and method used, resource consumption, equipment and pollution control performance etc. The key aims of monitoring are, first to ensure that results/ conditions are as per prediction during the planning stage and where they are or not, to pinpoint the cause and implement action to remedy the situation. A second objective is to verify the evaluations made during the planning process, in particular with risk and impact assessments and standard & target setting and to measure

operational and process efficiency. Monitoring will also be required to meet compliance with statutory and corporate requirements. Finally, monitoring results provide the basis for auditing.

## 6.1.2 Environmental monitoring Cell

In order to maintain the environmental quality within the standards, regular monitoring of various environmental components is necessary. The EMC team will take care of pollution monitoring aspects and implementation of control measures.

### 6.1.2.1 Responsibilities of EMC

The generalized responsibilities of the EMC will be as follows:

- a) Conducting Environmental monitoring of the surrounding area.
- b) Carrying out the Environmental Management Plan.
- c) Organizing meetings of the Environmental Management Committee and reporting to the committee.
- d) Ensuring that prescribed environmental standards are maintained.
- e) Ensure that all different types of statutory returns / compliance report to be submitted to relevant regulatory bodies.
- f) Commissioning of pollution control equipment/ measures.
- g) Specification and regulation of maintenance schedules for pollution control equipment.
- h) Developing the green belt.
- i) Ensuring water use is minimized.

The composition of the environment management cell along with the responsibilities of respective members are given in **Figure 6-1** as follows.

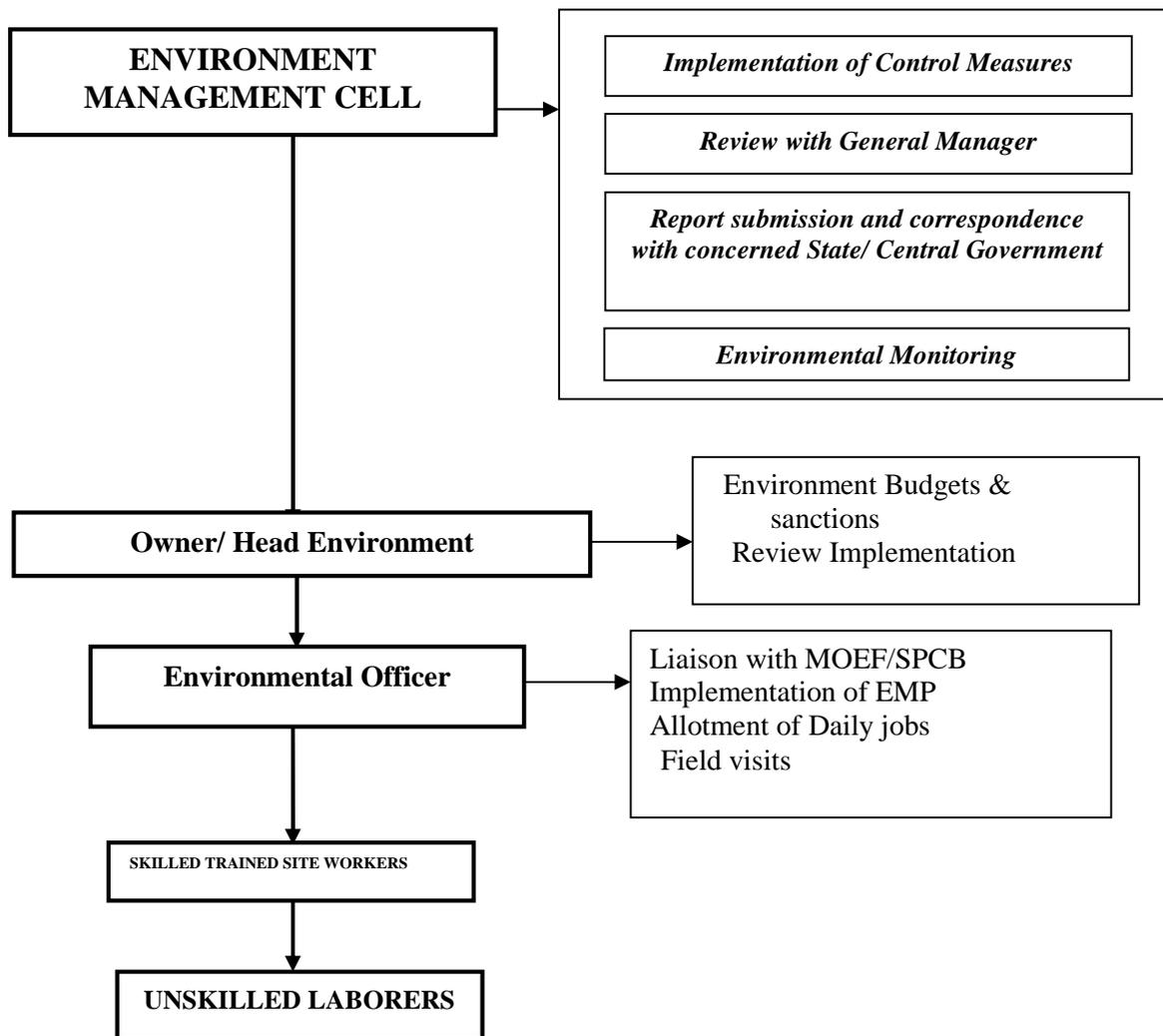


Figure 6- 1: Environment Management Cell

Table 6- 1Monitoring Schedule and Parameters

S. No.	Description of Parameters	Schedule and Duration of Monitoring/Execution
1	Air Quality: In the vicinity of the mine In the vicinity of the transportation Network Dust suppression on roads Scraping/ bulldozing of road to shift accumulated dust to the sides	24 hourly samples twice a week for one month in each season except monsoon season  Regularly in non- monsoon months and whenever occurrence of fugitive dust takes place Fortnightly
2	Water Quality near or around the site: a) Surface water quality b) Ground water quality	Once in a season for 4 seasons in a year
3	Ambient Noise Level	Twice a year for five years
4	Soil Quality	Twice a year for five years
5	Inventory of Flora(tree plantation, survival etc) & Fauna	Once in years on project monitoring area
6	Socio-economic condition of local, population, physical survey	Once in 3 years

## 6.2 Green Belt Development

During first four years, about 240 saplings of local varieties of trees will be planted every year in the un-worked area around and the haulage route. Plant species act as bio-monitoring agent to monitor the air environment as well as to keep and maintain the project environ healthy. Trees have substantial inter-specific as well as intra-specific variation in air pollution tolerance. Green Belt development / tree plantation in organized manner will be carried out around the existing mine site by the end of the mining activity. The species suggested are Local tree species in the mine area and nearby villages, to reduce the impact of expansion activities in the surroundings of the existing mine site. The suggested plants are suitable for green belt development have characteristics like, fast growing, thick canopy cover, perennial and evergreen large leaf area, naturally growing, efficient in absorbing pollutants without major effects on natural growth. On the basis of the general principles mentioned and as per the CPCB guidelines for the development of Greenbelts following species are recommended:

**OUTER PERIPHERY TREES**

- *Azadirachta indica*
- *Eucalyptus hybrid.*
- *Ficus religiosa*
- *Hetrophragma roxburghii DC*
- *Samanea saman*
- *Tamarindus indica*

**INNER PERIPHERY TREES**

- *Balanites roxburghii planch*
- *Bougainvillea Spectabilis wild*
- *Derris indica (lam) Bennett*
- *Ficus Benjamina linn*

**MEDIUM SIZE TREES**

- *Phoenix sylvestris*
- *Sesbania Grandiflora pers*
- *Mimusops hexandra*

**SMALL SIZE SHRUBS**

- *Acacia catechu.*
- *Accacia ferruginea DC*
- *Clerodandrum inerme*
- *Callistemon citrinus stapf*

**Table 6- 2: Proposed afforestation programme**

Year	No. of Plants	Area (Ha)
1 <sup>st</sup>	240	0.24
2 <sup>nd</sup>	240	0.24
3 <sup>rd</sup>	240	0.24
4 <sup>th</sup>	240	0.24
5 <sup>th</sup>	240	0.24

**6.3.Occupational Health & Safety**

The working conditions in the mines are governed by the enactments of the Director General of Mines Safety (DGMS). As per the guidelines of the Mines Act, the management will take all necessary precautions. Normal sanitary facilities will be provided within the lease area. The management will carry out periodic health check up of workers.

Occupational hazards involved in mines are related to dust pollution, noise pollution, blasting and injuries from moving machineries & equipment and fall from high places.

DGMS has given necessary guidelines for safety against these occupational hazards. The management will strictly follow 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 firefighting equipment. All operators and mechanics will be trained to handle fire-fighting equipments. Further all the necessary protective equipments such as helmets, safety goggles, earplugs, earmuffs, etc. will be provided to persons working in mines as per Mines Rules, 1955.

#### **Reporting schedule of monitored data**

It is proposed that voluntary reporting of environmental performance with reference to the EMP.

The Environmental Monitoring Cell will co-ordinate all monitoring programmes at site and data thus generated will be furnished as per statutory requirements.

## **6.4 SUMMARY**

In order to maintain the environmental quality within the stipulated standards, regular monitoring of various environmental components is necessary which will be complied as per conditions. For this Shri Sangram Singh S/o Shri Jaiwant Singh has taken decision to formulate an Environment Policy of the mine and constitute an Environmental Management Cell and committed to operate the proposed mine with the objectives mentioned in approved Environment Policy. EMP may also require measurement of ambient environmental quality in the vicinity of a site using ecological/biological, physical and chemical indicators. Monitoring may include socio-economic interaction, through local liaison activities or even assessment of complaints. Regular Monitoring of all the environmental parameters viz., air, water, noise and soil as per the formulated program based on CPCB and MoEF & CC guidelines will be carried out every year. The location of the monitoring stations was selected on the basis of prevailing micro meteorological conditions of the area like; wind direction and wind speed, relative humidity, temperature.

**CHAPTER – 7:**  
**ADDITIONAL STUDIES**

## 7.0 ADDITIONAL STUDIES

### 7.1 PUBLIC CONSULTATION

Public hearing is a mandatory requirement laid down as per Govt. of India, Ministry of Environment and Forests (MoEF & CC) Notification No. SO 1533 dated 14th September, 2006, and as amended on 15th January 2016 for seeking environmental clearance for mining of Building Stone (Khanda, Gitti, Boulder) in the applied mining lease area measuring 2.02 hectares falling under category “B”. The lease area is located at Gata No.- 1876, Khand No.- 01, Village- Girwan, Tehsil- Naraini, District- Banda, Uttar Pradesh. The report is being incorporated to conduct Public Hearing Proceedings. This proposal falls in category “B” sub-category “B1” which requires EIA study. As per the TOR (Terms of reference) issued for the project by the SEAC vide Letter no. : **197/Parya/SEAC/4782/2019 dated 31<sup>st</sup> July, 2019**, Public Hearing of Building Stone (Khanda, Gitti, Boulder) mining project Gata No.- 1876, Khand No.- 01, Village- Girwan, Tehsil- Naraini, District- Banda, Uttar Pradesh. was conducted by RO, Regional Office, UPPCB, Banda, on 20-11-2019. The minutes of Public hearing attached as **Annexure- V**.

### 7.2 Risk Analysis & Disaster Management Plan

#### 7.2.1 Background

The methodology for the risk assessment has been based on the specific risk assessment guidance issued by the Directorate General of Mine Safety (DGMS), Dhanbad, vide Circular No.13 of 2002, dated 31st December, 2002. The DGMS risk assessment process is intended to identify existing and probable hazards in the work environment and all operations and assess the risk levels of those hazards in order to prioritize those that need immediate attention. Further, mechanisms responsible for these hazards are identified and their control measures, set to timetable are recorded along with pinpointed responsibilities.

In the unlikely event that a consequence has occurred, disaster management kicks in. This includes instituting procedures pertaining to a number of issues such as communication, rescue, and rehabilitation. These are addressed in the disaster management plan.

Both, the RA and DMP, are living documents and need to be updated whenever there are changes in operations, equipment, or procedures

Assessment is all about preventing accidents and taking necessary steps to prevent it from happening.

### 7.2.2 Key Definitions

**Hazard:** Source of potential harm, injury, or loss.

**Consequence:** Size of the loss or damage. In terms of health and safety, it is the degree of harm that could be caused to people exposed to the hazard, the potential severity of injuries or ill health and / or the number of people who could be potentially affected. Consequence of a hazard need not only be in terms of safety criteria but could also be in terms of a money loss, incurred costs, loss of production, environmental impacts as well as public outrage.

**Risk:** Combination of the likelihood of a specific unwanted event and the potential consequences if it should occur.

**Risk Assessment:** Is a process that involves measurement of risk to determine priorities and to enable identification of appropriate level of risk treatment (used also to describe the overall process of risk management).

**Risk Control:** Implementation of strategies to prevent or control hazards

**Risk Rating:** The category or level of risk assigned following risk assessment (e.g. High, Medium or Low).

**Risk Management:** Overall description of the steps taken to manage risk, by identifying hazards and implementing controls in the workplace.

**Emergency:** A situation of process deviation that, if uncontrolled, may lead to a major accident /disaster with potential short term and/or long term risk damage consequence to life and property in and/or around the workplace.

**Disaster:** A catastrophic consequence of a major emergency / accident that leads to not only extensive damage to life and property, but also disrupts all normal human activity for a significant period of time and requires a major national and / or international effort for rescue and rehabilitation of those affected.

## 7.3 Scope of Work for RA & DMP Study

The scope of work has been framed as per DGMS requirements for risk and safety studies in mines and includes the hazard identification, risk assessment, and ranking, resulting in treatment controls and action plans.

### 7.3.1 Level 1: Hazard Identification

Hazard identification includes:

#### STUDY OF SAFETY ISSUES PERTAINING TO THE PROJECT

- Study of operational information, including safety concepts used in design of equipment and storages.
- Listing of hazardous inventory and identification of key hazardous substances to be used.
- Available procedures and the extent to which they are followed in operational mines by the same organization.
- Consultations with employees who carry out or are likely to carry out the jobs.
- Safety statistics for this and other mines, as applicable and available.
- Statutory mine inspection reports, where available.
- Past history of accidents and near misses.

The above are applicable to all the aspects of the mining activities including winning of minerals, crushing – sizing and transport.

#### IDENTIFICATION OF HAZARD SCENARIOS

- Identification of scenarios that can cause damage to life & property.

### 7.3.2 Level 2: Risk Assessment & Ranking RISK

#### ASSESSMENT

As defined earlier, risk is a function of likelihood and consequence. Likelihood is the chance that the hazard might occur. Since the risk of any hazard is dependent upon the chance that it will occur (likelihood) and the impact of an occurrence (consequence):

#### **Risk Score = Likelihood x Consequence**

In some cases personnel are only exposed to the hazard for part of the time. Hence, a more detailed analysis of the risk ranking can be carried out by taking exposure (% time personnel are present) and probability (chance that they will be injured) into consideration. Thus:

#### **Risk Score = (Probability x Exposure) x Consequence**

The values used for likelihood, consequence, exposure or probability need to be agreed by the risk assessment team, and there is an element of professional judgment in exercising these choices.

### RISK RANKING

Risk ranking can be determined by qualitative and quantitative means. It should however be remembered that no one method is best. The best choice of method will depend on the circumstances and preferences at the mine, at the time the exercise is done. However, regardless of the method establishing risk ranking will set priorities for Hazard control. The most important purpose in hazard identification, risk assessment, and ranking is to draw up and implement plans to control these hazards. However, keeping the acceptance of the participants during workshops conducted at different mines, DGMS has suggested a criteria table for quantitative risk ranking to be used as in **Table 7.1**.

**Table 7- 1: Risk ranking criteria**

Scale for consequence	Scale for exposure	Scale for probability
Several dead: 5	Continuous: 10	May well be expected: 10
One dead: 1	Frequent (daily): 5	Quite possible: 7
Significant fatality chance: 0.3	Seldom (Weekly): 3	Unusual but possible: 3
One permanent disability/ less chance of fatality: 0.1	Unusual (Monthly): 2.5	Only remotely possible: 2
Many lost time injuries: 0.01	Occasional (Yearly): 2	Conceivable but unlikely: 1
One lost time injury: 0.001	Once in 5 years: 1.5	Practically impossible: 0.5
Small injury: 0.0001	Once in 10 years: 0.5	Virtually impossible: 0.1
	Once in 100 years: 0.02	

On the basis of the above scoring format, and after a perusal of the resultant scores, professional judgment was exercised in selecting the following scale for assessing risk levels:

- Level 1: > 15; i.e., requiring immediate action
- Level 2: <15 but > 5; i.e., requiring management action
- Level 3: < 5; i.e., low risks requiring periodic review

### 7.3.2.1 Hazard Analysis

Broadly, the hazards cover explosive material management, working at heights, slope and bench stability, mineral transport, mineral processing and force majeure conditions (rainfall & flooding). The mechanisms due to which hazards (coming under Risk Levels 1 & 2) may actually occur are covered in **Table 7-2**.

**Table 7- 2: Cause analysis for level 1 & level 2 hazards**

S.No	Hazard Description (Risk)	Risk Level	Cause Analysis
1	Travel in moving vehicle in uneven terrain	Level 3	<ul style="list-style-type: none"> <li>• Poor visibility</li> <li>• Incompetent driver</li> <li>• Poorly maintained vehicles</li> </ul>
2	Unintended explosions (exposure to overpressure)	Level 1	<ul style="list-style-type: none"> <li>• Defective explosives</li> <li>• Outdated explosives</li> <li>• Improper storage of explosives</li> <li>• Force majeure conditions such as lightning strike</li> <li>• Fire (can be caused by unsafe practices or as ignition)</li> <li>• Sabotage</li> </ul>

3	Unintended explosion or exposure (exposure to overpressure)	Level 3	<ul style="list-style-type: none"> <li>• Defective explosives</li> <li>• Outdated explosives</li> <li>• Improper storage of explosives</li> <li>• Force majeure conditions such as lightning strike</li> <li>• Fire (can be caused by unsafe practices or as arson)</li> <li>• Sabotage</li> </ul>
4	Hit by fly rock (bodily injuries)	Level 3	<ul style="list-style-type: none"> <li>• Poor access control of blast area</li> <li>• Poor blasting practices (leading to excessive fly rock)</li> </ul>
5	Rock falls or slide due to lack of bench face stability (bodily injuries)	Level 1	<ul style="list-style-type: none"> <li>• Improper design of bench</li> <li>• Force Majeure (such as heavy floods or rainfall)</li> <li>• Improper blasting practices</li> <li>• Incompetent blasting personnel</li> </ul>
6	Hit by Machineries – Electrical Equipment (bodily injuries)	Level 2	<ul style="list-style-type: none"> <li>• Improper design of equipment</li> <li>• Improper maintenance</li> <li>• Non usage of required PPE.</li> <li>• Incompetent Personnel</li> </ul>
7	Vehicle Accident (bodily injuries)	Level 1	<ul style="list-style-type: none"> <li>• Head on collision between vehicle and another vehicle (due to poor visibility or incompetent drivers)</li> <li>• Poor vehicle maintenance</li> </ul>
8	Accidental fire in vehicle (bodily injuries, exposure to heat radiation)	Level 3	<ul style="list-style-type: none"> <li>• Accident to vehicle carrying fuel, and subsequent ignition of spilt fuel</li> <li>• Improper storage of fuel, in MS drums, leading to spillage followed by ignition</li> <li>• Driving with loaded material on uneven terrain, and subsequent ignition of spilt fuel</li> </ul>

### 7.3.3 Controls and Action Plans

To ensure that causes leading to the possible consequences are prevented from occurring, control and action plans are developed and suggested as described in **Table 7-3**. It is required that these control and action plans be implemented and reviewed at least annually and also when there are changes to the work plan.

Table 7- 3: Control &amp; Action Plan

S. No	Hazard	Causes	Control	Relevant Legislation	Procedure	Existing Procedure (Y/N)	Responsible Person (Designation)
1	Unintended explosions (exposure to over pressure) during storage of explosives in magazines	Defective explosives	Explosive used should be purchased only from approved and licensed authority. If deteriorated or unserviceable explosive is found, seek advice of licensing authority	Metalliferous Mines Regulation – 1961. & Explosive act, 1884	If any defective explosive is found, it is returned back to the original supplier for disposal at their end as per Rule 16 of The Explosive Rules 1983	Y	Authorized supplier of explosives
		Outdated explosives	Records and accounts of explosive stock and issue is to be maintained. Stock should be drawn upon strict rotation. Well planning for requirement of explosives shall be exercised. Disposal of outdated explosives as the chief controller or controller of explosive may issue	Explosive act, 1884, MMR – 1961.	Maintaining registers for Explosives receipt, issue and stock as per Reg. 154, 156 of MMR 1961.	Y	Mines Manager
		Improper storage of explosives	Detonator are to be stored separately. Explosives shall be stored in dry and well ventilated area.  Protect explosives from extreme temperatures	Explosive act, 1884,	Explosives and Detonators are stored separately as per approved design & licensed capacity of magazine under Explosive act, 1884	Y	Mines Manager
		Force majeure conditions such as lightning strike	Lightning conductor are to be installed on the top of magazine. Lightning conductor should not have resistance more than 10 ohms	The Explosive Rules 1983	Lightning arrestors are provided and maintained as per the requirement under Rule 116 the Explosive Rules 1983	Y	Mines Manager

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		Fire (can be caused by unsafe practices or as arson)	Empty packages shall be removed immediately and destroyed. No smoking or any source of light or fire shall be allowed near explosives storage	The Explosive Rules 1983 MMR – 1961	Follow the instructions Specified in Rule 154, 156 and 170 of MMR–1961 for storage, and handling of Explosives. Rule 97 and 101 of the ER 1983	Y	Mines Manager, Mines Foreman (Blasting)
		Sabotage	Security shall be provided at the magazine Shortage and theft of explosive shall be reported to the nearest police station and the licensing authority	The Explosive Rules, 1983,	Round the clock security guards provided and immediate reporting to nearest Police Station and Licensing Authority done in case of thefts or sabotage as per Rule – 123 of ER 1983	Y	Mines Manager
2	Rock falls or slide due to lack of bench face stability (bodily injuries)	Improper design of bench	Proper catch bench design and proper blasting pattern reduces over break Maintain the width to height ratio as per DGMS	MMR-1961	Procedure for opencast working as per Reg. 106	Y	Mines Manager
		Force Majeure (such as heavy floods or rainfall)	Dewatering or culverting the storm water may reduce slides of bench	MMR-1961.	Following procedures as per Reg. 127 and 130 of MMR –1961 for Dewatering or and culverting the water	Y	Mines Manager
		Improper blasting practices	Good design of blasting network is important to reduce rock fall and slides of bench face	MMR-1961.	Procedure for opencast working as per Reg. 106	Y	Mines Manager
		Incompetent blasting personnel	Shot firer should have shot firer's permit granted under explosive rules	MMR – 1961	Appointment of Shotfirer as provided in Reg. 160 of MMR 1961	Y	Mines Manager
3	Vehicle accident (bodily injuries)	Head on collision between vehicle and another vehicle (due to poor visibility or incompetent drivers)	Haul road should be sprinkled Regularly  Driving at night shall be avoided  Driver should be RTO licensed holder for driving vehicle	MMR – 1961 Motor Vehicle Act	Sprinkling of water in haul road as per Reg. 124 MMR 1961 and appointment of RTO licensed drivers	Y	Mines Manager

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		Poor vehicle maintenance	Periodic servicing of vehicle Brakes and steering apparatus should be in good condition Headlight and tail light of the vehicle should be in good condition	MMR 1961	Procedure for Maintenance of Vehicles under Reg. 176 of MMR – 1961	Y	Mines Manager
4	Unintended explosion or exposure to overpressure, charging blast holes	Poor access control of blast area	Well planning is required before and after charging of blast holes.  Blast sites should be secured and warning signs posted before loading boreholes.	MMR 1961	Procedure for drilling charging stemming and firing of holes as per Reg. 162	Y	Mines Manager
		Incompetent blasting personnel	Shot firer should have shot firer's permit granted under explosive rules	MMR 1961	Appointment of Shot firer as per Reg. 160 as per MMR 1961	Y	Mines Manager
		Poor blasting practices	Tamping rod of wood must be used, iron or steel rods should not be used.  No smoking or any source of light or fire shall be allowed near explosives storage.  Before loading the blast hole blaster should check the driller log Blast sites should be secured and warning signs posted before loading boreholes.	MMR – 1961 - The Explosive Rules, 1983,	Procedure for drilling charging stemming and Firing of holes as per Reg. 161, Rule 14 of ER ISO procedure QSP- 760-06	Y	Certified Blaster
		Defective explosives	Explosive used should be purchased only from approved and licensed authority only If deteriorated or unserviceable explosive is found, seek advice of licensing authority	The Explosive Rules, 1983	Explosive are purchased from Approved manufactured or authorized license holder from CCE.	Y	Mines Manager
		Outdated explosives	Stock should be drawn upon strict rotation	The Explosive Rules 1983	Issue of explosives on first come first ISO procedure QSP- 760-06	Y	Mines Manager

## FINAL EIA REPORT FOR BUILDING STONE (KHANDA, GITTI, BOULDERS) MINE

5	Hit by fly rock (bodily injuries) During blasting	Poor access control of blast area	Adequate blast area security must be provided. Blast sites should be secured and warning signs posted before loading boreholes. Post guards at the access points to prevent unauthorized entry	MMR – 1961	Procedure for tacking shelter etc. during drilling and blasting Reg. 164 of MMR 1961	Y	Mines Foreman (Blasting)
		Poor blasting practices (leading to excessive fly rock)	Burden, spacing, hole diameter, stemming, sub drilling, initiation system, and type of explosive used matched the characteristics of the rock formation.  Adequate blasting Shelter must be used for the persons whose presence is required in blasting  Nobody should be present within 300 m radius of blasting site as per DGMS circular except blasting personnel.  Practice for controlled blasting Technique with milli-second delay detonators/ electric shock tubes/ cord relays. Training of persons and their helpers engaged in such blasting operation.	DGMS/(Tech) Cir.No.2 of 2003	Procedure for drilling and blasting, tacking shelter etc. as per Reg. 164 MMR1961, DGMS (SOMA)/(Tech) Cir.No.2 of 2003	Y	Certified Blaster (MMR)
6	Hit by Machineri es – Electrical Equipment (bodily injuries)	Poor machinery Maintenance	Periodic servicing of machineri es Periodic Inspection/ Audit of Machineri es and Structures Non Compliance to SOP	MMR 1961	Procedure laid under Section 174 Chapter XVI – Machinery and Plant of MMR 1961	Y	Mines Manager
		Poor Cabling / Earthing To Rotating Equipments	Periodic servicing of electrical instruments. Periodic Inspection / Audit of Electrical equipments – cables and accessories  Non Compliance to SOP	Indian Electricity Rules 2003	Section VII – Works of Licensees of Indian Electricity Rules 2003	Y	Electrical In charge under Mines Rules 1951

## 7.4 First Aid

First aid facility will always be made available to time mine site with well maintained first aid box. A separate van will also be made available at the site which will deliver the employ to the nearest health center in case of any miss-happening.

## 7.5 Community Development Policy:

### Corporate Environment Responsibility

As per the primary analysis and secondary data available the mine site is located in a remote location with scanty of available social infrastructure available. The break-up of CER is tabulated below:

Sr. No.	Activity	Cost in Rs. (in Lakhs)
1.	Installation of Hand pumps for drinking water	50,000
2.	Solar Street Lights on village roads	80,000
	<b>Total</b>	<b>1,30,000</b>

Apart from the motioned activity other suggested activities will be:

- ✓ Medical Camps will be organized for the employees of the project and for the people in the nearby area of mine lease area. It will be done with coordination of the Government Hospital in the nearby area whose equipment facilities can be used for this purpose. Medicines will be provided free of cost.
- ✓ First aid training will be regularly imparted to trainees from the neighboring villages.
- ✓ The Company also distributes saplings to the local villagers as a part of social forestry.
- ✓ Give financial assistance for construction work in schools, for community Centre etc. through gram panchayat.
- ✓ Give financial assistance to Government Hospitals for their modernization and purchase of required equipment.

**CHAPTER – 8:**  
**PROJECT BENEFITS**

## **8.0 PROJECT BENEFITS**

### **8.1. General**

Various benefits are envisaged while planning for the mining of Building Stone (Khanda, Gitti, Boulders) at village Girwan. This chapter gives a comprehensive description of various advantages and benefits anticipated from the proposed project to the locality, neighbourhood, region and nation as a whole.

Building Stone (Khanda, Gitti, Boulders) is very important raw material for road and pavements, flooring and many more. The need for mining of the Building Stone (Khanda, Gitti, Boulders) from the project (mine lease area) has arisen to meet the current situation of demand supply gap.

### **8.2 Improvements in Physical Infrastructure**

As it is captive Building Stone (Khanda, Gitti, Boulders) mine, it will have direct and indirect impacts to improve physical infrastructure in nearby community.

The project will improve the physical infrastructure of the adjoining areas. This will include the following:-

- Improved road communication;
- Strengthening of existing community facilities through the existing Community Development Programme;
- Mine pits will be converted into Rain water reservoir to augment the water availability for irrigation and plantation;
- Awareness program and community activities, like health camps, medical aids, family welfare programs, immunization camp sports & cultural activities, plantation etc.

### **8.3 Improvements in Social Infrastructure**

The proposed project is expected to provide employment to local people in different activities such as Mining, sizing, transportation and plantation activities. The project activity will not have any major impact on the environment. At Post mining stage of proposed project, the existing waste land shall be converted to water harvesting bodies and green belts.

Also the Corporate Environment Responsibility initiatives will have a positive impact on socio economic fabric of the region.

#### **8.4 Employment Potential**

The local labors shall be engaged for sizing of Building Stone (Khanda, Gitti, Boulders) and loading and handling of mineral in mining area, besides, watch and ward and plantation activity with proper maintenance. The total manpower required for material handling and loading works out to 33. Beside this, The proponent Shall engage skilled and managerial staff to meet the statutory requirement under MMR 1961 and MCDR 1988. At present, the mine is not functional. The following skilled / unskilled and semi-skilled workers besides managerial and administrative staff shall be employed at the time of re-opening of mine.

#### **8.5 Tangible social benefits**

There will be positive impact in socio-economic area due to increased economic activities, creation of new employment opportunities, infrastructural development and better educational and health facilities.

##### **Health**

Company will undertake awareness program and community activities like health, camps, medical aids, family welfare camps, etc.

Periodic medical checkups as per Mines Act/ Rules and other social development and promotional activities will be undertaken. All this will assist to lift the general health status of the residents of the area around mines.

##### **Plantation**

A massive plantation is proposed to mitigate the ill-effects of mining and to improve the vicinity and environment of mine and it surrounding area. The management will give emphasis on plantation and will also motivate local persons for plantation during rainy season. This will also increase the consciousness in workers and near-by villagers for greenery. Fruit trees can contribute towards their financial gains.

## 8.6 Other Benefits

Apart from all the above mentioned benefits there will be other benefits to the region in terms of up gradation of lifestyle, overall area development etc.

## 8.7 SUMMARY

The management will recruit the semi-skilled and unskilled workers from the nearby villages. 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. The company management will contribute to the local schools, dispensaries for the welfare of the villagers. A suitable combination of trees that can grow fast and also have good leaf cover will be adopted to develop the green belt. It is proposed to plant native species along with some fruit bearing and medicinal trees during the mining plan period. Other than this social development of village will be considered as per social activities.

**CHAPTER – 9:**  
**ENVIRONMENT**  
**MANAGEMENT PLAN**

## **9.0 ENVIRONMENTAL MANAGEMENT PLAN**

### **9.1 General**

The environmental management plan consists of a set of mitigation, management, monitoring and institutional measures to be taken during implementation and operation of the project, to eliminate adverse environmental impacts or reduce them to acceptable levels. The present environmental management plan addresses, the components of environment, which are likely to be affected by the different operations in a Building Stone (Khanda, Gitti, Boulders) mine.

The Objectives of EMP are:

- Overall conservation of environment.
- Minimization of waste generation and pollution.
- Judicious use of natural resources and water.
- Safety, welfare and good health of the work force and populace.
- Ensure effective operation of all control measures.
- Vigilance against probable disasters and accidents.
- Monitoring of cumulative and long term impacts.
- Ensure effective operation of all control measures.

### **9.2 Environment Management System**

#### **Environment Cell**

Company has well established Environmental Management System which is headed by General Manager- Safety, Health & Environment. Company has implemented online Legal Compliance management system with well-defined compliance owners. The system generates Email alerts for meeting compliances and has inbuilt escalation mechanism to keep the senior management informed on compliance updates.

**Table 9- 1: Environment Monitoring Cell**

S. No.	Designation	Proposed responsibility
1.	Owner/Head Environment	Overall responsibility for environment management and decision making for all environmental issues
2.	Manager – Environment Management System	Overall in-charge of operation of environment management facilities;  Ensuring legal compliance by properly undertaking activities as laid down by various regulatory agencies from time to time and interacting with the same
3.	Skilled Trained Site Workers & Unskilled Labours	Secondary responsibility for implementing the environment management & ensure the implementations.

### 9.3 Proposed Environmental Management Plan

The environment management plan is prepared with a view to facilitate effective environmental management of the project, in general and implementation of the mitigation measures in particular. The EMP provides a delivery mechanism to address potential adverse impacts and to introduce standards of good practice to be adopted for all project works. For each stage of the programme, the EMP lists all the requirements to ensure effective mitigation of every potential biophysical and socio-economic impact identified in the EIA. For each impact or operation, which could otherwise give rise to impact, the following information is presented:

- A comprehensive listing of the mitigation measures (actions);
- The parameters that will be monitored to ensure effective implementation of the action;
- The timing for implementation of action to ensure the objectives of mitigation is fully met.

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 form in and out land.

#### 9.4 Budget Allocation For EMP Implementation

Annual budget for EMP is very essential for successful implementation of EMP. As there are no pollution control systems, no capital cost of Pollution Control systems are envisaged. Costs will be annual operating costs as given below. The fund allocated will not be diverted for any other purposes and the top management will be responsible for this. The budget will take into consideration the following expenses:

**Table 9- 2: Cost of EMP**

Items	Units	Total Cost	
		Capital	Recurring
<b>Environment Management Plan (EMP)</b>			
<b>Plantation</b>			
No of plants (@5 plants/ha)	240 saplings	-	24,000
Tree Guard (@ Rs 1000/sapling)	240 saplings	-	2,40,000
Water Demand for plantation (@ 4.0 liter/plant)	960 L		1,50,000
Sprinkling on haulage route a day for dust suppression (Rs. 500/ Tanker of 2 KLD)	300 days	-	3,00,000
Air Quality Monitoring (regular)		1,00,000	
Monitoring of Ground water and Surface water			50,000
Noise Environment			50,000
Land Environment			50,000
Mobile Toilets			1,50,000
Separate Bins for waste Collection	20 bins @ 500Rs.	10,000	
	Total	1,10,000	10,14,000
<b>Grand Total</b>		<b>11,24,000</b>	

## 9.5 Anticipated Environmental Issues & their Mitigation

The likely impacts of the proposed mining and allied activities on the various environmental parameters are discussed as under and tabulated in separate heads.

IMPACT AREA	PROBABLE IMPACTS	PROBABLE SOURCE	MITIGATION MEASURES	REMARKS
<b>LAND USE</b>	Change in land use pattern	<ul style="list-style-type: none"> <li>• Site preparation</li> <li>• Excavation</li> <li>• Construction of approach and haulage road.</li> <li>• Drilling &amp; Blasting.</li> <li>• Disposal of overburden/waste etc.</li> </ul>	<ul style="list-style-type: none"> <li>• At any point of time, area under reclamation should be kept at minimum by ensuring simultaneous reclamation of land along with mining activity to reduce the time gap between land reclamation and mitigation.</li> <li>• The scheme of Plantation has been proposed all along the approach road of lease area &amp; will be made accordingly. The selection of plant species will be based on the local soil conditions. Post plantation care like watering and protection from grazing will be done by proving tree guard / fencing.</li> <li>• The top soil shall be scraped manually and send to the plantation site directly.</li> <li>• Number of access roads to mining site should be kept minimum.</li> <li>• Stockpiling of stone shall be avoided.</li> <li>• There shall be no waste generated during the mining as all the ROM shall be used in making aggregates.</li> </ul>	<ul style="list-style-type: none"> <li>• The existing land form is hilly barren terrain there is no forest land in the lease area, the land use is waste land and ownership is owned by state government.</li> <li>• There is no agriculture in the vicinity of lease area so mining will not have any impact on agricultural pattern.</li> <li>• Aesthetic environment will also be not affected as the mine lease area is waste land (rocky terrain) with some bushes only.</li> </ul>

## FINAL EIA REPORT FOR BUILDING STONE (KHANDA, GITTI, BOULDERS) MINE

IMPACT AREA	PROBABLE IMPACTS	PROBABLE SOURCE	MITIGATION MEASURES	REMARKS
<b>AIR QUALITY</b>	Probable contamination of air with dust and exhaust gases of the vehicle transporting stone and by drilling, blasting operations.	<ul style="list-style-type: none"> <li>The dust generated from mining activities is the primary source of air pollution. The emission sources include excavation and mining of stone, drilling, sizing and transportation within the project area.</li> <li>Negligible amount of auto exhaust emissions also expected to be found in the core zone because of vehicular activities arising due to transportation of limestone and waste by dumpers and Excavators.</li> <li>NO<sub>x</sub> generated from blasting</li> <li>Storage of Mineral</li> </ul>	<ul style="list-style-type: none"> <li>As the primary concern in air quality is emanated dust to dust suppression system mainly water spraying is to be done in and around mining area.</li> <li>Use proper drill bits for drilling holes and wet drilling method to reduce dust generation at source.</li> <li>Loading of mineral should be done at optimum height so as to reduce the dust below.</li> <li>Overloading will be prevented. The trucks and trolley after loading will be covered by suitable cover.</li> <li>Timely maintenance of vehicle used for transportation of mineral shall be ensured.</li> <li>Green belt along the available area &amp; haulage roads shall minimize the impact.</li> </ul>	Spreading of dust particles shall be negligible as the dust shall be suppressed at source. However, plantation all along lease boundary & haulage roads shall act as dust arrester & sink hole for suspended particles.

## FINAL EIA REPORT FOR BUILDING STONE (KHANDA, GITTI, BOULDERS) MINE

<b>WATER QUALITY</b>				
<b>IMPACT AREA</b>	<b>PROBABLE IMPACTS</b>	<b>PROBABLE SOURCE</b>	<b>MITIGATION MEASURES</b>	<b>REMARKS</b>
<b>SURFACE WATER</b>	Change in quality as well as quantity.	<ul style="list-style-type: none"> <li>• Waste generated due to mining.</li> <li>• Due to runoff water from the rain.</li> <li>• Due to disposal of waste by labors.</li> <li>• Due to washing of vehicles used in transportation</li> <li>• Due to disposal of excreta.</li> <li>• Due to leakage of oil and greases from vehicle and machinery used.</li> </ul>	<ul style="list-style-type: none"> <li>• Waste shall not be generated as all the quantity of ROM shall be used in making aggregates.</li> <li>• Massive plantation in and around lease area and haulage road.</li> <li>• Rainwater accumulated in worked out pit will be collected and will be used for dust suppression and green belt development.</li> <li>• Retaining wall &amp; Check dam construction all along slope.</li> <li>• Drains all along road side.</li> <li>• No open air defecation shall be allowed mobile toilets shall be provided to labours for defecation.</li> <li>• Throwing of waste or item in nearby water bodies should be strictly prohibited.</li> <li>• Proper maintenance of vehicle used in transportation.</li> </ul>	Mining will be done above the water table in leased area which is waste land and there is no river or surface water exists within this area. However, composition of granitic rock merely reacts with surface water as it contaminates the run-off water during rains.
<b>IMPACT AREA</b>	<b>PROBABLE IMPACTS</b>	<b>PROBABLE SOURCE</b>	<b>MITIGATION MEASURES</b>	<b>REMARKS</b>
<b>GROUND WATER</b>	Interception, diversion, contamination and wastage of ground water	<ul style="list-style-type: none"> <li>• Digging and excavation.</li> <li>• Piling of overburden.</li> </ul>	<ul style="list-style-type: none"> <li>• Regular monitoring of ground water.</li> <li>• Piling of overburden will be avoided</li> <li>• Whenever the mining reaches the water table the leaseholder should dig a separate well in the lease area itself in which water from mining pit is disposed with objective of recharging water table by doing so there would be no storage of ground water.</li> </ul>	No interception diversion or contamination of groundwater because Mining will be done above the water table in leased area. There is not any generation of toxic waste from mining site and ground water is not used for any mining activity Except, drinking purpose which shall be procure from nearby hand pump/ tube well. Bottom of the excavated pit will act as recharge well to the ground water.

## FINAL EIA REPORT FOR BUILDING STONE (KHANDA, GITTI, BOULDERS) MINE

IMPACT AREA	PROBABLE IMPACTS	PROBABLE SOURCE	MITIGATION MEASURES	REMARKS
<b>NOISE QUALITY</b>	Increase in Noise level of the area which will affect the inhabitant residing nearby and there.	<ul style="list-style-type: none"> <li>• Drilling &amp; blasting</li> <li>• Heavy earth moving machinery</li> <li>• Due to vehicle used for transportation of excavated material</li> <li>• Accumulation of labor in mining area, noise is created from their verbal communication and manual excavation.</li> </ul>	<ul style="list-style-type: none"> <li>• Drilling &amp; Blasting shall be performed under the supervision of competent Blaster &amp; Mines Manager with Optimum hole charge by using delay detonators &amp; muffle blasting to minimizes nose impact &amp; rock fly</li> <li>• Care will be taken to produce minimum sound during loading of mineral.</li> <li>• Minimum use of horn and provision of speed limit will be ensured.</li> <li>• Timely maintenance of vehicles and their silencers to minimize sound and vibration.</li> </ul>	Noise limit shall be within 90db limit during mining operation by using these mitigation norms.
<b>ECOLOGICAL /BIOLOGICAL</b>	Loss of flora and fauna residing there and nearby.	<ul style="list-style-type: none"> <li>• Site preparation</li> <li>• Excavation</li> <li>• Construction of approach and haulage road</li> <li>• Drilling</li> </ul>	No measure loss has been noticed so no mitigation measure is proposed	Mining is done on mining lease area which is barren, unfertile. No wildlife of any sort is found within lease hold area. The fauna found in the area are of common variety and no endangered or threatened species are reported in the area.

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IMPACT AREA	PROBABLE IMPACTS	PROBABLE SOURCE	MITIGATION MEASURES	REMARKS
OCCUPATIONAL HEALTH	<ul style="list-style-type: none"> <li>Workers of area likely to get affected by respiratory or pulmonary diseases like bronchitis, silicosis and asthma fungal infection.</li> <li>Water related disease such as diarrhea, dysentery etc.</li> <li>Minor accidents such as cut and bone fracture.</li> </ul>	<ul style="list-style-type: none"> <li>Due to emanation of dust, exhaust and noise from vehicle transport.</li> <li>Due to lack of personnel hygiene</li> <li>Due to lack of personal safety procedure</li> </ul>	<ul style="list-style-type: none"> <li>First aid facility will be provided at mining site.</li> <li>Training of the worker regarding use of safety appliances and first aid.</li> <li>Every six month Periodical medical examination of all workers by experienced medical professional shall be ensured.</li> <li>Training shall also includes emergency response including location and proper use of emergency equipment, procedure for raising alarm and notifying contractor and proper response action for each foreseeable emergency situation.</li> <li>Use of helmets, safety shoes, ear plugs &amp; masks and gloves shall be provided to workers.</li> </ul>	
DEMOGRAPHY/ SOCIO- ECONOMY	Strain on existing amenities like housing, water sources and sanitation, medical and infrastructure Facilities.	Influx of employees as well as contractor's employee/laborers.	Only local peoples in limited numbers and residing in nearby area will be employed as man power.	No additional impacts

**CHAPTER – 10:**  
**SUMMARY &**  
**CONCLUSION**

## **10.0 SUMMARY AND CONCLUSION**

### **10.1 PROJECT DESCRIPTION**

The proposed project is for mining of Building Stone (Khanda, Gitti, Boulders) at village Girwan, Tehsil- Naraini, District Banda, U.P., categorized under category “B” 2 (a) (mining lease area <5 hectare- Mining of Minerals) as the lease area is 2.02 ha. However due to the presence of other mining areas within 500 m radius of the mine lease area , the project is categorized as Category “B1” and will be considered at SEIAA/SEAC, Uttar Pradesh.

The production rate of the mine will be 20,200 cubic meter Per Annum as per Mining plan approved by DGM, Lucknow. The lease area is 2.02 ha which comprises totally of Govt. waste land. The total reserves are 17,91,072 m<sup>3</sup> or 48,35,894 MT out of which mineable (proved & probable) reserves are 7,06,009 m<sup>3</sup> or 19,06,224 MT. The expected life of the mine is 35 years. Proposed Project is located near village – Girwan, Tehsil- Naraini, District- Banda, U.P.

### **10.2 Environmental Setting of the project in study area**

<b>Particulars</b>	<b>Details</b>
Village	Girwan
Tehsil	Naraini
District	Banda
State	U.P.
Latitude	25° 18' 28.85"N to 25° 18' 32.55"N
Longitude	80° 23' 03.47"E to 80° 23' 12.41"E
Total Mine Lease area	2.02 Hectare
Elevation	162.0 – 138.0 M.RL
Land use of the lease area	Govt. Waste land – 2.02 ha.
Nearest Habitation	Girwan Village
Nearest Highway	NH 76- 10.50 km (E)
Nearest Railway station	Khurhand Railway Station – 11.50 km* (NE)
Nearest Airport	Khajuraho Airport 72.0 km* (SW)

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Nearest educational institutions	Primary School: Girwan – 1.0 km
Nearest Medical facilities	Banda
Nearest communication & post-office	Banda
Tourist places	None
Defense installation	None
Seismic Zone	Seismic Zone –II
Water Demand	4.95 KLD

### 10.3 Project Nature, Size & Location

The mining lease of Building Stone (Khanda, Gitti, Boulders) mine is categorized as Government waste land. State Government has granted the Lease for mining of Building Stone (Khanda, Gitti, Boulders). The production rate of the mine will be 20,200 cubic meter Per Annum as per Mining plan approved by DGM, Lucknow.

The mine is situated near in Gata No.- 1876, Khand No.- 01, Village Girwan, Tehsil-Naraini of Banda District (U.P.). The geographical location of the lease area is as under:-

Latitude	25° 18' 28.85"N to 25° 18' 32.55"N
Longitude	80° 23' 03.47"E to 80° 23' 12.41"E

The lease area is a government waste land on toposheet no.- 63 C/07, which falls under the revenue limit of Girwan village. There is no reserve forest or protected forestland within the lease area. There is no village or hutment within the lease area.

### 10.4 Details of Mining process

#### Method of Mining Primary Mining:

Primary mining is done by conventional drilling & blasting (using explosives) as per the guidelines of Directorate General of Mines Safety, Gwalior as well as Directorate of Geology & Mines, U.P. Blasted material (ROM) is loaded into tippers and shifted to a nearby crusher unit outside the leasehold area where sizing of Building Stone (Khanda, Gitti, Boulders) is done.

#### Proposed method of mining:

- It shall be opencast semi-mechanized mine. Excavators L & T Kamastu 200 OR Hyundai-

**FINAL EIA REPORT FOR BUILDING STONE (KHANDA, GITTI, BOULDERS) MINE**

210 shall be deployed for the removal of overburden, excavation & loading the Building Stone (Khanda, Gitti, Boulders) into Tata tippers to nearby crusher for making aggregates. The soil to be generated in pockets shall be excavated by deployment of an excavator, filled in to tippers and shall be dumped to plantation site. The soil shall be used for the purpose of plantation while waste shall be spread over the approach roads for the maintenance.

- Drilling & blasting shall be carried out with 110 mm. dia Atlas capco & blasting shall be carried out with slurry explosives and DF cord with delay electric detonator (Class 2 explosive) according to condition imply and shall be executed by competent qualified person employed by Applicant.
- The height of running bench shall not be >6m whereas width of the bench shall be >10m.
- Applicant shall obtained the permission for deployment of Heavy Earth Moving Machinery (HEMM) form The Director, Mines Safety, Varanasi Region, Varanasi, U.P under regulation 106(2) (b) of Mines Act 1961.
- The bench height & width for closing benches shall be kept 6m with face slopes 70° , maintaining overall slope of 45° . Blasted material shall be dressed by excavator & big boulders of Building Stone (Khanda, Gitti, Boulders) will also re-handled by excavator. Blasted material shall be broken by excavator & broken sized of boulders up to 2-3ft size shall be loaded into tippers with the help of excavator & transported to crusher plant.
- Considering the safety and mineral conservation aspect of the area, the ultimate pit limit of 7.5m wide strip along the eastern lease boundary has been exempted as both the Applicant will mined out their areas mutually. Permission for the exemption will be taken from The Director, Mines Safety, Varanasi Region, Varanasi, U.P under regulation 106(2) (b)& 111 of Mines Act 1961. With this proposal of mining, production of the area can be increased with safety.

**Utilities Required Power Supply**

The mine will work in day shift only, so lighting arrangement will not be required.

**Workshop and Stores**

No major additional facilities will be required to be installed.

**Fuel Detail**

High Speed Diesel (HSD) is used for running equipments and vehicles at the mining site.

## 10.5 Site Facility

### Mines Office

Mine office and rest room will be provided at leases. Specifically the following facilities will be provided to mine workers at the mines' office and in conformance with the Mines Rules, 1952:

- Canteen cum Rest room
- Toilet
- First Aid

### Rest Shelter

Rest shelters along with first-aid station, complying with relevant provisions of Mines Rules will be provided at mine.

### Blasting Shelter

A portable blasting shelter will be provided for the mine employees to take shelter during blasting operations. Blasting operations will be usually carried out during lunch hours.

## 10.6 Solid waste management

The conspicuous feature of topography of the area is typical Bundelkhand landscape of elliptically isolated hills with gentler to sudden steep slope. The area is dominated by boulders and in situ outcrops of Bundelkhand granite. The general slope of lease area is from middle of the area to SE, north & North West directions. There is neither any overlying waste stratum nor any overburden. Hence, no overburden or mine reject generation is anticipated during the mining operations.

### Disposal of Waste

There is neither any overlying waste stratum nor any overburden. Hence, no overburden or mine reject generation is anticipated during the mining operations. However, if some top soil is encountered in pot holes, solution channels during mining, then it will be recovered carefully and used for plantation purposes.

## 10.7 Water and Wastewater Management

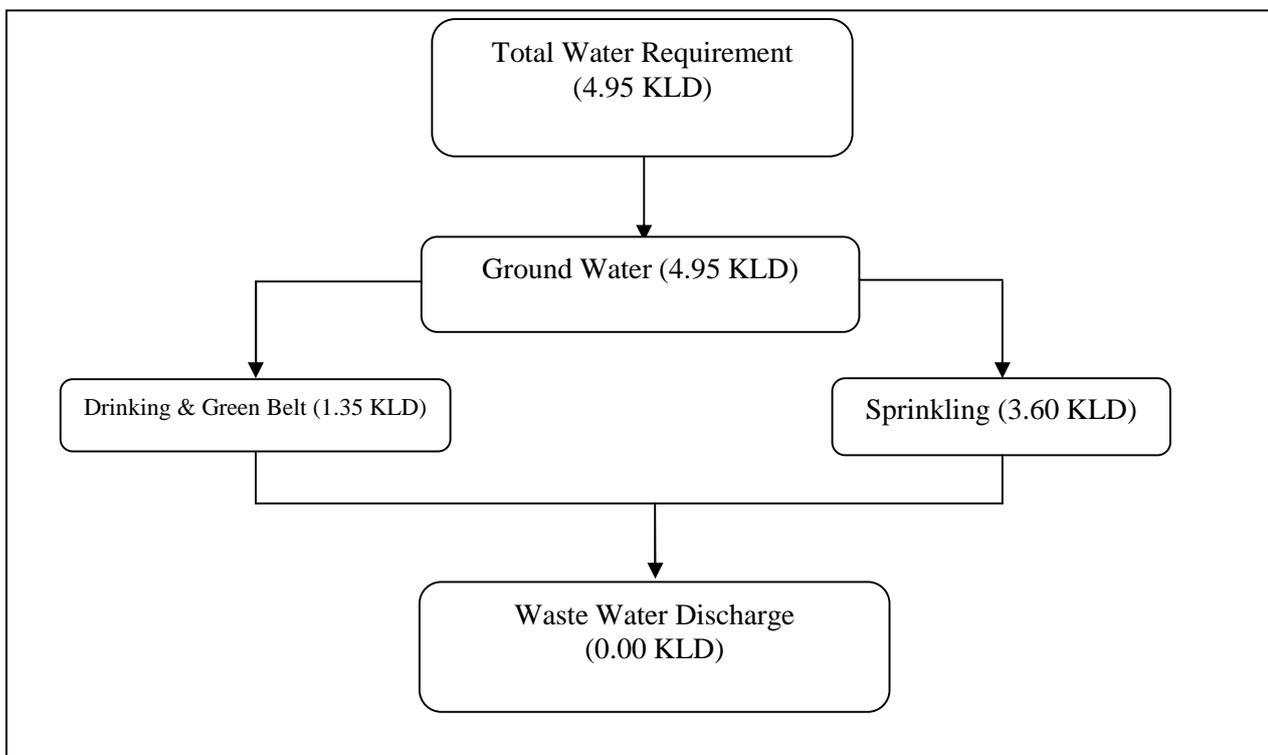
### Water Supply & Sanitation

The Girwan mine plans to abstract water from nearby privately owner dug well located near Girwan mine lease area.

### Water Source & Requirement

The projected water requirements for the mine site are likely to be in the range of 4.82 kld. The major areas of water consumption are dust suppression (3.60 KLD), for domestic purposes (0.35 KLD) and green belt development (1.0 KLD). Most of the water consumption proposed will be for dust suppression. It is to be noted that due to mechanical nature of mining in this lease the water requirement for the dust suppression will be optimal. The detailed water balance is shown Figure 10.1

**Figure 10- 1: Water Balance Diagram**



### Wastewater Generation and Disposal

There will be no wastewater generation from Building Stone (Khanda, Gitti, Boulders) mining activities; however, marginal quantities of domestic wastewater will be generated, which will be disposed in soak pits.

### Ground Water

The Building Stone (Khanda, Gitti, Boulders) deposit is an elevated, above the ground and hence mining excavation will not go deeper down the ground level, will never touch the ground water table. The details of site levels and ground water table are given as below.

TOP SURFACE LEVEL	166 mRL (max.) above mean sea level
GROUND LEVEL	138 mRL (max.) above mean sea level
ULTIMATE DEPTH OF MINING	141 mRL above mean sea level 3 m. above ground level
WATER TABLE	85 mRL (50 m below from ground level)

Hence, The Proposed Mining will not intersect ground water. The detailed quality of ground water in study area and impacts has been given in EIA Report Chapter 3.

## 10.7 Post Mining Land use

### Rain Water storage/Harvesting

The mine will be worked as opencast mechanized method and mining operations will generate rainwater storage pits at the end of mining. The total estimated area of pits will be 1.558 Hectare.

## 10.8 Description of the environment

The baseline environment quality represents the background environmental scenario of various environmental components such as Land, Water, Air, Noise, Biological and Socio-economic status of the study area. Field monitoring studies to evaluate the base line status of the project site were carried out covering March- 2019 to May- 2019 with CPCB guidelines. Environmental data has been collected with reference to proposed mine for:-

1. Land
2. Water
3. Air
4. Noise
5. Biological
6. Socio-economic status

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Attribute	Baseline status
<b>Ambient Air Quality</b>	<p>Ambient Air Quality Monitoring reveals that the minimum &amp; maximum concentrations of PM<sub>10</sub> for all the 5 AQ monitoring stations were found to be 63.48 µg/m<sup>3</sup> at AQ-3 and 89.87 µg/m<sup>3</sup> at AQ-5, respectively.</p> <p>As far as the gaseous pollutants SO<sub>2</sub> and NO<sub>x</sub> are concerned, the prescribed CPCB limit of 80 µg/m<sup>3</sup> for residential and rural areas has never surpassed at any station. The maximum &amp; minimum concentrations of SO<sub>2</sub> were found to be 5.21 µg/m<sup>3</sup> at AQ-2 &amp; 9.11 µg/m<sup>3</sup> at AQ-5, respectively. The maximum &amp; minimum concentrations of No<sub>x</sub> were found to be 10.06 µg/m<sup>3</sup> at AQ-3 &amp; 16.01 µg/m<sup>3</sup> at AQ-3 respectively. The air environment around this area is also affected by agriculture activities in the area</p>
<b>Noise Levels</b>	<p>Noise monitoring was carried out at 5 locations. The results of the monitoring program indicated that both the daytime and night time levels of noise were well within the prescribed limits of NAAQS, at all the five locations monitored.</p>
<b>Water Quality</b>	<p>Groundwater samples and surface water samples were analyzed and concluded that:</p> <p>The ground water from all sources remains suitable for drinking purposes as all the constituents are within the limits prescribed by drinking water standards by Indian Standards IS: 10500.</p> <p>From the Surface water analysis it is evident that most of the parameters of the samples comply with 'Category 'B' standards of CPCB indicating their suitability for Outdoor Bathing.</p>
<b>Soil Quality</b>	<p>Samples collected from identified locations indicate the soil is sandy type and the pH value is 7.57-7.69, which shows that the soil is alkaline in nature.</p>
<b>Ecology and Bio-diversity</b>	<p>There are no Ecologically Sensitive Areas present in the study area, but many reserved forests regions surround the project area.</p>
<b>Socio-economy</b>	<p>The implementation of the Gata No.-1876, Khand No.- 01, village – Girwan, Tehsil- Naraini, District- Banda, U.P. Building Stone (Khanda, Gitti, Boulders) mining project will throw opportunities to local people for both direct and indirect employment.</p> <p>The study area is still lacking in education, health, housing, water, electricity etc. It is expected that same will improve to a great extent due to proposed mining project and associated industrial and business activities.</p>

## 10.9 Land Environment

### LAND USE/ LAND COVER

The existing land use pattern of the study area based on the latest satellite imagery is given below:

Land use pattern of the study area

S. No.	Land Category	Area (ha)	% land cover
1.	Agriculture	20717.33	65.92
2.	Waste Land/ Open land	5543.90	17.64
3.	Build-up area	1332.55	4.24
4.	River	1910.82	6.08
5.	Forest	1923.40	6.12
<b>TOTAL</b>		<b>31428</b>	<b>100</b>

## 10.10 Seismicity of the area

The project site as well as study area lies in Zone-II of Seismic Zoning Map, and thus can be said to be located in an area of moderate seismic hazard by national standards. Hence the risk of earthquake at the site persists though there has to be no incident in the near past.

## 10.11 Socio-Economic Environment

An attempt has been made to assess the impact of the proposed Building Stone (Khanda, Gitti, Boulders) mining project at village Girwan on Socio-economic aspect of the study area. The various attributes that have been taken into account are population composition, employment generation, occupational shift, household income, consumption pattern, ethnic issue and law & order problem.

Implementation of the Building Stone (Khanda, Gitti, Boulders) Mine project will generate both direct and indirect employment. Besides, it will provide a check on existing system of mining operation. Mining operation will be legally valid and it will bring income to the state exchequer. The project will also provide impetus to industrialization of the area. At present agriculture is the main occupation of the people as more than half of the population depends on it. With the implementation of the proposed mining project the occupational pattern of the people in the area will change making more people engaged in mining based activities rather in agriculture.

**10.12 Anticipated Impacts & Mitigation measures**

S.No.	Aspect	Impact	Mitigation measure
<b>A.</b>	<b>Land Environment</b>		
i.	Land Use / Land Cover	At conceptual stage most of the waste land i.e. a will be converted into rain water harvesting pit and green belt Hence impact due to change in land use is positive.	--
ii.	Topography	--	--
iii.	Drainage	There are no prominent watercourses or nallahs in the lease area. The drainage pattern will not get disturbed due to mining activity.	--
iv.	Geology	No impact is anticipated as the mine lease area lies in Seismic Zone-III and has practically no soil cover.	--
<b>B.</b>	<b>Water Environment</b>		
i.	Hydrological Regime	As there is no river or nallah passing through the mine site, hence no impact is anticipated on the hydrological regime of the area due to mining activity.	--
ii.	Diversion of Natural water course	No natural course of water stream is interrupted or diverted due to mining activity; hence no impact on natural drain is anticipated.	--
iii.	Contamination due to flow of waste generated	Practically there is no overburden or reject generating from the mining activity, moreover the excavated mineral itself is non-toxic and hence no effect due to water flow during rains following the contours of the area is expected.	--
iv.	Ground water abstraction	Impact on ground water is anticipated as there is provision of consuming ground water for the purpose of various mining activities. Total water demand to be met by ground water is 4.95 KLD.	Permission has been taken for withdrawal of requisite amount of water. However measures will be taken for optimal use of ground water. At the end of mine life excavated pit will be converted into a water reservoir. This will help in recharging the ground water table.

## FINAL EIA REPORT FOR BUILDING STONE (KHANDA, GITTI, BOULDERS) MINE

v.	Ground water contamination	As the mineral is non-toxic so contamination of ground water due to leaching is not anticipated.	Ground water monitoring at regular intervals shall be carried out.
<b>C.</b>	<b>Air Environment</b>		
i.	Drilling	Fugitive dust	Wet drilling will be provided. Suitably designed dust extractor will be provided for dry drilling along with dust hood at the mouth of the drill-hole collar.
ii.	Blasting	Emission of noxious gases	Establish time of blasting to suit the local conditions. Avoid blasting i.e., when temperature inversion is likely to occur and strong wind blows towards residential areas.
iii.	Haul Road	Fugitive dust	The long life WBM (Water Bound Macadam) haul roads will be constructed and maintained for traffic movement. Regular water spraying shall be done
iv.	Transportation	Gases, such as, Sulphur Dioxide, Oxides of Nitrogen, Carbon Monoxide etc. from vehicular exhaust.	The speed of dumpers/trucks on haul road will be controlled as increased speed increases dust emissions. Overloading of transport vehicles will be avoided. The trucks/ tippers will have sufficient free board. Spillage of ore on public roads will be cleared immediately and vehicles will be in safe speed.

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<b>D. Noise Environment</b>			
i.	Drilling & Blasting		Implement good working practices (equipment selection and sitting) to minimize noise and also reduce its impacts on human health (ear muffs, safe distances and enclosures). Adopt good blasting practices to reduce impact on flora and fauna. Muffling will be done at the time of blasting
ii.	Mining machineries & Equipment	Noise generated from machineries & equipment	List of all noise generating machinery onsite along with age to be prepared. Equipment to be maintained in good working order.
iii.	Transportation	Generation of vehicular noise	Plantation of dense hedges on the boundary of lease area, these will reduce dust and noise in the vicinity area.
<b>E. Ground vibration</b>			
i.	Blasting	Ground Vibrations due to Blasting	Good blasting layout must be adopted Adopting less number of holes per delay
<b>F. Biological Environment</b>			
S.No.	Aspect	Impact	Mitigation measure
i.	Flora	There is no significant vegetation in the mine lease area, so no adverse impact on vegetation is anticipated. However at the conceptual stage Green belt shall be developed which will add to the aesthetics of the study area.	Phase wise plantation shall be carried out to improve the aesthetics of the study area.
ii.	Fauna	No major species are cited in the mine lease area.	Conservation plan have been submitted for approval and all the measures shall be taken to minimize any potential impact on the Scheduled fauna.
G.	Socio-Economic Environment	Practically there is positive impact on Socio-economic conditions of the study area	All the aspects covered shall be mitigated as per the CSR.
H.	Mine Waste Management	Undersize Granite (Gitti, Boulders) Management	Undersized mineral will be used as aggregate.
		Hazardous waste management	Hazardous waste (Used oil and oil containers)

## FINAL EIA REPORT FOR BUILDING STONE (KHANDA, GITTI, BOULDERS) MINE

		will be managed as per Hazardous Wastes (Management and Handling) Rules, as amended till date
	Batteries of vehicles	Batteries will be managed as per Battery (Management & Handling) Rules; 2000.
	Non-routine events and accidental releases	Plan to be drawn up, considering likely emergencies and steps required to prevent/limit consequences

### 10.13 PROJECT BENEFITS& COST EVALUATION

Various benefits are envisaged while planning for the mining of Building Stone (Khanda, Gitti, Boulders) at village Girwan and a comprehensive description of various advantages and benefits anticipated from the proposed project to the locality, neighborhood, region and nation as a whole.

- Improved roadcommunication;
- Strengthening of existing community facilities through the Community Development Programme;
- Rain water reservoir to augment the water availability for irrigation and plantation;
- Creation of community assets (infrastructure) like school buildings, village roads/ linked roads, dispensary & health centre, community centre, market place etc.;
- Skill development & capacity building like vocational training of teachers
- Awareness program and community activities, like health camps, medical aids, family welfare programs, immunization camps sports & cultural activities, plantation etc.

**CHAPTER – 11:**  
**DISCLOSURE OF**  
**CONSULTANTS**

## 11.0 Disclosure of consultant Engaged

**PARAMARSH (Servicing Environment and Development)** is a techno – scientific service organization dedicated exclusively to the cause of maintaining the disturbed equilibrium between the developmental activities and the environment. This includes the protection and management of natural resources.

The objective of PARAMARSH (Servicing Environment and Development) is to revive, support, strengthen and promote the traditional and unconventional technologies, which have survived through ages. These technologies meet our target of achieving the eco-friendly environment in this modern age. For the same cause we, at PARAMARSH (Servicing Environment and Development), take initiatives in associating with national and international institutions, working for the same cause.

PARAMARSH (Servicing Environment and Development) is also dedicated to collect, analyze and disseminate the scientific, technical and socioeconomic information and knowledge for the benefit of the masses. The advance technology like the Information Technology tools is positively used for a better perspective. In achieving the desired objective in each project the vital factor of socio-economic information collation and analysis always plays an indispensable role. PARAMARSH (Servicing Environment and Development) have always stood in the front lines in this important area.

**PARAMARSH (Servicing Environment and Development) has got accreditation of EIA consultant with Quality Council of India (QCI) /National Accreditation Board of Education and Training (NABET) (Certificate No. - NABET/EIA/1821/RA0120, Dated November 15, 2019. For details kindly refer QCI website <http://www.qcin.org/nabet/about.php>**

To summarize PARAMARSH (Servicing Environment and Development) is a group which is inspired and guided by the nature and finds immense pleasure in working on scientific lines with a role of activator between the decision makers and the locals. The active participation of locals through the development of self-help groups is always on top of the main agenda. PARAMARSH (Servicing Environment and Development) is dedicated to work in the field of research, development and exploration of traditional technologies and unconventional energy resources. The benefit of these activities is propagated to the end users.

## FINAL EIA REPORT FOR BUILDING STONE (KHANDA, GITTI, BOULDERS) MINE

## DECLARATION BY EXPERTS CONTRIBUTING TO B-1 PROJECT REPORT

**Project Detail:** “Building Stone (Khanda, Gitti, Boulders) Mining” Project at Gata No.- 1876, Khand No.- 01, Village- Girwan, Tehsil- Naraini, District- Banda, U.P. (Leased Area : 2.02 ha.)

**Project Proponent Name - Shri Sangram Singh S/o Shri Jaiwant Singh**

R/o- Vill- Pahara, Tehsil- Mahoba, District- Mahoba, U.P.

I, hereby, certify that I was a part of the B-1 PROJECT team in the following capacity that developed the above B-1 PROJECT.

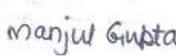
**EIA coordinator:**

Name : Dr. Surendra Vikram Ghavri

: Dr S Prasad

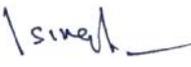
Period of involvement : March 2019 to May 2019

Contact Information : [paramarsh.env@hotmail.com](mailto:paramarsh.env@hotmail.com)

S. No.	Functional Area	Name of the experts	Involvement		Signature and date
			Period	Task	
1	RH	Mr. Akash Kumar	March 2019 to May 2019	Identification of hazards materials, Fire accidents from Diesel storage and lethality damages, DMP and EPP for onsite & offsite were provided.	
2	WP			Estimating water requirements based on population, suggesting wastewater treatment/disposal schemes and developed the plan for rain water harvesting.	
3	EB			Generating the ground truthing ecological assessment with secondary data from different departments, earmarking rare and endangered species	
4	SW & HW	Dr. Manjul Gupta	March 2019 to May 2019	Inventory of Municipal Solid Waste, suggesting treatment options viz; organic waste convertor technology.	
5	SC			Proposing the soil management practices during construction and operation phase of project.	
6	AP			Collected the meteorological data and AAQ data through secondary sources and suggested air pollution control measures during both phase of project.	
7	SE & RH	Mr. Pankaj Kumar Srivastava	March 2019 to May 2019	Collected the primary data, livestock inventory/ impacts, identified village-wise amenities/ needs.	

## FINAL EIA REPORT FOR BUILDING STONE (KHANDA, GITTI, BOULDERS) MINE

8	AQ & NV	Mr. Vinod Kumar Dwivedi	March 2019 to May 2019	Collected the ambient noise data through secondary sources and suggested Noise pollution control measures during both phases of project.	
9	SC	Dr. S.V. Ghavri	March 2019 to May 2019	Proposing the soil management practices during construction and operation phase of project.	
10	Geo	Dr. Abdul Rahman	March 2019 to May 2019	Input in EIA/EMP report regarding geology of the area.	
11	LU & HG	Mr. S.P. Tiwari	March 2019 to May 2019	Input in EIA/EMP report regarding Land use and Hydro-geology of the area.	
12	SW	Mr. Promod Kumar Vishwkarma	March 2019 to May 2019	Quantification of Solid & Hazardous Waste and Assessment of Impacts and Probable impacts of noise on communities,	
13		Mr. Shamshad Ahmad (Team Member)	March 2019 to May 2019	Assisted in drafting and compilation of report with respective FAE	
14		Mr. Mohammad Arif Ansari (Team Member)	March 2019 to May 2019	Assisted in drafting and compilation of report with respective FAE	

1.	Mr. Asgrul Hasan	Technical Assistance	
2.	Mr. Indra Singh	R.Q.P.	

**\*List of Functional Areas**

1.	LU	:	Land Use
2.	AP	:	Air Pollution Monitoring, Prevention & Control
3.	AQ	:	Meteorology, Air Quality Modeling & Prediction
4.	WP	:	Water Pollution Monitoring, Prevention & Control
5.	EB	:	Ecology & Biodiversity
6.	NV	:	Noise & Vibration
7.	SE	:	Socio-Economics
8.	HG	:	Hydrology, Ground Water & Water Conservation
9.	GE	:	Geology
10.	SC	:	Soil Conservation
11.	RH	:	Risk Assessment & Hazard Management
12.	SHW	:	Solid & Hazardous Waste Management




**Quality Council of India**  
National Accreditation Board for  
Education & Training

**CERTIFICATE OF ACCREDITATION**

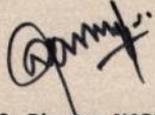
**Paramarsh (Servicing Environment & Development)**  
B 1/67, Sector - G, Jankipuram, Lucknow-226021, UP

Accredited as **Category - A** organization under the QCI-NABET Scheme for Accreditation of EIA Consultant Organizations: Version 3 for preparing EIA-EMP reports in the following Sectors:

Sl. No.	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1	Mining of minerals - opencast mining only	1	1 (d)	A
2	Metallurgical industries (ferrous & non-ferrous)	8	3(a)	A
3	Cement Plants	9	3(b)	B
4	Asbestos milling and asbestos based products	12	4 (c)	A
5	Distilleries	22	5 (g)	A
6	Pulp & paper industry excluding manufacturing of paper from wastepaper and manufacture of paper from ready pulp without bleaching	24	5 (i)	A
7	Sugar Industry	25	5 (j)	B
8	Industrial estates/ parks/ complexes/ Areas, export processing Zones (EPZs), Special economic zones (SEZs), Biotech Parks, Leather Complexes	31	7 (c)	A
9	Building and Construction Projects	38	8 (a)	B
10	Townships and Area development Projects	39	8 (b)	B

**Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in RAAC minutes dated January 04, 2019 posted on QCI-NABET website.**

*The Accreditation shall remain in force subject to continued compliance to the terms and conditions mentioned in QCI-NABET's letter of accreditation bearing no. QCI/NABET/ENV/ACO/19/0911 dated February 15, 2019. The accreditation needs to be renewed before the expiry date by Paramarsh (Servicing Environment & Development), Lucknow, following due process of assessment.*

  
**Sr. Director, NABET**  
 Dated: February 15, 2019

**Certificate No.**  
 NABET/ EIA/1821/ RA 0120

**Valid till**  
 01.05.2021

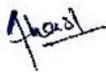
For the updated List of Accredited EIA Consultant Organizations with approved Sectors please refer to QCI-NABET website.

**Declaration by the Head of the Accredited Consultant Organization**

I, Akash Kumar, hereby, confirm that the above mentioned experts prepared the B-1 PROJECT Report for “Building Stone (Khanda, Gitti, Boulders) Mining” Project at Gata No.-1876, Khand No.- 01, Village- Girwan, Tehsil- Naraini, District- Banda, U.P. (Leased Area : 2.02 ha.). I also confirm that the PARAMARASH (Servicing Environment and Development) organization has been prepared this B-1 PROJECT report with full diligence and within the terms of the contract with the client, incorporating our general terms and conditions of business.

This document is one of a series of overview information documents on the concepts of and approaches to Environmental Impact Assessment (EIA). EIA provides the overarching framework for the integration of Environmental assessment and Management principles into environmental decision-making. It includes the use of several environmental impact assessment and management tools that are appropriate for the various levels of decision-making. The aim of this document series is to provide general information on techniques, tools and processes for environmental impact assessment and management.

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**(Akash Kumar)**

Authorized Signatory