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EXECUTIVE SUMMARY

OF

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

(Submitted for Public Consultation as per EIA Notification)

IN FAVOUR OF

Sh. Sham Singh

Prop: M/s. NANDI STONE CRUSHER

FOR RIVER BED MINING OF MINOR MINERALS: SAND, STONE AND BAJRI

SITUATED IN KHASRA NO. 527/495/2/1

FALLING IN MAUZA KHANNI, TEHSIL-NURPUR,

DISTRICT KANGRA, HIMACHAL PRADESH

CONSULTANT

M/s. IDMA LABORATORIES LIMITED

391, Industrial Area, Phase-I

Panchkula, Haryana

Ph.0172-5064827 Fax-0172-2583587

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EXECUTIVE SUMMARY

1.0 PROJECT DESCRIPTION

1.1 INTRODUCTION

M/s. Nandi Stone Crusher, a part concern, with Sh. Sham Singh, Village & P.O. Lahru, Tehsil Jawali, District Kangra, Himachal Pradesh. The mining lease was transferred to them, along with approval for second renewal, for mining sand, stone and bajri vide letters Nos. **Udyog-Bhu (Khani-4) Laghu-502/09-6076 dated 13.9.2010** for a period of five year. The stone was used in a captive stone crushing unit.

The project involves mining / collection of 68000 MTPA of sand, stone and bajri from old river terrace of Chaki Khad for a stone crushing unit to be set by the project proponent. The total area of mine lease is 8-64-00 Hectares. The proponent has been granted mining lease for mining of sand, stone and bajri vide **order no. Udyog – Bhu (Khani - 4) Laghu –502/09-6076 dated 13.9.2010 attached as Annexure II,** for a period of five years.

As per the New EIA Notification dated 14 September, 2006, the mining project falls under category 'A', project activity 1(a) (3). Therefore, this project requires Environmental Clearance from MoEF, New Delhi. This mining project falls in category-A as the site is situated within 10 Km of interstate boundary with Punjab. The Environmental Impact Assessment (EIA) and Environmental Management Plan for "Mining of Minerals" as per the EIA Notification, 14th September 2006 has been prepared in accordance to Terms of reference issued by the Ministry of Environment & Forest vide their letter No. J – 11015/213/2011 – IA.II (M) dated 1st November, 2011 and the Environmental Impact Assessment Guidance Manual published by MoEF for grant of environmental clearance with relevant project specific data. All these mining projects are statutorily required to conduct Environmental Impact Assessment study for obtaining environmental clearance

1.2 DETAILS OF THE PROJECT

TABLE-1

BRIEF DESCRIPTION OF NATURE, SIZE, LOCATION OF THE PROJECT AND ITS IMPORTANCE TO THE COUNTRY, REGION

S. No.	Particulars	Details
A.	**Nature of project**	Mining Project
B.	**Size of project**	
1.	Mining Lease area	8-64-00 Hectares
2.	Proposed Production capacity	67500 MTPA
C.	Project Location	
3.	Villages	Pail
4.	Tehsil	Nurpur
5.	District	Kangra
6.	State	Himachal Pradesh
7.	Latitude	32^0 17 ' 25.3 " N to 32^0 17' 40.7 " N
8.	Longitude	75^0 46 ' 31.2" E to 75^0 46' 46'43 " E
9.	Toposheet No.	43P/15
D.	**Environmental Settings Details**	
10.	Nearest Major Town	Pathankot (12 km)
11.	Nearest State Highway	Nurpur – Kadwal Road
12.	Nearest Railway Station	Pathankot (12 km)
13.	Nearest Airport	Dharamshala (75 km)
14.	Ecological Sensitive Areas (National Park, Wild Life Sanctuaries, Biosphere Reserves etc.)	Nil within the 10km radius
15.	Nearest River	Chaki River
16.	Seismic Zone	Seismic Zone - V
E.	**Cost Details**	
17.	Total Project Cost	Annual Turnover- Rs. 5088000/=
18.	Cost for Environmental Protection Measures	Capital Cost - Rs. 3,50,000/= Recurring Cost – Rs.70,000/=

Source: *Site Visit & Mining plan*

2.0 TECHNOLOGY & SPECIFICATIONS OF INPUTS

2.1 Size and magnitude of operation

The project involves mining / collection of 67500 MTPA of sand, stone and bajri from old river terrace of Chaki Khad for a stone crushing unit to be set by the project proponent. The total area of mine lease is 8-64-00 Hectares. The proponent has been granted mining lease for mining of sand, stone and bajri for a period of five years for the extraction of sand, stone & Bajri for use in already established stone crusher unit.

2.2 Extent of mechanization

The proposed project is manual extraction and collection of sand, stone and bajri from Chakki Khad old terrace by using hand tools. No blasting is involved and no machinery is used to extract the minerals.

2.3 Anticipated life of the mine

The anticipated life of the mine is expected to be 05 years with the annual production being of 54400 metric tons of stone, bajri and sand in the first year and reaching to optimum production of about 68000 MTPA in the fifth year.

2.4 Proposed method of mining

It is an open cast mine, bench wise mining will be undertaken manually. No mining machinery shall be deployed. The material is sorted manually at mining site and sand is separated from stone and bajri. Stone and bajri shall be transported to the Crusher for crushing and Sand will be sold in the open market.

3.0 DESCRIPTION OF THE ENVIRONMENT

Study area at a glance

The study area is 10 km radius known as buffer zone and it has been measured from the boundary of the mines site in every direction. The buffer zone area falls in Kangra district.

General Particulars:

Village	**:**	Pail
Tehsil	**:**	Nurpur
District	**:**	Kangra
State	**:**	Himachal Pradesh
Latitude	**:**	32^0 17’ 25.3” N to 32^0 17’ 40.7” N
Longitude	**:**	75^0 46’ 31.2” E to 75^0 46’ 43” E

3.1 Climatic Condition

During study period (April, May and June 2012)

Maximum Temperature	**:** 41 ^{o}C
Minimum Temperature	**:** 20 ^{o}C
Relative Humidity (%)	
At 08:30 hrs	**:** 18 % to 68 %
At 17:30 hrs	**:** 18 % to 77 %
Dominant Wind Direction	**:** NW

3.2 Air Quality

Core Zone – Mine Area Respirable particulate matter (PM_{10}) monitored in the Mine area showed 98th percentile value of 46.2 µg/m^3. 98th percentile values of Sulphur dioxide and Oxides of Nitrogen in the mine area from the monitored data were 5.2 µg/m^3 and 13.5 µg/m^3 respectively.

Buffer Zone

Particulate Matter – PM_{10}

PM_{10} values monitored at 5 locations showed 98th percentile values in the range of 40.3 – 55.6 µg/m^3. Highest value of 55.6 µg/m^3 was recorded at Ghandwal. However this value is well within the limits of NAAQ.

Sulphur dioxide - SO_2

98th percentile value of Sulphur dioxide in the study area from the monitored data was in the range of 5.2 – 6.8 µg/m^3. Maximum value of 6.8 µg/m^3 was obtained near the sampling station located at Harial village. The values of SO_2 monitored in the study area are well within the limits of NAAQ standards.

Oxides of Nitrogen - NOx

Ambient air quality status monitored for nitrogen oxides in the study area were in the range with 98th percentile values between 12.4 -16.9 µg/m^3. A maximum value of 16.9 µg/m^3 was prevailing at the time of sampling at Harial village.

Results of the ambient air quality at all the above locations were found to be well within the limits of National Ambient Air Quality (NAAQ) standards. Concentrations of, PM10, SO_2 and NOx are mainly contributed due to vehicular traffic and local activities.

3.3 Noise Level

a) Day time Noise Levels (L_{day})

The daytime (L_{day}) noise levels at all the locations are observed to be in the range of 50.0 dB (A) to 51.4 dB (A). The maximum noise level of 54.3 dB (A) was observed at Harial and the minimum noise

level of 38.2 dB (A) was observed at Ghandwal during the study period. It is observed that the day time noise levels are in accordance to the prescribed limits.

b) Night time Noise Levels (L_{night})

The nighttime (L_{night}) noise levels at all the locations was observed to be in the range of 40.6 dB (A) to 42.9 dB (A). The maximum noise level of 54.3 dB (A) was observed at Harial during the study period. It is observed that the day time noise levels are in accordance to the prescribed limits.

3.4 Water Quality

Ground water quality

The analysis results indicate that the p^H of the ground water was to be 7.3.The TDS were found to be in the range of 220-286 mg/L. Other parameters like Chlorides and Sulphates were observed to be well within the prescribed limits. From the table, it is seen that the physico chemical analysis for all the parameters has within the standards as per IS: 10500.

Surface water Quality

The analysis results indicate that the pH of the surface waters was to be in the range of 7.40-7.50. The TDS were found to be in the range of 240-288 mg/L. Other parameters like Chlorides and Sulphates were observed to be well within the prescribed limits. From the table, it is seen that the physico chemical analysis for all the parameters has within the standards as per IS: 10500.

3.5 Soil Quality

Soil quality of the study area is one of the important components of the environment. Soil samples from villages located in the study area are collected as per methodology specified in BIS to make them representative and analyzed for physico- chemical analysis. Samples are collected by hand auger boring and soil pits. Samples collected from identified locations indicate P^H value ranging from 8.0 to 8.5, which shows that the soil is alkaline in nature. Organic Matter ranges from 1.5 % to 2.1 % in the soil samples.

3.6 Biological Environment

Flora : Most commonly found tree species in the area are *Dalbergia sissoo* (Shisham), *Azardiracta indica* (Neem), *Albizzia lebbek* (Siris), *Bauhinia variegate* (Kachnar), *Bombax ceiba* (Semal), *Eucalyptus tereticornis* (Eucalyptus), *Ficus glomerata* (Gular), *Ficus religiosa* (Pipal), *Syzygium cumini* (Jamun), *Cedrela tuna* (Tun), *Zizuphus mauratiana* (Ber), *Morus alba* (Tut), *Acacia modesta* (Phulai)) etc.

Fauna : The wild lives present in the study area mainly includes hiran (*Antilope cervicrapa*), spotted deer (Axis masculates), Barking Deer (*Muntiacus muntjak*), kakkar, sambhar (*Cervis unicolor*) are common. *Panthera pardus* (leopard): Its population has reduced considerably. Porcupine (*Hystrix indica*), Indian wild boar (*Sus scorfa*), jackal (*Canis spp.),* wild cat (*Felis chaos*), leopard cat, Monkey *(Macaca mulata)*, Langur (*Presbytis entellus) etc.*

3.7 Socio-Economic Status

The information on socio-economic aspects of the study area has been compiled from secondary sources, which include various public offices as indicated in the above section. The sociological aspects of this study include human settlements, demography, social such as Scheduled castes and Scheduled Tribes and literacy levels besides infrastructure facilities available in the study area. The economic aspects include occupational structure of workers.

There are no villages falling within the core zone. The entire mine lease area is private lands and falls under Hagwal and Gagwal.

4.0 ENVIRONMETAL MONITORING PROGRAMME

TABLE-2

ENVIRONMETAL MONITORING PROGRAMME

S. No.	Potential Impact	Action to be Followed	Parameters for Monitoring	Frequency of Monitoring	Location
1	Air Emissions	Ambient air quality within the premises of the proposed unit and nearby habitations to be monitored.	PM10, PM2.5, SO_2, NO_x and CO.	Half Yearly	Near Mine office, Near Haulage road
		Exhaust from vehicles to be minimized by use of fuel efficient vehicles and well maintained vehicles having PUC certificate.	Vehicle logs to be maintained	Regularly	Main gate
		Vehicle trips to be minimized to the extent possible	Vehicle logs	Daily records	Main gate
2	Noise	Noise generated from various mining operations and stone crusher	Spot Noise Level recording; Leq(night), Leq(day), Leq(dn)	Periodic during operation phase	Main gate,working zone
3	Wastewater Discharge	No untreated discharge to be made to surface water, groundwater or soil.	No discharge hoses in vicinity of watercourses.	Periodic during operation phase	-

S. No.	Potential Impact	Action to be Followed	Parameters for Monitoring	Frequency of Monitoring	Location
4	Drainage and effluent Management	Ensure drainage system and specific design measures are working effectively. Design to incorporate existing drainage pattern and avoid disturbing the same.	Visual inspection of drainage and records thereof	Periodic during operation phase	-
5	Water Quality and Water Levels	Monitoring used water quality & groundwater quality and levels	Comprehensive monitoring as per IS 10500 Groundwater level bgl	Periodic during operation phase	
9	Maintenance of flora and fauna	Vegetation, greenbelt / green cover development	No. of plants, species	Periodic during operation phase	-
10	Waste Management	Implement waste management plan that identifies and characterizes every waste arising associated with proposed activities and which identifies the procedures for collection, handling & disposal of each waste arising.	Records of solid waste generation, treatment and disposal	Periodic during operation phase	
11	Soil quality	Maintenance of good soil quality	Physico-chemical parameters and metals.	Periodical monitoring	Plantation areas
12	Health	Employees and migrant labour health check ups	All relevant parameters including HIV	Regular check ups	-

5.0 ANTICIPATED ENVIRONMENTAL IMPACTS, MITIGATION MEASURES AND ENVIRONMENT MANAGEMENT PLAN

5.1 Air Pollution Control

In the stone mine, air pollution is caused mainly due to dust generation added with gaseous emission from mining activities like loading & transport etc. Following measure shall be adopted to mitigate air pollution generated due to the mining activities:

Following measures is been taken to minimize air pollution.

- All the haul roads are properly graded with sufficient width and Water spray is been done on mine haul roads.
- Green belt/plantation is been developed all along the haul roads and other places to arrest dust.
- Personal Protective Equipments like dust mask is been provided to all employees working in the likely dusty areas.
- Ambient Air Quality Monitoring is been conducted on regular basis to assess the quality of ambient air as per the EC conditions and submitted to respective authorities.
- Proper maintenance of vehicles is been done, which minimize the pollutants.

5.2 Noise Control Measures

Noise will be generated from the movement of vehicles & crusher. The following control measures are been adopted to keep the ambient noise levels well below the limits:

- Plantation has been carried out along mining lease boundary and sides of haul roads, etc. The greenbelt minimizes propagation of noise.
- In order to reduce the effect of noise pollution, ear plugs /earmuffs are provided to all employees.
- Selections of equipments have been done which generate less noise.
- Confining the noise generating sources.
- Periodical noise level monitoring is carried out.

5.3 Water Management

Waste water from the process is reused resulting in zero discharge. Adequate control measures are adopted to check not only the wash-off from soil erosion but also uncontrolled flow of mine water. The measures adopted are as follows:

- No wastewater is generated from the mining activities.
- The ground water in the mine area is not likely to be affected, as no toxic chemicals are present in the rejects stacked.

6.0 OCCUPATIONAL HEALTH & SAFETY

Healthy and safe working conditions are among the first expectations for sustainability, i.e. the expectation that risks in mining will not deprive workers of their livelihoods or of their quality of life. Occupational injuries and ill-health have huge social and economic implications for individuals, their families and their communities. They also have an adverse impact on the economy of the society as a whole. The fresh employees when taken are thoroughly medically examined under initial medical examination and thereafter during continuation of employment; the periodic medical examination is being done suggested by DGMS.

7.0 GREENBELT DEVELOPMENT

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

8.0 PROJECT BENEFITS

M/s. Nandi Stone Crusher management have undertaken and will undertake various Socio Economic upliftment activities. Development Projects are planned after a participatory need assessment of the communities around the activity area. Each project has a one-year and a three-year rolling plan, with milestones and measurable targets. The objective is to phase out the presence over a period of time and then further hand over the reins of further development to the people. This also enables the company to widen their reach.

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CHAPTER–I

INTRODUCTION

1.1 Preamble

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

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

Law requires that every project proponent must take Environmental Clearance from Ministry of Environment and Forests, New Delhi, before starting up any project. The environmental clearance is also mandatory for the expansion, modernization or renewal projects. The conditions are applicable as per the MoEF guidelines and EIA notifications issued and amended time to time.

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

1. Environment (Protection) Act, 1986
2. Environment (Protection) Rules, 1986
3. Water (Prevention & Control of Pollution) Act, 1974
4. Air (Prevention & Control of Pollution) Act, 1981
5. Environment Impact Assessment (EIA) Notification, dated 27th January, 1994
6. Environment Impact Assessment (EIA) Notification, dated 14th September, 2006 and as amended on 1st December 2009.

This mining project falls in category-A as the site is situated within 10 Km of interstate boundary with Punjab. All these mining projects are statutorily required to conduct Environmental Impact Assessment study for obtaining environmental clearance

1.2 General Information of Mines

Crushed stone, gravel and sand are one of the largest non-fuel mineral commodities by tonnage produced in Himachal Pradesh, supplying some of the most important construction materials. Further, average unit value of crushed stone, sand and gravel is one of the lowest of all mineral commodities.

This production of aggregate in a particular area is a function of the availability of natural resources, the size of population, the economy of the area and various developmental and infrastructural works being undertaken in the area like road construction, hydro-electric projects etc. Further, being a low- value, high-volume mineral commodity, the prices are dramatically affected by transportation distances. If the distances increase, the transportation cost may increase much more than the cost of the aggregates.

Although river bed deposits of sand stone & bajri form significant resource that is seasonally replenished, their excessive extraction may cause scouring and erosion of river and other environmental problem. The extraction of river bed deposits is alternative to riverbed mining. Substantial resources of sand and stone exists in river bed beneath land assessed through geological /resource mapping and site exploration survey involving test pits, geophysical surveys, and sampling and laboratory studies.

Mining of the stones from river bed is done, which are processed for production of stone of various size, grit and sand essential for construction activities. Environmental impacts can arise during all activities of the mining process. Minimizing the damage due to mining operations depends on sound environmental practices in a framework of balanced environmental legislation. The potential adverse effects of river bed mining activities include change in land use pattern, air pollution, degradation of land, noise, damage to local ecology, natural topography and drainage, etc. All these environmental components have been considered while selecting a proper methodology of mining, mitigation measures to reduce pollution load, conservation of natural resources, etc.

1.3 Details of Project Proponent

The details of the project proponent are given below:

Sham Singh, Prop
M/s. Nandi Stone Crusher,
Village -Pail, Mauza - Khanni,
Tehsil -Nurpur, District -Kangra,
Himachal Pradesh

Incorporation of Nandi Crusher Company attached as **Annexure I**.

1.4 Mine Lease Status

The mining lease over an area of 08-64-00 hectares has been granted in favour of **Sh. Sham Singh,** Prop. **M/s. Nandi Stone Crusher**. vide **letter no. Udhyog-Bhu (Khani-4) Laghu – 502/09 - 6076 dated 13.09.2010** for a period of 5 years.

1.5 Brief Description of the Project

1.5.1 Size of the project

The project involves mining / collection of 67500 TPA of sand, stone and bajri from old river bed of Chakki Khad (which is a tributary of Beas river) for a stone crushing unit to be set by the project proponent. The total area of mine lease is 08-64-00 Hectares. The proponent has been granted mining lease for mining of sand, stone and bajri vide **order no. Udhyog-Bhu (Khani-4) Laghu – 502/09 - 6076 dated 13.09.2010 attached as Annexure II,** for a period of five years for the extraction of sand, stone & bajri for use in already established stone crusher unit.

1.5.2 Location of the project

The proposed mining site is located on old river bed of Chakki Khad falling in village Pail, Tehsil Nurpur, District Kangra of Himachal Pradesh. The area is covered in Survey of India (SOI) toposheet No. 43 P/15

Latitude - 32^0 17' 25.3" N to 32^0 17' 40.7" N
Longitude - 75^0 46' 31.2" E to 75^0 46' 43" E

TABLE - 1.5.1

BRIEF DESCRIPTION OF THE PROJECT

S. No.	Particulars	Details
A.	Nature of project	Mining Project
B.	Size of project	
1.	Mining Lease area	8-64-00 Hectares
2.	Proposed Production capacity	68000 TPA
C.	Project Location	
3.	Village	Pail
4.	Tehsil	Nurpur
5.	District	Kangra
6.	State	Himachal Pradesh
7.	Latitude	32^0 17' 25.3" N to 32^0 17' 40.7" N
8.	Longitude	75^0 46' 31.2" E to 75^0 46' 43" E
9.	Toposheet No.	43P/15
D.	Environmental Settings Details	
10.	Nearest Major Town	Pathankot (12 km)
11.	Nearest State Highway	Nurpur – Khandwal Road
12.	Nearest Railway Station	Pathankot (12 km)
13.	Nearest Airport	Dharamshala (75 km)
14.	Ecological Sensitive Areas (National Park, Wild Life Sanctuaries, Biosphere Reserves etc.)	Nil within the 10km radius
15.	Nearest River	Chakki Khad
16.	Seismic Zone	Seismic Zone - V
E.	Cost Details	
17.	Total Project Cost	Annual Turnover- Rs. 50,88,000
18.	Cost for Environmental Protection Measures	Rs. 3,50,000 (Capital)+Rs. 70,000/-(Recurring)

Source: *Site Visit & Mining plan*

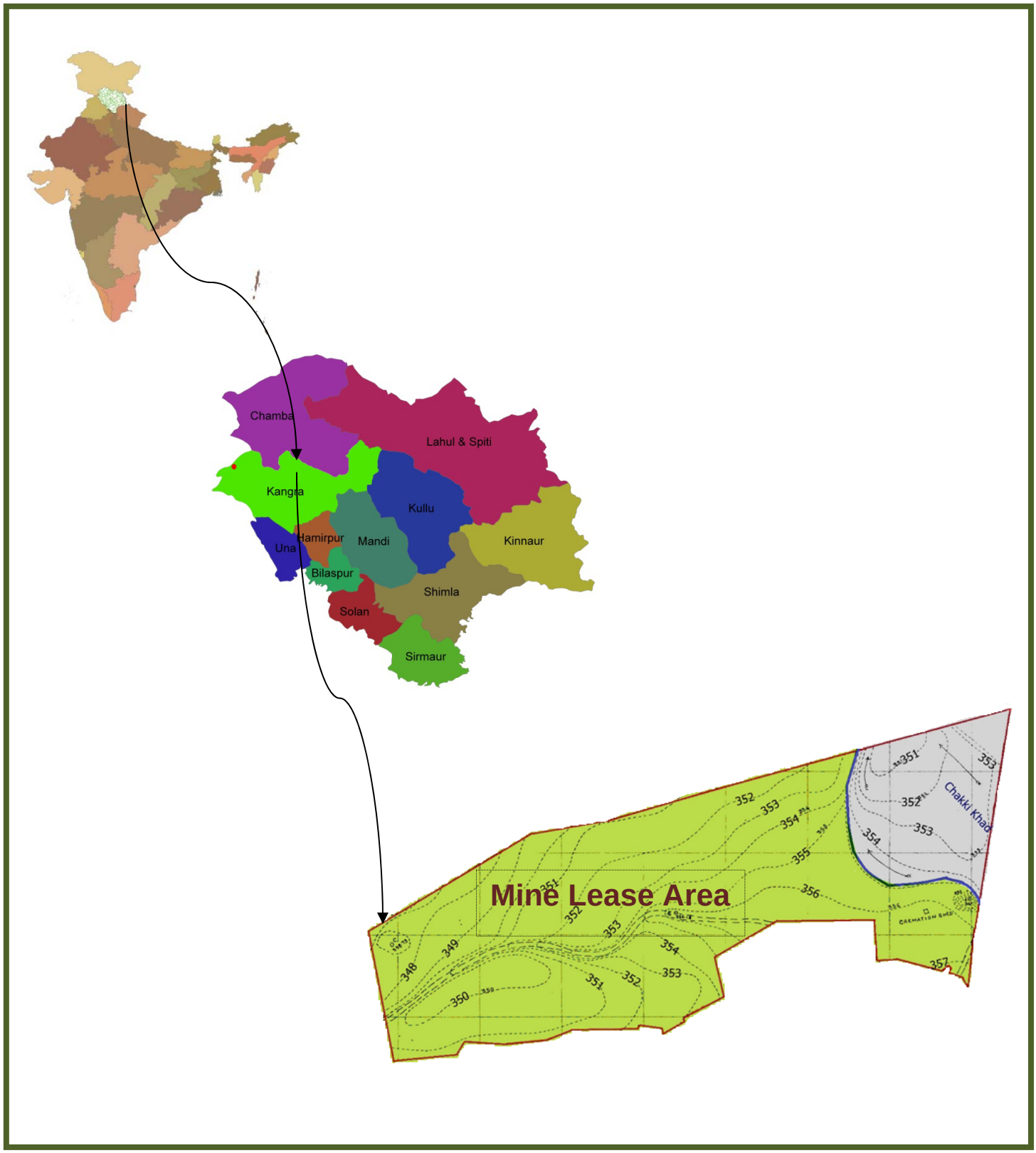

Figure 1.5.1: Location of mine lease Area

Figure 1.5.2: Environmental Settings of the area

Figure 1.5.3: Site Photographs showing Environmental Settings of the area

1.6 Post-Environmental Clearance Monitoring

For category A projects, it shall be mandatory for the project proponent to make public the environmental clearance granted for their project along with the environmental conditions and safeguards at their cost by prominently advertising it at least in two local newspapers of the district or state where the project is located and in addition, this shall also be displayed in the project proponent's website permanently.

The project management shall submit half-yearly compliance reports in respect of the stipulated prior environmental clearance terms and conditions on 1st June and 1st December of each calendar year. All such reports shall be public documents. The latest such compliance report shall be displayed on the web site of the concerned regulatory authority.

1.7 Generic structure of Environmental Impact Assessment

In terms of the EIA notification of the MoEF dated 14th September 2006 as amended Dec 2009, the generic structure of the EIA document should be as under:

1. Introduction
2. Project Description
3. Description of the Environment
4. Anticipated Environmental Impact & Mitigation Measures
5. Environmental Monitoring Programme
6. Additional Studies
7. Project Benefits
8. Environmental Management Plan
9. Summary & Conclusion
10. Disclosure of Consultants engaged

1.8 Analysis of Alternatives

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.

1.8.1 Analysis of Alternative sites

Mineral deposits are site specific, and therefore, selection of a mine site has limited alternatives.
This is bed mining where the material will be lifted manually into truck-trolley.

1.8.2 Analysis of Alternative Technology

This is a small mine and there is no new technology is involved to extract the minerals. Mining shall be done by opencast manual method as per laid down procedures and given in approved mining plan.

1.9 Importance to the Country and Region

India is a developing country which required large infrastructure development. Sand, Stone and Bajri mine are important source of raw materials for Infrastructure. Hence, considering the demand of Sand, Stone and Bajri & sufficient availability in the area, it is very much necessary to have Sand, Stone and Bajri projects to sustain Infrastructure project as well as household requirement in the area and to provide employment opportunities to the locals.

1.10 SCOPE OF EIA STUDY

The First technical presentation (TOR Presentation) with respect to Environmental Clearance was held on November 28-30, 2011. The committee has suggested Terms of References (ToR) for preparation of the Environmental Impact Assessment (EIA) Report and Environmental Management Plan (EMP), **No. J-11015/213/2011-IA.II (M) dated 28th December, 2011** which has already been annexed in Draft EIA/EMP Report as **Annexure III.** Nandi Stone Crusher has got NoC from Gram Panchayat annexed as **Annexure IV**. As per the ToR's issued have collected all data and incorporated in this Draft EIA/EMP Report.

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CHAPTER–II

PROJECT DESCRIPTION

The mining project is situated in the Chaki Khad, a primary tributary of the River Beas. The mining lease area comprises of Khasra Nos. 527/495/2/1, measuring 8.6400 hectares falling in Mohal Pail, Mouza Khanni, Tehsil Nurpur of District Kangra, Himachal Pradesh.

The proposed project is collection and extraction of stone, sand and bajri from river bed of Chaki Khad. The project involves collection / extraction of about 68000 metric tons of stone, sand and bajri (Cobbles). The stone and bajri (48000 metric tons) would be transported to crusher. The un-processed sand would be sold directly to the builders etc.

The deposit is replenish-able. The replenishment depends upon relief and area of catchment of the river, physiography of the area, geology of the catchment, length and gradient of the river course, geology of the area and the intensity of the rainfall particularly during monsoons.

The chapter deals with location of area, physiography of the area, description of river, geology of the area, mineral reserves, method of mining, annual rate of production and generation of waste.

2.1 Location.

The mining lease area is located in Village Tipri, tahsil Nurpur, District Kangra, Himachal Pradesh. The mining lease area / project area is part of Chaki Khad, and falls in Topography sheet No I43V 15 (43P/15). The coordinates of the mining lease area are:

Table 2.1: Showing Coordinates of the mining lease area.

Latitude	Longitude
$32^0$17’ 25.3” N	75^0 46’ 31.2”E
$32^0$17’ 40.7” N	75^0 46’ 43”E

Figure 2.1 Showing Location of Lease area on Google Earth Imagery.

2.2 Land Use pattern of Lease Area.

The entire mining lease area falls within the river course of Chaki Khad as shown in the table below:
Table 2.1: Showing Land use of Lease Area

S. No.	Kism (Land use type)	Area in Hectares
1.	Govt. waste land	-
2.	Agriculture land	-
3.	Grazing land	-
4.	Forest land	-
5.	Others 'Gairmumkin Darya'(River bed)	8.6400
Total		**8.6400**

2.3 PHYSIOGRAPHY OF AREA

The area falls in the Chaki river bed. The Chaki catchment area is a typical rugged mountainous terrain with steep slopes and narrow and deep valleys. The river Chaki as it enters the plains a few kilometres upstream of the lease area, with Himalayas in the north and Siwalik hills in the east and plains in south and west.

2.3.1. Ridges: In the SSE is the sub watershed ridge dividing the Chaki Catchment. The Chaki Khad which takes an elbow turn about five kilometres downstream of the lease area is fed by east west flowing khads and south of elbow turn by north east to south west flowing khads. The ridge rises from the Chaki Khad from about 330m MSL toward ∆ 433. In the NNE are the peaks marked 473MSL, 486m MSL and the ridge joins the West East running ridge dividing the catchment of Jabber Khad (a tributary of Chaki Khad) in the north and Chhounch Khad in the South. Small village such as Baranda, Maud, Kut, Giora, Bhaletti, Agharetc are habitated almost on the watershed ridge. In the north and northeast is Pathankot valley extending up to Ravi River.

***2.3.2* Drainage**: The Chaki Khad, one of the important tributaries of the Ravi River, carries the main drainage of the area. It originates from Dhauladhar Ranges and initially has a Southeasterly flow. At places it runs north west to south east and SE to NW along the Shiwalik Hills. But after cutting through the Shiwalik hills, its general flow is from NE to SW. It takes an elbow turn east of Pathankot Airport towards south.

The study area is drained by tributaries of Chaki Khad. The eastern part is mainly drained by Bari Khad. It originates from near the villages Balkhora and Baranda at a height of 520 metres MSL. There are other khads , originating from Lodhwan Reserve Forest which drain the Southeastern areas and flow from south east to North west.The Northern parts are drained by Bagra Khad which joins Chaki Khad north of the lease area and Phungtori Khad drains north western and western parts of the area and joins Chaki Khad quite a way in the south. The area has a drainage density of the order of 0.51 (Kms per square km). In general quartzite and carbonate rocks constitute steep slopes, while the gentler slopes are provided by the slate-shale sequence. Down cutting by the rivers is evident by beds preserved at different levels.

2.3.3 Springs: Springs are common feature in the hilly parts, and for many of the villages are main source of potable water though the discharge in some of them is greatly reduced during the summer months.

2.4 DESCRIPTION OF CHAKI RIVER & CATCHMENT AREA

General: The lease is situated in the River Chaki, a primary tributary of the River Beas. The Chakki Khad originates from the southern aspect of Dhauladhar Range at the attitude of 2937 meter above mean sea level. The attitude at confluence with Beas River is 250 meters above mean sea level.

The general gradient of the river in the effective catchment is given below.

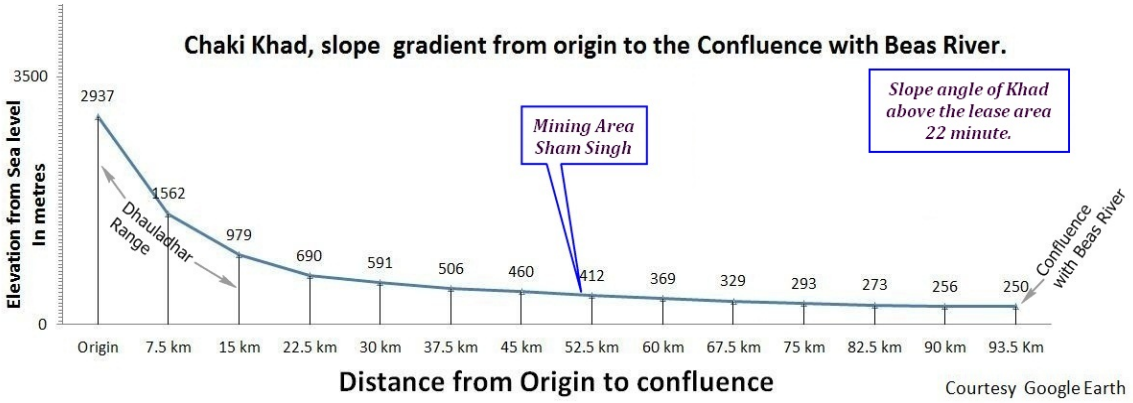


FIGURE 2.1: SLOPE GRADIENT OF CHAKI RIVER FROMORIGIN TO CONFLUENCE WITH RIVER BEAS.

Total catchment area of Chaki Khad= Approx975Sq Km
Total length in the river course up to confluence = 93.5 Km
Elevation at Origin 2937 metre above MSL
Elevation at Confluence 250metre above MSL.
Total elevation difference from origin to confluence = 2687 metres
Distance from origin to lease area = Approximately 50 kms
Total elevation difference up to mining lease= 2518 metres.

From various analysis of the drainage the River Chaki can be divided into 3 parts (Figure 2.2)

TABLE -2.1 CATCHMENT OF RIVER CHAKI

1.	From origin to the 1000 meter above mean sea level	The zone of active erosion	**Young stage**
2.	From 1000 meter to 500 meter contour to confluence	The zone of erosion during very high floods; otherwise deposition	**Maturity stage**
3.	Less than 500 meter contour to confluence	The Zone of deposition only except very high and rare flood	**Old stage**

The lease area is situated in the zone of old stage

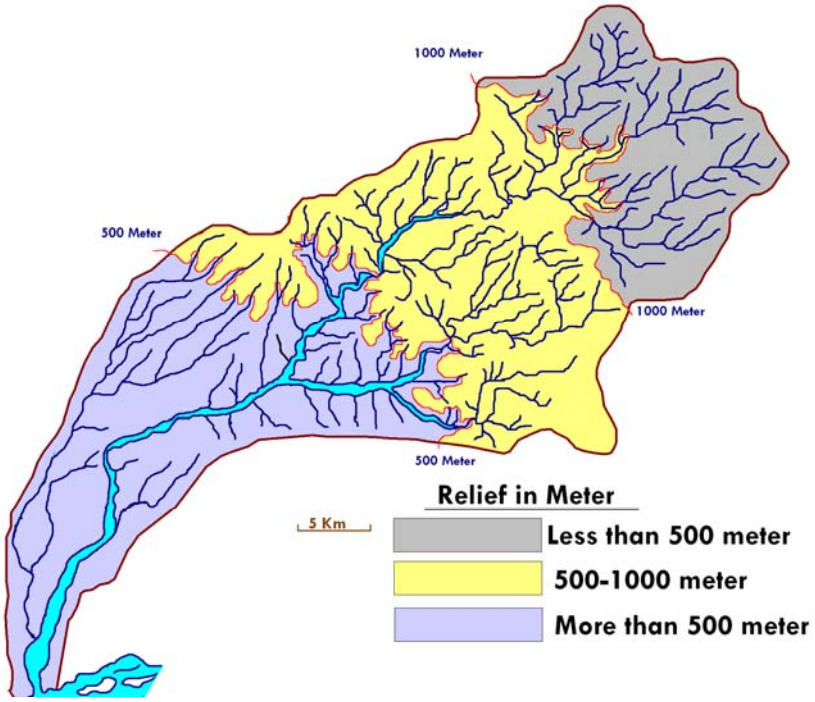


FIGURE:2.2 SHOWING THE CATCHMENTS OF THE RIVER CHAKI.

TABLE 2.2 CHARACTERISTICS OF CHAKI RIVER CATCHMENT

S. No.	**Characteristic**	Description
a)	**Name of River/ Stream in which the lease is situated**	The lease is situated in the Chaki River, a primary tributary of the River Beas.
b)	**Drainage System**	Beas
c)	**Type of Drainage**	Dendritic (Figure)
d)	**Origin of River/Stream**	The Chakki Khad originates from the southern aspect of Dhauladhar Range at the attitude of 2937 meter above mean sea level.
e)	**Altitude at Origin**	2937mts above MSL
f)	**Width of River at the place of Mining**	Width if Chaki River near the mining lease area is 350 Metres to 380 Metres.

g)	**The annual deposition at the place of mining**	The annual deposition at the mining lease area is one to six Cms depending upon the location. At some places it may be more than the six Cms.
h)	**The Competency of the River/ Stream at the mining site**	The general competency at the mining area is about six Kg approx. The largest boulders vary 12 to 18 cm X 12 to 12 cm X 9 to 12 cm (length X breath X height)However exceptionally large boulders are also observed indicating ferocity of river flow during high floods.
i)	**The level of HFL**	During monsoon high floods the water level rises up to about two meters, at times for short spells.
j)	**The thread of deepest water in meandering.**	The landform being depositional the meandering thread is constantly changing during the rainy season depending upon the water level.

Photo 1: Showing competency of Chaki River.

2.5 REGIONAL GEOLOGY AND LOCAL GEOLOGY.

The Himalaya, traditionally are divided into five tectonic zone having characteristic physiography. These zones commencing from south/southwest are (i) Sub-Himalaya, constituted of the Neogene Siwalik and the Paleogene Sirmur groups of the foreland basin, rises just north of the Indus-Ganga plains having an average altitude of 900-1500 m. A thrust, commonly known as the Main Boundary Fault, separates the Paleogene from the Neogene. The Sub-Himalaya zone is thrust over the

Alluvium along the Main Frontal Thrust and in turn is thrust over by the next tectonic zone of the Lesser Himalaya, (ii) the Lesser Himalaya ranges in altitude from 1500 to 5000 m. being sited immediately south of the main range, this zone receives heavy monsoon rains and thus, is thickly vegetated. This tectonic zone contains rocks ranging in age from Palaeoproterozoic (2000 My) to Cambrian with isolated outliers of the Permian, Cretaceous and Eocene rocks in many parts of the Himalaya. The metamorphic grade of the Lesser Himalayan rocks is low--mostly in the range of greenschistfacies. The Lesser Himalaya incorporates vestiges of thrust sheets of high greenschist to amphibolite facies that had originated from the next higher tectonic zone of the Higher Himalaya. Between the thrust sheets tectonic windows are exposed, presenting an extremely complicated structural setup, (iii) Higher Himalaya comprises ambhibolite grade metasediments and granitoids involving three thrust sheets in the Himachal part viz., the Kulu Thrust Sheet, the Jutogh Thrust Sheet and the Vaikrita Thrust Sheet; the first two demarcate the northern/northeastern limit of the Lesser Himalyan regime, whereas the Vaikrita Thrust Sheet, which supports the Tethyan succession marks the southern/southwestern limit of the Tethyan province, (iv) the Tethyan tectonic zone is constituted of the fossiliferous succession ranging in age from Late Precambrian to Cretaceous/Eocene and (v) Trans-Himalaya includes the Indus Suture Zone – the junction between the Indian and Asian plates.

2.5.1 **Local Geology**

The leased out area forms a part of the stream bed covered with boulders, cobbles, pebbles, river born bajri, and sand and clay deposit of Channel alluvium. The rocks along the banks are Bed Alluvium and Fan Alluvium and in higher reach of catchments Upper Siwalik Formation, Dharamsala formation, Chail Formation and Dhauladhar Granitoid of are observed.

The lithostratigraphy of the area near lease and its effective catchment is given in the table 2.3 and figure 2.3 .

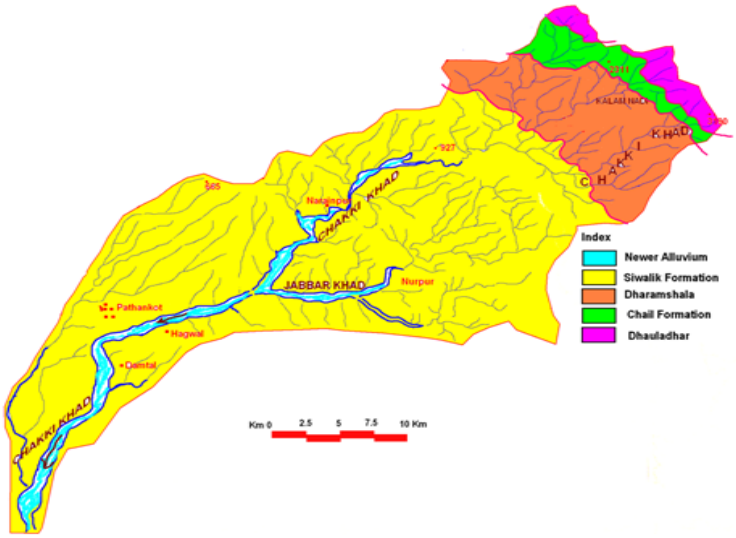


FIGURE: 2.3 GEOLOGICAL MAP OF THE CHAKI CATCHMENT.

TABLE:2.3 LITHO-STRATIGRAPHY OF THECHAKI RIVER AND SURROUNDING AREAS NEAR THE MINING LEASE AND ITS EFFECTIVE CATCHMENT

Sr. No	Formation	Rocks
1	Newer Alluvium Channel Alluvium	Grey micaceous, fine to coarse grained sand, silt, clay, boulders, cobbles and pebbles of sandstone and quartzite
2	Upper Siwalik	Predominantly massive conglomerate with red and orange clay as matrix and minor sandstone and earthy buff and brown clay-stone
3	Middle Siwalik	Massive Sandstone with minor conglomerate and local variegated clay-stone
4	Lower Siwalik	Alternation of fine to medium- grained sporadically pebbly sandstone, calcareous cement and prominent chocolate and medium maroon claystone in the middle part
5	Upper Dharamshala	Medium to fine grained, hard, bluish grey and massive Sandstone, green clay and siltstone
6	Lower Dharamshala	Hard, grey, well bedded and high mica content sandstone
7	Chail Formation	Slate, Phyllite and Schist
8	Dhauladhar Granitoid	Mylonitic Gneiss, Slate, Phyllite

2.6 RAINFALL

In a normal rainfall, raindrops range in size from 1 to 7 millimeters in diameter and hit the ground going as fast as 20 miles per hour. The impact of millions of raindrops hitting the bare soil surface can be incredible, dislodging soil particles and splashing those 3 to 5 feet away.

A heavy rainstorm may splash as much as 90 tons of soil per acre. Most of the splashed soil particles don't leave the field; they clog surface pores, which in turn reduce water infiltration, increases water runoff, and increases soil erosion.

The monsoon, which produces the heaviest precipitation over long periods (most world records of rainfall rates for periods greater than 12 hours are a result of monsoons).

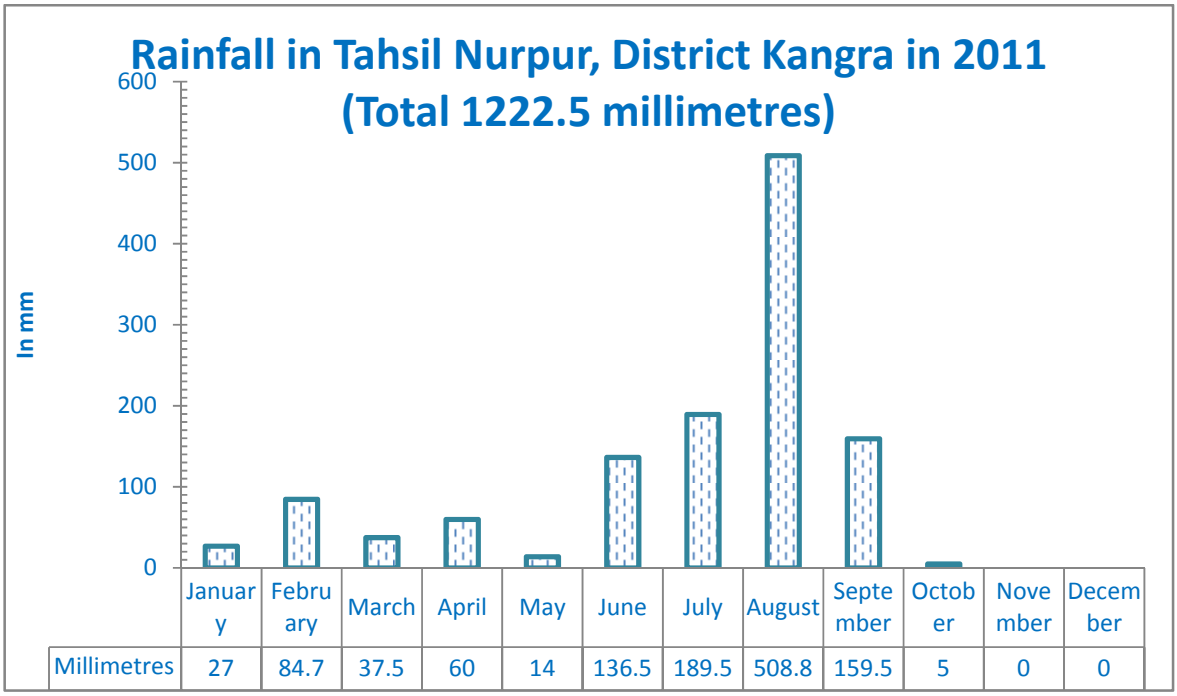


FIGURE:2.4: RAINFALL RECORDED AT NURPUR IN 2010.

- The monsoon rains set in motion the process of erosion of the rocks in the catchment area. Erosion is the set of all processes by which soil and rock are loosened and moved downhill or down slope. The splash erosion by the rain drops loosens the soil, joints, fractures, matrix of the coarsely bedded conglomerates. The most important process of erosion is due to running water. The amount of erosion of a slope depends on:
  - The length and steepness of the slope (Figure2.1).
  - The rainfall intensity (Figure 2. 4).
  - The permeability and structure of the surface figure 2.3.
  - The amount of vegetation cover.

The rocks in the catchment area belong to Dhauladhar Granitoid, Dharamsala and Siwalik formations (Figure 2.3). These formations comprise siltstones, sandstones, shale, and coarsely bedded **conglomerates**. Rock or soil that is already loose is easily dislodged and washed away in heavy rainstorms. The water enters the joints and cracks in the rock and widens them, making them more prone to weathering. These loosened rocks and boulders are carried down the slopes by rain storm waters. These reach the ChakiRiver which transports it downstream.

Deposition occurs when a loss of energy results in a decrease in velocity. This may be due to such things as **declining gradient (figure 2.2)**, or by local obstructions (Figure 2.1). An excessive load produced by increased erosion in the drainage basin or tributary valleys, inevitably lead to deposition.

These rocks suffer erosion during the rainy season and especially on the days of heavy rainfall (Figure 2.5) and due to steep gradient in the hill region carry down the boulders from the conglomerates and mud and sand from siltstone and sandstone and other formations.
Near the mining lease area the gradient of the river is gentler figure 2.2. Thus the area is amenableto the deposition of stone, sand and bajri.
Pits / depressions created during the extraction of minerals get replenished during the monsoon period.

2.7 MINING AREA, RESERVES OF DEPOSIT AND MINING METHODOLOGY.

- The lease area is situated well within the meandering corridor of Chaki River. The mining lease area is 8.6400 hectares part of river bed of Chaki River.
- Mining area is defined after considering the 1/5 of width from the HFL that is 120 to 130 meters, depending upon the width which varies from 600 to 650 meter. The mine able area thus calculated is 70000 square metres out of the total lease area of 86400 square metres.

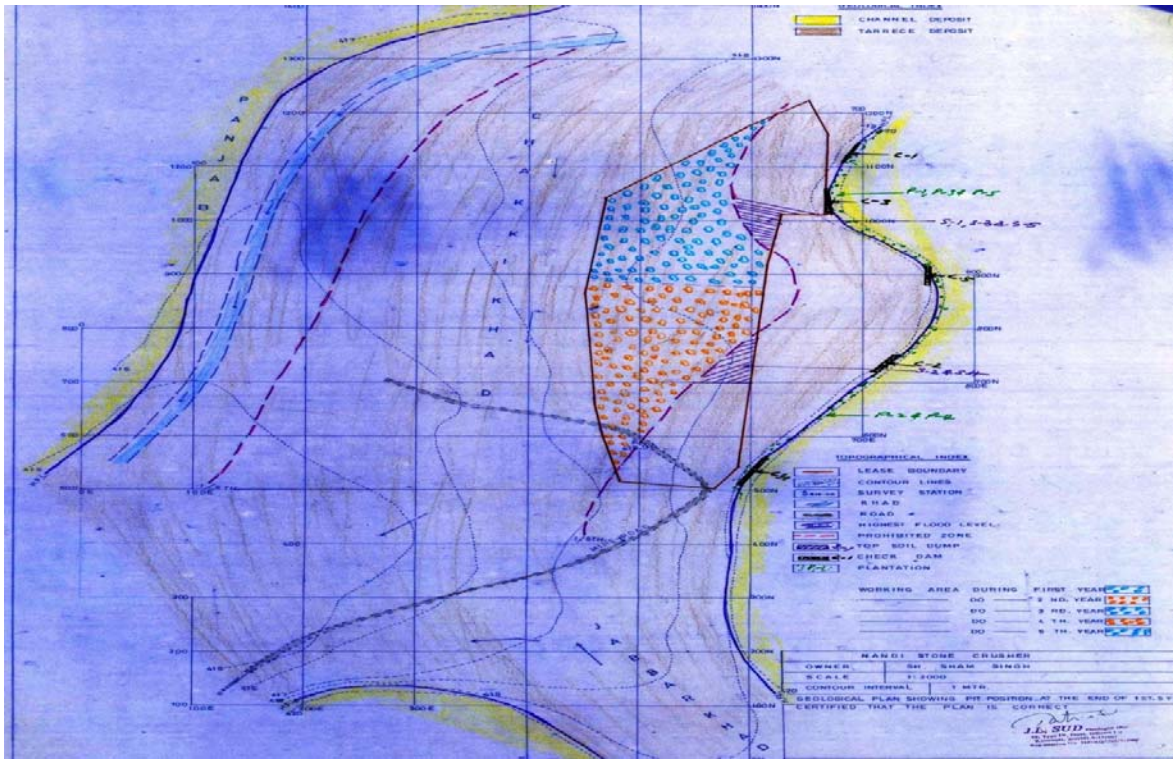


FIGURE-2.5: CONTOUR AND WORKING PLAN OF THE MINING LEASE AREA.

2.7.1 Exploration

- In order to calculate the percentage of various sediments found in the River bed, a trial pit was dug, at a most representative site, having dimensions of 1 m. * 1 m. * 1 m. (Length * width * depth). The content of the total material dug out from the pits were separated into five

categories i.e. stone, bajri (cobbles), sand, silt and clay. The percentage of the each category was found to be stone 35 %, bajri 25 %, sand 25%, silt 10% and clay 5%.

- *The percentage of these constituents is likely varied from year to year depending upon amount and ferocity of rainfall.*
- One meter from the surface is considered for calculation of the reserve.
- ***The specific gravity of Quartzite is 2.65 and of sand is 1.85. Hence average specific gravity of 2.25 is taken for calculation of the deposit***

2.7.2 Mineable Reserve

- The of mineable reserves were estimated by multiplying the surface area with specific gravity and depth of one metre (70000*2.25*1)up to which the mining shall be undertaken. Thus a total of 157500 metric ton of R o M material is available in the mineable area of 70000 squares.

2.7.3 Mining method

- The mining method shall be adopted to facilitate the replenishment of the excavated pits during rainy season. Thus the mineable area has been divided in two blocks. The up steam block is 35,000 square metres and the downstream block is 35,000 square metres. The Mining of these two blocks is suggested on rotation basis in such a way that pit of previous year mining will act as depository for the post monsoon season. The previous year pit will reduce the velocity of the flow of the khad waters and thus reducing its carrying capacity resulting in deposition material being transported by the khad waters. In totality the principal of the Placer Deposit is adopted.

    - The working period for mining will be restricted to 270 days and during three month of rainy season no mining shall be undertaken.
    - The mining operations in the lease area would be confined to day light hours, from 9 A.M. to 5 P. M.
    - Thus virtually each block would be rested for replenishment for two consecutive monsoons.
    - The mining shall be done manually. No mining machinery shall be deployed.
    - The highest contour in the lease area is 419 and lowest is 417.5 metres above mean sea level, therefore mining would be undertaken/limited up to the level of 418 to 416.5 metres above MSL
    - The material is sorted manually at mining site and sand is separated from stone and bajri.
    - The sorted stone and bajri is than loaded into trolleys by shovels and pans and transported to the crusher site.

Table 2.4 Rotational Planning of mining. Each block is rested for two consecutive monsoons.

Year	Season	Block Rotation	
First Year	Working Season 270 days	Upstream Block	
	Monsoons Blocks rest for Replenishment	Upstream Block	Downstream Block
Second Year	Working Season 270 days	Downstream Block	
	Monsoons Blocks rest for Replenishment	Downstream Block	Upstream Block
Third Year	Working Season 270 days	Upstream Block	
	Monsoons Blocks rest for Replenishment	Upstream Block	Downstream Block
Fourth Year	Working Season 270 days	Downstream Block	
	Monsoons Blocks rest for Replenishment	Downstream Block	Upstream Block
Fifth Year	Working Season 270 days	Upstream Block	
	Monsoons Blocks rest for Replenishment	Upstream Block	Downstream Block

2.8 EMPLOYMENT GENERATION:

The mining activity in the lease area will thus give direct employment to about 16 persons engaged in extraction of stone, bajri and sand; loading of material into tractor trolleys and tipper trucks.
The directly employed worker can be categorized as

1) Munshi: one.
2) Supervisor: One.
3) Mining Workers: 14

The stone and bajri shall be transported to the crusher. Thus, for transportation of material about three to four drivers and equal number of helpers shall be engaged. At the crusher about 6 skilled and semiskilled workers are deployed. Moreover, the construction industry using the raw material from the mine will generate employment for more than 200 skilled and semi-skilled workers. Thus, the production of construction aggregates, such as sand stone and bajri has tremendous impact on multiple generation of employment in downstream activities.

2.9 RATE OF PRODUCTION

- The proposed rate of production, every year, would be about 68000 metric tons of material excavated. Thus, about 48000 metric tons of stone and bajri suitable for crushing would be transported to the crushing unit, and 20000 metric tons of sand would be sold at mining site directly.
- No blasting shall be undertaken to break the large boulders. The boulders larger than two feet will not be disturbed as per policy of the state Government, so that these act as obstruction to the flood waters and assist in deposition of material in the lease area.
- The production proposed during five years of mining according to approved mining plan.

  As the demand for construction aggregate would increase in the future the production rate per years will remain at optimum level of 63400 metric tons of stone, bajri and sand.

2.10 WASTE GENERATION.

- During the excavation of stone, bajri and sand from the river bed silt and clay are also quarried being associated minerals. The silt and clay which will be generated to the extent of 12000 metric tons per year will be left in the pits as back fill. The silt and clay being the lightest of the sediment load in the flowing river water is carried downstream by even the lightest floods during the onset of monsoons., Sand particles range in diameter from 0.0625mm (or 1⁄16 mm, or 62.5 μm) to 2 mm. Particles smaller than sand fall in the category of silt and clay. Silt and clay in the river water are derived mostly from erosion of soil cover and weathered rocks and are generally suitable for agricultural field.
- As the silt and clay do not contain any harmful constituents, therefore their carriage/movement further downstream would not create any harmful environmental impact.

- **Land use plan of mine lease.**

- The mining lease area falls within the meandering corridor of the river course, below the high flood level. It therefore cannot be put to any other use. Before the lease was granted it was part of the river course. During the mining of river bed, as the mining would be resorted to a depth of one metre only, the land form is not likely to change. Rather the river course, which at present is flowing more near the banks may shift towards centre. Thus, the mining activity in the centre of the river bed may to some extent help in its channelization. Post mining also the area will remain part of active river course.

2.11 TRANSPORTATION.

- The lease area is having gentle slope with the gradient of less than one degrees hence, tracks for the movement of trucks and tractors can be made and maintained in any part of the lease area.
- The loaded tractor trolleys / tipper trucks would carry the material to the crusher site, at a distance of about one kilometre from the mining site. About 180 metric tons of stone and bajri would be required to be moved daily. Two tipper trucks will be able to move this material making ten trips each or three to four tractor trolleys would be engaged to move the stone and bajri to the stone crusher.

CHAPTER–III

DESCRIPTION OF THE ENVIRONMENT

3.1 Introduction

A regional background to the baseline data is being presented 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 base line status of the project environs is described section wise for better understanding of the broad-spectrum conditions. The baseline environment quality represents the background environmental scenario of various environmental components such as air, noise, land, ecological 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 February, March and April-2012 in compliance with CPCB guidelines. The key plan for detailed Environmental Baseline study is finalized based on standard guidelines of MoEF and CPCB. The local topography and meteorological conditions of the study area are taken into consideration while preparing the key plan.

In order to assess impacts of project activities on assisting physical biological and social Environment it is necessary to collect information on following parameters:

May be given according to priority and the importance of parameters specific to the project

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

To achieve these objectives, our team monitored the above said environmental parameters within core and buffer zones (10 km. radial distance) from the project site in accordance with the Guidelines for EIA issued by the Ministry of Environment & Forests, Govt. of India.

3.2 Study area at a glance

The study area is 10 km radius known as buffer zone and it has been measured from the boundary of the mines site in every direction. The buffer zone area falls in Kangra district.

1. General Particulars:

- Village : Pail
- Tehsil : Nurpur
- District : Kangra
- State : Himachal Pradesh
- Latitude : 32^0 17' 25.3" N to 32^0 17' 40.7" N
- Longitude : 75^0 46' 31.2" E to 75^0 46' 43" E

2. Demography (within 5km radius of the project site)-As per Census-2001

- Total Population : 7291
- Scheduled Castes : 1535
- Literacy Rate : 68.11%
- Workers : 1994
- Total Household : 1351

3. Climatology

During study period (February, March and April- 2012)

- Maximum Temperature : 43 ^oC
- Minimum Temperature : 22 ^oC
- Relative Humidity (%)
  - At 08:30 hrs : 21 % to 74 %
  - At 17:30 hrs : 19 % to 77 %
- Dominant Wind Direction : NW

3.3 Land use / Land Cover Study

The District Census 2001 classified the land available in surrounding villages into following five categories.

1. Area not available for cultivation
2. Un-irrigated
3. Cultivable waste
4. Irrigated
5. Forest

Table – 3.3.1

Land use pattern of villages surrounding the mining lease (Census record of 2001.)

Village	Total Area	Forest Land	Total Irrigated	Unirrigated	Culturable waste	Area not available for cultivation	Population
Baduhi	262	18.00	0.00	158.00	13.00	73.00	1534
Chakban Khani	468	280.00	0.00	1.00	187.00	0.00	0
Khani Upperli	155	27.00	12.00	80.00	17.00	19.00	686
Maira Batrah	308	63.00	26.00	37.00	31.00	151.00	266
Gudli	93	17.00	0.00	52.00	13.00	11.00	301
Chaugan	72	17.00	0.00	41.00	8.00	6.00	159
Pail	358	0.00	42.00	0.00	71.00	245.00	0
Gharthara	100	14.00	0.00	61.00	16.00	9.00	287
Khani Jhikli	295	50.00	19.00	147.00	17.00	62.00	1185
Tunun	119	26.00	25.00	42.00	6.00	20.00	265
Khandwal	296	56.00	93.00	56.00	8.00	83.00	1289

3.4 PHYSIOGRAPHY & DRAINAGE PATTERN

The area falls in the foot hill area of Himalayas in the west of Himachal Pradesh. The lease area is part of old bed of Chakki Khad near the confluence of Bari Khad with Chakki Khad.

The Chakki Khad, one of the important right bank tributaries of the Beas River, carries the main drainage of the area. It originates from Dhauladhar Ranges and initially has a Southeasterly flow. At places it runs North West to south east and east to West along the Shiwalik Hills. But after cutting through the Shiwalik hills, it general flow from NE to SW. It takes an elbow turn east of Pathankot Airport towards south.

The study area is drained by tributaries of Chakki Khad. The eastern part is mainly drained by Bari Khad. It originates from near the villages Balkhora and Baranda at a height of 520 metres MSL. There are other khads , originating from Lodhwan Reserve Forest which drain the Southeastern areas and flow from south east to North west.

The Northern parts are drained by Bagra Khad which joins Chakki Khad north of the lease area and Phungtori Khad drains north western and western parts of the area and joins Chaki Khad quite a way in the south.

3.5 Seismicity & Flood Hazard Zonation of Area

The study area comes under Zone-V. The Seismic Zone Map of India is given below figure-3.5.1.

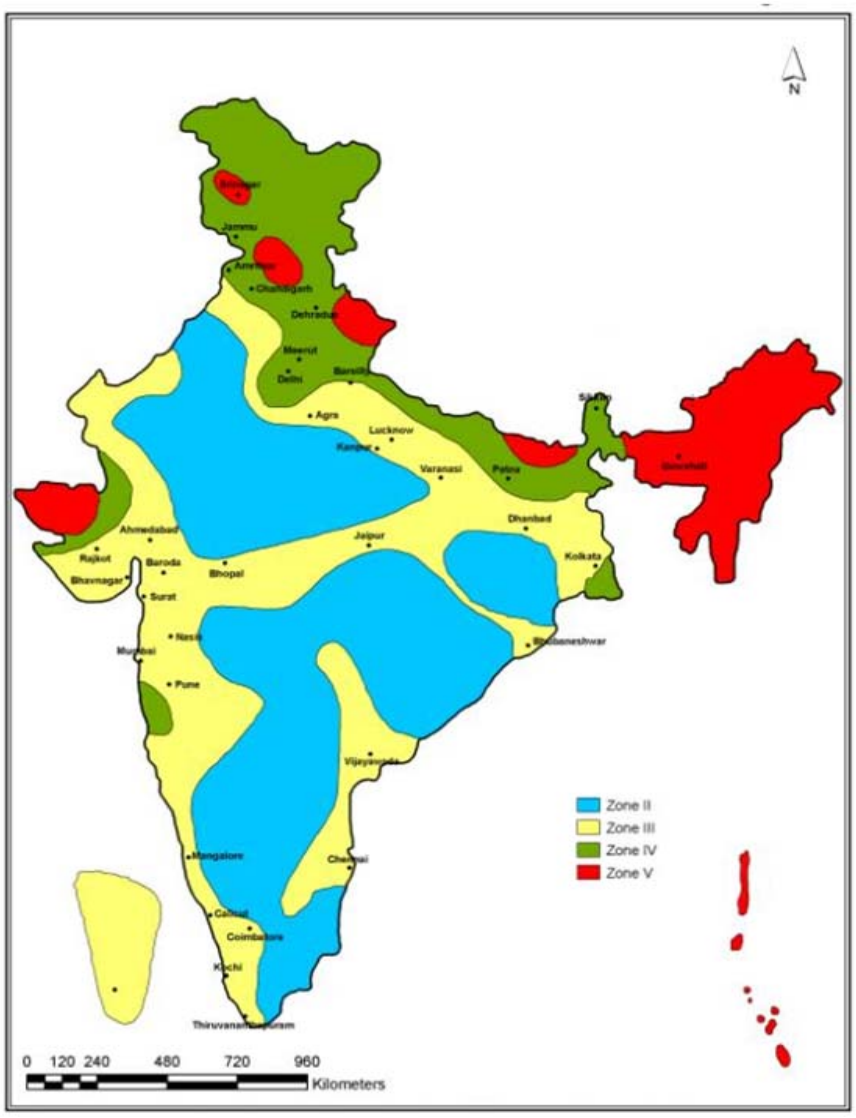


Figure-3.5.1: Seismic Zone Map of India

3.6 Instruments used for Environmental Baseline Data Collection

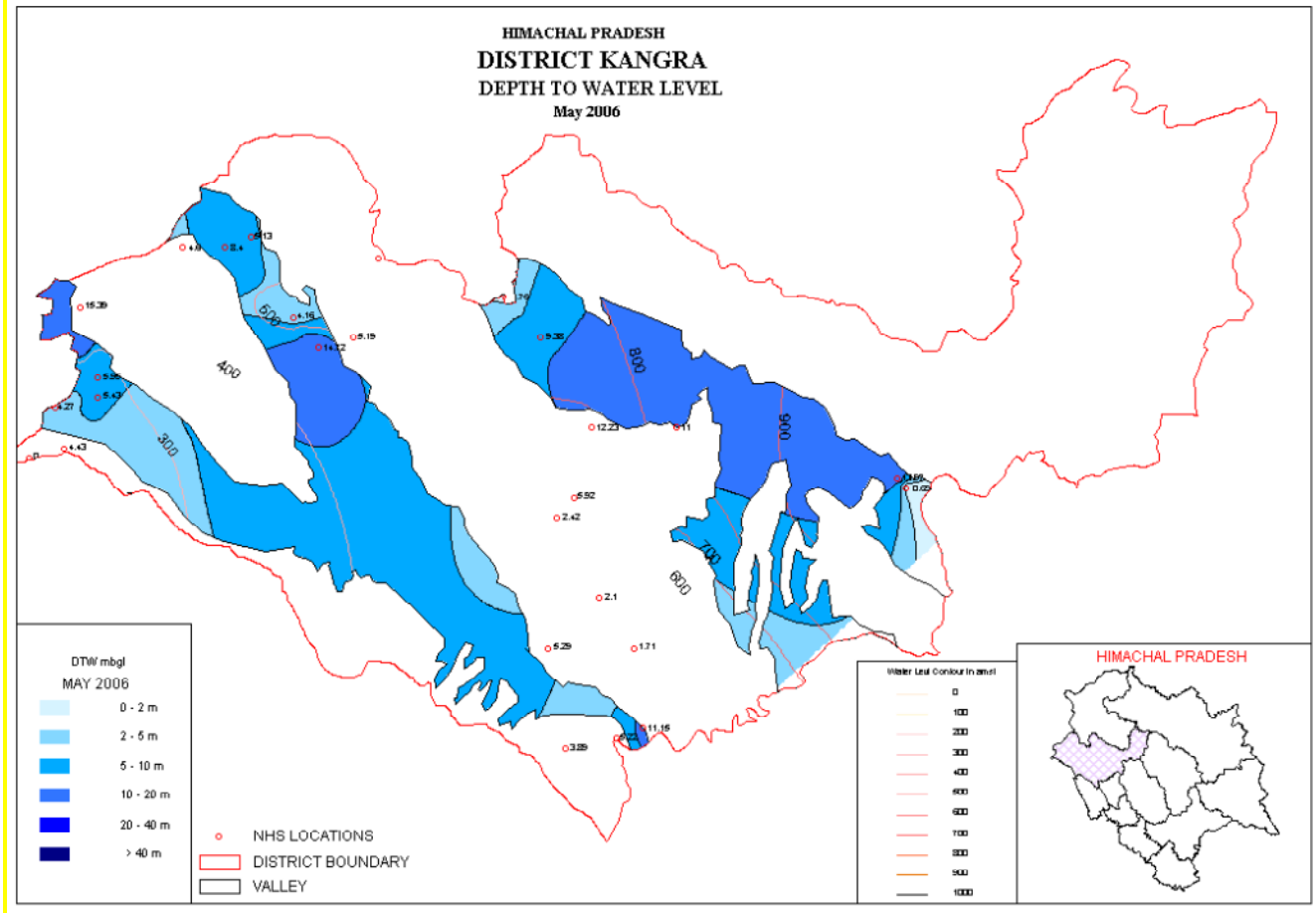
1. Respirable Dust Sampler with attachment for gaseous Pollutants,
2. Digital D.O. Meter
3. Dry and Wet Bulb Thermometer.
4. Sound Level Meter
5. Micro Meteorological Station
6. Water Level Indicator
7. GPS

Apart from collecting samples of air, water and soil from representative sampling points given in proceeding sections, the data on land use, vegetation and agricultural crops were also collected by the field team through interaction with a large number of local inhabitants of the study area and different Government departments / agencies. This provided an excellent opportunity to the members of the field team for obtaining clear scenario of the existing environment of the study area.

3.7 WATER ENVIRONMENT

3.7.1 Ground Water

The general water table depth of the aquifers in the study area varies between 10 to 20 m on pre and post monsoon basis. The yield of the aquifers is reasonably good and serves as a dependable source of drinking and irrigation water. The water level fluctuations in these aquifers vary between 10 to 20 m. The district map showing the depth of water level in May month of the year 2006 is given below.



Source: Central Ground Water Department (CGWD)

3.7.2 Ground Water Quality

Selected water quality parameters of ground water and surface water resources within 10-km radius of the study area have been studied for assessing the hydrological environment to evaluate anticipated impact of the proposed mine. Understanding the water quality is essential in the preparation of Environmental Impact statement. It also assists to identify critical issues in a view to suggest appropriate mitigation measures for implementation.

The purpose of this study is to:

- Assess the water quality characteristics for critical parameters;
- Evaluate the impacts on agricultural productivity, habitat conditions, recreational resources and aesthetics in the vicinity; and
- Predict the likely impacts on water quality due to the project and related activities.

3.7.3 Methodology

Reconnaissance survey was undertaken and monitoring locations were finalized based on the following aspects:

- Drainage pattern of the regional area;
- Location of residential areas representing different activities/likely impact areas; and
- Areas representing the existing baseline environment.

Three surface water samples and two ground water samples were collected in the study area were examined for physico-chemical parameters in order to assess the effect of industrial and other activities on the hydrosphere resources. The samples were collected and analyzed as per the procedures specified in 'Standard Methods for the Examination of Water and wastewater' published by American Public Health Association (APHA).

3.7.4 Water Sampling Locations

Surface and ground water samples were collected as grab samples and were analyzed for various parameters. The analyzed results were compared with the standards for drinking water as per IS: 10500. The water sampling locations are listed below in **Table-3.7.1** and are depicted in **Figure-3.7.1**.

TABLE-3.7.1

DETAILS OF WATER SAMPLING LOCATIONS

Location Code	Location	Distance from the project boundary (km)	Direction
Ground Water			
GW-1	Harial	1.3	SE
GW-2	Ghandwal	1.8	SEE
Surface Water			
SW-1	Chakki Khad Upstream	0.8	NE
SW-2	Chakki Khad Upstream	0.7	SE
SW-3	Chakki Khad Down stream	0.8	SW

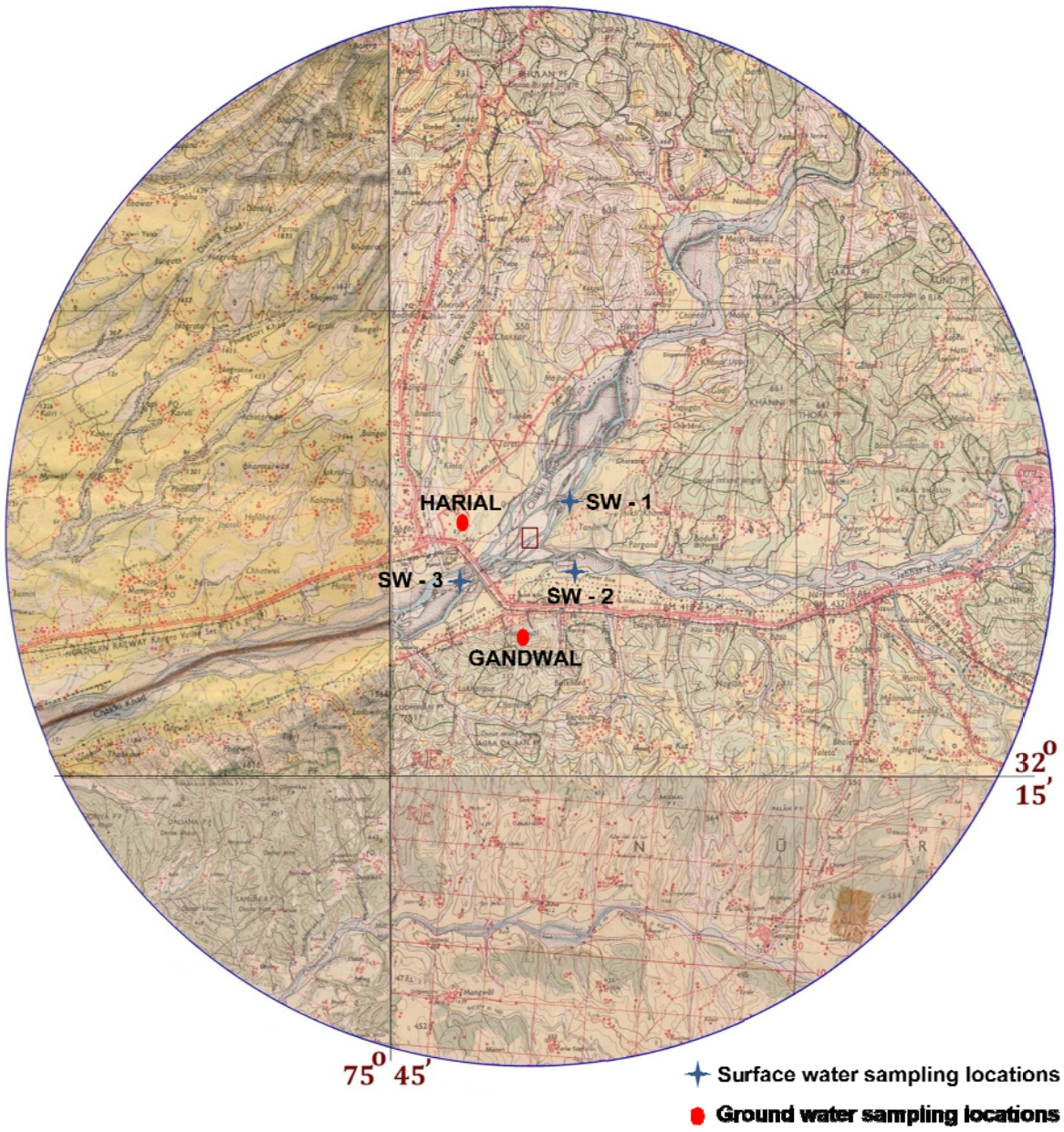


FIGURE-3.7.1

WATER SAMPLING LOCATIONS

3.7.5 Presentation of Results

Two ground and three surface water samples have been considered in and around the proposed mine site within the periphery of 10 km taking in to account the various uses, these water resources are put to. The results of water samples are presented in **Table-3.7.2 and 3.7.3.**

TABLE-3.7.2

RESULTS OF GROUND WATER QUALITY

S.No.	Parameter	Unit	GW-1 [Harial]	GW-2 [Lodhwan]
1.	pH	--	7.30	7.30
2.	Turbidity	--	<5	<5
3.	Taste		Agreeable	
4.	Odour		Unobjectionable	
5.	Colour		<5	<5
6.	Total Hardness	mg/l	150.48	205.20
7.	Iron	mg/l	0.20	Nil
8.	Chlorides as Cl	mg/l	21.33	12.66
9.	TDS	mg/l	220.00	286
10.	Calcium	mg/l	32.83	36.48
11.	Magnesium	mg/l	16.41	27.36
12.	Sulphates	mg/l	20.00	10.71
13.	Nitrate	mg/l	12.50	8.21
14.	Total Alkalinity	mg/l	81.22	125.76
15.	Fluoride	mg/l	0.34	0.20
16.	Phenol	mg/l	BDL	BDL
17.	Mercury	mg/l	BDL	BDL
18.	Cadmium	mg/l	BDL	BDL
19.	Selenium	mg/l	BDL	BDL
20.	Arsenic	mg/l	BDL	BDL
21.	Cynide	mg/l	BDL	BDL
22.	Lead	mg/l	BDL	BDL
23.	Zinc	mg/l	BDL	BDL
24.	Mn	mg/l	BDL	BDL
25.	Copper	mg/l	BDL	BDL
26.	Anionic detergent	mg/l	BDL	BDL
27.	Chromium	mg/l	BDL	BDL
28.	Residual free chlorine	mg/l	Absent	Absent

TABLE-3.7.3

RESULTS OF SURFACE WATER QUALITY

S. No.	PARAMETER	Chakki Khad upstream [SW-1]	Chakki Khad upstream [SW-2]	Chakki Khad Downstream[S-3]
1.	pH Value	7.50	7.40	7.50
2.	Temperature (Deg. ^{0}C)	26	27	28
3.	Chloride (as Cl), mg/l, Max.	15.31	14.67	15.95
4.	DO, mg	10.02	9.92	7.98
5.	Total Hardness (as $CaCO_3$)mg/l	195.88	200.6	169.92
6.	Total Alkalinity, mg/l	120.52	125.76	112.66
7.	Nitrate, mg/l, Max.	5.08	6.91	8.89
8.	Floride,mg/l,Max	0.16	0.18	0.20
9.	Iron (as Fe), mg/l, Max.	0.08	0.05	0.01
10	Total Dissolved solids mg/l, Max.	280	288	240
11	Total Suspended Solids mg/l, Max.	24	32	20
12	Sulphate (as SO_4) mg/l, max.	11.28	12.76	8.51
13	Oil & Grease, mg/l	Nil	1.20	5.1
14	Biochemical Oxygen Demand, mg/l (3 days for 27^0 C)	Nil	Nil	Nil
15	Chemical Oxygen demand, mg/l	Nil	4.00	Nil
16	Phosphorus	0.13	0.15	0.11

3.7.6 Observations

3.7.6.1 Ground water quality

The analysis results indicate that the p^H of the ground waters was 7.3. The TDS were found to be in the range of 220-286 mg/L. Other parameters like Chlorides and Sulphates were observed to be well within the prescribed limits. From the table, it is seen that the physico chemical analysis for all the parameters has within the standards as per IS: 10500.

3.7.6.2 Surface water Quality

The analysis results indicate that the pH of the surface waters was to be in the range of 7.40-7.50. The TDS were found to be in the range of 240-288 mg/L. Other parameters like Chlorides and Sulphates were observed to be well within the prescribed limits. From the table, it is seen that the physico chemical analysis for all the parameters has within the standards as per IS: 10500.

3.8 Meteorology

The meteorological data helps for appropriate interpretation of the baseline status of the study area as well as for input into prediction models to evaluate air quality dispersion. Chronological data on meteorological parameters also plays an important role in identifying the general meteorological regime of the region. The year may broadly be divided into three seasons:

- Winter season : October to Mid-March
- Summer Season : Mid-March to June
- Rainy season : July to September

3.8.1 Methodology

The methodology adopted for monitoring surface observations is as per the standard norms laid down by Bureau of Indian Standards (IS: 8829) and India Meteorological Department (IMD). Automatic Meteorological station has been installed near to the proposed project site.

3.8.2 Meteorological Data Recorded at Proposed Project Site

Meteorology plays a vital role in affecting the dispersion of pollutants. Since meteorological factors show wide fluctuations with time, meaningful interpretations can be drawn only from long term reliable data. The source of such data is the Indian meteorological Department (**IMD**), which maintains a network of meteorological stations at several important locations.

3.8.3 Meteorological Data

The data recorded near mine site for the study period February-2012 to April-2012 are summarized in **Table 3.8.1, 3.8.2 and 3.8.3**

TABLE-3.8.1

Meteorological data recorded at mine site in February-2012

Date	Wind Direction(Deg)	Temp(Deg C)	R Humidity (%)	Speed(Km/hr)
February-01	219	15.9	65	4.5
February-02	222	15.6	74	5.7
February-03	215	15.5	69	4.0
February-04	179	15.8	78	4.5
February-05	230	16.1	75	4.2
February-06	245	16.0	61	3.3
February-07	251	16.7	69	4.9
February-08	246	16.9	64	3.8
February-09	235	17.8	73	3.6
February-10	243	17.8	70	3.9
February-11	244	15.6	69	5.4
February-12	241	17.0	77	4.8
February-13	244	16.9	72	4.3
February-14	240	15.2	79	4.7
February-15	245	16.4	78	5.2
February-16	246	17.0	58	3.9
February-17	246	15.2	66	4.3
February-18	239	14.9	61	4.2
February-19	233	14.8	70	4.1
February-20	235	15.1	67	3.9
February-21	228	15.4	52	4.7
February-22	234	15.3	60	4.8
February-23	141	16.0	55	4.1

February-24	113	16.2	64	4.5
February-25	88	17.1	61	4.6
February-26	125	17.1	60	4.7
February-27	132	14.9	68	4.6
February-28	146	16.3	63	4.1
February-29	201	16.2	72	4.2

TABLE-3.8.2

Meteorological data recorded at mine site in March-2012

Date	Wind Direction(Deg)	Temp(Deg C)	R Humidity (%)	Speed(Km/hr)
March-01	203	20.2	61	5.0
March-02	203	18.7	58	3.0
March-03	203	19.6	61	4.3
March-04	202	20.0	61	3.5
March-05	199	20.3	60	4.6
March-06	204	21.4	59	4.2
March-07	204	22.9	57	4.3
March-08	205	23.6	56	3.5
March-09	203	24.2	57	4.2
March-10	238	24.1	62	4.3
March-11	241.3	25.4	58	4.2
March-12	220.4	21.4	56	4.3
March-13	242.1	21.6	47	4.2
March-14	239.5	21.2	52	4.3
March-15	241.4	22.3	51	3.3
March-16	246.4	23.0	49	5.0
March-17	232.2	21.5	48	5.0
March-18	189.2	23.9	52	4.3
March-19	198.9	24.7	52	3.6
March-20	198.5	21.7	58	3.8
March-21	200.8	23.7	40	4.6
March-22	204.2	21.5	50	4.7
March-23	201.7	21.8	49	4.9
March-24	198.9	22.8	47	4.1

March-25	203.7	21.8	51	3.2
March-26	203.0	23.8	43	3.1
March-27	204.0	23.8	42	5.0
March-28	141.5	23.6	47	5.2
March-29	152.2	19.8	61	5.9
March-30	139.5	18.5	44	5.0
March-31	195.6	21.65	36	4.2

TABLE-3.8.3

Meteorological data recorded at mine site in April-2012

Date	Wind Direction(Deg)	Temp(Deg C)	R Humidity (%)	Speed(Km/hr)
April-01	173.0	22.4	40	4.4
April-02	202.9	23.8	41	4.1
April-03	200.9	23.8	43	3.6
April-04	202.9	23.8	42	4.2
April-05	202.9	24.5	45	5.2
April-06	200.2	25.0	39	4.8
April-07	204.9	25.41	41	4.7
April-08	200.5	24.0	48	5.3
April-09	202.9	26.6	49	4.3
April-10	198.1	22.9	57	3.6
April-11	205.3	22.2	57	4.5
Apri-12	198.2	21.1	56	3.7
April-13	201.9	23.5	38	4.4
April-14	204.5	22.2	30	4.0
April-15	175.3	23.9	38	5.1
April-16	135.7	27.1	36	4.3
April-17	161.2	28.6	38	4.4

April-18	186.7	30.0	38	4.2
April19	177.6	29.1	40	4.5
April-20	192.3	30.6	42	4.8
April-21	241.0	31.2	40	4.0
April-22	168.2	31.6	34	4.6
April-23	178.6	28.6	44	4.7
April-24	192.0	21.6	69	4.9
April-25	212.7	24.0	69	4.2
April-26	191.0	24.8	68	4.9
April-27	213.1	21.8	52	4.5
April-28	157.2	23.8	46	4.3
April-29	182.1	21.6	52	4.9
April-30	222.6	22.3	48	3.7

Percentage frequencies of wind in 16 directions have been computed from the recorded data during the study period [February, 2012 to April, 2012] for 24 hourly intervals to plot wind rose. Fig – 3.8.1 represents the wind pattern of the study period.

3.8.4 Wind pattern during the study period

The predominant wind direction during this period was from SE to NW. The wind rose diagram for the study period is given below.

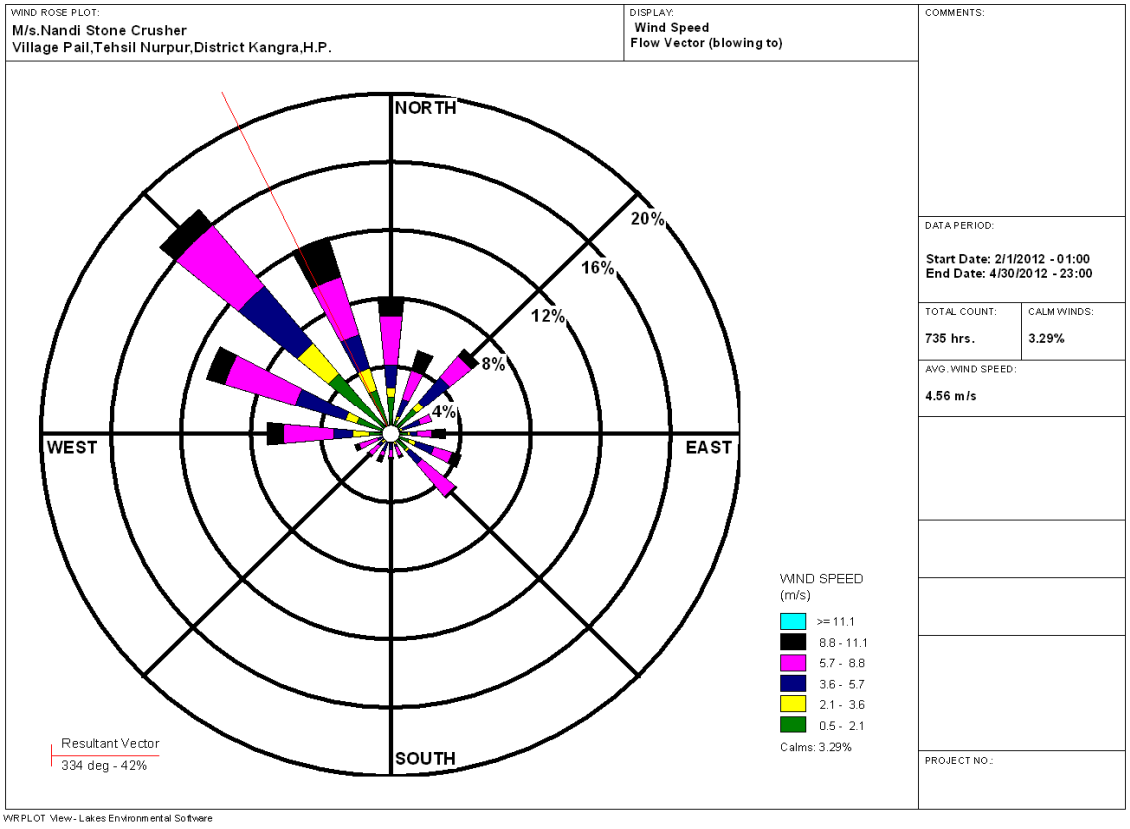


Figure - 3.8.1

Site specific Wind Rose Diagram

3.9 AMBIENT AIR ENVIRONMENT

3.9.1 AIR QUALITY

The ambient air quality with respect to the study zone of 10 km radius around the mine site forms the baseline information. The various sources of air pollution in the region are dust rising from unpaved roads, domestic fuel burning, vehicular traffic, agricultural activities, other industries, etc. The prime objective of baseline air quality monitoring is to assess existing air quality of the area. This will also be useful in assessing the conformity to standards of the ambient air quality as per standards during the mine operations.

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

- Meteorological conditions.
- Topography of the study area.
- Likely impact area.

3.9.2 AMBIENT AIR MONITORING

Ambient air monitoring was carried out on monthly basis in the surrounding areas of the mine site to assess the ambient air quality at the source. To know the ambient air quality at a larger distance i.e. in the study area of 10 km. radius, air quality survey has been conducted at 06 locations over a period of three months of February, March and April-2012. Major air pollutants viz, Particulate Matter (PM_{10}), Sulphur Dioxide (SO_2), Nitrogen Dioxide (NO_2), representing the basic air pollutants in the region were identified for Ambient Air Quality Monitoring (AAQM). The ambient air quality monitoring stations were set up at the following locations.

The prime objective of the baseline air monitoring was to evaluate the existing air quality of the area. This will also be useful for assessing the conformity to standards of the ambient air quality during the operation of the proposed mine.

This section describes the selection of sampling locations, methodology adopted for sampling, analytical techniques and frequency of sampling. The results of monitoring carried out for study period (February, March and April-2012) is presented in Table-3.9.4 to Table-3.9.5

3.9.3 Methodology adopted for Air Quality Survey

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

- Meteorological conditions on synoptic scale;
- Topography of the study area;
- Representatives of regional background air quality for obtaining baseline status; and
- Representatives of likely impact areas.

Ambient Air Quality Monitoring (AAQM) stations were set up at **six** locations with due consideration to the above mentioned points. **Table-3.9.1** gives the details of environmental setting around each monitoring station and their distances with reference to the proposed mine. The AAQM locations are depicted in **Figure–3.9.1.**

TABLE - 3.9.1

DETAILS OF AMBIENT AIR QUALITY MONITORING LOCATIONS

Station Codes	Location	Distance from Mine [Km]	Direction
A-1	At Mine Site	--	--
A-2	Baduni	3.7	NEE
A-3	Chakkar	4.1	NNW
A-4	Harial	1.8	NW
A-5	Ghandwal	2.1	S
A-6	Karoli	6.8	NW

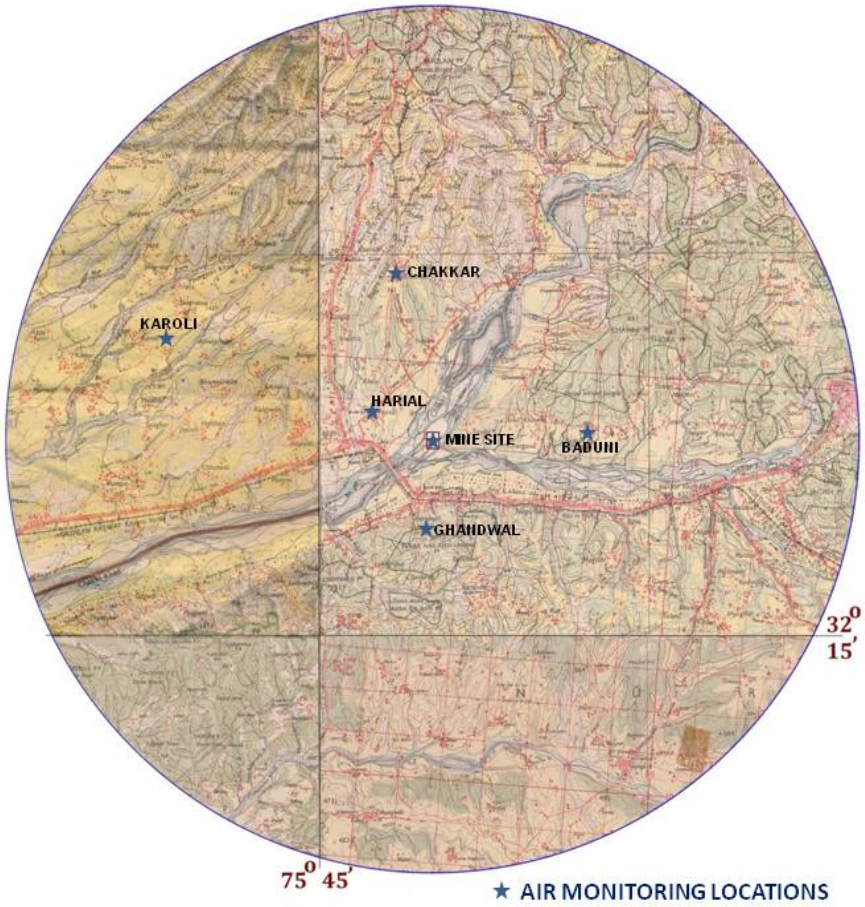


FIGURE-3.9.1

AMBIENT AIR QUALITY SAMPLING LOCATIONS

3.9.4 Frequency and Parameters for Sampling

Ambient air quality monitoring has been carried out with a frequency of two days per week at four locations covering one complete season except monsoon (CPCB guidelines). The ambient air quality parameters along with their frequency of sampling are given in **Table-3.9.2**.

TABLE-3.9.2

MONITORED PARAMETERS AND FREQUENCY OF SAMPLING

Parameters	Sampling Frequency
Respirable Particulate Matter	24 hourly sample twice a week for a season except monsoon
Sulphur dioxide (SO_2)	24 hourly sample twice a week for a season except monsoon
Oxides of Nitrogen (NO_X)	24 hourly sample twice a week for a season except monsoon

3.9.5 Instruments used for Sampling

Respirable dust samplers (RDS) were used for monitoring of Respirable Particulate Matter (RPM)/PM10 and gaseous pollutants like SO_2 and NOx. .

3.9.6 Sampling and Analytical Techniques

Sampling and analysis was done as per guidelines issued by CPCB/MoEF. The techniques used for ambient air quality monitoring and technical protocols are given in **Table-3.9.3**.

TABLE-3.9.3

TECHNIQUES USED FOR AMBIENT AIR QUALITY MONITORING

Sr. No.	Parameter	Technique	Technical Protocol
1.	Respirable Particulate Matter / PM 10	Respirable Dust Sampler (Gravimetric method)	IS-5182 (Part-IV)
2.	Sulphur Dioxide	Modified West and Gaeke	IS-5182 (Part-II)

3.	Nitrogen Oxide	Jacob & Hochheiser	IS-5182 (Part-VI)

3.9.7 Presentation of Results

The analysis results for the study period are presented in detail in **Table-3.9.4 and Table-3.9.5.**Various statistical parameters like 98th percentile, average, maximum and minimum values have been computed from the observed raw data for all the AAQ monitoring stations. The summary of these results for all the locations is presented in **Table-3.9.6.** These are compared with the standards prescribed by Central Pollution Control Board (CPCB).

TABLE-3.9.4

AMBIENT AIR QUALITY MONITORING RESULTS –A1,A2,A3

Location	**Mine Area (A1)**			**Baduni (A2)**			**Chakkar (A3)**		
Pollutant	**PM_{10}**	**SO_2**	**NO_X**	**PM_{10}**	**SO_2**	**NO_X**	**PM_{10}**	**SO_2**	**NO_X**
Standard	**100**	**80**	**80**	**100**	**80**	**80**	**100**	**80**	**80**
01/02/12	35.6	4.6	12.6	36.9	4.6	10.6	36.2	4.3	9.9
03/02/12	30.4	4.1	13.2	31.6	5.2	12.4	39.9	4.1	12.1
08/02/12	32.5	5.2	11.2	30.8	4.8	13.1	40.1	4.6	10.5
10/02/12	37.5	4.3	10.9	33.9	4.2	10.1	35.2	5.0	13.1
15/02/12	31.9	4.9	12.3	36.1	5.1	9.8	34.8	4.2	10.1
17/02/12	36.9	4.1	13.5	39.6	4.2	7.9	32.9	4.9	9.5
22/02/12	42.8	4.2	14.2	34.8	4.2	9.8	33.8	5.1	8.6
24/02/12	33.3	4.8	10.3	30.1	5.2	8.3	39.2	5.5	8.4
29/02/12	37.8	5.1	10.9	39.8	4.9	10.3	34.5	5.0	10.3
02/03/12	46.2	4.6	12.3	43.9	5.6	12.0	30.9	4.3	12.5
07/03/12	35.4	5.2	11.8	40.3	5.1	9.3	38.5	4.6	10.4
09/03/12	39.9	4.8	13.2	36.4	4.6	8.3	41.2	4.9	9.8
14/03/12	42.6	4.4	10.2	35.9	4.1	12.3	36.2	5.2	8.3
16/03/12	46.8	4.9	11.2	40.3	4.0	10.1	32.4	4.5	10.1
21/03/12	40.8	5.2	09.3	32.1	4.6	11.8	36.9	4.9	10.3
23/03/12	31.6	4.1	10.1	36.4	4.2	9.4	39.2	5.3	9.6
28/03/12	37.2	4.3	08.9	30.8	4.3	12.3	37.6	4.4	8.6
30/03/12	37.8	5.1	10.9	33.5	4.5	10.1	42.1	4.9	11.1

04/04/12	33.9	4.8	9.3	32.4	4.0	8.6	35.4	4.0	10.3
06/04/12	29.4	4.1	8.3	38.6	4.2	9.9	39.2	4.8	12.4
11/04/12	31.6	5.2	10.6	36.1	4.9	10.8	36.4	5.1	9.8
13/04/12	28.9	4.6	13.2	30.3	4.3	12.1	40.2	4.5	8.6
18/04/12	33.5	4.2	10.8	34.2	5.1	10.4	38.9	4.9	10.6
20/04/12	39.4	5.1	09.4	28.4	4.4	11.3	35.3	5.3	9.1
25/04/1	32.6	5.5	11.1	29.8	4.0	12.1	39.7	4.2	12.1
27/06/12	33.1	4.6	10.7	35.6	4.9	10.9	42.1	4.1	10.3
Mean	**36.1**	**4.7**	**11.2**	**34.9**	**4.6**	**10.5**	**37.3**	**4.7**	**10.2**
Maximum	**46.8**	**5.5**	**14.2**	**43.9**	**5.6**	**13.1**	**42.1**	**5.5**	**13.1**
Minimum	**28.9**	**4.1**	**8.3**	**28.4**	**4.0**	**7.9**	**30.9**	**4.0**	**8.3**
98th percentile	**46.2**	**5.2**	**13.5**	**40.3**	**5.2**	**12.4**	**41.2**	**5.3**	**12.5**

TABLE-3.9.5

AMBIENT AIR QUALITY MONITORING RESULTS – A4,A5,A6

Location	**Harial (A4)**			**Ghandwal(A5)**			**karoli (A6)**		
Pollutant	**PM_{10}**	**SO_2**	**NO_X**	**PM_{10}**	**SO_2**	**NO_X**	**PM_{10}**	**SO_2**	**NO_X**
Standard	**100.0**	**80.0**	**80.0**	**100.0**	**80.0**	**80.0**	**100.0**	**80.0**	**80.0**
02/02/12	52.3	5.6	15.6	46.8	5.3	12.3	41.5	5.2	10.3
04/02/12	58.1	6.7	14.1	40.3	4.6	10.2	47.9	4.4	11.9
09/02/12	49.6	6.2	16.6	42.5	4.1	10.8	45.2	4.9	09.5
11/02/12	55.3	5.5	11.9	48.1	4.9	11.3	50.5	4.1	12.6
16/02/12	50.2	5.1	12.1	50.6	5.2	12.3	51.2	5.9	11.9
18/02/12	46.4	6.8	13.5	44.2	5.6	13.5	53.9	5.2	15.2
23/02/12	49.9	6.2	14.2	49.9	4.6	12.1	52.8	5.5	12.1
25/02/12	52.1	5.3	16.9	53.6	4.0	10.6	55.1	4.6	10.4
01/03/12	56.3	5.9	13.2	55.6	4.8	10.6	44.8	5.5	12.1
03/03/12	51.4	6.3	15.3	47.3	5.3	8.9	49.2	5.1	10.6
08/03/12	50.8	6.0	14.1	49.5	4.5	9.2	41.5	4.7	12.9
10/03/12	46.2	4.3	15.5	53.6	4.1	10.6	45.2	4.1	10.1
15/03/12	48.9	5.2	13.3	49.8	5.2	8.6	44.6	5.2	11.2
17/03/12	52.7	5.0	16.2	56.2	5.6	9.8	48.9	4.1	12.5
22/03/12	55.3	4.5	14.1	51.3	5.0	10.6	50.3	4.9	13.2
24/03/12	49.2	6.9	15.9	45.3	4.4	12.5	55.2	4.8	11.5
29/03/12	45.9	5.3	16.3	50.6	4.8	10.9	51.5	4.3	12.6
31/03/12	48.2	5.7	14.1	54.5	5.1	11.7	48.6	5.2	13.2

05/04/12	51.2	5.9	12.9	48.6	5.0	12.6	44.9	5.5	11.6
07/04/12	46.5	6.2	15.5	52.3	4.8	10.8	51.2	4.6	12.3
12/04/12	44.8	5.1	14.1	49.6	4.1	13.5	52.5	5.1	13.2
14/04/12	49.6	5.0	12.3	44.2	4.6	14.2	45.2	4.8	12.5
19/04/12	47.8	4.5	11.5	50.3	4.9	11.0	50.8	4.2	12.1
21/04/12	53.2	5.1	12.3	47.5	5.3	10.3	47.1	4.9	11.5
26/04/1	46.7	5.2	11.9	49.6	5.6	12.6	51.2	5.5	10.2
28/04/12	49.9	5.8	13.5	45.1	5.1	11.1	46.5	4.9	11.9
Mean	**50.3**	**5.6**	**14.1**	**49.1**	**4.9**	**11.3**	**49.0**	**4.9**	**12.0**
Maximum	**58.1**	**6.9**	**16.9**	**56.2**	**5.6**	**14.2**	**55.2**	**5.9**	**15.2**
Minimum	**44.8**	**4.3**	**11.5**	**40.3**	**4.0**	**8.6**	**41.5**	**4.1**	**9.5**
98th percentile	**56.5**	**6.8**	**16.6**	**55.6**	**5.3**	**13.5**	**55.1**	**5.5**	**13.2**

Observations of the results

Core Zone – Mine Area (A1)

Respirable particulate matter (PM_{10}) monitored in the Mine area showed 98th percentile value of 46.2 µg/m^3

98th percentile values of Sulphur dioxide and Oxides of Nitrogen in the mine area from the monitored data were 5.2 µg/m^3 and 13.5 µg/m^3 respectively.

Buffer Zone (Stations A2 to A6)

Particulate Matter – PM_{10}

PM_{10} values monitored at 5 locations showed 98th percentile values in the range of 40.3 – 55.6 µg/m^3. Highest value of 55.6 µg/m^3 was recorded at Ghandwal. However this value is well within the limits of NAAQ.

Sulphurdioxide - SO_2

98th percentile value of Sulphur dioxide in the study area from the monitored data was in the range of 5.2 – 6.8 µg/m^3. Maximum value of 6.8 µg/m^3 was obtained near the sampling station located at Harial village. The values of SO_2 monitored in the study area are well within the limits of NAAQ standards.

Oxides of Nitrogen - NOx

Ambient air quality status monitored for nitrogen oxides in the study area were in the range with 98th percentile values between 12.4 -16.9 µg/m^3. A maximum value of 16.9 µg/m^3 was prevailing at the time of sampling at Harial village.

Results of the ambient air quality at all the above locations were found to be well within the limits of National Ambient Air Quality (NAAQ) standards. Concentrations of, PM10, SO_2 and NOx are mainly contributed due to vehicular traffic and local activities.

Table 3.9.6

Summary of Ambient Air Quality Monitoring

Code	Locations	PM_{10}		SO_2		NO_X	
		Max	Min	Max	Min	Max	Min
A-1	Mine Site	46.8	28.9	5.5	4.1	14.2	8.3
A-2	Baduni	43.9	28.4	5.6	4.0	13.1	7.9
A-3	Chakkar	42.1	30.9	5.5	4.0	13.1	8.3
A-4	Harial	43.2	33.5	5.6	4.2	16.9	11.5
A-5	Ghandwal	56.2	40.3	5.6	4.0	14.2	8.6
A-6	Karoli	55.2	41.5	5.9	4.1	15.2	9.5

Note: **All values are represented in $\mu g/m^3$**

Table: 3.9.7

National Ambient Air Quality Standards

S. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air		Method of Measurement
			Industrial Area, Residential Rural & Other Areas	Ecologically Sensitive Area (Notified by Central Govt.)	
(1)	(2)	(3)	(4)	(5)	(6)
1	Sulphur Dioxide (SO_2), $\mu g/m^3$	Annual Average * 24 hours **	50 80	20 80	1. Improved West and Gacke Method. 2. Ultraviolet fluorescence
2	Oxides of Nitrogen as NO_2, $\mu g/m^3$	Annual Average * 24 hours **	40 80	30 80	1. Modified Jacob & Hochheiser (Na-Arsenite) Method 2. Chemiluminescence (Gas phase)
3	Particulate Matter (size less than 10μm) or PM_{10}, $\mu g/m^3$	Annual Average * 24 Hours **	60 100	60 100	1. Gravimetric, 2. TOEM, 3. Beta attenuation.

4	Particulate Matter (size less than 2.5μm) or $PM_{2.5,}$ μg/m^3	Annual Average* 24 Hours **	40 60	40 60	1. Gravimetric, 2. TOEM, 3. Beta attenuation.
5	Ozone (O_3), μg/m^3	8 Hours ** 1 Hours *	100 180	100 180	1. UV Photometric, 2. Chemilminescence, 3. Chemical Method.
6	Lead (Pb), μg/m^3	Annual Average * 24 Hours **	0.50 1.0	0.50 1.0	1. AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper. 2. ED-XRF using Teflon filter
7	Carbon Monoxide (CO), mg/m^3	8 Hours** 1 Hours	02 04	02 04	Non Depressive Infrared (NDIR) Spectroscopy
8	Ammonia (NH_3), μg/m^3	Annual Average* 24 hours **	100 400	100 400	1. Chemiluminescence (Gas phase) 2. Indophenol blue method
9	Benzene (C_6H_6), μg/m^3	Annual Average*	05	05	1. Gas Chromatography based continuous analyzer, 2. Adsorption and Desorption followed by GC analysis.
10	Benzo(α) Pyrene (BaP) – Particulate Phase only, ng/m^3	Annual Average*	01	01	Solvent extraction followed by HPLC'GC analysis
11	Arsenic (As), ng/m^3	Annual Average*	05	06	AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper.
12	Nickel (Ni), ng/m^3	Annual Average*	20	20	AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper.

* 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.

Note: Whenever and wherever monitoring results on two consecutive days of monitoring exceed the limits specified above for the respective category, it shall be considered adequate reason to institute regular or continuous monitoring and investigation.

3.10 NOISE ENVIRONMENT

The physical description of sound concerns its loudness as a function of frequency. Noise in general is sound, which is composed of many frequency components of various types of loudness distributed over the audible frequency range. The most common and universally accepted scale is the A weighted scale, which is measured as dB (A). This is more suitable for audible range of 20 to 20,000 Hz. The scale has been designed to weigh various components of noise according to the response of human ear. The environmental impact of noise can have several effects varying from Noise Induced Hearing Loss (NIHL) to annoyance depending on loudness of noise.

The main objective of noise monitoring in the study area is to establish the baseline noise levels and assess the impact of the total noise expected to be generated during the project operations around the project site.

3.10.1 Identification of Sampling Locations

A preliminary reconnaissance survey has been undertaken to identify the major noise generating sources in the area. Noise at different noise generating sources has been identified based on the residential, industrial and commercial activities in the area.

The noise monitoring has been conducted for determination of noise levels at three locations covering both core and buffer zones in the study area. The noise levels at each location were recorded for 24-hrs. The environment setting of each noise monitoring location is given in **Table-3.10.1** and shown in **Figure-3.10.1**.

TABLE-3.10.1

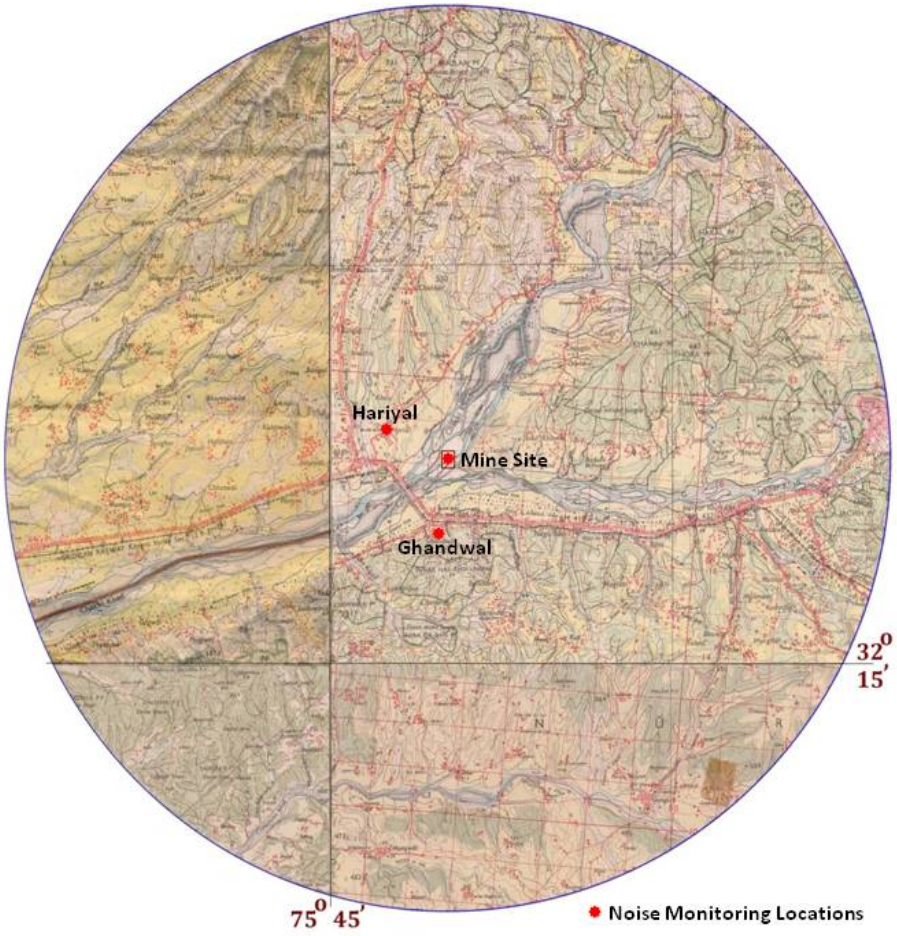
DETAILS OF NOISE MONITORING LOCATIONS

Station Codes	Location	Distance from Mine [Km]	Direction
N-1	Mine Site	--	--

N-2	Harial	1.8	NW
N-3	Ghandwal	2.1	S

3.10.2 Method of Monitoring

Sound Pressure Levels (SPL) measurements were recorded at four locations. The readings were taken for every hour for 24-hrs. The day noise levels have been monitored during 6 am to 10 pm



and night noise levels during 10 pm to 6 am at all the locations.

FIGURE-3.10.1

NOISE MONITORING LOCATIONS

Measured noise level displayed as a function of time provides a useful scheme for describing the acoustical climate of a community. Noise levels recorded at each station are computed for equivalent noise levels. Equivalent noise level is a single number descriptor for describing time

varying noise levels. The equivalent noise level is defined as mathematically

$$10\text{Log}1/T \Sigma (10^{Ln/10})$$

Where L = sound pressure level a function of time dB (A)

T = Time interval of observations

Noise levels during the night time generally drop, therefore to compute Equivalent noise levels for the night time, noise levels are increased by 10 dB (A) as the night time high noise levels are judged more annoying compared to the day time.

TABLE-3.10.2

RESULTS OF AMBIENT NOISE QUALITY MONITORING

Time	N-1 Mine Site	N-2 Harial	N-3 Ghandwal
06am - 07am	42.8	45.6	43.9
07am - 08am	44.5	47.8	45.8
08am - 09am	48.9	50.1	48.6
09am - 10am	50.2	52.9	51.8
10am - 11am	52.6	54.3	53.5
11am - 12pm	50.3	53.2	52.9
12pm - 01pm	49.6	53.9	51.2
01pm - 02pm	48.9	51.1	49.8
02pm - 03pm	51.3	50.2	50.4
03pm - 04pm	51.9	49.9	50.9
04pm - 05pm	52.3	51.2	51.1
05pm - 06pm	52.8	52.6	52.6
06pm - 07pm	50.3	53.2	53.1
07pm - 08pm	48.6	50.1	50.6
08pm - 09pm	46.1	48.5	48.9
09pm - 10pm	45.2	46.9	48.1
10pm - 11pm	43.2	45.3	44.7
11pm - 12am	42.3	44.2	42.1
12am - 01am	40.1	43.1	40.3
01am - 02am	39.2	41.5	38.9
02am - 03am	38.4	40.2	38.2
03am - 04am	38.6	41.6	39.5
04am - 05am	39.3	42.1	39.9
05am - 06am	40.9	42.9	40.8
Max	**52.8**	**54.3**	**53.5**
Min	**38.4**	**40.2**	**38.2**
Leq Day dB(A)	**50.0**	**51.4**	**50.8**
Leq Night dB(A)	**40.6**	**42.9**	**41.0**

3.10.3 Presentation of Results

The statistical analysis is done for measured noise levels at three locations in the study area. The parameters are analyzed for L_{day} and $L_{night.}$The statistical analysis results are given in **Table-3.10.3.**

TABLE-3.10.3

STATISTICAL ANALYSIS RESULTS OF AMBIENT NOISE MONITORING

Location	Noise Level dB (A)	
	Day Equivalent (L_{day})	Night Equivalent(L_{night})
Mine Site	50.0	40.6
Harial	51.4	42.9
Ghandwal	50.8	41.0

3.10.4 Observations of Results

a) Day time Noise Levels (L_{day})

The daytime (L_{day}) noise levels at all the locations are observed to be in the range of 50.0 dB (A) to 51.4 dB (A). The maximum noise level of 54.3 dB (A) was observed at Harial and the minimum noise level of 38.2 dB (A) was observed at Ghandwal during the study period. It is observed that the day time noise levels are in accordance to the prescribed limits.

b) Night time Noise Levels (L_{night})

The nighttime (L_{night}) noise levels at all the locations was observed to be in the range of 40.6 dB (A) to 42.9 dB (A). The maximum noise level of 54.3 dB (A) was observed at Harial during the study period. It is observed that the day time noise levels are in accordance to the prescribed limits.

The Ambient noise standards prescribed by Central Pollution Control Board (CPCB) for different category of areas is given in the below table.

Table-3.10.4

Ambient Noise Quality Standards

Area Code	Category of Area	Limits In Leq. dB (A)	
		Day Time 06.00 am–10.00 pm	Night Time 10.00 pm–6.00 am

(A)	Industrial Area	75	70
(B)	Commercial Area	65	55
(C)	Residential Area	55	45
(D)	Silence Zone	50	40

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

Source: Central Pollution Control Board Norms

3.11 SOIL ENVIRONMENT

3.11.1 Soil Quality and Characteristics

The information regarding soil environment has been collected from various secondary sources and also through soil quality analysis of soil samples collected from the study area.

For studying soil quality of the region, three samples were collected to assess the existing soil conditions in and around the project area. The soil sampling locations are presented in the below **Table-3.11.1.**

TABLE 3.11.1

SOIL SAMPLING LOCATIONS

Station Code	Station Name	Description	Location with respect to site	
			Distance (Km)	Direction
S-1	Mine Site	Near Core Zone	--	--
S-2	Ghandwal	Near Agricultural Land	2.1	S
S-3	Harial	Near Agricultural Land	1.8	NW

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 soils more importantly from agricultural productivity point of view.

The soil sample was collected from three different depths viz. 30 cm, 60 cm and 90 cm. The samples was then packed in a polythene plastic bag and sealed. The sample from three different

depths was homogenized and then was analyzed. The soil sampling locations are depicted in the below figure.

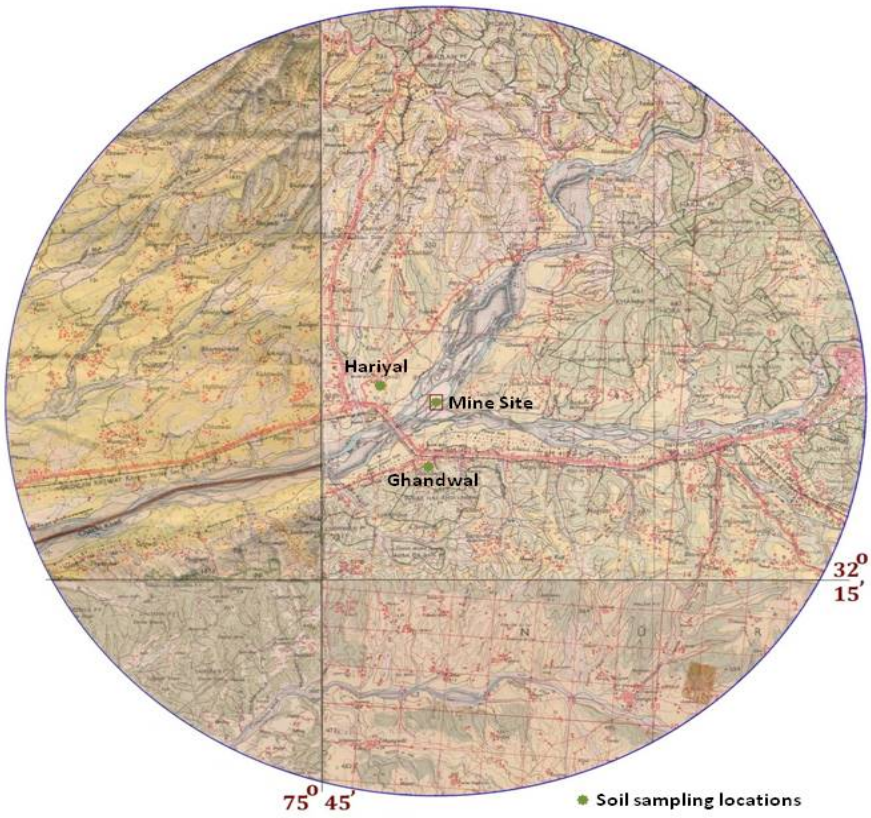


FIGURE-3.11.1

SOIL SAMPLING LOCATIONS

3.11.2 Baseline Soil Status

Soil quality of the study area is one of the important components of the environment. Soil samples from villages located in the study area are collected as per methodology specified in BIS to make them representative and analyzed for physico- chemical analysis. Samples are collected by hand auger boring and soil pits.

The soil analysis results are presented in **Table-3.11.2**. The result obtained is compared with the standard soil classification given in **Table-3.11.3.**

TABLE- 3.11.2

SOIL ANALYSIS RESULTS

S. No.	Parameters	Mine Site-S1	Ghandwal-S2	Harial-S3
1.	Color	Light brown	Brown	Black
2.	pH Value	8.2	8.5	8.0
3.	Water Holding Capacity %	37.2	35.7	30.5
4.	Electrical Conductivity (Micro-Siemens)	195	201	191
5.	Organic matter %	1.5	1.7	2.1
7.	Texture	Course Loamy Sand	Loamy Sand	Loamy Sand
9.	Nitrogen(N),gm/kg	1117.78	1097.49	1020.24
10.	Phosphorous(P),gm/kg	0.037	0.025	0.024
11.	Potassium(K),gm/kg	339.75	307.28	391.87

TABLE-3.11.3

STANDARD SOIL CLASSIFICATION

Sr. No.	Soil Test	Classification
1	P^H	<4.5 Extremely acidic 4.51- 5.00 Very strongly acidic 5.51-6.0 moderately acidic 6.01-6.50 slightly acidic 6.51-7.30 Neutral 7.31-7.80 slightly alkaline 7.81-8.50 moderately alkaline 8.51-9.0 strongly alkaline 9.01 very strongly alkaline
2	Salinity Electrical Conductivity (mmhos/cm) (1mmho/cm = 640 ppm)	Upto 1.00 Average 1.01-2.00 harmful to germination 2.01-3.00 harmful to crops

3	Organic Carbon (%)	Upto 0.2: very less 0.21-0.4: less 0.41-0.5 medium, 0.51-0.8: on an average sufficient 0.81-1.00: sufficient >1.0 more than sufficient
4	Nitrogen (Kg/ha)	Upto 50 very less 51-100 less 101-150 good 151-300 Better >300 sufficient
5	Phosphorus (Kg/ha)	Upto 15 very less 16-30 less 31-50 medium, 51-65 on an average sufficient 66-80 sufficient >80 more than sufficient
6	Potassium (Kg/ha)	0 -120 very less 120-180 less 181-240 medium 241-300 average 301-360 better >360 more than sufficient

Source: ICAR (Indian Council for Agricultural Research)

Samples collected from identified locations indicate P^H value ranging from 8.0 to 8.5, which shows that the soil is alkaline in nature. Organic Matter ranges from 1.5 % to 2.1 % in the soil samples.

3.12 Ecological Studies

3.12.1 Flora

Study of biological environment is one of the important aspects in Environmental Impact Assessment in view of the need for conservation of Environmental quality. We were carried out a detailed enumeration of species. Occurrences of flora at various locations were observed and typical plant species were collected. The visual observations of plants were recorded with a view to obtaining some idea about the relative density of certain species and their predominance.

Primary survey for flora and fauna studies have been conducted in and around proposed mine.

3.12.1.1 Objectives of Ecological Studies

The present study was undertaken with the following objectives:

- To assess the nature and distribution of vegetation in and around the project site;
- To assess the distribution of animal life spectra;
- To understand the productivity of the water bodies;
- To assess the biodiversity and to understand the resource potential; and
- To ascertain migratory routes of fauna and possibility of breeding grounds.

3.12.1.2 Methodology Adopted for the Survey

To achieve the above objectives a detailed study of the area was undertaken in 10 km radius around proposed mine area. The different methods adopted were as follows:

- Generation of primary data by undertaking systematic ecological studies in the area;
- Discussion with local people so as to elicit information about local plants, animals and their uses; and
- Gathering data for ethno biology.

The present report gives the review of published secondary data and the results of field sampling conducted.

3.12.1.3 Terrestrial Ecological Status: Primary Survey

A preliminary survey was made and selected four locations for detailed study within 10-km radius. The selected locations are given in **Table- 3.12.1** and depicted in **Figure-3.12.1.**

TABLE-3.12.1

DETAILS OF ECOLOGICAL SAMPLING LOCATIONS

Location Code	Name of village	Distance (in km)	Direction
EB-1	Karoli	4.8	NW
EB-2	Gagwal	2.4	SW
EB-3	Lodhwan	3.0	SE
EB-4	Malot	7.5	SSW

The primary data was generated through:-

1. Preparing a general checklist of all plants encountered in the study area. This would indicate the diversity for wild and cultivated plants.
2. Determining the bird population of migratory and local birds by taking 10 random readings at every location; and
3. Observing mammals, amphibians and reptiles, noting their calls, droppings, burrows, pugmarks and other signs.

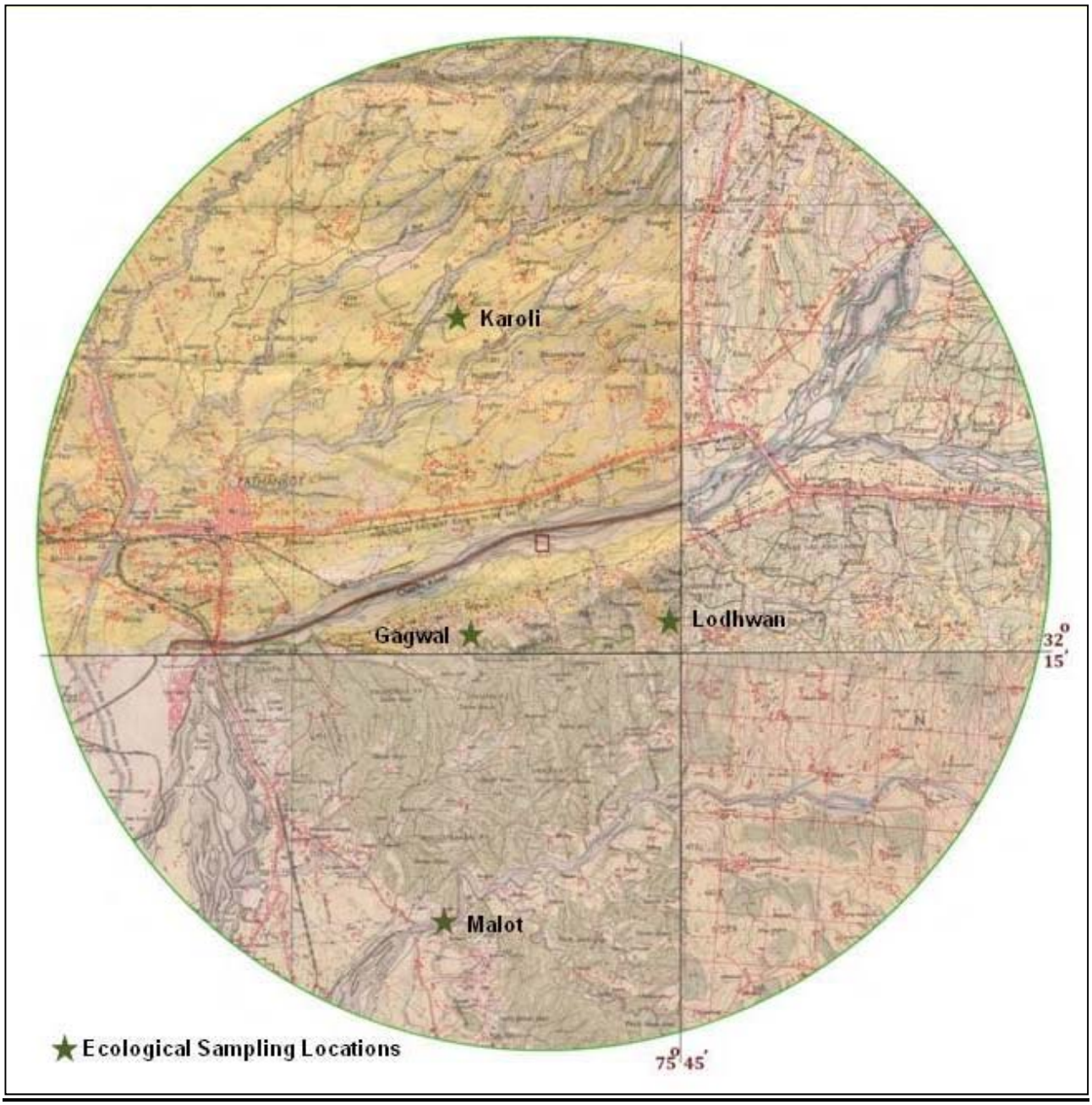


Figure-3.12.1: Ecological Sampling Locations

3.12.1.4 Flora observed in study area

The Chil is considered the prevailing conifer up to about 1950 meters when it gives place to the Deodar and the blue pines.In Kangra district the forest range between scrub, sal and bamboo forest of the low hills to the fur and alpine forests of the higher elevation. Lowest point of the southern boundary of the district is less than 300 meters above sea level and highest range of is at an elevation of 5500 meters in the north. The forests grown between these two extremes vary as the elevation itself.

The most prominent varieties of trees found in the area are

- Simbal (*Bombex malabaricum*),
- Mango (*Magnifera indica*)
- Tun (*Cedrela toana*)
- Several species of *acacia* and *albizia*
- Salambra (*Odina wodier*)
- Termnalia
- Jamun (*Engenia jambolana)*
- Larger tour
- Bamboo

Shrubs

The most common shrub at the higher elevation is Barberis, indigopera and Desmodium and following other shrubs are also found

- Vitex
- Munj
- Ber
- Ipomea
- Dodonea &
- Bamboo.

TABLE 3.12.2

FLORA IN THE STUDY AREA (CORE & BUFFER ZONE)

S. No.	Botanical Name	Common Name
1.	*Dalbergia sissoo*	Shisham
2.	*Azardiracta indica*	Neem
3.	*Albizzia lebbek*	Siris
4.	*Bauhinia variegata*	Kachnar
5.	*Bombax ceiba*	Semal
6.	*Eucalyptus tereticornis*	Eucalyptus
7.	*Ficus glomerata*	Gular
8.	*Ficus religiosa*	Pipal
9.	*Syzygium cumini*	Jamun
10	*Cedrela tuna*	Tun
11.	*Cassia fistula*	Amaltas
12.	*Ficus bengalensis*	Bar
13.	*Cordia dichotoma*	Lassora
14.	*Acacia catechu*	Khair
15.	*Acacia arabica*	Kiker
16.	*Mallotus phillippinesis*	Kambel
17.	*Grewia oppositifolia*	Dhaman
18.	*Zizuphus mauratiana*	Ber
19.	*Pinus roxburghi*	Chil
20.	*Anogeissus latifolia*	Dhao
21.	*Diospyros cordifolia*	Kendu
22.	*Morus alba*	Tut
23.	*Acacia modesta*	Phulai

The crops grown in the study area

1.	*Triticum aestivum*	Wheat
2.	*Oryza sativa*	(Paddy)
3.	*Brassica Comoistris*	Mustard

4.	*Zea mays*	Corn

The vegetables grown in the study area

1.	*Brassica oleraces*	Cabbage
2.	*Solaunum melongena*	Brinjal
3.	*Capsicum annuum*	Chilli
4.	*Chaseolus vulgoris*	Bean
5.	*Lucopersicum esculentum*	Tomato
6.	*Spinacea oleracea*	Palak
7.	*Solanum tuberosum*	Potato
8.	*Cucumis sativus*	Cucumber etc.

Fruit trees grown in the study area:

1.	*Mangferra Indica*	Mango
2.	*Litchi chinensis*	Litchi
3.	*Citrus limon*	Lemon
4.	*Citrus spp.*	Orange
5.	*Eriobotrya japonica*	Loquat

3.12.2 Fauna in the Study Area

Due to rich forest cover many fauna is expected to be found in this area .The wild lives present In the study area mainly includes monkeys, Sambhar, rabbit, deer, fox, leopard etc. Domestic animals include cow, buffalo, mules, hen, dogs, goat, oxen, cat are common.

Deer of many species including hiran (*Antilope cervicrapa*), spotted deer (Axis masculates), Barking Deer (*Muntiacus muntjak*), kakkar, sambhar (*Cervis unicolor*) are common. *Panthera pardus* (leopard): Its population has reduced considerably. Porcupine (*Hystrix indica*), Indian wild boar (*Sus scorfa*), jackal (*Canis spp.),* wild cat (*Felis chaos*),leopard cat, Monkey *(Macaca mulata)*,Langur (*Presbytis entellus).*

3.12.2.1 Wild birds: The resident birds include peafowl black grey partridges and gooses, jungle fowls, black partridges, chakor *(Alectoris gracea)*, Jungle thrush, common grey quail, blue rock pegion(*Colombia livia*), dove *(streptopelis spp.)*,wood pecker and the migrants include variety of water birds which can be often seen in Chakki khad in winters. Black eagle, Golden eagle, shahin, falcons, Forest eagle, owl, parrot, jungle crow etc.

3.12.2.2 Reptiles:

Snakes: Common Indian crait, Himalayan pit viper and other miscellaneous spp.

3.12.2.3 Aquatic fauna:

Tortoise, Small fishes are found in Chakki Khad

Aquatic Micro invertebrate

Mollusca-Corbicula sp.,Lymnaeidae,Planorbidae

Annelida- Oligochaeta, glossiphonidae

Insecta- Coleoptera, Trichoptera.

TABLE 3.12.3

FAUNA IN THE STUDY AREA

S. No.	Zoological name	Common Name	Wildlife(Protection Act, 1972)
1.	*Felis chaos*	Jungle Cat	Schedule-II
2.	*Cervus unicolor*	Sambhar	Schedule-III
3.	*Passer domesticus*	House Sparrow	Schedule-IV
4.	*Corvus spledens*	House Crow	Schedule-V
5.	*Acridotherus tristicus*	Common Myna	Schedule-IV
6.	*Herpestes spp.*	Newla	Schedule-II
7.	*Vulpes bengalensis*	Fox	Schedule-II
8.	*Macaca rhesus*	Monkey	Schedule-II
9.	*Muntiacus muntjak*	Barking deer	Schedule-III
10.	*Lepus nigricolis*	Rabbit	Schedule-IV
11.	*Pavo cristatus*	Peacock	Schedule-I
12.	*Strigidae spp.*	Owl	Schedule-IV
13.	*Endybnamyes leucogaster*	Cheel	Schedule-I
14.	*Psittacula krameri*	Parrot	Schedule-IV
15.	*Viper russelli*	Viper	Schedule-II
16.	*Python spp*	Ajgar	Schedule-I
17.	*Panther pardus*	Panther	Schedule-I

In addition to this Snakes, Lizards, Monkey, wild pig, porcupine are seen in the area. In core zone rabbit and snakes are found commonly.

3.12.2.4 Animals

Due to wide variations in the attitude a large variety of fauna is available in the forests of the district. The black bears are common in the higher valley. The leopards are found throughout the district. Barking dears and gural are found at medium elevation the musk deer or Kastura and serao are found in certain areas. Most commonly found is the porcupine, which is found in almost in the entire District.

Common Mammals & Birds in the Kangra District is given in the Table-3.12.4

Table 3.12.4

Common mammals and birds in the Kangra District

Birds of District Kangra		
Zoological Name	**English Name**	**Common Name**
Milvus migrants	Vulture	Cheel, Gidh, Eell
Eudynamys scolopacca	Koel	Koel
Columbia livia	Pigeon	Kabuttar
Coracias bengalensis	Blue jay	Nilkantha
Colums livia	Hawk	Baj
Francolius francolinus	Black partridge	Kala Tittar
Francolius pondicerians	Grey partridge	Safed Tittar
Payo crisslatus	Peacock	Mor
Coturnix colurnix	Common quail	Bater
Alectoris graeca	Chakor	Chakor
Crovus splendens	Crow	Kanwa
Prottacula Karneri	Parrot	Totta
Lophophorus impejanus	Monal	Monal / Karadi
Tertaogallus himalayanensis	Snow cock	
Tragopan melanocephalus	Western horned Tragopan	Phulgar/Jujurana
Picoides macei	Fulvourbreasted Pied Woodpecker	Kathfowra
Streptopelia decaocto	Ring dove	Gughi
Streptopelia chinesis	Spotted dove	Gughi
Accipiter badius	Shikra	
Aquila rapax vindhian	Tawny eagle	
Ducula bicolor	Green Pigeon	
Parus rufonuchalis	Tits	
Picus canus	Black napped Woodpecker	Woodpecker
Drycocopus javensis	Woodpecker	
Muscicapa subrubra	Himalayan Fly Catcher	

Acidotheres tristis	Common Myna	Ghatari
Terpsiphone paradisi	Paradise flycatcher	Choti- Pinja
Grus spp.	Cranes	
Grus antigone	Sarus Crane	Saras
Passer domesticus	House sparrow	
Carduelis spinoides	Himalayan Green Finch	Chiria

In the leased out area and surrounding hills following are the common animals:-

- Leopard (Bagher)
- Hare
- Wild Bore (Jangli Soor)
- Jackal
- Barking Deer (Kakkar)
- Monkey
- Sambar
- Pig

3.12.2.5 Birds

- Chakor
- Crow
- Red Jungle Fowl (Jangli Murga)
- Black Partridge (Kala Titar)
- Grey Partridge (Safed Titar)

3.13 Socio-Economic Environment

The growth of industrial sectors and infrastructure developments in villages and towns is bound to create its impact on the socio-economic aspects of the local population. The impacts may be positive or negative depending upon the developmental activity. To assess the impacts on the socio-economics of the local people, it is necessary to study the existing socio-economic status of the local population, which will be helpful for making efforts to further improve the quality of life in the area of study. To study the socio-economic aspects of people in the study area around proposed mine, the required data has been collected from various secondary sources and supplemented by the primary data generated through the process of a limited door to door socio-economic survey.

3.13.1 Methodology Adopted for the Study

Review of secondary data, such as District Census Statistical Handbooks-2001 and the records of National Informatics Center data, for the parameters of demography, occupational structure of people within the general study area of 10 km radius around the project site.

3.13.2 Review of Demographic and Socio-Economic Profile - 2001

The information on socio-economic aspects of the study area has been compiled from secondary sources, which include various public offices as indicated in the above section. The sociological aspects of this study include human settlements, demography, social such as Scheduled castes and Scheduled Tribes and literacy levels besides infrastructure facilities available in the study area. The economic aspects include occupational structure of workers.

There are no villages falling within the core zone. The entire mine lease area is private lands and falls under village Pail.

The requirement of unskilled semi skilled workers for the mining and transportation of minerals to market and crushing site will be limited to about 18. The workers directly engaged for mining activity will be deployed for collection of minerals and loading it into tractor trolleys/tipper trucks. About four/five tractor trolleys/tipper trucks will be engaged daily as per demand. It is pertinent to mention that percentage of marginal workers in the district is 18.85 and non worker is 56.01 percent as per 2001 census. Thus the project would give fruitful employment to local workers and will help in stemming or at the least lessening the migration of such workers to urban centre from the village.

3.13.3 Occupational structure in buffer zone

In the initial stages, the shift of resources occurs away from the, primary sector (agriculture, forestry, fishery, dairy, poultry, mining etc.) to the manufacturing sector or the secondary sector. These two sectors are the commodity producing sectors and their activities are required to be supported by the appropriate and adequate development of the service sector, or the tertiary sector.

Occupational structure of the workforce will be indicative of the economic activity. Any change in occupational structure would be indicative of the changing nature economically. The occupational structure has been worked out for categories of occupational available in the project buffer zone, which includes cultivators, agricultural labor, and household industry workers etc.

3.13.4 Health Status

Health of the people is not only a desirable goal, but is also essential investment in human resources. As per the National Health Policy (1983) primary health center has been accepted as a main instrument for achieving this goal.

For the development and strengthening of rural health infrastructure through a three tier system, such as sub centers, primary health centers (PHC) and community health centers have been established.

3.13.5 Socio Economic Survey

Following salient observations were recorded:-

- Educational facilities are available in all the villages in the form of primary and middle schools. In some of the villages it is extended up to high schools. For higher studies people have to avail this facility from the nearest town.
- Primary health centers and sub-centers are available to the rural people. During emergencies people have to move to the nearest town places.
- Communication facilities are available in the villages.
- Agriculture is the main occupation of the respondents. Main crops grown in the area are wheat, maize, rice etc.
- Most of the villages having good infrastructural facilities like primary schools, transportation, post office, telecommunication, power, banking facilities etc.

3.13.6 Awareness and opinion about the project

- The respondents from almost of all the villages are aware about this project activity.
- The respondents have mixed view about the project. Most of the respondents have opinion that due to proposed project activity, economy of the villages will be improved.
- As regards the respondents from the nearby villages also shown favorable opinion about activity that it may lead to increase in infrastructural facilities, job opportunities and business opportunities in the project area.
- People from the villages under the study area have put their opinion and willingness for the allotment of the land for the project.

3.13.7 Civic Amenities

Infrastructure resources are base of the villages with reference to education, drinking water resources, post and telegraph, communications and supply.

- High school facility is available in the village Jasur (12Kms).

- Higher education facilities are available within 12 kilometers from mining lease area at Pathankot.
- Banking facilities and Private medical practitioner are available at village Kandwal about 2 kilometres from Mining area.
- All Hospital /medical facilities and Banking facilities are available at Pathankot (12 kms) & Nurpur (19kms).
- For drinking water, villages are dependent on ground water resource
- Most of the villages are connected through road network and are also approachable through public transport.
- Electricity is available in all the villages.

3.13.8 Note on Agriculture Development and role of incoming project

The economy of Kangra district is predominately agrarian and majority of population is dependent on agriculture and activities allied to it for earning their livelihood. The moisture retention capacity of the area is poor due mainly to the fact the bed rocks are argillaceous and the land the uneven. The crops usually face moisture stress during the remaining period of the year due to inadequate and irregular rainfall. The irrigation facilities are provided by lifting water from steams, shallow dug wells and medium to deep tube wells in the valley area.

Major food crops are grouped into three categories:

1. Cereals
2. Pulses
3. Other food crops like Chilies, ginger, sugarcane and turmeric.

Non- food crop area is of two kinds:

1. Oil seeds
2. Other non-food crops such as cotton, tobacco and fodder crop

Agriculture in this area plays vital role in the socio-economic development of the area as it constitutes the main source of livelihood. Majority of the families in the periphery of 10Km radius of the proposed project mainly depended on agriculture activity. Attention will be therefore focused on this source of income while developing the projects in this area.

In this context following points may be noted:-

a. In a totally rain fed agriculture, the green revolution components can be appropriately used. As a matter of fact irrigation is the basic inputs for the development of agriculture which facilitate the use of inorganic fertilizers, insecticides and pesticides, improved seeds,

improved high yielding varieties of seed and use of modern agriculture implement and mechanization to what extent possible by proper.

b. Farmers find it increasingly difficult to support their families' entirely on agriculture and since the avenues for employment outside agriculture are not developing fast enough, the population pressure on land has kept on increasing all the time. Under these circumstances, the farmers appear to be convinced:-
    a. Agriculture is not likely to sustain them and their future generations.
    b. Non-agricultural sources of employment are not likely to develop at fast rate enough to accommodate and employ gainfully the subsequent additional force labors.

That such, if the present structure of economic activity in the project area were to continue without any change, the farmers and their generation are likely to suffer untold hardship.

Table 3.13.1

Demography details of study area (5km buffer zone)

Name	Population	SC Population'	Literates	Illiterates	Working Population	Main Workers	Marginal Workers	Non Workers	Households	Literacy Rate	Male Population	Female Population
Parnala	213	40	147	66	42	24	18	171	37	69.01	110	103
Damin	101	0	75	26	58	15	43	43	17	74.26	47	54
Padhar	233	0	167	66	35	35	0	198	45	71.67	108	125
Songher	265	54	153	112	64	47	17	201	49	57.74	135	130
Bhatoli	385	0	321	64	108	102	6	277	81	83.38	192	193
Broti	74	0	47	27	16	16	0	58	11	63.51	33	41
Haler	195	43	142	53	62	19	43	133	32	72.82	94	101
Chhatwal	63	0	42	21	46	13	33	17	11	66.67	37	26
Momun	790	107	508	282	311	191	120	479	153	64.30	386	404
Suliali	1661	558	1268	393	300	202	98	1361	313	76.34	813	848
Lodhwan	672	114	389	283	211	44	167	461	129	57.89	341	331
Tipri	1179	272	724	455	338	250	88	841	213	61.41	647	532
Gagwal	540	245	346	194	142	133	9	398	97	64.07	285	255
Hagwal	748	92	505	243	187	183	4	561	124	67.51	393	355
Padora	172	10	132	40	74	29	45	98	39	76.74	77	95
Total	**7291**	**1535**	**4966**	**2325**	**1994**	**1303**	**691**	**5297**	**1351**	**68.11**	**3698**	**3593**

Source: Census-2001

3.14 Conclusion

The environment baseline study was conducted in the project area by both secondary data & primary data collection. Abiotic factors including air, water and soil were studied for the core & buffer zone. It was found that most of the parameters were within the limits as per the Indian Standards. In general, there is no major threat to the quality of these parameters. Similarly, the study for the biotic factors was conducted. It was found that no forests falls in the study area. Hence it can be concluded that the present environment status of the study area is good enough for the enhancement of production capacity. Adoption of adequate pollution control measures in past have shown that there is any degradation in Quality of the environmental scenario of the area.

CHAPTER–IV
ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 ENVIORNMENTAL IMPACT ASSESSMENT

The environmental parameters likely to be affected by mining are related to many factors, i.e. physical, social, economic, agriculture and aesthetic. Opencast mining involves extraction of Sand Stone and Bajri and dumping of waste along with other operations, viz. traffic network, and other vehicular movements. All the operations can disturb environment of the area in various ways, such as removal of mass, change of landscape, displacement of human settlement, flora and fauna of the area, surface drainage, and change in air, water and soil quality. While for purpose of development and economic upliftment of people, there is need for establishment of industries and mining, but these have to be environmental friendly. Therefore, it is essential to assess the impacts of mining on different environmental parameters, before starting the mining operations, so that abatement measures could be planned in advance for eco-friendly mining in the area.

The likely impacts on different environmental parameters due to this mining project are discussed below.

4.2 ENVIRONMENTAL IMPACT ASSESSMENT & MITIGATION MEASURES

The mining activities cause environmental problems such as degradation of land, deteriorating air, water and soil quality, affecting the biological and socio-economic environment of the area. The impacts of mining on various environmental parameters were assessed and are given below:

4.2.1 IMPACT ON AIR QUALITY & MITIGATION MEASURES

4.2.1.1 Impact of movement of vehicles for mineral transportation

Sand Stone and Bajri is transported from quarry to crusher located outside mining lease area by trucks/Tractor trolley and further leading to the crusher plant by vehicle after the proposed clearance.

4.2.2.2 Emission Rates

The emissions in the present case have been computed using empirical factor given in “Indian Mining and Engineering Journal”. The details of emissions computed from mining operations are given below:

Total Sand, Stone & Bajri handling in the mine is 296 TPD on the bases of 270 working days per annum. Per hour handling of sand, stone & Bajri (on the bases of 08 hr/day operation) is 40 t/ hr.

Total handling of material will be 40 t/hr.

Rate of emission being 23.6 kg/ hr for handling 1000 t/ hr the emission rate shall be

$$= \frac{40 \text{ t/ hr} \times 23.6 \text{ kg/ hr}}{1000 \text{ t / hr}} = 0.944 \text{ kg/hr}$$

or 0.2622 gm/ sec

The above mentioned emission rates are uncontrolled emissions. Due to installation and operation of dust control measures at mining site, the emissions will be one third of established emissions. This is based on experience and literature.

The emission rates and conditions have been summarized in **Table-4.2.1.**

TABLE-4.2.1
EMISSION RATE AND EMISSION CONDITIONS

MINE AREA	=	8.6400 HECTARES
STONE HANDLING	=	80000 TPA
DUST EMISSION RATE	=	0.2622 gm/ sec
EMISSION TEMPERATURE	=	AMBIENT

The emission rate concentration is too little hence; no Air modelling is required for the present project.

4.2.2.3 Ambient Air Quality Standards

Ambient air quality standards promulgated by National Ambient Air Quality Standards for different areas are as follows:

Area	Time Weighted Average	Concentration ($\mu g/m^3$)		
		PM_{10}	SO_2	NO_2
Industrial Area, Residential Rural & Other Areas	**Annual Average ***	60	50	40
	24 hours **	100	80	80
Ecologically Sensitive Area (Notified by Central Govt.)	**Annual Average ***	60	20	30
	24 hours **	100	80	80

It is clear from the predicted values that the concentrations of SO_2, NO_2 and PM_{10} are well below the limits of NAAQS **(Industrial Area, Residential Rural & Other Areas)** at all locations.
The increment in the fugitive emissions will be mainly due to transportation activity. Therefore emissions due to mineral handling during mining operation are not much and restricted to the lease area only.
Proper mitigation measures are practiced during mining activities to control air pollution load below the prescribed limits. The same are as follows:

- Laying of haul roads as per the standards to avoid or eliminate air – borne dust.
- Watering of haul roads and other roads at regular intervals
- Spraying of water on permanent transport roads at required frequencies.
- Provision of dust filters / mask to workers working at highly dust prone and affected areas.
- Provision of green belt by vegetation for trapping dust.
- Greenbelt development along the haul roads, dumps and along the boundaries of the lease area.
- Utmost care will be taken to prevent spillage of sand and stone from the trucks.

4.2.2.4 Air Pollution Due To Mining

I. Gaseous Pollution

The gaseous pollutants (SO_2 & NO_2) are anticipated by transportation vehicles. The ambient air quality was measured on 24 hourly basis for the gaseous pollutants.

ii. Particulate Matter

The generation of dust is anticipated from various mining activities i.e. loading, haulage and other transport activities related to mining. These will increase PM_{10} in the area if no mitigative measures are taken.

4.2.2.5 Mitigation Measures for Air Pollution

In the stone mine, air pollution is caused mainly due to dust generation added with gaseous emission from mining activities like loading & transport etc. following measure shall be adopted to mitigate air pollution generated due to the mining activities:

4.2.2.6 Prevention and Control of Air Pollution

A. **Dust Pollution**

One of the main pollutants in air will be particulate matter (PM), which will be generated during various activities of mining such as, removal of overburden, extraction of sand, stone and movement of vehicles. Following measures is been taken to minimize air pollution.

- All the haul roads are properly graded with sufficient width and Water spray is been done on mine haul roads.
- Green belt/plantation is been developed all along the haul roads and other places to arrest dust.
- Personal Protective Equipments like dust mask is been provided to all employees working in the likely dusty areas.
- Ambient Air Quality Monitoring is been conducted on regular basis to assess the quality of ambient air as per the EC conditions and submitted to respective authorities.

B. Prevention and control of Gaseous pollutants

Proper maintenance of vehicles is been done, which minimize the pollutants.

4. 3 IMPACT OF NOISE / VIBRATIONS & MITIGATION MEASURES

4.3.1 Impact of Noise on Working Environment

In the proposed mining operations noise levels due to excavation and transportation of Sand, Stone & Bajri.

The area in general represents calm surroundings. There is no heavy traffic, industry or noisy habitation near the proposed leased mining area except stone crushers. As there will be no heavy earth moving machinery there will not be any major impact on noise level due to proposed mining and other associated activities. It was found that the proposed mining activity will not have any significant impact on the noise environment of the region. The only impact will be due to transportation of Bajri and stone by tractors to the stone crushing.

To understand the combined effect of these noise levels on the nearby community, an attempt based on a scientific model has been made to estimate the noise levels at different distances from the proposed mine. The noise level at various locations due to different sources is calculated based on the following formula:

$$Lp_2 = Lp_1 - 20 \log (r_2 / r_1) - Ae_{1,2}$$

Where, Lp_1 and Lp_2 are sound levels at points located at distance r_1 / r_2 from the source and $Ae_{1,2}$ is the excess attenuation due to environmental conditions. Combined effects from different sources at various locations are then computed by the following equation:

$$Lp\ (total) = 10 \log (10\ Lpx_{/10} + 10\ Lpy_{/10} + 10\ Lpz_{/10})$$

Where Lpx, Lpy, Lpz are noise pressure levels at a point due to different sources.

The predicted noise levels based on the above analysis in the nearby villages, considering that there is no attenuation on account of barriers, will be as follows:

LOCATION	MAX.EXISTING	ADDITION	PREDICTED MAX
Mine Site	52.8	19.7	67.2
Harial	51.3	13.8	52.2
Ghandwal	53.5	17.6	51.7

All values are in dB(A)

From the above, it is clearly seen that there will be no significant impact on the surrounding community due to noise from the mine.

Thus due to natural attenuation effects, by proper green belt development, design / maintenance of machines, etc., the impact on noise levels will be minimal.

4.3.2 Noise Abatement and Control

4.3.2.1 Mitigation Measures to Reduce Ambient Noise Levels

The following control measures are been adopted to keep the ambient noise levels well below the limits:

- Plantation has been carried out along mining lease boundary and sides of haul roads, etc. The greenbelt minimizes propagation of noise.
- In order to reduce the effect of noise pollution, ear plugs /earmuffs are provided to all employees.
- Selections of equipments have been done which generate less noise.
- Confining the noise generating sources.
- Periodical noise level monitoring is carried out.

4.4 Impact on Water Environment & Mitigation Measures

4.4.1 Impact on Surface Water

There are no first order streams passing through the lease area. So, surface drainage is not be affected by mining. It is, therefore, apparent that there will be negligible impact of mining on the surface water regime.

4.4.2 Mitigation Measures for Water Environment & Water Conservation

Adequate control measures are adopted to check not only the wash-off from soil erosion but also uncontrolled flow of mine water. The measures adopted are as follows:

- No wastewater is generated from the mining activities.
- The ground water in the mine area is not likely to be affected, as no toxic chemicals are present in the rejects stacked.

4.4.3 Rain Water Harvesting

The proposed mine is situated on the river bed of the Chakki khad.So, no rain water harvesting structure is proposed.

4.5 Biological Environment

4.5.1 Impact on Terrestrial Ecology

The proposed mine lease area is 'gair mumkin Khad'' falling in category "land not available for cultivation". There is no forest land within the mine lease area. The forest area is far away from the mining area and will not be disturbed during proposed mining operations. There are no national parks, sanctuaries, notified biospheres, Tiger/Elephant Corridors, Birds migratory routes, etc. within 10 km radius.

4.5.2 Impact on Flora

No adverse impact is envisaged on the existing flora, as there will be no deforestation by mining operation. Plantation is been developed in the mining lease area and same will be done as per plantation programme. These activities help to improve the floral cover of the area. The greenery and plantation development will eventually attract micro fauna, birds etc in the area.

Assistance will be taken from local forest department in selection of species of plants so that green coverage could improve very fast. The varieties would include those plants, which are suitable in the area.

The dust is the only major pollutant which will be generated from different activities of mining. The effect of particulate matter on vegetation is in the form of incrustation, plugging of stomata, loss of chlorophyll and reduction of photosynthesis process. Disturbance in plant metabolism due to deposition of dust particles on foliar surfaces leads to reduction in plant growth. The atmospheric concentrations normally do not reach a level sufficient to induce acute injury.

A perusal of previous section reveals that the maximum incremental ground level concentrations for PM10 likely to be encountered in the mine operations are well within the NAAQM standards.

Moreover, progressive afforestation programme activity over a period of time in the core zone will create favourable conditions for fauna in the area and hence reversible impact is anticipated after presence of favourable condition.

4.5.2.1 Measures for Minimizing Impact on Flora

Green Belt Development

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

At the conceptual stage the land will be used for green belt / plantation, which will improve biological scenario of the area. The plantation work for green belt development will be carried in consultation with a horticulturist which will help minimizing adverse impact on the flora found in the area.

4.5.3 Impact on Fauna

The mining lease area is in non-forest land where presence of fauna is very rare. No endangered species of fauna is found in and around lease area. As such, there will be no adverse impact of the mining activity on fauna around the mining lease area.

4.5.3.1 Measures for Minimizing Impact on Fauna

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

- Measures is been taken to curb pollution due to air, water, land & noise environment.
- Greenery developed around mining lease area helps in creating habitats for local faunal species and to create better environment for various fauna.
- The tree plantation is been developed and animal food value in buffer area and the area not under active mining as well as other neighbouring areas have been developed which have created favourable conditions for wildlife.
- Creating and developing awareness for nature and wildlife in the adjoining villages.

Impact on Aquatic Ecology

The proposed mining activity is on the Chakki Khad bed. Since the mining activity is on the bed away from the river flow, therefore there shall be no impact on the aquatic flora and fauna.

4.6 Impact on Soil and Land Use Pattern & Mitigation Measures

4.6.1 Impact of change of land use

The lease area is 8-64-00 ha, The mine lease area belongs to private individuals. So, at the end of the mine life the area shall be eventually put into agricultural use.

In the ML area, mining activity will be confined to the mineralized zone & proper pollution control measures will be adopted to restrict the pollution load within the active zone in order to prevent any negative impact on nearby crop fields.

4.7 Socio - Economic Environment :

Opening of proposed mine definitely provides the following series of positive impacts:

- Direct employment for over 18 persons in the various mine activities.
- Indirect employment in transport sector, offer of contract labourers.
- Improvement in the general living standards and knowledge sharing.
- The wage level and the living standard of the local and the migrated people will also improve as a result of higher earnings.
- Improvement in the economic growth in the region
- Benefit to the State and the Central governments through financial revenues by way of royalty, tax, duties, etc from this project directly and also indirectly.
- Additional mineral availability for the region.

From the above it can be confidently concluded that the project activities in short and long terms are expected to enhance the economic growth and all kinds of facilities of the area which is industrially and economically backward and hence the Impact on socio- economic environment will be positive.

4.8 Impact on local transport/infrastructure

The traffic density on the surrounding roads of the mine site is very low and capable of handling of increased traffic. In the proposed mining, the production capacity is less and for transporting of excavated material, less number of vehicles are required. Hence, the local transport / infrastructure facilities are capable of handling the increased load due to mining activities.

4.9 Impact of cumulative mining in surrounding area:

There are about five numbers of mining leases in 10 kilometres buffer zone area of the mining lease. The mining of sand stone and Bajri is being carried out in accordance with the approved mining plans which are prepared keeping in view the sustainability of the area.

4.10 Impact on Civic Amenities

The impact of mining on the civic amenities will be substantial after the increase production capacity of the project. With improved transportation facilities there is always a scope for development. The communications facilities have increased and developed in the area and will also further develop in near future.

4.11 OCCUPATIONAL HEALTH & SAFETY

Healthy and safe working conditions are among the first expectations for sustainability, i.e. the expectation that risks in mining will not deprive workers of their livelihoods or of their quality of life. Occupational injuries and ill-health have huge social and economic implications for individuals, their families and their communities. They also have an adverse impact on the economy of the society as a whole.

Occupational accidents and health hazards can also affect public health and safety, and the environment. The effect on the health and safety of people, costs to the economy and impacts the environment. Efforts will be made to address occupational health and safety with broader social agenda for sustainable development.

Hazards, which are associated with poor engineering design, contribute to increased safety risks. Although health risks can be avoided by implementing controls at source in the work environment, designing such controls for mining environment presents considerable challenges because dust and noise are generated by mining itself. A range of control measures that act together to reduce exposure to such risks is therefore necessary. These could include methods for minimizing dust levels by reducing dust generation and methods for dilution, suppression, capture, and containment.

While significant uncertainties remain in controlling dust exposures and maintaining the effectiveness of controls, the use of appropriate personal protective equipment (PPE) is important.

Occupational health and safety (OHS) is a cross-disciplinary area concerned with protecting the safety, health and welfare of people engaged in work or employment. The goal of all occupational health and safety programs is to foster a safe work environment.
Excessive dust, noise and vibration are the chief health hazards for the miners. Some examples of such hazards are:

- Exposure to dust and
- Noise exposure;
- Vehicular movements and blasting related issues.
- Physical Hazards.

Exposure to Dust

Exposure to fine particulates is associated with work in most of the dust-generating stages notably from drilling and blasting, mineral handling, and transportation.
Workers with long term exposure to fine particulate dust are at risk of pneumoconiosis, emphysema, bronchitis, and fibrosis.
Methods to prevent and control exposure to dust include the following:

- Control of dust through water spraying,
- Use of PPE, as appropriate (e.g. masks and respirators) to address residual exposures.

Physical hazards

Injuries during Project operation are typically related to slips and falls; contact with falling / moving objects; and lifting / over-exertion. Other injuries may occur due to contact with, or

capture in, moving machinery (e.g. trucks). In case of any accident immediate & proper first –aid medical care is been provided at the mine site.

Pre-placement medical examination and periodical medical examination schedules

- The fresh employees when taken are thoroughly medically examined under initial medical examination and thereafter during continuation of employment; the periodic medical examination is being done suggested by DGMS.

So far following activities have been practised by M/s.Nandi Stone Crusher:

- No of Employees Examined: 18
- Frequency of Examination
  - More than 45 years – once in Three Year
  - Less than 45 years – once in Five Year

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CHAPTER–V

ENVIRONMENTAL MONITORING PROGRAMME

5.1 Introduction

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 as important as that of control of pollution since the efficiency of control measures can only be determined by monitoring.

Usually, as in the case of the study, an impact assessment study is carried over short 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.

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

- State of Pollution within the project site and in its vicinity.
- Generate data for predictive or corrective purpose in respect of pollution.
- Examine the efficacy of pollution control system adopted at the site.
- To assess environmental impacts.

Monitoring will be carried out at the site as per the norms of CPCB.Environmental Monitoring Programme will be conducted for various environmental components as per the conditions stipulated in Environmental Clearance Letter to be issued by MOEF. Six monthly compliance report will be submitted every year to Regional office, MoEF, Chandigarh on 1st of June & 1st of December.

5.2 Formation of EMC (Environmental Management Cell)

In order to maintain the environmental quality within the standards, regular monitoring of various environmental components is necessary. A full-fledged environmental management cell (EMC) will be established for environmental monitoring and control. The EMC team will take care of pollution monitoring aspects and implementation of control measures.

5.2.1 Responsibilities of EMC

The responsibilities of the EMC include the following:

- Environmental monitoring of the surrounding area.
- Commissioning of pollution control equipment.

- Specification and regulation of maintenance schedules for pollution control equipment.
- Ensuring that standards of housekeeping in the mine are maintained.
- Developing the green belt.
- Ensuring Water use is minimized.
- Carrying out the Environmental Management Plan.

5.3 Measurement Methodologies

5.3.1 Instrument to be used

The following instruments will be used for data collection work in the monitoring schedule:

1. Respirable dust sampler.
2. Fine volume sampler
3. Water level indicator
4. Sound level meter model

5.3.2 Monitoring Programme

The post project monitoring will include details of any major/ minor impact in the core zone and area within buffer zone in respect of the following parameters: -

- Micro - meteorological data
- Ambient air quality monitoring
- Noise level monitoring
- Water quality & level
- Soil monitoring

5.4 Environmental Monitoring and Reporting Procedure

Monitoring shall confirm that commitments are being met. This may take the form of direct measurement and recording of quantitative information, such as amounts 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 socio-economic interaction, through local liaison activities or even assessment of complaints.

The preventive approach to 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 forecast during the planning stage, and where they are 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.

5.4.1 Objectives of Monitoring

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.

5.5 Environmental Monitoring

The monitoring program can serve as an indicator for any deterioration in environmental conditions due to operation of the mine, and helps in planning suitable mitigatory steps that could be taken in time to safeguard the environment. Monitoring is as important as that of control of pollution since the efficiency of control measures can only be determined by monitoring. The following routine monitoring program will be implemented under the post-project monitoring as per CPCB guidelines.

During operation of mine, dust is the main pollutant which arises from different mining and stone crusher activities

The following attributes which merit regular monitoring based on the environmental setting and nature of project activities are listed below:

- Source emissions and ambient air quality
- Groundwater quality
- Soil quality
- Noise levels (occupationnel exposures and ambient noise levels);and
- Ecological preservation and afforestation.

The following routine monitoring programme as detailed in **Table-5.5.1** shall be implemented at site. Besides to this monitoring, the compliances to all environmental clearance conditions and regular permits from SPCB/MoEF shall be monitored and reported periodically.

The monitoring of liked project i.e. Stone Crusher shall be carried out as per the norms of State Pollution Control Board to meet the prescribed standards under EPA. The unit shall be required to install the pollution control equipment as per consent conditions.

TABLE-5.5.1

ENVIRONMENTAL MONITORING DURING OPERATIONAL PHASE

Sr. No.	Potential Impact	Action to be Followed	Parameters for Monitoring	Frequency of Monitoring	Location
1	Air Emissions	Ambient air quality within the premises of the proposed unit and nearby habitations to be monitored.	PM10, PM2.5, SO_2, NO_x and CO.	Half Yearly	Near Mine office, Near Haulage road
		Exhaust from vehicles to be minimized by use of fuel efficient vehicles and well maintained vehicles having PUC certificate.	Vehicle logs to be maintained	Regularly	Main gate
		Vehicle trips to be minimized to the extent possible	Vehicle logs	Daily records	Main gate
2	Noise	Noise generated from various mining operations and stone crusher	Spot Noise Level recording; Leq(night), Leq(day), Leq(dn)	Periodic during operation phase	Main gate, working zone
3	Wastewater Discharge	No untreated discharge to be made to surface water, groundwater or soil.	No discharge hoses in vicinity of watercourses.	Periodic during operation phase	-

Sr. No.	Potential Impact	Action to be Followed	Parameters for Monitoring	Frequency of Monitoring	Location
4	Drainage and effluent Management	Ensure drainage system and specific design measures are working effectively. Design to incorporate existing drainage pattern and avoid disturbing the same.	Visual inspection of drainage and records thereof	Periodic during operation phase	-
5	Water Quality and Water Levels	Monitoring used water quality & groundwater quality and levels	Comprehensive monitoring as per IS 10500 Groundwater level bgl	Periodic during operation phase	
9	Maintenance of flora and fauna	Vegetation, greenbelt / green cover development	No. of plants, species	Periodic during operation phase	-
10	Waste Management	Implement waste management plan that identifies and characterizes every waste arising associated with proposed activities and which identifies the procedures for collection, handling & disposal of each waste arising.	Records of solid waste generation, treatment and disposal	Periodic during operation phase	
11	Soil quality	Maintenance of	Physico-	Periodical	Plantation

Sr. No.	Potential Impact	Action to be Followed	Parameters for Monitoring	Frequency of Monitoring	Location
		good soil quality	chemical parameters and metals.	monitoring	areas
12	Health	Employees and migrant labour health check ups	All relevant parameters including HIV	Regular check ups	-

5.6 Monitoring Methods

5.6.1 Air Quality Monitoring

5.6.1.1 Workspace Monitoring

The concentration of air borne pollutants in the workspace/work zone environment shall be monitored periodically. If concentrations higher than threshold limit values are observed, the source of fugitive emissions shall be identified and necessary measures taken. If the levels are high suitable measures as detailed in EMP shall be initiated.

5.6.1.2 Ambient Air Quality Monitoring

The ground level concentrations of $PM_{2.5}$,PM_{10}, SO_2 and NO_X in the ambient air shall be monitored at regular intervals. Any abnormal rise shall be investigated to identify the causes and appropriate action shall be initiated. Greenbelt shall be developed for minimising dust propagation.

5.6.2 Water Quality Monitoring

Periodic water audits shall be conducted to explore further possibilities for water conservation.

Methods prescribed in "Standard Methods for Examination of Water and Wastewater" prepared and published jointly by American Public Health Association (APHA), American Water Works Association (AWWA) are recommended.

5.6.2.1 Groundwater

The monitoring of groundwater is the most important tool to test the efficiency of mining performance. It is suggested to collect water samples nearer to mine site and analyse. Records of analysis should be maintained.

5.6.2.2 Surface Water

Nearest surface water source is Chakki Khad. It is suggested to collect surface water samples from upstream and downstream directions to assess the quality of the water.Records of analysis should be maintained

5.6.3 Noise Levels

Noise levels shall be monitored in the mine area. The noise monitoring shall be conducted in regular intervals at working zone and near main gate.

5.7 Reporting Schedules of the Monitoring Data

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

The environmental monitoring cell shall co-ordinate all monitoring programmes at site and data thus generated shall be regularly furnished to the state regulatory agencies.

The frequency of reporting shall be on six monthly basis to the local state PCB officials and to Regional office of MoEF. The Environmental Audit reports shall be prepared for the entire year of operations and shall be regularly submitted to regulatory authorities.

5.8 Data Analysis

Monitoring data analysis will be done as per CPCB guidelines by EPA approved laboratory & shall be submitted to concern authority (specified in Environment Clearance Letter issued by MoEF, & Consent issued by HPSPCB) on regular basis.

5.9 Detailed Budget

- Capital cost of the project is Rs. 5088000.00
- Cost proposed for EMP measures is Rs. 3,500,00/=
- Recurring Cost for EMP: Rs. 70000/ annum

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CHAPTER–VI

ADDITIONAL STUDIES

6.1 Introduction

As per New EIA Notification dated 14.09.2006, the first technical presentation for TOR was held on November 28-30, 2011 Terms of Reference (TOR) were issued from EAC (M), vide Letter No. **No.J-11015/213/2011-IA.II (M) dated 28th December, 2011.**

6.2 Public Consultation

As per the New EIA Notification dated 14th September, 2006, Public hearing for this project has to be conducted in accordance with the procedure to obtain the Environmental Clearance.

6.3 Risk Assessment and Disaster Management Plan

Risk Assessment and Disaster Management Plan is prepared keeping in view that location of the proposed project is close to the river. This plan is prepared based on the below considerations.

- The mining operations in the lease area would be confined to day light hours, from 9 A.M. to 5 P.M.
- The highest contour in the lease area is 437 meters above MSL
- The mining shall be restrained well above this level.

6.3.1 Definition

A major emergency in a work is one, which has the intensity to cause serious injury or loss of life. It may cause extensive damage to property and serious disruption both inside and outside the work. It would normally require the assistance of emergency services to handle it effectively.
Emergency may be caused by a number of different factors, it will normally manifest itself in two basic forms, viz fire, explosion or toxic release.

6.3.2 Scope

An important element of mitigation is emergency planning i.e. recognizing that accidents are possible, assessing the consequences of such accidents and deciding on the emergency procedures, both on site and off site that would need to be implemented in the event of an emergency. Emergency planning is just one aspect of safety and cannot be considered in isolation.

6.3.3 Objective

The overall objectives of the emergency plan are:

(a) To localize the emergency and, if possible eliminate it; and

(b) To minimize the effect of the accident on people and property.

Elimination requires well planned process/technology and its effective implementation, so that such situation should either not arises or if it comes, a pre warning is received for timely action in built or by preparedness for zeroing the effects.

Minimizing the effects may include prompt action, rescue, first aid, and evacuation, fire fighting and also passing on information promptly to people living nearby.

6.4 Disaster Management Plan

In order to handle disaster/emergency situations, an organizational chart entrusting responsibility to various project personnel will be prepared with their specific roles during emergency.

6.5 Occupational Health and Safety

6.5.1 Occupational Health

Operation and Maintenance

Occupational health needs attention during operation phase. The problem of occupational health, in the operation and maintenance phase is primarily due to dust and noise which could affect the workers from respiratory and hearing problems. The necessary personal protective equipments will be given to all the workers. The working personnel shall be given the following appropriate personnel protective equipments.

- Industrial Safety Helmet;
- Zero power plain goggles with cut type filters on both ends;
- Cylindrical type earplug;
- Ear muffs;
- Dust mask;
- hand gloves;
- Industrial safety shoes with steel toe.

All working personnel will be medically examined at least once in every year and at the end of his term of employment. This is in addition to the pre-employment medical examination.

6.5.2 Safety Plan

Safety of both men and materials during operation phase is of concern. Safety plan shall be prepared and implemented in the proposed site. The preparedness of an industry for the occurrence

of possible disasters is known as emergency plan.

Keeping in view the safety requirement during construction, operation and maintenance phases a safety policy will be formulated with the following regulations:

- To allocate sufficient resources to maintain safe and healthy conditions of work;
- To ensure that adequate safety instructions are given to all employees;
- To provide wherever necessary protective equipment, safety appliances and clothing and to ensure their proper use;
- To inform employees about materials, equipment or processes used in their work which are known to be potentially hazardous to health or safety;
- To keep all operations and methods of work under regular review for making necessary changes from the point of view of safety in the light of experience and up to date knowledge;
- To provide appropriate facilities for first aid and prompt treatment of injuries and illness at work;
- To provide appropriate instruction, training, retraining and supervision to employees in health and safety, first aid and to ensure that adequate publicity is given to these matters;
- To organize collection, analysis and presentation of data on accident, sickness and incident involving people injury or injury to health with a view to taking corrective, remedial and preventive action;
- To publish/notify regulations, instructions and notices in the common language of employees;
- To prepare separate safety rules for each type of occupation/processes involved in at site;

6.5.3 Safety Organization

A qualified and experienced safety officer shall be appointed. The responsibilities of the safety officer include identification of the hazardous conditions and unsafe acts of workers and advice on corrective actions, conduct safety audit, organize training programs and provide professional expert advice on various issues related to occupational safety and health. He is also responsible to ensure compliance of Safety Rules/ Statutory Provisions.

6.5.4 Health and Safety Monitoring Plan

The health of all employees shall be monitored once in a year for early detection of any ailment due to exposure to dust, heat and noise.

6.6 Natural Resource Conservation

- A green belt will be developed so that minimum soil erosion takes place.
- In any case the natural habitats of the existing flora and fauna will not be disturbed.
- Use of traditional knowledge in all aspects of conservation;
- Time to time analysis of the soil, water resources etc will be done in order to analyze the negative impacts of mining activities on the environment.

6.7 R & R Action Plan

There will be no resettlement or rehabilitation issues involved in this project.

6.8 Corporate Social Responsibilities (CSR)

It is proposed to take up the CSR activities in line with the findings of socioeconomic survey done.

The project proponent agrees to provide free of cost boulders, bajri and sand for social projects as Panchayat ghar, schools in the area.

Employment - The Company will provide direct employment to around 18 skilled and semi skilled persons and indirect employment to around 200 persons. The company will give preference to local peoples.

6.9 IDENTIFICATION OF HAZARDS

The possibility of the following may be there for such projects:

(a) Fire associated with storage of combustible material, lubricants, oil.

(b) Accidents in the mine

To deal the above emergencies, the Emergency Plan is prepared.

6.9.1 Disaster Due To Surface Fire

The fire could be due to surface fire. Such case has so far not been reported. Likewise equipment sometimes catches fire which needs to be dealt.

Code of Practice in Case of Fire at Mines

Objective:

To deal with fire efficiently and quickly at different locations of mine

Source of Fire:

i) Oil & Lubricant Room.

ii) Mine machineries.

Line of Action:

i) Sufficient fire extinguishers will be installed at selected locations on site. Besides, numbers of water hydrants with sufficient length of hosepipes will be made available at the surface for fire protection.

ii) Any person notices any sign of fire shall immediately take steps to give warning by blowing the siren continuously and take steps to extinguish the fire by using appliances available near the site.

iii) **Duties of mine Official:** - The Mine officials receiving the warning will forthwith inform at following places.

a) Fire fighting station
b) Mines Manager
c) Mines Agent / Owner

After intimation he should reach the spot, remove Men & Machinery and take steps to tackle the fire in accordance with the fire fighting instructions. Inform the security office to get an Ambulance if required.

a) Duties of Fire Fighting Team: - On receiving warning, the team shall reach the site of fire and depending on its nature, class and extent shall take steps to extinguish it and rescue persons who may be caught in fire.

b) Duties of Mines Manager: -

(i) On receipt of information about fire, the Manager will forthwith rush to the spot and assess the situation. He will oversee the overall rescue operation and make necessary arrangement for medical aid to the affected persons, if any.

(ii) Inform the management and statutory bodies.

6.9.2 Code of Practice in case of Explosion & Accidents

Objective

To deal with accidents efficiently and quickly.

Line of Action

Any person, who notices any explosion or accident, should immediately take steps to give warning by suitable mean and at the same time take necessary action for withdrawal of men from the site He shall also inform the mine's Manager and other officials without any delay.

Duties of Mine's Manager

(a) On receipt of information about explosion or accident, the manager shall forthwith rush to the spot and the situation. He shall make the arrangements for withdrawal of affected persons, if any.

(b) Inform the hospital for Ambulance for affected persons, if any.

(c) Provide First aid to affected persons.

(d) Inform the senior officials and statutory bodies.

6.9.3 Action in Emergency

If any emergency like fire arises in the mine one should immediately inform to Security Supervisor. Security will inform key personnel and act as detailed above and consequently inform to CCR for broad announcement by Public Address System and to blow the Alarm if CCR is not affected itself. The emergency alarm will be wailing sound for two minutes on hearing telephone or alarm; the key personnel will act as per responsibilities. The procedure for all emergency situations as mentioned above would be same.

6.9.4 Site Restoration

The incident controller will check the areas thoroughly for possible hazards such as toxic fume or live wires after emergency and will inform site controller accordingly. The key personnel will meet to evaluate their individuals and overall performance in responding to situation after the emergency is over. The review shall determine.

- Effectiveness of emergency response plan.
- Mine crew performance.
- Any need for updating or revision of the emergency response plan.
- Suitable arrangement for restart of the work.
- Evaluation and control of efficient arising out of mitigating measures like foam discharge & overflow of oil in water.
- Rehabilitate evacuated area.
- Adopt measures to prevent similar recurrence.

6.9.5 Precautions

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

(i) The persons shall be trained properly to handle the situation.

(ii) Detailed warning system, implementation procedure, emergency control centre, shall be maintained at the mine with names of trained persons.

(iii) Details and availability of machinery, fire-fighting equipment shall be available at the site.

(iv) Proper arrangements shall be made for treatment of injured person, if any.

(v) All the safety equipment shall be available at the mine.

6.9.6 Post Disaster Analysis and Evaluation

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

6.9.7 Off-Site Emergency Planning

Introduction

The off-site emergency plan is an integral part of any hazard control system. It would be based on those accidents identified by the works management, which could affect people and the environment outside the works. Thus, the off-site plan follows logically from the analysis that took place to provide the basis for the on-site plan and the two plans should therefore complement each other. The key feature of a good off-site emergency plan is flexibility in its application to emergencies other than those specifically included in the formation of the plan. The roles of the various parties that may be involved in the implementation of an off-site plan are described below. The responsibility for the off-site plan will be likely to rest either with the works management or with the local authority.

Either way, the plan must identify an emergency coordinating officer who would take overall command of the off-site activities. As with the on-site plan, an emergency control center will be required within which the emergency coordinating officer can operate. An early decision will be required in many cases on the advice to be given to people living “within range” of the accident – in particular whether they should be evacuated or told to go indoors. Consideration of evacuation may include the following factors:

a. In the case of a major fire but without explosion risk (e.g. an oil storage tank), only houses close to the fire are likely to need evacuation, although a severe smoke hazard may require this to be reviewed periodically.
b. But if the fire is escalating it might be necessary to evacuate people nearby, but only if there is time; if insufficient time exists, people would be advised to stay indoors and shield themselves from the fire.

6.9.7.1 Aspects to Be Included In An Off-Site Emergency Plan

Some of the aspects to be included in off-site emergency plan are as follows:

a) Organization

Details of command structure, warning systems, implementation procedures, emergency control centers Name and appointments of incident controller, site main controller, their deputies and other key personnel.

c) Communications

Identification of personnel involved, communication center, call signs, network, list of telephone numbers.

d) Voluntary Organizations

Details of organizers, telephone numbers, resources, etc

e) Humanitarian Arrangements

Transport, evacuation centers, emergency feeding, treatment of injured, first aid, ambulances.

f) Public Information

Arrangements for: -

(i) Dealing with the media-press office

(ii) Informing relatives, etc.

g) Assessment

Arrangements for: -

(i) Collecting information on the causes of the emergency

(ii) Reviewing the efficiency and effectiveness of all aspects of the emergency plan.

6.9.7.2 Role of the Emergency Coordinating Officer

The various emergency services will be coordinated by an Emergency Coordinating Officer (ECO) who is likely to be a senior police officer but, depending on the circumstances, could be a senior fire officer. The ECO will liaise closely with the site main controller. Again depending on local arrangements, for very severe incidents with major or prolonged off-site consequences, the external control may pass to a senior local authority administrator or even an administrator appointed by the Central or State Government.

6.9.7.3 Roles of Major Hazard Works Managements

Where the local authority has the organization to formulate the plan, the role of works managements in off-site emergency planning will be to establish liaison with those preparing the plans and to provide information appropriate to such plans. This will include a description of possible on-site accidents with potential for off-site harm, together with their consequences and an indication of the relative likelihood of the accidents.

Advice should be provided by works managements to all the outside organizations which may become involved in handling the emergency off-site and which will need previously to have familiarized themselves with some of the technical aspects of the works activities, e.g. emergency services, medical departments, etc.

6.9.7.4 Role of The Local Authority

In some places the duty to prepare the off-site plan lies with the local authorities. They may have appointed an emergency planning officer (EPO) to carry out all this duty as part of the EPO's

roles in preparing for a whole range of different emergencies within the local authority area. The EPO will need to liaise with the works to obtain the information to provide the basis for the plan. Rehearsals for off-site plans are important for the same reasons as on-site plans and will need to be organized by the EPO.

6.9.7.5 Role of the Police

The police normally assume the overall control of an emergency, with a senior officer designated as emergency coordinating officer. Formal duties of the police during an emergency include protecting life and property and controlling traffic movements. The functions include controlling bystanders, evacuating the public, identifying the dead and dealing with casualties and informing relatives of dead or injured.

6.9.7.6 Role of the Fire Authorities

The control of a fire is normally the responsibility of the senior fire brigade officer who would take over the handling of the fire from the site incident controller on arrival at the site. The senior fire brigade officer may also have a similar responsibility for other events. Fire authorities having major hazard works in their area should have familiarized themselves with the location on site of all stores of flammable materials, water and foam supply points and fire-fighting equipments.

6.9.7.7 Role of the Health Authorities

Health authorities, including doctors, surgeons, hospitals, ambulances and so on, have a vital part to play following a major accident and they should form an integral part of any emergency plan.

For major fires, injuries will be the result of the effects of thermal radiation to a varying degree and the knowledge and experience to handle this in all, but extreme, cases may be generally available in most hospitals.

6.9.7.8 Roles of the Government Safety Authority

The Inspectors of Director General of Mines Safety are likely to want to satisfy themselves that the organization responsible for including the off-site plan has made adequate arrangements for handling emergencies of all types including major emergencies.

In the event of an accident, local arrangements regarding the role of the factory inspector will apply. In the aftermath, factory inspectors may wish to ensure that the affected areas are rehabilitated safely.

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CHAPTER–VII

PROJECT BENEFITS

7.0 INTRODUCTION

As we know that the stone, sand and Bajri are the back bone of infrastructure development and its demand is expected to increase further more in coming year to meeting demand of infrastructure development. The proposed project would enable to meet a small part of the growing demand in the state of Himachal Pradesh. Further, the proposed project will result in improvement of upliftment of social structure in the area. The people residing in the nearby areas will be benefited indirectly. It is anticipated that the proposed project will provide benefits for the locals.

The company will help in overall socio economic development of the area. The company has contributed substantially to the exchequer by way of royalty, excise and government taxes

7.1 DEMOGRAPHY BENEFITS

During the operational phase, about 18 people shall be employed. Considering that most of the skilled/unskilled personnel proposed to be employed for the proposed project shall be from within the study area, the proposed project would add to the population in the study area which results in better scope for indirect employment etc. in addition to the workforce the indirect employment also be generated for about 200 members or even more.

7.2 EDUCATION

Unskilled people and limited skilled people (depending on availability) shall be hired from local population. Due to economic growth of these people there may be chances to growth of education in that locality.

7.3 EMPLOYMENT

The man power requirements for the operational phase of the proposed project shall be about 18 persons. Many of these persons however shall be unskilled people and shall be satisfied from local population.

In addition to the direct employment mentioned above, there will be indirect employment of local people by utilizing their expertise in different areas like horticulture, site clearing, road development, etc. Also, due to secondary development in the study area, employment opportunities will be generated. About 50 or more people are expected to get indirect employment. Preference shall be given to local populace based on their qualifications, skill set and availability.

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7.4 CONCLUSION

M/s.Nandi Stone Crusher management have undertaken and will undertake various Socio Economic upliftment activities .Development Projects are planned after a participatory need assessment of the communities around the activity area. Each project has a one-year and a three-year rolling plan, with milestones and measurable targets. The objective is to phase out the presence over a period of time and then further hand over the reins of further development to the people. This also enables the company to widen their reach.

The company also co-ordinates with the government bodies, district authorities, village Panchayat and the end beneficiaries — the villagers. The Government has, in their 5-year plans, special funds earmarked for human development and the company recourses to many of these. At the same time, company also networks and collaborates with like-minded bilateral and unilateral agencies to share ideas and ensure that efforts are not duplicated.

The management supports the local administration and other form of assistance for the development of public facilities in the region. Mainly they are providing the basic amenities to nearby villagers for water distribution, building of schools, hospitals, etc. and all this adds to the economic positivity and benefits to the locals of the activity area.

In conclusion we may write that the Project Proponent proposes to enhance production of sand, stone & Bajri from same lease area. There will be further generation of direct and indirect employment due to this project. There will be increase in revenue generation to the government by way of royalty, excise and government taxes. There will be further improvement in infrastructure like education, roads, availability of drinking water, medical facilities in adjacent villages. The increase in earnings of local villagers who will get employment in the limestone mine and due to increased spending on social welfare measures by the company will provide better standard of living for the villagers.

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CHAPTER–VIII

ENVIRONMENTAL MANAGEMENT PLAN

8.1 INTRODUCTION

Utilisation of non-renewable resources of the study area and within the limits of permissible capacity. The assimilative capacity of the study area is the maximum amount of pollution load that can be discharged in the environment without affecting the designated use and is governed by dilution, dispersion and removal due to physico-chemical and biological processes. The EMP is required to ensure sustainable development in the study area of 10 Km radius of the proposed mining site; hence it needs to be an all encompassive plan for the proposed activity. Government regulating agencies like Pollution Control Board working in the region and more importantly the people living in the study area need to extend their co-operation and contribution.

It has been evaluated that the study area has not been affected adversely with the proposed activity and likely to get new economical fillip, not only for the study area but also for the region as a whole. Mitigation measures at the source level and an overall management plan at the study area level are elicited so as to improve the supportive capacity of the receiving bodies. The EMP aims at controlling pollution at the source level to the possible extent with the available and affordable technology followed by treatment before they are discharged.

Environmental management for the proposed mining activity is discussed for the environmental impact pertains to the operational phase. Even though reversible in nature - all the impacts will be visible only during operational phase. It is planned to take corrective measures to ensure that these effects are kept to bare minimum. The EMP will therefore, be initiated during planning stage itself.

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 the 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 men and populace.
- Ensure effective operation of all control measures.

- Vigilance against probable disasters and accidents.
- Monitoring of cumulative and long time impacts.
- Ensure effective operation of all control measures.

Environmental Management Plan (EMP) aims at the preservation of ecological system by considering in-built pollution abatement facilities at the proposed site. Some of the major criteria governing the environmental measures will be adopted, and the same is described in ensuring paragraphs.

8.2 POLLUTION CONTROL MEASURES

8.2.1 Air Pollution Control

The proposed mining operations are not anticipated to raise the concentration of the pollutants beyond prescribed limits. However, the following measures would be adopted to mitigate the pollution levels in ambient air. Dust particles generated during various mining activities when become airborne lead to increase in particulates level in the ambient air. The major source of dust generation is the transport of material by trucks and tractor trolleys. Adequate control measures shall be taken during mining operations as well as transportation of minerals. The following measures will be taken to mitigate the fugitive dust from different operations.

8.2.2 Prevention and control of Dust Pollution

The main pollutant in air is Particulate Matter (PM_{10}), which is generated due to various mining activities. However, to reduce the impact of dust pollution the following steps are being taken during various mining activities.

a. During loading operation

No machinery shall be used in loading process. Loading will be done completely manual method.

b. During Transport operation

All the haulage roads in the area are being kept wide, levelled, compacted and properly maintained and water is sprayed regularly during the shift operation to prevent generation of fugitive dust due to movement of vehicles.

c. Plantation work :

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

d. Monitoring of air pollution

Periodic air quality survey is being carried out to monitor the quality and for timely corrective actions.

e. Laying of haul roads as per the standards to avoid or eliminate air – borne dust.

f. Watering of haul roads and other roads at regular intervals

g. Spraying of water on permanent transport roads at required frequencies.

h. Provision of dust filters / mask to workers working at highly dust prone and affected areas.

i. Provision of green belt by vegetation for trapping dust.

j. Greenbelt development along the haul roads, dump and along the boundaries of the lease area.

k. Utmost care will be taken to prevent spillage of sand and stone from the trucks.

The extracted mineral should be transported from the mine to crusher and the end user by adopting following measures so as to minimize dust emissions.

- Speed of the vehicles should be maintained with in the prescribed limits.
- Trucks should not be over loaded and should be maintained to the body level.

8.3 Noise Environment

As there will be no heavy earth moving machinery there will not be any major impact on noise level due to sand mining and other association activities a detailed noise survey has been carried out and results were cross referenced with standards and were found to be well within limits.

Blasting technique is not used for sand and stone lifting, hence no possibility of land vibration. It was found that the proposed mining activity will not have any significant impact on the noise environment of the region. The only impact will be due to transportation of sand and stone by trucks and tractor trolleys.

The following control measures shall be taken to keep the ambient noise levels well within limits:

- Use of personal protective devices i.e., earmuffs and earplugs by workers, working in high noise areas.
- The greenbelt with species of rich canopy around the lease area and along the roads will further attenuate the noise levels.
- Conducting periodical medical check up of all workers for any noise related health problems
- Proper training to personnel to create awareness about adverse noise level effects.
- Planned noise monitoring at suitable locations in the mine and outside location for proper effective remedial actions.
- Minimum use of horns and speed limit of 10 kmph
- Timely maintenance of vehicles and their silencers to minimize vibration and Sound.
- Care will be taken to produce minimum sound during sand and stone loading.

The greenbelt, which is being provided, will act as noise attenuator. With the noise abatement measures (as indicated above), it is expected that the noise levels will be maintained in compliance with DGMS standards.

8.4 Water Environment

8.4.1 Surface Water

The major source of surface water pollution due to sand mining is insignificant, however the following measures shall be undertaken to prevent water pollution.

- Utmost care will be taken to minimize spillage of stone and sand.
- Drainage around the mining area would be undertaken so that no rain water do not enter the mining pits.
- Plantation will be under taken as per green belt development plan enclosed in approved mining plan

8.4.2 Ground Water

There would not be any adverse effect on the ground water quality. The mineral formation does not contain any harmful element, which could percolate into the ground and pollute the ground water. Hence, no control measures are required.

However, regular monitoring of quality in the existing hand pumps/tube wells in the vicinity would be carried out both with reference to area and times intervals to study the hydrodynamics of the strata.

8.5 Land Environment

Any mining activity may alter the land use pattern in the lease area. In order to minimise the adverse affects, the following suggestions have been made. Degradation of land is not a very significant adverse impact of river bed mining due creation of access roads, mining operations, transportation of mined material. In order to prevent the environmental degradation of leased mine area and its surroundings, the following measures shall be taken;

- Minimal damage to the flora standing around the lease area.
- Operations during daylight only.
- No foreign material should be allowed to remain/spill in lease area and catchments area, or no pits/pockets will be allowed to be filled with such material,
- No stockpiling of harvested sand and stone shall be done outside the lease area.

Movement of the vehicles on the road will be increased; however, non metalled road leading to sand and stone mining area will be sprinkled with water at regular intervals. In addition to prevent spillage by trucks/tractor trolley, over loading should be controlled along with speed limit.

There will be minimum numbers of access roads to lease area. No Access points to the lease area shall be from the river bed side.

8.5.1 Plantation and Soil Conservation

The main objective of the green belt is to provide a barrier between the source of pollution and the surrounding areas. The green belt helps to capture the fugitive emission and to attenuate the noise generated apart from improving the aesthetics. Development of green belt and other forms of greenery shall also prevent soil erosion and washing away of topsoil besides helping in stabilizing the functional ecosystem and further to make the climate more conducive and to restore water balance. While making choice of plant species for cultivation in green belts, weightage has to be given priority to the natural factor of bio-climate. It is also presumed that the selected plants will be grown as per normal horticultural (or forestry) practice and authorities responsible for plantation will also make sure that adequate provision for watering and protection of the saplings exists at site.

Soil Quality will be monitored on yearly basis in the area surrounding the core zone used for agricultural activity to check for any negative impacts on the soil quality.

Year wise plantation activity shall be undertaken as proposed in the approved mining plan.

8.5.2 Post mining land use

As the mining lease area is part of old river bed and at a safe distance of about 100 meters from the river bank, and it belong to private individuals, it would be converted into agricultural fields surrounded by plantation undertaken during the mining period.

8.6 Biological Environment

The mining activity will have insignificant effect on the existing flora and fauna. Data have been collected from various Government Departments such as forests, agriculture, fisheries, animal husbandry and various offices to establish the pre project biological environmental conditions. The project area is surrounded by reserved forests on the banks are also lined with agricultural land. The purpose of the project itself is to convert the existing not cultivable land into land suitable for agriculture and horticulture. It was found that the sand and stone mining activity will not have any significant impact on the biological environment of the region.

8.6.1 Mitigation of Impacts on Biological Environment

There is a requirement to establish a stable ecosystem with both ecological and economic returns. Minimization of soil erosion and dust pollution enhances the beauty of the core and the buffer zone. To achieve this it is planned to increase plantation activities. The basic objectives of plantations are as follows.

- Improvement of Soil quality
- Quick vegetative cover to check soil erosion
- Improvement in river bank stability

- Conservation of biological diversity

8.7 OCCUPATIONAL HEALTH AND SAFETY MEASURES

Occupational health and safety (OHS) is a cross-disciplinary area concerned with protecting the safety, health and welfare of people engaged in work or employment. The goal of all occupational health and safety programs is to foster a safe work environment.

To control and minimize the risks at workplace, Nandi Stone Crusher implements Health, Safety and Environment Policy with the following objectives:

- To prevent hazards
- To provide safe and healthy environment to all the employees.

The company, therefore, adopts the policy set below for the purpose of creating and maintaining safe and healthy environment.

8.7.1 Occupational health hazards at mine site:

Mining activity experiences risk of a number of hazards. Some examples of such hazards are as under:

- Exposure to dust
- Noise exposure;
- Physical Hazards;
- Vehicular movements and other related issues.

These mainly impact on those working within the mine although health hazards can also impact on local communities.

8.7.2 Implementation of Occupational Health and Safety Measures

Occupational Health & Safety measures result in improving the conditions under which workers are employed and work. It improves not only their physical efficiency, but also provides protection to their life and limb. Management will consider the following safety measures:

- Safety clauses in contract order
- To depute dedicated safety team
- Inspection and maintenance of equipments and accessories
- Pre placement and periodic health check up
- Removal of unsafe conditions and prevention of unsafe acts
- Detailed analysis of each and every incident
- To provide standard PPEs and ensure its uses
- Periodic inspection by internal and external safety experts
- Celebrations of various safety events for awareness
- Medical facilities & first aid boxes will be established in the mine premises.

Besides, following points are also taken care of during mine operation for assuring safety of workers:

- Health Awareness Programmes and camps are organized and will be done in future too.
- The mine workers are provided all necessary PPE, especially dust masks for their safe guard from dust, Ear Plugs/Ear Muffs for noise and measures for other hazards. The fresh employees when taken are thoroughly medically examined under initial medical examination and thereafter during continuation of employment; the periodic medical examination will be conducted. The examination includes apart from the general observation, the Chest X-ray, Lung function Test, Spirometry, Auditory are conducted and the record of the same are maintained and submitted to the concerned authorities.
- Under initial vocational training, the workers are given training related to all safety and health aspects pertaining to their vocation and thereafter every quarter, special training courses/ Awareness programme for Malaria eradication, HIV and health effects on exposure to mineral dust are organized for employed person as well as for nearby villagers.
- **The Occupational Health Surveillance Programme:** A team of qualified doctors and nurses visit periodically for health check up of all the workers, team and its records is maintained properly.

8.8 ENVIRONMENTAL MONITORING PROGREMME

Details of the Environmental Monitoring Programme have been incorporated in Chapter V (Environmental Monitoring Programme) of this report.

8.9 Socio-Economic Environment /Corporate Social Responsibility

This project operation will provide livelihood to the poorest section of the society. The overall impact of riverbed mining of sand stone and bajri on the social economics of the area shall be a very positive one, as not only it will generate employment opportunities for local population at mine site but also in associated activity i.e. at stone crushing plant , for transportation of mined material, etc . It will also give a good boost to the general economy of the area.

About 18 persons shall be employed at mine site. And approximately 200 people are to be benefited directly or indirectly by the project.

The project proponent as corporate social responsibility agrees to provide free of cost boulders, bajri and sand for social projects as Panchayat ghar, schools in the area besides carrying out extensive tree plantation.

The proposed mining activity is expected to provide stimulus to socio-economic activities in the region and thereby accelerate further development processes.

8.10 Cost Provision for Environmental Measures

It is proposed to invest a capital cost of Rs. 3.50 lakhs on pollution control, treatment and monitoring systems with recurring amount of Rs.0.7 lakhs per annum. The break-up of the investment is given in the following **Table-8.7.1**.

TABLE-8.7.1

COST PROVISION FOR ENVIRONMENTAL MEASURES

S. No	Title	Recurring Cost Rs. in Lakhs	Capital Cost Rs. in Lakhs
1.	Monitoring of Air, Water ,Soil etc.	0.2	0.6
2.	Air Pollution Control- Management of Haulage Roads including Sprinkling	--	0.8
3.	Plantation and check dams as per Mining plan	0.3	1.0
4.	Disposal and spreading of Silt/clay as per Mining Plan	--	0.4
5.	Occupational Health Measures Provision of PPE and other Miscellaneous expenditure	0.2	0.7
	Total	**0.7**	**3.5**

8.11 CONCLUSION

As discussed, it is safe to say that the proposed project is not likely to cause any significant impact on the ecology of the area, as adequate preventive measures has been adopted to contain the various pollutants within permissible limits. Green belt development around the area is been developed and also be taken up as an effective pollution mitigative technique, as well as to control the pollutants released from the premises of Nandi Stone Crusher and will developed the greenbelt as per the programme to improve aesthetic beauty of the area .

CHAPTER–IX

SUMMARY AND CONCLUSION

9.1 INTRODUCTION

M/s.Nandi Stone Crusher, a partnership concern, with Sham Singh Mankotia and Parmod Singh as partners, at village Pail, P.O. Khandwal, Tahsil Nurpur, District Kangra, Himachal Pradesh. The mining lease was granted for mining of sand, stone and bajri vide letter No. Udhyog-Bhu (Khani-4) Laghu – 502/09 - 6076 dated 13.09.2010 for a period of five year. The stone was used in a captive stone crushing unit.

As per the New EIA Notification dated 14 September, 2006, the mining project falls under category 'A', project activity 1(a) (3).

9.2 JUSTIFICATION FOR THE PROJECT

The following points show the justification for the implementation of the proposed mining project:

- The project involves mining / collection of about 68000 MTPA of sand, stone and bajri from old river bed of Chakki Khad for a stone crushing unit to be set by the project proponent.
- The total area of mine lease is 8-64-00 Hectares. The proponent has been granted mining lease for mining of sand, stone and bajri for a period of five years for the extraction of sand, stone & Bajri for use in already established stone crusher unit.
- The project will generate employment for approx.18 persons during mine operation; preference will be given to the local people.
- There will not be any kind of major pollution due to the mining activity, as proper pollution control measures will be implemented with environment friendly technology. There will be **"Zero Water Discharge"**, as the domestic wastewater generated from the mine office will be disposed off to soak pit via septic tank.
- Water spraying on muck pile, Use of Murrum, Road Compactor & water spraying on haul roads will be done.
- Green belt will be developed as dust preventive barrier
- No National Park, Biosphere Reserve, Wild Life Sanctuary, exists within the study area.

9.3 BRIEF DESCRIPTION OF THE PROJECT

Table-9.3.1
Description of the Project

S. No.	Particulars	Details
1.	**Lease Area Details**	
	Total Lease Area (in hectares)	8-64-00 Ha.
2.	**Location Details**	
	Village	Pail
	Tehsil & District	Nurpur, Kangra Dist.
	State	Himachal Pradesh
	Latitude	32^0 17' 25.3" N to 32^0 17' 40.7" N
	Longitude	75^0 46' 31.2" E to 75^0 46' 43" E
	Toposheet No.	43 P/15
Project Detail		
3.	Annual Turnover	Rs. 50,88,000
4.	Cost for Environmental Protection	➢ Capital Cost Rs. 3,500,00 ➢ Recurring Cost Rs. 700,00/ annum
Climatology (Post Monsoon Season: October to December, 2010)		
5.	A. Temperature	Maximum : 43 ^{0}C Minimum : 22 ^{0}C
	B. Relative Humidity At 8:30 hrs. At 17:30 hrs.	18 % to 68 % 18 % to 77 %
6.	Dominant Wind Direction	NW
	Project Site Vicinity Details	
7.	Nearest Village	Pail
8.	Nearest Railway Station	Pathankot
9.	Nearest National Highway	N.H.-20
10.	Nearest Airport	Pathankot
11.	Nearest city	Pathankot
12.	Nearest Water Body	Chakki Khad
13.	Place of Archaeological Importance	Nil within the study area
14.	Ecological Sensitive Areas	Nil within the study area
15.	Industries/Mines falling in 10 km radius of the area	Stone crusher units and Pharmaceutical industries
16.	Seismic Zone	Zone – V [as per IS 1893 (Part-I): 2002]

9.4 MINING DETAILS

Table – 9.4.1

Mining Details

S. No.	Particulars	Details
1.	Method of mining	Opencast, Manual Method
2.	Mineable Reserve	160000 metric tons
3.	Life of the Mine	Deposit Replenish-able (Mine lease for 05 Years)
4.	Ultimate Pit Slope angle	45^0
5.	Elevation Range	433m – 437m
6.	Ultimate Working Depth	One metre from Bed level
7.	Total waste generation till the end of life of mine	50000 metric tonnes.
8.	Stripping Ratio (mineral in tonnes to over burden in m^3)	5.0

9.5 MITIGATION MEASURES

9.5.1 Strategy to Control Air Pollution

- The vehicles used for transportation are loaded as per their capacity.
- All the haul roads are kept properly graded with sufficient width and regular water spraying is done on the haul roads.
- Personal Protective Equipments like dust masks, ear plugs/ear muffs, goggles, helmets, safety shoes, hand gloves, etc. are provided to employees.
- Proper maintenance (preventive as well as scheduled maintenance) of vehicles are carried out regularly for minimization of generation of gaseous pollutants.
- Development of green belt/plantation is being done around the lease boundary, sides of approach roads and other places to arrest dust.
- Periodic air quality monitoring is carried out.

9.5.2 Reclamation Plan for Land use

Total mining lease area is 8-64-00 hectare.

After the completion of mining in the ultimate pit at 345 metres level the area would be leveled as far as possible. The entire silt and clay would be spread all over the area making it suitable for agricultural and / or horticultural purpose, depending upon the preference of the land owners, it being private land.

Post Mining Management Plan

In view of the fact that the land is privately owned and after mining it will revert back to the owners and they will be putting it to best possible economic use of either agricultural and / or horticultural purpose, no special 'Post Mining Management Plan' is envisaged.

Phase wise Green belt Development.

During the period the area is used for mining purposes, plantation of the safety belt around lease area will be undertaken. After the first year and subsequent years the plantation would be done in the abandoned benches.

9.5.3 Strategy to Control Water Pollution

- Garland drains are provided all around the pits and dumps.
- The rain water collected is preserved in the bottommost bench of pits and then it used for plantation, dust suppression work, washing of equipment etc.
- Septic tanks and soak pits have been provided for the disposal of domestic effluent generated from mines office.
- Waste water generated at mines workshop is treated with the help of oil-water separators and the treated water is recycled/used for dust suppression work.

9.5.4 Noise Abatement and Control

- Plantation has been carried out around the pit periphery, dump sides, along mining lease boundary and sides of haul roads, etc. The greenbelt minimizes propagation of noise.
- In order to reduce the effect of noise pollution, ear plugs /earmuffs are provided to all employees.
- Proper maintenance, oiling and greasing of machines at regular interval reduces generation of noise.
- Selection of equipments has been done which generate less noise.
- Confining the noise generating sources.
- Controlled blasting is being done to minimize noise, ground vibration, fly rock and air overpressure.
- Periodical noise level monitoring is carried out

9.5.5 Solid Waste Mitigation Measures

During the excavation of stone, bajri and sand from the bed silt and clay are also quarried being associated minerals. The silt and clay which will be generated to the extent of 60000 Metric tons for the life of the mine will be left in the pits as back fill.

A site within the mining area has been designated as per the approved mining plan to store the waste silt and clay during the mining of first bench. After the first bench is exploited fully / exhausted the waste material from the dump would be spread over the abandoned first bench and waste of the second bench would also be spread over the abandoned bench. This process will continue till exhaust of the mineral in the final bench.

9.5.6 Green Belt Development

The company has planned to develop greenbelt in the area. It is proposed to plant about the trees as per green belt development plan in and around the lease area at the end of life of mine. This will help in reducing the spread of pollutants and will also be effective in attenuating noise levels.

9.6 CONCLUSION

There is no significant pollution of air, water, soil and noise. Regular monitoring of all the components of environment is being by the Project Proponent.

There will be increase in revenue generation to the government by way of royalty, excise and government taxes. There will be further improvement in infrastructure like education, roads, availability of drinking water, medical facilities in adjacent villages. The increase in earnings of local villagers who will get employment in the limestone mine will result in better standard of living for the villagers.

Due to increased spending on social welfare measures by the company there will be improvement in standard of living for the villagers.

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CHAPTER–X

DISCLOSURE OF CONSULTANTS

Idma Laboratories Limited the group's Flagship Company was incorporated in 1984. It is a multidisciplinary center for excellence in testing and analysis including capacity building. **Punjab Agri Food Parks Limited (PAFPL)** was incorporated in 2002 is a dedicated agricultural hub that has the resources and infrastructure to provide world-class facilities and services for demand driven agriculture and better farming practices. **Punjab Agri Ventures Limited (PAVL)** incorporated in 2004 is a state of the art, horticulture & food-processing complex. Founded in 1999, **Idma Foundation for Sustainable Development** works on environmental problems associated with development. It is registered under the Societies Registration Act XXI of 1860 at Chandigarh, India as a not-for-profit organization.

Idma represents our corporate philosophy- **I**nvest energy and ingenuity in programme areas; **d**evelop knowledge networks for new insights through interaction of different perspectives and approaches; **m**anage resources in a sustainable manner and be **a**ccountable.

IDMA Laboratories Ltd. has its own Environmental Laboratory at Plot No. 391, Industrial Area, Phase I, Panchkula (Haryana) approved by the **Ministry of Environment & Forests**, Govt. of India, New Delhi vide notification No.1150(E) dated 22.05.2012. The Environmental Laboratory is also approved by the **National Accreditation Board for Calibration and Testing Laboratories (NABL)** vide certificates no. T-0187 dated 25.05.2012 as ISO/IEC -17025: 2005 in chemical testing and T-0188 for Mechanical testing. The laboratory also recognized by **Bureau of Indian Standards (BIS)** vide Ref.No.CI/COAPD/OSL (9123236), dated 04 July, 2011.

IDMA is offering Environmental Consultancy Services in various sectors viz River valley, Hydel, Drainage and Irrigation projects, TSDFs, Building and large construction projects etc.

PROJECT TEAM

EIA Coordinator	Dr. Shalini Gupta
Deputy EIA Coordinator	Mr. S.C Sharma

Functional Area Experts:

S. No.	Functional Areas	Name of the experts	Name of Associate Expert
1.	Land Use	P. Radhkrishnamoorthy Mr. S.C Sharma	
2.	Air Pollution Prevention, Monitoring & Control	Dr. P.K.Aggarwal Dr. Shalini Gupta	Ms.Pooja Mittal
3.	Water Pollution Prevention, Control & Prediction of impacts	Mr. N.D.Behl Dr. Pramod Kumar	Ms.Ragini Sharma
4.	Meteorology , Air Quality Modeling & Prediction	Dr. Shalini Gupta	Ms.Ragini Sharma and Ms.Pooja Mittal
5.	Ecology and Biodiversity	Dr. Pramod Kumar	Mr.Paramanand Rai,Ms.Ragini Sharma and Ms.Pooja Mittal
6.	Socio- Economic	Dr. Puran Chandra Joshi	
7.	Noise/ Vibration	Mr. Arun Kumar Yadav	Ms. Anita Kumari
8.	Geology	Mr. S.C Sharma	
9.	Hydrology, Ground Water & Water Conservation	P.RadhaKrishnamoorthy	
10.	Risk Assessment & Hazard Management	Mr. Arun Kumar Yadav	Mr. Ankush Aggarwal
11.	Solid Waste and Hazardous Waste Management	Mr. Ankush Aggarwal	Ms.Ragini Sharma
12.	Soil Conservation	Mr. M.K. Dwevedi	Ms.Pooja Mittal

Declaration

I, **Dr. P.K Aggarwal**, Managing Director, hereby, confirm that the above mentioned experts prepared the EIA report of M/s.Nandi Stone Crusher. Village- Pail, P.O- Khandwal, Tehsil- Nurpur, District Kangra, Himachal Pradesh. I also confirm that I shall be fully accountable for any misleading information mentioned in this statement.

Signature
Name: Dr. P.K Aggarwal
Designation: Managing Director