

EXECUTIVE SUMMARY OF ENVIRONMENTAL IMPACT ASSESSMENT REPORT

(Submitted for Public Consultation as per EIA Notification)

IN FAVOUR OF:

**SUNIL KUMAR GARG
PROP M/S SHIV BHAWANI STONE CRUSHER
VILLAGE & P.O. – DABHOTA,
TEHSIL-NALAGARH, DISTRICT- SOLAN,
HIMACHAL PRADESH.**

**FOR RIVER BED MINING OF MINOR MINERALS: SAND, STONE AND BAJRI,
KHASRA No 2232/1324,2261/1535.2265,/1539 ,1804,1923/1,904/843/3,856/180,199/1
TOTAL 36.8845 Ha FALLING IN MAUZA /MOHAL RATYOR & BHANGLAN
TEHSIL-NALAGARH,
DISTRICT-SOLAN
HIMACHAL PRADESH**

Submitted By:

**SHIVALIK SOLID WASTE MANAGEMENT LTD.
(UPL ENVIRO INFRASTRUCTURE GROUP CO),**

**VILLAGE MAJARA P. O. DABHOTA, TEHSIL NALAGARH DIST. SOLAN,
HIMACHAL PRADESH.**

1.0 INTRODUCTION

PURPOSE OF THE REPORT

The Environmental Impact Assessment Report of Mining Lease for collection of Sand, Stone and Bajri situated in Khasra No **2232/1324, 2261/1535.2265,/1539 ,1804,1923/1, 904/843/3, 856/180,199/1** Measuring **36.8845 Ha** for maximum production of 94500 TPA from the bed of Pali Mahadeo falling in **MAUZA /MOHAL RATEYAR & BHANGLAN** in Tehsil Nalagarh, District Solan, Himachal Pradesh has been prepared in accordance with the Terms of Reference approved by Expert Appraisal Committee on Mining Projects in its Meeting held on 24-26th August, 2011. The project has been considered as Category-A project because of interstate boundary with Punjab at a distance of within 10 Km thus sent to EAC, MoEF, Government of India for clearance.

The report follows the Generic structure of Environment Impact Assessment Document, given in Appendix III/IIIA of EIA Notification, 2006.

IDENTIFICATION OF PROJECT & PROJECT PROPONENT

PROJECT

Mining Lease for Sand, Bajri and Boulders situated in Khasra No. **2232/1324, 2261/1535 .2265,/1539 ,1804,1923/1, 904/843/3, 856/180,199/1** Measuring **36.8845 Ha** for maximum production of 94500 TPA from the bed of Pali Mahadeo River in **MAUZA /MOHAL RATEYAR & BHANGLAN** in Tehsil Nalagarh, District Solan, Himachal Pradesh

PROJECT PROPONENT

The project proponent is Sunil Kumar Garg, Proprietor M/S Shiv Bhawani Stone Crusher, The contact person for the purpose is-

SUNIL KUMAR GARG

PROP M/S SHIV BHAWANI STONE CRUSHER

VILLAGE & P.O. – DABHOTA,

TEHSIL-NALAGARH, DISTRICT- SOLAN,

HIMACHAL PRADESH.

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

The proposed mine is located at at Longitude: 76° 37' 44"E and 76° 40' 26"E /Latitude: 31° 05' 42."N and 31° 06' 55"N

Maps/Figure attached in the main report

Drawing-1: Topographic Sheet

Drawing:2. Google View

Drawing-3; Location Map

Drawing-4; Contour and Geological Map

Drawing-5 Year wise Working Map

SIZE: The project fall under category A project at S.No. 1(a) (i) <50 ha ≥ 5 ha .of mining lease area because of interstate boundary with Punjab is within a distance of 10 Km. The proposed mining area is **36.8845** ha for maximum mining of 94500 TPA Total yearly projected production is:

- (1) Ist Year 72900 MT
- (2) IInd year- 72900 MT
- (3) IIIrd year- 74300 MT
- (4) IVth year- 76200 MT
- (5) Vth year- 77000 MT

The method of mining shall be manual, No blasting shall be done.

IMPORTANCE OF THE PROJECT:

The urban sector in India presents an attractive investment proposition. Increased disposable incomes, easy availability of loans and a general reduction in applicable interest rates coupled with encouragement to genuine buyers by the central government in the form of income tax benefits are some of the factors that have fuelled demand for quality urban infrastructure developments.

Achieving such a huge infrastructure requires basic building materials and stone, sand and bajri is one of primary building material required for the purpose. The mining projects as such are the backbone of all construction and infrastructure projects as the raw material for construction is available only from such mining.

2.0 PROJECT DESCRIPTION

MAGNITUDE OF OPERATION

The project as submitted in Chapter-II is Proposed. It is a mine of only **36.8845** Ha for maximum mining of 94500 TPA Total material handling including waste material shall be:

- (1) Ist Year 94600 MT
- (2) IInd year- 94600 MT
- (3) IIIrd year- 97100 MT
- (4) IVth year- 99000 MT
- (5) Vth year- 100000 MT

No Blasting shall be done.

Achieving a huge infrastructure as being envisaged by Government of India particularly in road and housing sector requires basic building materials. The stone, sand and bajri is one of primary building material required for the purpose. The mining activities as proposed are the backbone of all construction and infrastructure projects as the raw material for construction is available only from such mining.

There is no National Park, Sanctuary, Elephant/Tiger Reserve, eco-sensitive area, migratory routes within 10 km of the project site. The joint inspection report by the team of Himachal Pradesh Government has also clarified that there is no Forest Land involved. It has also clarified that there is no activity of the forest department in the area as soil conservation works, nursery plantation, check dams, taming of stream nor there is any property of the Forest Department nearby which may have direct effect if mining is allowed. The project is, however, at an aerial distance within 10 kms from the interstate boundary of Punjab and thus sent to EAC, MoEF, and Government of India for clearance

PROPOSED SCHEDULE FOR APPROVAL & IMPLEMENTATION

The proponent has been granted mining lease for mining sand, stone and bajri vide letter Nos. Udyog-Bhu(Khani-4)Laghu 317/2001-9668 dated 29-01-2009 for a period of five years.

Following approvals are in place and documents are attached in main report:

A-I: Approval Letter from Department of Industries, Government of H.P-Grant of mining Lease

A-II: Joint Inspection report from SDM, Forest Department, Pollution Control Board, PWD and IPH Department.

A-III: NOC from Village Panchayat.

A-IV: Mining Plan

TECHNOLOGY & PROCESS DESCRIPTION

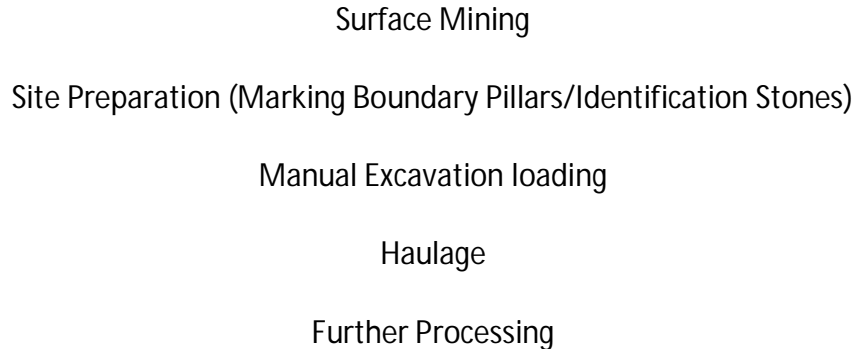
As per Environmental Impact Assessment Guidance Manual for -MINING OF MINERALS released by MoEF- the project is a surface mining.

The project does not involve any processes as overburden removal, drilling, blasting and processing. The mining will involve collection of material by simple hand tool, sorting, manual picking, stacking and loading into trucks/tractor –trolley for transporting. The pits from where the material is picked are not deeper than one meter as allowed in mining lease

and shall follow the normal channel direction of the khad. These get replenished during monsoon. No ballasting is done. The only waste is silt/clay which is added back to the pits.

PROJECT DESCRIPTION

The Process Flow diagram is given below:



There is no source of air pollution like Flue Gas emissions from boilers, furnace etc. The water required is only for drinking purpose and toilet needs of 15-20 workers for which toilet with septic tank is to be provided at Stone Crusher site. The water is further required for sprinkling on haulage road which is done twice a day in morning and evening with a tanker. The crusher is at a distance of **6000 m** from the mining area. . Water shall be sprinkled as per requirements by using a tanker. Daily 10 tractor-trolley move to and fro from the mining site to the crusher and make about 9 turns each only.

WASTE MATERIAL

A total of 111400 metric tonne of waste shall be generated in five years that is silt and clay which do not have market value as below:

Year	Silt/ Sand- clay mixture	Generated Clay
1 st year	11300	10400
2 nd year	11300	10400
3 rd year	11600	10600
4 th year	11900	10900
5 th year	12000	11000

The material is spread back over the river bed.

SUMMARISED INFORMATION ABOUT ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT

The proposed project falls under Item 1 (a) (Mining of Minerals) as per Environmental Impact Assessment Notification dated 19 January,2009. The project will fall under Category A and will require environmental clearance from the Ministry of Environment and Forest (MoEF).

An EIA/EMP study report has been prepared for this project for the period of October to December 2011. Identification & prediction of significant environmental impacts due to the proposed Mining activity with an Environmental Impact Statement followed by delineation of appropriate impact mitigation measures in an Environmental Management Plan are included in the EIA Report.

The purpose of this Environmental Impact Assessment (EIA) study is to provide information on the nature and extent of environmental impacts arising from the construction and operation of the proposed project.

The Environmental Impact Assessment (EIA) for proposed sand and stone mining activities of area deals with detailed studies for various environmental components viz., air, water, land, noise, biological and socio-economic environment which represent the existing environmental scenario.

For the environmental impact studies, an area covering 10 km distance from the boundary of mining lease areas was identified as study area (impact zone). The environmental attributes, parameters, stations, height (RL), distance and direction with respect to the core zone were studied. The report incorporates the data collection during the period of October to December 2011. Secondary data was collected from various government departments, boards, public sector, educational and scientific institutions.

- ☐ The collected meteorological data during this season represented the local weather phenomena. The predominant wind direction of the study area is from NE.
- ☐ The monitored ambient air quality in the core & buffer study area was found to be in compliance with the National Ambient Air Quality Standard (NAAQS)
- ☐ Ambient equivalent noise levels (Leq) during day and night times were found to be well within the CPCB Norms of Industrial & Commercial area limits.
- ☐ The water quality of surface water and ground water was found to be in compliance with BIS/CPCB Norms
- ☐ The soil in the study area would very well support vegetation after amending it suitable with manure the yield will increase.
- ☐ The native species of plants and animals will be protected by mitigating the affecting factors.
- ☐ The proposed lease area is located on Pali Mahadeo river bed .The Pali Mahadeo river flows towards the South-western side before it confluences with River Satluj.

BASELINE ENVIRONMENTAL STATUS

Attribute	Baseline status
Ambient Air Quality	Ambient air quality was monitored at 4 locations within a 10 km distance from the project site. The observed RSPM levels were in range of 34.0 to 77 µg/m ³ , while SPM was in range of 45.0 to 199 µg/m ³ . The range of SO ₂ and NO _x was 2.7 to 6.7 µg/m ³ and 4.2 to 14.4 µg/m ³ respectively. The CO was recorded less than 1.0 ppm.
Noise Levels	Noise monitoring was carried out at three locations. The results of the monitoring program indicated that both the daytime and night time levels of noise were well within the prescribed limits NAAQS at all the four locations monitored.
Water Quality	2 Groundwater samples and 2 surface water samples were analyzed and concluded that the: <ul style="list-style-type: none"> ☑ Ground water at the site is safe for use as potable water. ☑ Surface water is suitable for drinking purpose only after chemical and biological treatment; however it is suitable for bathing purpose.
Soil Quality	The proposed site is characterised by highly variable stratified soils. Soil of the area is almost neutral with pH of 7.32 – 7.36
Biological Environment	There are no Ecologically Sensitive Areas present in the study area, but many reserved forests regions surround the project area
Socio-economy	The study area falls under Solan District of HP. The percentage of literate population is 85.02%. The sex ratio for the area is 884:1000. In the study area maximum number of people is found to be dependent on the agricultural activities.

ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATING MEASURES

Anticipated Impacts Due To Access Roads

Plying of trucks and tractor trolleys from public road to river sand, stone and Bajri collection points needs access roads. Majority of such access roads are following the same alignment of existing roads/tracks being used by pedestrians/cart owners. Movement of heavy vehicles sometimes cause problems to cattle post, agriculture land, human habitations due to dust, noise and movement of public, and also causes traffic hazards. These environmental problems are felt more as the background is rural in nature.

Mitigation of Impacts on Access Roads

Movement of the vehicles on the road will be increased; however, unmetalled road in the

sand and stone mining area will be sprinkled with water at regular intervals. In addition to prevent spillage by trucks and tractor trolleys over loading should be controlled along with speed limit.

There will be minimum numbers of access roads to river bed, as cutting river banks should be avoided and ramps are to be maintained. Access points to the river bed are to be decided based on the following-

- ☒ Least steepness of river bank,
- ☒ Where steepness cannot be avoided access ramps should be constructed,
- ☒ Haulage roads parallel to the river bank and roads connecting access (ramps) to the river bed shall be away from bank, preferably a minimum of **100 mts.** away,
- ☒ Access roads from the public roads and up to the river bank should be aligned in such a way that it would cause least environmental damage,
- ☒ For particular operations approaching river bed from both the banks should be avoided.

Impact on Water Environment

Damage in the water body, depends on its assimilative capacity. To find out assimilative capacity of receiving water body, water samples were collected from different Well, Bore Well, and other water bodies. The study indicates that assimilative capacity of the River water bodies still exists, but effective measures should be taken to check water pollution. To find out the effect on ground water hydro-geological data has been collected and from the study it can be safely concluded that there is no noticeable effect on surrounding ground water resource due to mining. Therefore the water bodies will not be affected. The sand, Stone and Bajri mining activity will not have any significant impact on the water environment of the region.

Mitigation Measures to Control Water Pollution

- The major source of surface water pollution due to Sand, Stone and Bajri mining is insignificant.
- Utmost care will be taken to minimize sand and stone spillage.
- Drains and their Catchments will be constructed just beside the access roads so that the storm water gets settled before flowing to the river.

- The washing of trucks and tractor trolleys in the river will be avoided.
- Plantation along the river banks will be done in consultation with Village Panchayat to arrest the velocity of the storm water.

Impact on Air Environment

Information on air quality was studied and Caline-4 modelling technique predicted that the Sand, stone and Bajri's mining activity will not affect the air quality in a significant manner. In Sand and Stone mining operations, loading, transportation and unloading operations may cause deterioration in air quality. The Sand and Stone collection and lifting is a manual operation. Therefore the dust generated is not so significant as compared to mining process of other hard minerals like the process of drilling, blasting, mechanized loading etc.

Mitigation of Impact on Air Environment

The only air pollution sources are the road transport network of the trucks and tractor trolleys. The dust suppression measures like water spraying will be done on the roads. Utmost care will be taken to prevent spillage of Sand and Stone from the trucks. Overloading will be prevented. The trucks will be covered by tarpaulin covers before dispatch to the crusher site . Plantation activities along the roads in consultation with Village Panchayat will also reduce the impact of dust in the nearby villages.

Noise and Vibration Environment

As there will be no heavy earth-moving machinery involved, there will not be any major impact on noise level due to sand and stone mining and other associated 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 sand and stone mining activity will not have any significant impact on the noise environment of the region. The only impact will be due to transportation of stone and sand by trucks.

Mitigation of Noise and Vibration Environment

As the only impact is due to transportation of stone/sand to the Stone Crusher through Village roads, emphasis will be given on the following points.

- ☐ Minimum use of Horns at the village area.
- ☐ Timely maintenance of vehicles and their silencers to minimize vibration and Sound.
- ☐ Phasing out of old and worn out trucks and trolleys.
- ☐ Provision of green belts along the road networks.

- ☐ Care will be taken to produce minimum sound during sand and stone loading.

Biological Environment

The mining activity will have insignificant affect on the existing flora and fauna. Data has 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 save the flora around the project area from river widening, excessive erosion and floods. It was found that the sand mining activity will not have any significant impact on the biological environment of the region.

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 in consultation with Village Panchayat. 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
- ☐ Provide forage and browse for wild life

Greenbelt Development and Bio-Diversity Preservation

- ☐ Plantation activities will be carried out from the profits in consultation with village Panchayat.
- ☐ This activity will help for maintaining ecology and environment of the area.

Socio-Economic Environment

This project operation will provide livelihood to the poorest section of the society. Approximately 10-12 people shall work at mine site and nearly 200 people are to be benefited directly or indirectly by the project.

Anticipated impacts and evaluation

The results of the field survey conducted to understand the knowledge and perception of

the people living around the project area gives a clear idea about the need for the project.

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

CONCLUSION:

All possible environment aspects have been adequately assessed and necessary control measures have been formulated to meet statutory requirements thus implementing this project will not have any appreciable negative impacts.

ENVIRONMENTAL IMPACT ASSESSMENT REPORT & ENVIRONMENT MANAGEMENT PLAN

(Submitted for Public Consultation as per EIA Notification)

**FOR EXTRACTION OF SAND, STONE AND BAJRI
FROM PALI MAHADEO RIVERBED**

AREA 36.8845 Ha

**KHASRA No. 2232/1324,2261/1535.2265,/1539
,1804,1923/1,904/843/3,856/180,199/1**

**FALLING IN MAUZA /MOHAL RATYOD & BHANGLAN
TEHSIL-NALAGARH,
DISTRICT-SOLAN
HIMACHAL PRADESH**

PROJECT PROPONENT:

**SUNIL KUMAR GARG
PROP M/S SHIV BHAWANI STONE CRUSHER
VILLAGE & P.O. – DABHOTA,
TEHSIL-NALAGARH, DISTRICT- SOLAN,
HIMACHAL PRADESH.**

CONSULTANT:

**SHIVALIK SOLID WASTE MANAGEMENT LTD.
(UPL ENVIRO INFRASTRUCTURE GROUP CO),**

**P O DABHOTA, TEHSIL NALAGARH,
DIST. SOLAN, HIMACHAL PRADESH.**

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**TERMS OF REFERENCE AS ISSUED BY EXPERT APPRAISAL COMMITTEE ON
MINING PROJECTS IN ITS MEETING HELD ON AUGUST 24 -26, 2011**

S. No.	Terms of Reference	Cross Ref. in EIA Report
1	Year-wise production details since 2006 after the EIA Notification, 2006 coming into force.	-----
2	An undertaking on a non judicial stamp paper to the effect that the mine has been closed on 23.04.2011 should be given.	Copy Enclosed
3	A copy of the document in support of the fact that the proponent is rightful lessee of the mine should be given.	Lease order attached
4	All documents including approved mine plan (eco friendly mine plan), EIA report and public hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management and mining technology.	Yes Chapter-I provides details on project; Lease deed at Annexure-II and Eco friendly Mining Plan.
5	The terms and conditions imposed, if any, by the competent Authority in the State government while granting mining lease/ permit/ contract should be built into the mine plan (eco friendly mine plan) as well as the EIA report. It may inter-alia include; area of working (length and breadth of the river stretch), mode of working, working shift, transportation of mineral, restriction, if any imposed for working etc.	The chapter-V EMP reports include Mining Conditions. Chapter II
6	Involvement of forestland, if any, in the project and status of forestry clearance should be given.	No forestland is involved in Mining lease area. A-II Joint Inspection Report by Government of HP.
7	The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as	Chapter II and III

	waste generation etc. should be for the life of the mine/ lease period.	
8	Does the company have a well laid down Environment Policy approved by its Board of Directors? If so, it may be detailed in the EIA report.	The proponent is sole owner & responsible for Environment Policy.
9	Does the Environment Policy prescribe for standard operating process/procedures to bring into focus any infringement/deviation/violation of the environmental or forest norms/condition? If so, it may be detailed in the EIA.	Approved mining plan has Environment Management Plan
10	What is the Hierarchical system or Administrative order of the company to deal with the environmental issues and for ensuring compliance with the EC conditions. Details of this system may be given.	The proponent is sole owner & responsible for complying EC Condition.
11	Does the company have a system of reporting of non compliances/violations of environmental norms to the Board of Directors of the company and /or shareholders or stakeholders at large? This reporting mechanism should be details in the EIA report.	The proponent is sole owner & responsible for complying Environment norms
12	A study should also be carried out to decide on the quantum of mineral which can be removed on sustainable basis taking into account the replenishment potential of the area and details furnished.	Chapter II , Mining Plan has been prepared .
13	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary and national park, migratory routes of fauna, water bodies, human settlements and ecological features.	Chapter III
14	Land use plan of the mine lease area should be prepared to encompass pre-operational, operational and post-operational phases.	Chapter III
15	Impact of the project on the wildlife in the surrounding and any other protected area and accordingly detailed mitigation measures required should be worked out with cost implications.	Chapter IV.

16	The vegetation cover in the RF/PF in the study area, if any, should be indicated.	Chapter III
17	A study shall be done to ascertain the impacts of the mining project on wildlife of the area including aquatic life.	Chapter III, Chapter IV
18	Location of National Parks, Sanctuaries, Biosphere Reserves, wildlife Corridors, Tiger/Elephant Reserves (existing as well as proposed) within 10 km of the mine lease should be clearly supported by a location map duly authenticated by Chief Wildlife warden. Necessary clearance from the Chief Wildlife warden for operating the mine within 10 km of the National Park/Sanctuary, if any, should be obtained and furnished.	Not Applicable
19	<p>A detailed biological study for the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] including the aquatic fauna in the riverine system shall be carried out. Details of flora and fauna, duly authenticated, separately for core and buffer zone should be furnished based on field survey clearly indicating the Schedule of the fauna present.</p> <p>In case of any scheduled-I fauna present in the study area, the necessary plan for their conservation should be prepared in consultation with State Forest and wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.</p>	<p>Chapter III.</p> <p>Report of Forest Officer Enclosed. There is no water during non monsoon season to support aquatic flora & fauna.</p>
20	Impact of the project on land use including change of river course, if any should be given.	Chapter IV
21	Impact on topography, drainage, agricultural fields, cattle fields, wildlife, water logging leading to water borne diseases, if any. It may also be shown whether it will lead to change of watercourse of the river. Modeling exercise should also be carried out through an expert agency to show the change in river flow dynamics, if any.	Chapter IV

22	Collection of one season (non-monsoon) primary baseline data on ambient air quality (PM ₁₀ , SO ₂ and NO _x), water quality, noise level, soil and flora and fauna, site-specific meteorological data should be collected. The location of the monitoring stations should be justified. Date wise collected baseline AAQ data should form part of EIA and EMP report. The mineralogical composition of PM ₁₀ particularly for free silica should be given. There should be at least one AAQ monitoring station within 500 m of the mine lease in the pre-dominant downwind direction.	Chapter III
23	Air quality modeling should be carried out for prediction of impact of the project on the air quality of the area. It should also take into account the impact of movement of vehicles for transportation of mineral. The details of the model used and input parameters used for modeling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any and the habitation. The wind roses showing the pre-dominant wind direction may also be indicated on the map.	Chapter-IV,
24	The water requirement for the project, its availability and source to be furnished. A detailed water balance should also be provided. Fresh water requirement for the project should be indicated.	Chapter III, Chapter-IV
25	Necessary clearance from the Competent authority for drawal of requisite quantity of water for the project should be provided.	Chapter-IV
26	Impact of the project on the water quality should be assessed and necessary safeguard measures, if any required should be provided.	Chapter IV
27	Information on site elevation, working depth,	Chapter II ,Chapter III

	groundwater table should be provided both in AMSL and bgl. A schematic diagram may also be provided for the same.	
28	Quantity of solid waste generation, if any, should be estimated and details for its disposal and management should be provided.	Chapter II
29	Impact on local transport infrastructure due to the project should be evaluated. Projected increase in truck traffic as a result of the project in the present road network (including those outside the project area) and whether it is capable of handling the increased load should be estimated. Arrangement for improving the infrastructure, if contemplated including action to be taken by other agencies such a state government, if any, should be covered.	Chapter IV
30	Details of the infrastructure facilities to be provided for the mine workers should be furnished.	Chapter III
31	Phase- wise plan of green belt development, plantation and compensatory afforestation clearly indicating the area to be covered under plantation and the species to be planted should be provided.	Chapter IV
32	Occupational health impacts of the project activity should be anticipated and reported and proposed preventive measures indicated. These along with details of pre-placement medical examination and periodical medical examination schedules and medical facilities proposed to be provided should be incorporated in the EMP.	Chapter IV
33	Measures of socio economic influence to the local community, proposed to be provided by project proponent should be spelt out. As far as possible, quantitative dimensions should be given.	Chapter IV & V

34	Detailed environmental management plan to mitigate the environmental impacts. Specific safeguard measures to control PM ₁₀ as well as pollution due to transportation should be given. It should be also address the impact due to stone crusher nearby.	Chapter V
35	Public hearing points raised and commitment of the project proponent on the same along with time bound action plan to implement the same should be provided.	Yes shall be incorporated after public hearing.
36	Details of litigation pending against the project, if any, with direction/order passed by any Court of Law against the project should be given.	Not Applicable.
37	The cost of the project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.	Chapter V

CHAPTER- I

1.0 INTRODUCTION

Sunil Kumar Garg Prop. M/s Shiv Bhawani Stone Crusher, Village & P O Dabhota, Tehsil Nalagarh District Solan , Himachal Pradesh concern for mining activity proposes to mine stone, bajri and sand. The stone will be used in a captive stone crushing unit. The proponent has been granted mining leases for mining sand; stone and bajri vide State Govt. letter no. Udyog – Bhu (Khani - 4) Laghu – 317/2001-9668 dated 29-01-2009 over an area of 36.8845 hectares situated in khasra numbers 2232/1324,2261/1535.2265,/1539 ,1804,1923/1,904/843/3,856/180,199/1 a term of five years and has applied for renewal .

As per the EIA Notification, dated 14.09.2006 under Environment (Protection) Act, 1986, and circular dated 06.02.2007, the mining of minerals more than 5 ha and with less than 50 hectare of mining lease area are categorized as Category-B projects, subject to the applicability of General Conditions. 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.

The Environmental Impact Assessment (EIA) and Environmental Management Plan for “Mining of Minerals” as per the EIA Notification, 2006 has been prepared in accordance to Terms of reference issued by the Ministry of Environment & Forest vide their letter No. J – 11015/146/2011 – IA.II (M) dated 28th March 2012 for mining of 94500 TPA of Sand Stone and Bajari from River bed of Pali Mahadev Khad and the Environmental Impact Assessment Guidance Manual published by MoEF for grant of environmental clearance with relevant project specific data.

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 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.

A stable river is able to consistently transport the flow of sediments produced by watershed such that its dimensions (width and depth) pattern and vertical profile are maintained without aggrading (building up) or degrading (scouring down) The amount of boulders, cobbles, pebbles and sand deposited in riverbed equals to the amount delivered to the river from watershed and from bank erosion minus amount transported downstream each year.

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 riverbed mining activities include air pollution, surface water pollution, noise, damage to local ecology, natural topography and drainage, depletion of water resources 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.

1.1 SCOPE OF WORK FOR REIA/EMP

This EIA/EMP report is prepared as per the guidelines of the Ministry of Environment & Forest, New Delhi & is based on observations made by during visit to the area in the study period and collection of primary as well as secondary environmental data.

1.2 WORK PROGRAMME

The disciplines covered under the work programme are, prerequisite information of the site, impacts and management plans. The above disciplines include the following method of collection & compilation of data and the resulting predictions.

- i) Preparation of a check – list including the details of type and class of information required developing an environmental impact assessment report.
- ii) Major environmental aspects (including testing etc.) Covered under the study are:
 - Selection of the appropriate sampling stations for Soil, Water & Air within Core & Buffer zone of 10 Km radius.
 - The offices of villages - Panchayats and Tehsils of study area were approached for their socio-economic status, standards of living, and possible impacts on their status by the new mine.
 - Besides the above-mentioned information, the concerning meteorological department was also contacted for the meteorological data like Rainfall, Wind, Temperature & Humidity

- The data were then compiled and results were interpreted in the form of Graphs, Figures, Tabulations and Illustrations.
- iii) The impacts were predicted on the basis of baseline environmental status, thus showing the positive or negative impact on account of various activities of mine.
- iv) Environmental Management Plan prepared for mining project, suggesting various mitigation measures to reduce/eliminate adverse impacts of the river bed mining and other aspects as may be required by the concerned authorities.

1.3 METHODOLOGY ADOPTED

On the basis of assessment of the environmental conditions at the mine site and the nature of adjoining area, it was found that the mining lease site as its centre was considered as core zone where fugitive emission of the mining activity can have an impact on physical and biological environments. Area within 10 km. radius circle was considered as buffer zone, where very little impact may be observed.

1.4 DATA GENERATION

The baseline data for the project site and 10 km radius area were collected in accordance with the requirement of guidelines of MoEF. Monitoring was done for post monsoon season (Oct.2011 - to Dec. 2011) for the following parameters: -

1. **AIR-** Ambient air monitoring (24 hourly samples), twice a week continuously. Parameters: SPM, SO₂, NO_x, RSPM, Silica content in SPM .
2. **METEOROLOGICAL-** Parameters at hourly duration simultaneously at one air monitoring station. Parameters: Wind speed, direction, Relative humidity, Temperature, cloudiness and rainfall etc.
3. **WATER-** Water from various locations (surface and ground water samples) in core and buffer zone 10 km radius) Parameters: water/effluents: tested for physical and chemical and biological parameters according to specified protocol.
4. **SOIL-** Once at various locations in core and buffer zone.
5. **NOISE-** Once at various locations in core and buffer zone.

1.5 DATA COLLECTED

In addition to the above, the data on land use, vegetation and agricultural crops were also collected from different Government departments / agencies for the preparation of EIA report.

CHAPTER II

2.1 INTRODUCTION

Sunil Kumar Garg Prop. M/s Shiv Bhawani Stone Crusher, Village & P O Dabhota, Tehsil Nalagarh District Solan , Himachal Pradesh proposes to mine stone, bajri and sand. The proponent has been granted mining leases for mining sand; stone and bajri vide State Govt. letter no. Udyog – Bhu (Khani - 4) Laghu – 317/2001-9668 dated 29-01-2009 over an area of 36.8845 hectares and has applied for renewal. The project involves mining / collection 94500 metric tons of stone, sand and bajri from Pali Khad bed for a stone crushing unit set by the project proponent.

The chapter deals with the location, physiographic feature of the area, description and characteristics of catchment area, regional / catchment area and local geology, rainfall and its impact on transportation of sediments, mineral reserves, method of mining, annual rate of production and generation of waste.

The mining lease falls in the bed of Pali Khad. Pali Khad, 3rd order primary tributary of Sarsa River (Secondary tributary of Satluj catchment). Pali Khad originate at a height of 1210 meters above mean sea level near Survey point 1029 [latitude $31^{\circ} 12' 8.3''$ longitude $76^{\circ} 44' 48''$], near Ghot (Survey of India Topo-sheet No 53 A/12).

2.2 LOCATION

The proposed mining site is located in the river bed of Pali Khad falling in villages Ratyor and Bhanglan, Tahsil Nalagarh, District Solan of Himachal Pradesh. The area is cover by Survey of India Toposheet No. 53 A/ 12. The mine is 10 kilometres from Nalagarh, tehsil head quarter and 65 kms from Chandigarh.

TABLE 2.1: SHOWING COORDINATES OF BOUNDARY PILLARS SHOWN IN FIGURE 2.1.

Latitude	Longitude
$31^{\circ}05' 42''$ N	$76^{\circ} 37' 44''$ E
$31^{\circ}06' 55''$ N	$76^{\circ} 40' 26''$ E



FIGURE 2.1. SHOWING BOUNDARY PILLARS OF MINING LEASE ON GOOGLE EARTH IMAGERY.

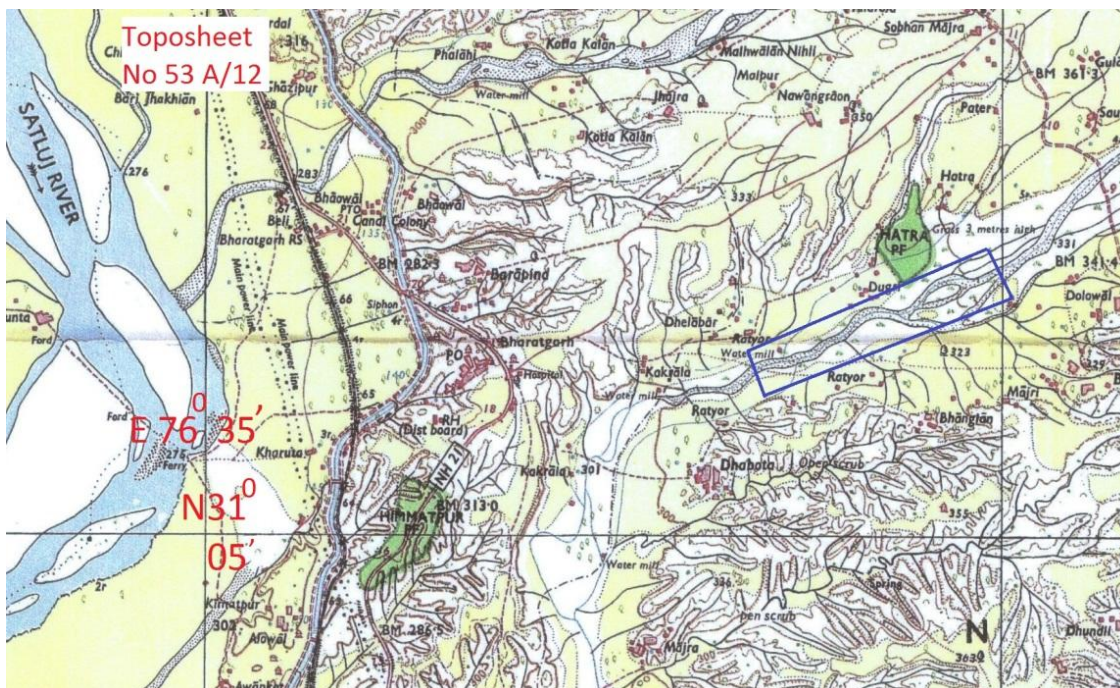


FIGURE 2.2 SHOWING LOCATION OF LEASE AREA ON SURVEY OF INDIA, TOPO-SHEET NO. 53 A/12.

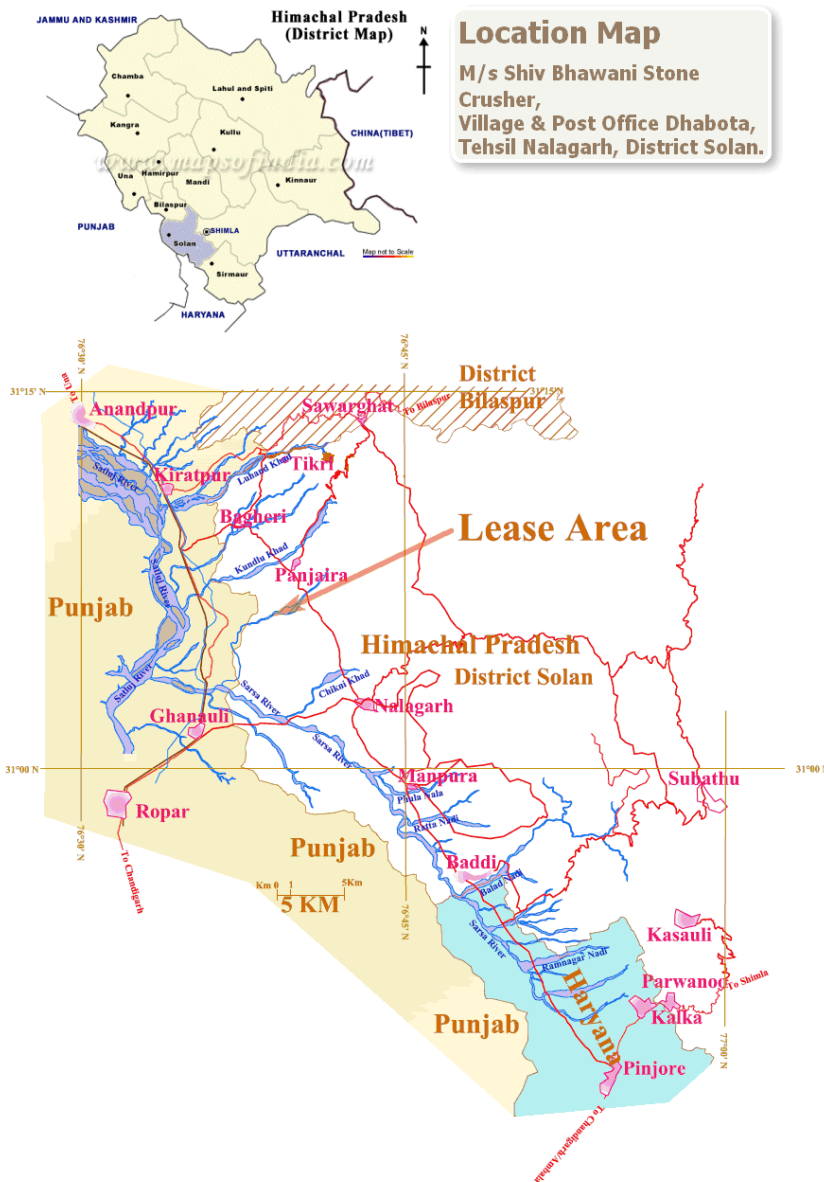


FIGURE 2.3 SHOWING LOCATION OF MINING LEASE AREA.

2.3 PHYSIOGRAPHY

The area falls in the Dun of Nalagarh and forms a typical rugged mountainous terrain with steep slopes and narrow and deep valleys in north and north east draining into Nalagarh valley. The Nalagarh valley is full of several Khads (streams) draining Shiwalik hills into river Satluj.

2.3.1.Ridges: The NW-NE running Naina Devi Ki Dhar, acts as water shed between Gobindsager (created by a dam near Bhakra on River Satluj) and Saltuj which takes a U turn flowing towards SE. The Naina Devi temple is at a height of 1186 metres above MSL. The ridges further south east passes through tops at Peak 1340 metres and Peak 1272 metres and near bench mark 1062.6 is Swarghat pass. Further south east is OKHU PF with a temple at a height of above 1420 near village Kasla. The ridge running SE passing through KALTI PF near Peak 1356 metres and turns SW to peak 1276 and again turns south and South East to peak 1404 metres, peak 1393 metres to peak 1203 metres, peak 1235 metres and through Rajpur Dhar and Δ 1388 joins the ridge to peak 1355 metres in east, then it runs south wards to peak 1360 metres, peak 1439 metres, peak 1647 metres, peak 1572 metres to Kasauli town at Δ 1910 to peak 1926 metres in south, passing through peak 1913 metres and it swings to west from peak 1786 metres to peak 1104 metres, to Δ 1065 and further it swings south along Thadugarh Dhar and passing through Kalka town swinging westward point 514 metres to Δ 601 and turns to North west to point 616 metres, peak 592 metres, peak 542 metres, peak 571 metres, peak 543 metres, peak 536 metres, peak 549 metres and swings to north to peak 482 metres turning to peak 506 metres west to peak 416 metres, peak 403 metres, peak 392 metres, peak 376 metres, peak 336 metres and ridge further west dips in to the River Satluj..

2.3.2 Drainage: The Sarsa Nadi one of the important tributaries of the Satluj River carries the main drainage of the area. The Sarsa originating from peak 2926 metres south of Kasauli town initially has westerly flow up to north of village Khera, after it almost consistently flows in north westerly direction almost till its confluence with river Satluj. Important tributaries of River Sarsa are 10, nine on the right bank and one on the left bank. Right Bank tributaries are 1).Kiratpur Nadi, 2) Ramgarh Nadi, 3) Surajpur Cho, 4) Balad Nadi, 5) Ratta Nadi, 6) Phula nadi, 7) Khali Nala, 8) Chikni Nadi and 9) Mahadev Nadi. The left bank tributary is Kahnani Nadi.

In addition Pali Khad, Karsoli Khad and Luhand Khad drain the area and merge in Satluj directly.

Several low order streams join to give the area a distinct drainage pattern, which is a combination of trellis and dendritic patterns. The trellis pattern is more prominent, thus emphasizing structural control on the drainage. The dendritic part is mainly confined to low order streams, which follow the natural

slopes of the young mountain. The Sarsa and its tributaries mostly follows the trace of the regional cross-fold.

The area has a drainage density of the order of 0.61 (Kms per square km). In general sandstone and conglomerate bands of Siwalik formations constitute steep slopes, while the gentler slopes are provided by the shale sequence. Down cutting by the river and khads is evident by terraces preserved at different levels.

2.3.3 Springs: Springs are the main source of potable water particularly in the sandstone bands, though the discharge in some of them is greatly reduced during the summer months.

2.4 DESCRIPTION OF PALI KHAD & CATCHMENT AREA

General

The lease area is situated in the Pali Khad, 3rd order primary tributary of Sarsa River (Secondary tributary of Satluj catchment) . Pali Khad originate at a height of 1210 meters above mean sea level near Survey point 1029 [latitude 31^o 12' 8.3" longitude 76^o 44' 48"], near Ghot (Survey of India Topo-sheet No 53 A/12). The general flow is

- From origin to Mahadev NE to SW
- Mahadev to Ratyor E-W
- Ratyor to Sarsa confluence N to S

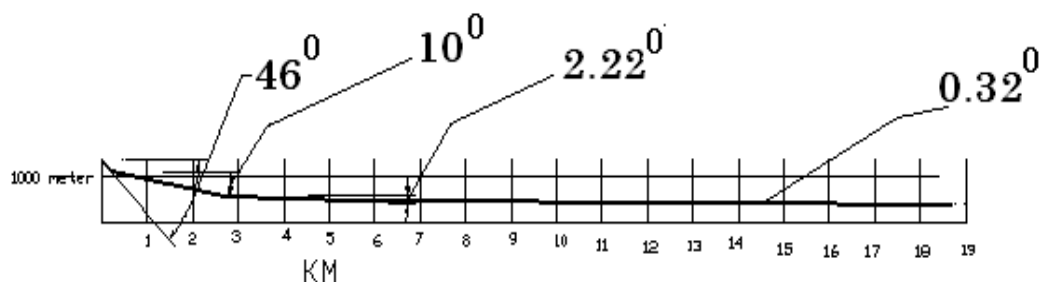
The attitude at confluence with Sarsa River is 280 Meters above MSL.

The general geometry of the Pali Khad catchment is given below:

- The total length is about 19.6 Km.
- Perimetersr of the Catchments is 86 Km
- Area of the catchments approx 47 Sq Km
- No of tributaries 33
- General gradient

Near confluence	15 meters in 5.0 Km
After 5.0 Km	35 meters in 4.1 Km
After 9.1 Km	50 meters in 3.8 Km
After 12.9 Km	215 meters in 3.2 Km
After 16.1 Km	400 meters in 3.6 Km

Slope of Palli River



Origin to 0.3 km = 46 degree
0.3 km to 2.8 Km = 10 degree
2.8 km to 4.6 km = 2.22 degree
4.6 to confluence (19.6 km) = 0.32 degree

FIGURE 2.4 : SHOWING GENERAL PROFILE OF PALI KHAD FROM ORIGIN TO CONFLUENCE WITH SATLUJ RIVER.

From various analysis of the drainage the Pali Khad can be divided into three parts (Figure 2.5)

TABLE -2.2 CATCHMENT OF PALI KHAD

1.	From origin to the 900 metre above mean sea level	The zone of active erosion	Young stage
2.	From 900 metre to 400 metre contour to confluence	The zone of erosion during very high floods; otherwise deposition	Maturity stage
3.	Less than 400 metre 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 mature stage

Relief of Palli Khad Catchment

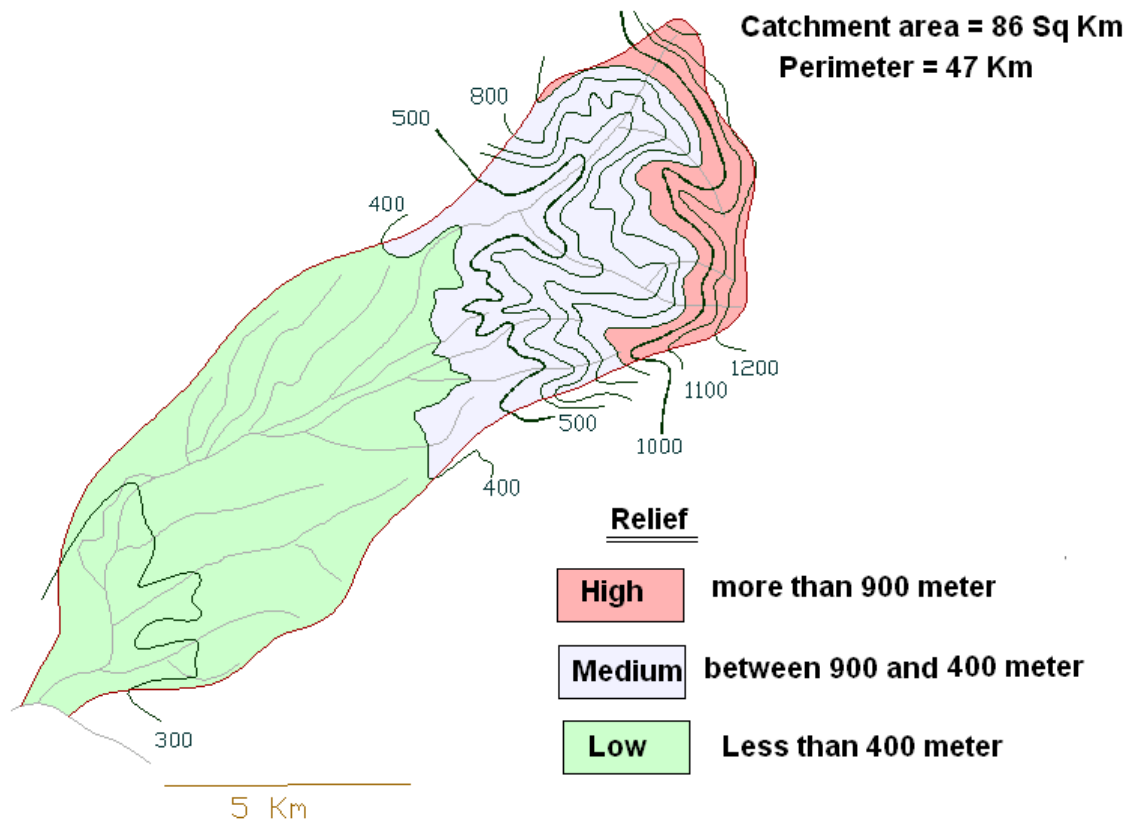


FIGURE: 2.5 GEOMORPHOLOGIC DIVISIONS OF PALI KHAD CATCHMENT.

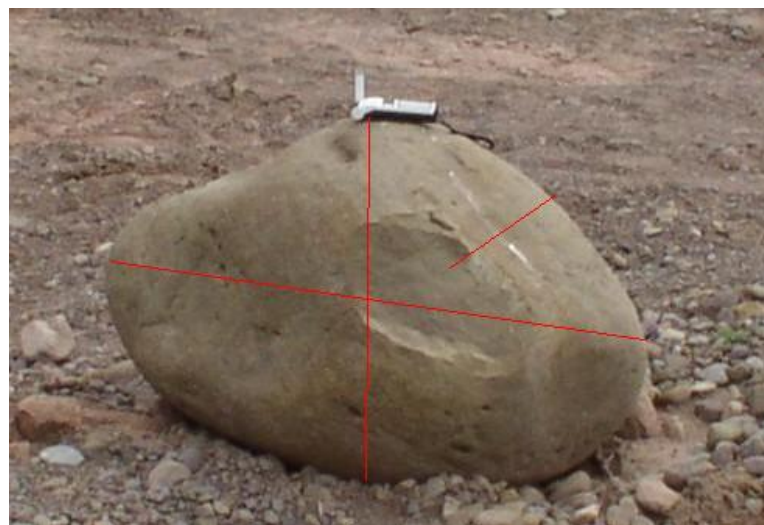


PHOTO 1: SHOWING COMPETENCY OF PALI KHAD RIVER.

TABLE 2.3 CHARACTERISTICS OF PALI KHAD CATCHMENT

a)	Name of River/ Stream in which the lease is situated	The lease is situated in the Pali Khad, a primary tributary of Sarsa River and secondary tributary of the River Satluj.
b)	Drainage System	Satluj
c)	Type of Drainage	Dendritic (Figure)
d)	Origin of River/Stream	The Pali Khad originates near Ghot at a height of about 1210 metres.
e)	Altitude at Origin	1210 metres above MSL
f)	Width of River at the place of Mining	Width of Pali near the mining lease area is 60 Metres to 135 Metres.
g)	The annual deposition at the place of mining	The annual deposition at the mining lease area is about six Cms depending upon the location. At some places it may be more than the six Cm.
h)	The Competency of the River/ Stream at the mining site	The general competency at the mining area is eight to ten Kg approx. The larger boulders vary 9 to 10 cm X 8 to 12 cm X 7 to 10 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 more than one and a half metres, 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.

2.5 REGIONAL GEOLOGY AND LOCAL GEOLOGY.

Solan District lying within the Lesser Himalaya and the Shiwalik Foothill comprises rocks ranging in age from Proterozoic to Quaternary. The oldest rocks of undifferentiated Proterozoic age belong to the Jutogh Group comprising carbonaceous phyllite, schist, gneiss, quartzite and marble. The Sundernagar Group of Rocks of Meso- Proterozoic age is represented by quartzite with basic flows. The Deoban/ Shali Group of Rocks (Meso- Proterozoic) comprising limestone, dolomite, (at places stromatolytic) slate, & quartzite occurs along the Main Boundary Fault and also in the northeastern part of the District. The argillo-arenaceous sequence of Shimla/Jaunsaur Group rests unconformably over the Deoban Group. The Jaunsaur Group of arenaceous rocks is homotaxial with Shimla Group and assigned Meso-Proterozoic age. Both Shimla and Jaunsaur Group of rocks are unconformably succeeded by the Baliana Group, comprising diamictite, pink dolomite, carbonaceous shale and slate besides quartzite bands. The Krol Group which overlies the Baliana Group is dominantly a carbonaceous sequence with minor shale and sandstone.

The Tal Group of Early Cambrian age is heterolithic sequence of siltstone, dolomite, shale, ash grey tuff, chert/phosphorite, carbonaceous shale, grit and quartz arenite and recorded algal structures and trilobite. Subathu Formation is composed of olive green shale, limestone, quartzite and laterite. The Sirmour Group is represented by a thick pile of Palaeogene sediments exposed in the foothill, bounded by the Main Boundary Fault and Krol Thrust. It comprises shale, fossiliferous limestone, quartz arenite, siltstone, clay, sandstone and local pebble bed. The Shiwalik Group of Middle Miocene of Early Pleistocene age comprises coarse clastic fluvial deposits of sandstone, clay and conglomerates. The Quaternary sediments (Older Alluvium and Newer Alluvium) along prominent channels consisting of sand, silt, clay, pebbles and cobbles occurring along present channels of Middle to Late Pleistocene and Holocene age.

The general trend of the rocks is NW-SE and E-W directions with dip varying from 10° to 40° on either side. Beside Main Boundary Fault, Krol, Giri, Chail and Jutogh Thrust two major synformal axes running NW-SE also passes through Krol and Tal Group of rocks.

The rocks of the Pali Catchment, represents the Shiwalik Group, Older Alluvium and Newer Alluvium. The stratigraphy of the Pali catchment is given in the table -4 and the geology of the area is given in the figure 2.6.

The Dun is bounded by Nalagarh thrust in the north and detached Siwalik hills (mainly comprising of Upper Siwalik) in the south. Within the Dun, Quaternary sediments were exposed as alluvial fan and Khad terraces. North of Nalagarh thrust, Tertiary (Siwalik Group) and lower Tertiary (Subathu Group) rocks were exposed. The Sub Himalaya, the southernmost division of the Himalaya, is separated from the Lesser Himalaya by the Main Boundary Thrust (MBT) in the north and the southern boundary is demarcated from the Indo-Gangetic Plain by the Himalayan Frontal Fault (HFF). The northern part of the Sub Himalaya is characterized by a series of intra-basinal thrusts (Nalagarh, Barsar and Bilaspur) which are in general parallel to the MBT. The Pinjaur Dun is developed between the detached anticlinal ridges of Siwalik molasses (mainly Upper Siwalik Formations) in the south and Lower Tertiary (Dagshai, Kasauli and Subathu)/Tertiary (Lower and Middle Siwalik) rocks in the north. The Nalagarh Thrust marks the northern boundary of the Dun, which brought the Tertiary/Lower Tertiary rocks over the Quaternary Dun sediments. The Satluj Khad and its tributaries are the major drainage system in the Dun. The Satluj Khad flows in a longitudinal course from the northwest to the southeast, whereas its tributaries originate from the higher reaches of Sub Himalaya, between Nalagarh Thrust and MBT, and flow in transverse courses in a south-southwest direction. The catchment areas of these piedmont Khads (tributaries of Satluj) are mainly comprised of Lower Tertiary and Tertiary (Lower and Middle Siwaliks) rocks. Mudstones and sandstones are the predominant rock types in the Lower and Middle Siwaliks, respectively. The important geomorphic features observed within the Dun basin are alluvial fans and Khad terraces. Alluvial fans are fan- or cone-shaped sedimentary bodies that accumulated at the base of the Sub Himalayan mountain front, south of Nalagarh thrust, downslope from the point where piedmont Khads emerge from the uplands. Extensive road cuttings and Khad cuts provide an excellent opportunity to examine nearly continuous exposures (from fan head to toe and transverse view) of these fan sediments. A series of alluvial fans are observed, exposed around present-day Khads, between Kirat pur in the west and Pinjaur in the east. Many alluvial fans exposed around Luhund Khad, Pali Ki Khad, Chikni and Mahadeva Khads etc. The Pali Ki Khad fan is about 15 km long and 6 km wide, whereas the Luhund Khad fan is about 11 km long and 7 km wide.

TABLE 2.4:- LITHOSTATIGRAPHY OF THE PALI CATCHMENT AND ITS SURROUNDING					
<i>Group</i>		<i>Lithology</i>		<i>Age</i>	
Newer Alluvium	<i>Channel Alluvium</i>	<i>Grey micaceous, fine to coarse grained sand, silt and clay</i>		Quaternary	
	<i>Terrace Alluvium</i>	<i>Cyclic sequence of grey micaceous sand, silt and clay</i>			
	<i>Fan Alluvium</i>	<i>Brownish grey clay, sand and gravel with boulders</i>			
Older Alluvium	<i>Dun Gravels</i>	<i>Multicyclic sequence of brown to grey silt, clay with kankar and reddish brown to grey micaceous sand with pebbles</i>			
Siwalik Group	<i>Upper Siwalik</i>	<i>B</i>	<i>Predominantly massive conglomerate with red and orange clay as matrix and minor sandstone and earthy buff and brown claystone</i>		Neogene
		<i>A</i>	<i>Sandstone, clay and conglomerate alternation</i>		
	<i>Middle Siwalik</i>	<i>B</i>	<i>Massive Sandstone with minor conglomerate and local variegated claystone</i>		
		<i>A</i>	<i>Predominantly medium to coarse- grained sandstone and red clay alternation, soft pebbly with subordinate claystone, locally thick prism of conglomerate</i>		
	<i>Lower Siwalik</i>	<i>B</i>	<i>Alternation of fine to medium- grained sporadically pebbly sandstone, calcareous cement and prominent chocolate and medium maroon claystone in the middle part</i>		
		<i>A</i>	<i>Red and mauve claystone with thin intercalations of medium to fine grained sandstone</i>		

Geology of Nalagarh Dun

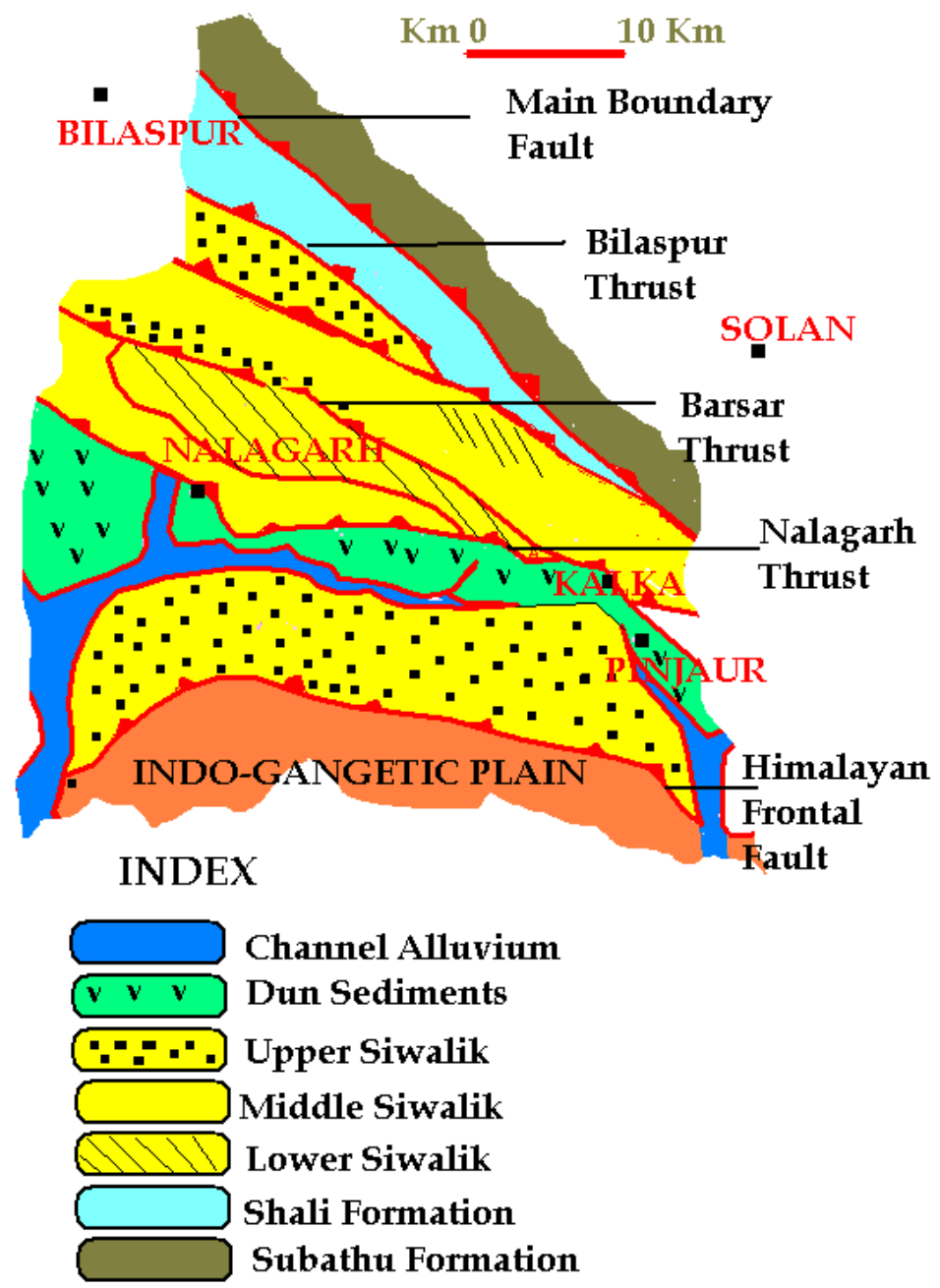


FIGURE: 2. 6 GEOLOGICAL MAP OF THE REGION.

2. 5.1 Siwalik Group

The Siwalik deposits are one of the most comprehensively studied fluvial sequences in the world. They comprise mudstones, sandstones, and coarsely bedded conglomerates laid down when the region was a vast basin during Middle Miocene, to Upper Pleistocene times. The sediments were deposited by Khads flowing southwards from the Greater Himalayas, resulting in extensive multi-ordered drainage systems. Following this deposition, the sediments were uplifted through intense tectonic regimes (commencing in Upper Miocene times), subsequently resulting in a unique topographical entity - the Siwalik Hills. The Siwaliks are divided stratigraphically into three major Subgroups - Lower, Middle, and Upper. These Subgroups are further divided into individual Formations that are all laterally and vertically exposed today in varying linear and random patterns.

Ongoing erosion and tectonic activity has greatly affected the topography of the Siwaliks. Their present-day morphology is comprised of hogback ridges, consequent, subsequent, obsequent, and resquent valleys of various orders, gullies, choes (seasonal streams), earth-pillars, rilled earth buttresses of conglomerate formations, semi-circular choe-divides, talus cones, colluvial cones, water-gaps, and choe terraces. Associated badlands features include the lack of vegetation, steep slopes, high drainage density, and rapid erosion rates.

In the advent of Neogene a depression was formed in front of the rising mountains (Proto- Himalaya). This depression becomes a repository of a thick sequence of molassic sediments of the Siwalik. The Siwalik Group comprising conglomerates friable micaceous sandstone, siltstone and claystone.

The conglomerates in general are poorly cemented but at places they are very hard. These consist mainly of pebbles and cobbles of quartzite. The stray pebbles of granite, limestone, sandstone, braccia and lumps of claystone are also observed at places. Often the size of pebbles is large enough to be called as Boulders. The conglomerates not only occur as regular band but also as lenticular bands alternative with micaceous sandstone and claybeds. The sediments were brought down 2 to 25 million years ago by the numerous fast flowing Khads issuing forth from rapidly Rising Mountain mass of the Himalaya, in the north.

The Siwalik Group is divisible into three sub-groups respectively the Lower, Middle and Upper on the basis of the lithostratigraphy as given in the table (Table 4).

Lower Siwalik: - The lower Siwalik consists essentially of a sandstone-clay alternation. In district Solan the lower sequence of the lower Siwalik consists of medium grained subgraywacke interbedded with thick red clay, but higher up in sequence, sandstones are coarser and clasts become more frequent while the clays are less developed. The uppermost horizon consists of conglomerate with well-rounded clasts of grey quartzite possible derived from the Shali. The total thickness is 1600 metres.

Middle Siwalik: - The Middle Siwalik Sub group comprises of large thickness of coarse micaceous sandstone along with some inter-beds of earthy clay and conglomerate. It normally succeeds the Lower Siwalik along a gradational contact. The sandstone is less sorted than those in Lower Siwalik. Clay beds are dull coloured and silty. The general thickness is 1400 to 2000 metres

Upper Siwalik:-The Upper Siwalik is mainly represented by sandstone interbedded with silt and conglomerate. The lower portion of the Upper Siwalik mainly consists of soft, massive, pebbly sandstone with intercalations of conglomerates. In the upper portion the conglomerate intercalation is replaced by the clays intercalations. The general thickness in the district is 2300 metres.

2.5.2 Older Alluvium

The Older Alluvium in Dun valley is designated as Dun Gravels while in the plains as Varanasi (= Ambala). It is a multicyclic sequence of brown to grey silt, clay with kankar and reddish brown to grey micaceous sand with pebbles.

2.5.3 Newer Alluvium

Newer Alluvium has been subdivided into Fan Alluvium composing brownish grey clay, sand and gravel sequence, lies dis-conformably over Older Alluvium within a narrow zone immediately to the south of Siwalik hill. Trace alluvium exposed as depositional terraces of Satluj and Pali Khad, is composed of cyclic sequence of grey, micaceous, fine to coarse grained sand, silt and clays. Channel alluvium exposed as point bar/channel bars within the active channels is composed of grey, fine to coarse micaceous sand and silts.

2.6 RAINFALL AND SEDIMENT

In a normal rainfall, raindrops range in size from 1 to 7 millimetres 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, increase water runoff, and increase 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). 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 (Figure 2.4).
 - The rainfall intensity (Figure 2. 7 & 2. 8).
 - The permeability and structure of the surface (figure 2.6).
 - The amount of vegetation cover.
- The rocks in the catchment area belong to Siwalik formations (Figure 2.6). 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 Pali Khad 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 2.4)**, a decrease in water volume, **an increase in cross-sectional area Figure 2.8**, or by local obstructions. An excessive load produced by increased erosion in the drainage basin or tributary valleys, inevitably lead to deposition. The accumulations of stream deposits are called **alluvium**.

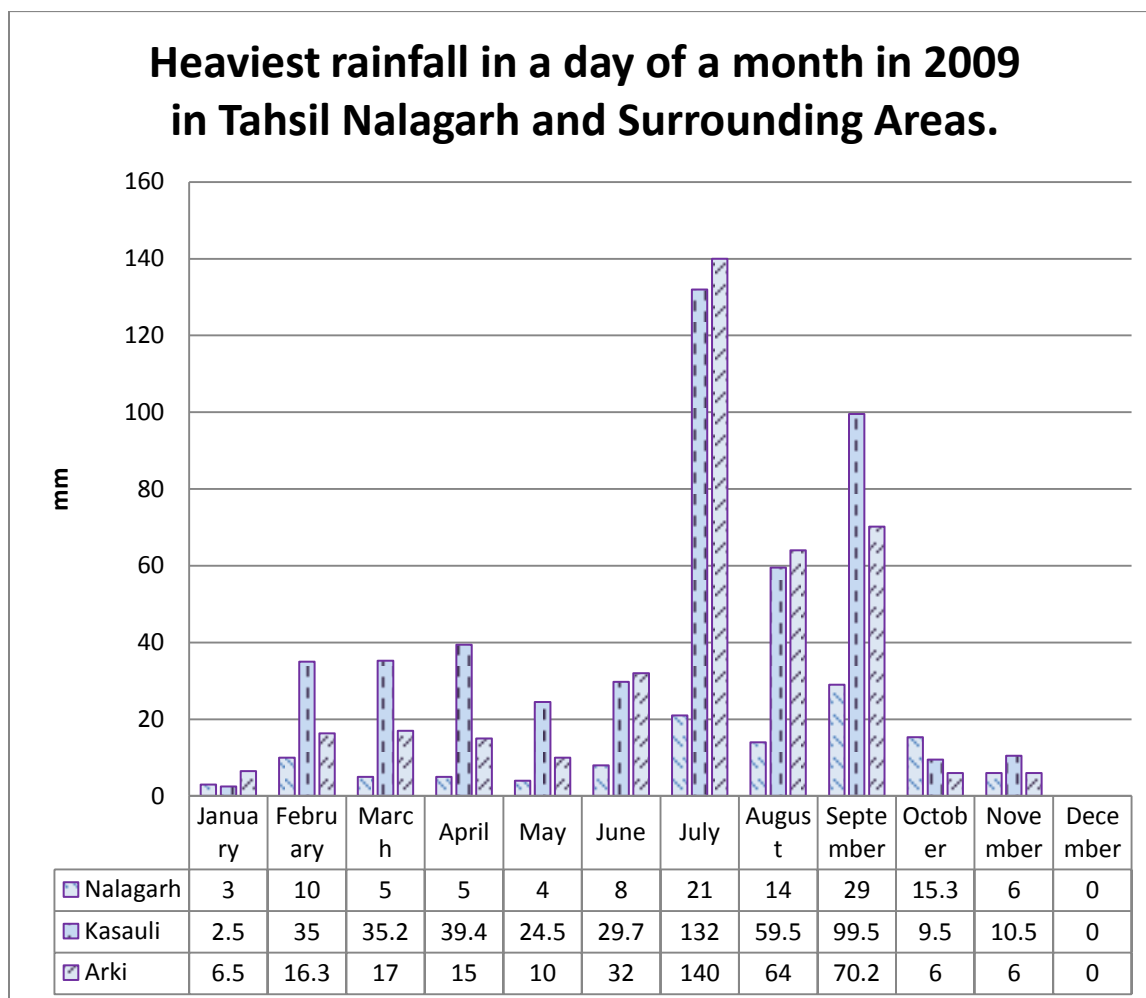


FIGURE:2.6: RAINFALL RECORDED AT NALAGARH, KASALI AND ARKI IN 2009.

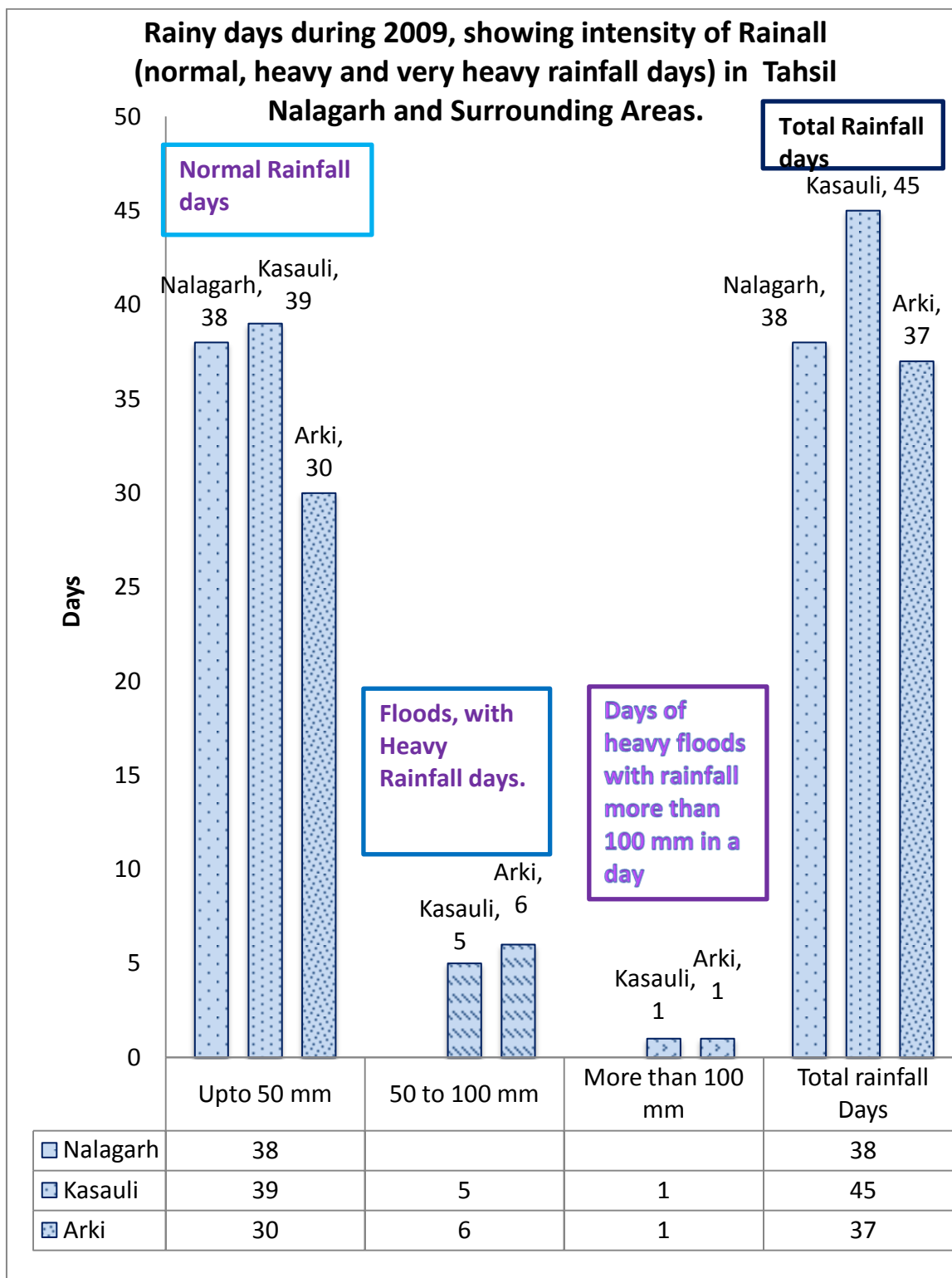


FIGURE 2.7: SHOWING DAYS OF NORMAL RAIN FALL, FLOODS WITH HEAVY RAINFALL (> 50MM) AND VERY HEAVY RAIN FALL (> 100MM) IN YEAR 2009.

- These rocks suffer erosion during the rainy season and especially on the days of heavy rainfall (Figure 2.6 & 2.7) 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 2.3. Thus the area is most amenable to 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 mining lease area is situated within the meandering corridor of Pali Khad. The Mining lease area measuring 490-03 Bighas ((36.8845 hectares), Khasra numbers 2232/1324, 2261/1535, 2265/1539, 1804, and 1923/1 falling in Mauza Ratyor and 904/843/3, 856/180 & 199/1 situated in Mauza Bhanglan, Tehsil Nalagarh, District Solan . The proposed project is for production of 94500 TPA river bed material including stone, bajari and sand from the bed of Pali Khad.
- Mining area is defined after considering the 1/5 of width from the HFL that is 12 to 27 metres, depending upon the width which varies from 60 to 135 metres. The mine able area thus calculated is 98000 square metres out of the total lease area of 368845 square metres.

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 (cobble), sand, silt and clay. The percentage of the each category was found to be stone 33 %, bajri 24 %, sand 20%, silt 12% and clay 11%. The percentage of these constituents is likely varied from year to year depending upon amount and ferocity of rainfall.
- One metre 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.**

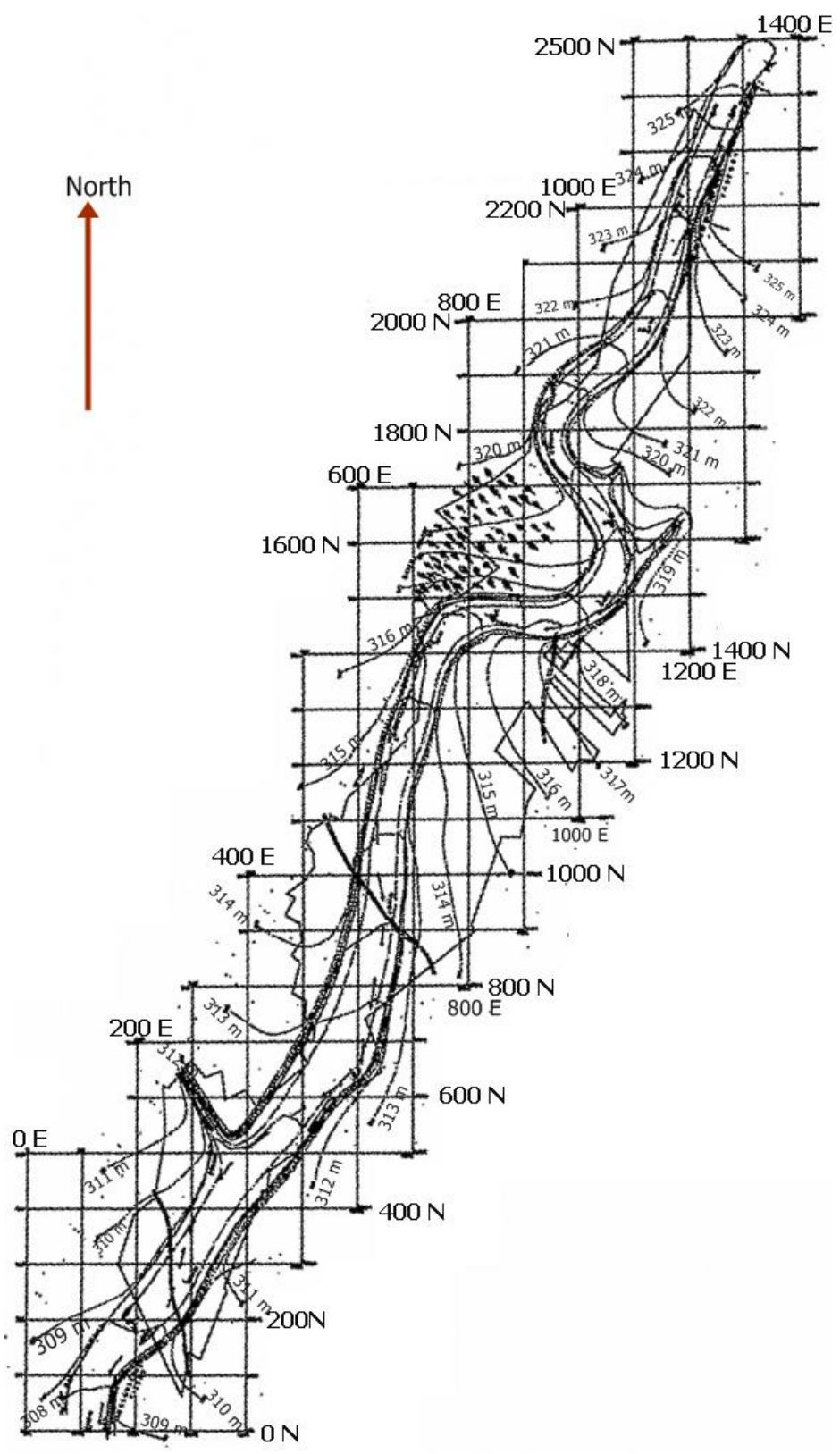


FIGURE 2.8 : CONTOUR PLAN OF THE MINING LEASE AREA

2.7.2 Mineable Reserve

- **The of mineable reserves were estimated** by multiplying the surface area with specific gravity and depth of one metre ($65000 \times 2.25 \times 1$) up to which the mining shall be undertaken. Thus a total of 146250 metric ton of material is available in the mineable area of 65000 square metres.

2.7.3 Mining method

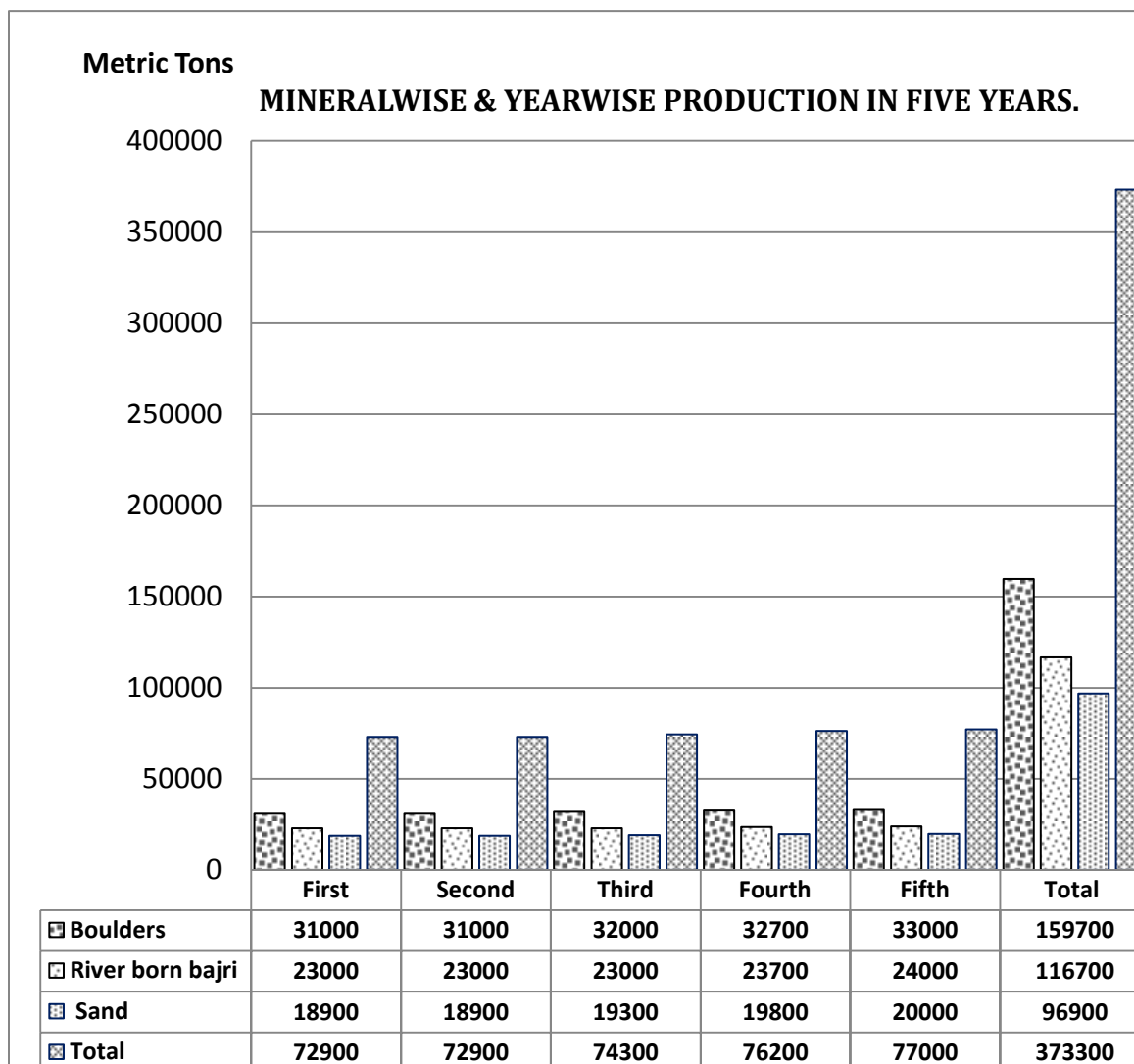
- The mining method shall be adopted to facilitate the replenishment of the excavated pits during rainy season. Thus the mineable area has been divided in two blocks. The up stream block is 32,000 square metres and the downstream block is 33,000 square metres. The Mining of these two blocks is suggested on rotation basis in such a way that pit of previous year mining will act as depository for the post monsoon season. The workability is suggested by keeping in the mind possible effect on the meandering of Khad. The previous year pits will reduce the velocity of the flow of the khad waters and thus reducing its carrying capacity resulting in deposition of material being transported by the river waters. In totality the principal of the Placer Deposit is adopted.
 - The working period for mining will be restricted to 270 days (nine months) 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.
 - The block being rested would be remaining so nearly for 15 months.
 - 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 325 and lowest is 309 metres above mean sea level, therefore mining would be undertaken/limited up to the level of 325 to 309 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.

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 stone and bajri shall be transported to the crusher. Thus, for transportation of material about five drivers and equal number of helpers shall be engaged. At the crusher about 8 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 94500 metric tons of material to be excavated. Though 17000 metric tons would be waste in the form of silt and clay which will be used for back filling the pits. 79300 metric tons of commercially sale able stone, bajri and sand would be moved. Thus, about 54700 metric tons of stone and bajri suitable for crushing would be transported to the crushing unit, and 24600 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 is as given in the table 2.3.
- As the demand for construction aggregate would increase in the future the production rate per years will remain at optimum level of 77000 metric tons of stone, bajri and sand.

TABLE 2.5 PRODUCTION PLAN FOR FIVE YEARS

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 23000 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 μ m) 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.

The generation of waste during five years of mining according to approved mining plan is as given in the table 2.6 below:

TABLE 2.6 SHOWING GENERATION OF WASTE IN FIVE YEARS.

	Silt/ and- Clay mixture	Clay	Total
First Year	11300	10400	21700
Second Year	11300	10400	21700
Third Year	11600	10600	22200
Fourth Year	11900	10900	22800
Fifth Year	12000	11000	23000
Total	58100	53300	111400

Land use plan of mine lease

- The mining lease area falls mostly within the meandering corridor of the river course, below the high flood level. This part in which the mining will be undertaken therefore cannot be put to any other use. Before the lease was 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 of 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. However, the lease area which is outside the river course will be made green by way of undertaking plantation of species as suggested by the Forest authorities. Some plantation of eucalyptus has already been done of part of right bank of the river as shown in the map (figure 2.8).

2.11 TRANSPORTATION

- The lease area is having gentle slope with the gradient of less than one degree 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 on average of about three kilometres from the mining site. About 285 metric tons of stone and bajri would be required to be moved daily. Ten tractor trolleys will be able to move this material making nine trips each.

CHAPTER-III

DESCRIPTION OF ENVIRONMENT

3.1 INTRODUCTION

The main objectives of environmental baseline study are;

- (i) To assess present environmental quality for prediction of environmental impacts.
- (ii) To identify environmentally significant factors for taking mitigating measures.

The chapter contains information on existing environmental status of land, air, water, biological & socio economic environment. The mining activity will remain confined to very small area and of little magnitude hence the zone of influence will be only surrounding fields of the leased out area. To achieve these objectives, monitoring of the environmental parameters within the core zone and buffer zone has been undertaken in accordance with the Terms of Reference and Guidelines for EIA issued by the Ministry of Environment & Forests, Govt. of India.

This chapter and the related discussions contain the results of field studies carried out during post monsoon season October to December 2011.

3.2 STUDY AREA AT A GLANCE

10 km radius measured from the boundaries of the mining lease in every direction and also includes mining lease area, i.e. core zone. The buffer zone area falls in Nalagarh Tehsil of Solan district. (Fig-3.1)

Location:

Latitudes	: North - 31° 05'42"- 31° 06' 55"
Longitudes	: East - 76°37'44"- 76°40'26"
Topo sheet No.	: 53A/12
Village	: Ratyod & Bhanglan
Tehsil	: Nalagarh
District	: Solan
State	: Himachal Pradesh

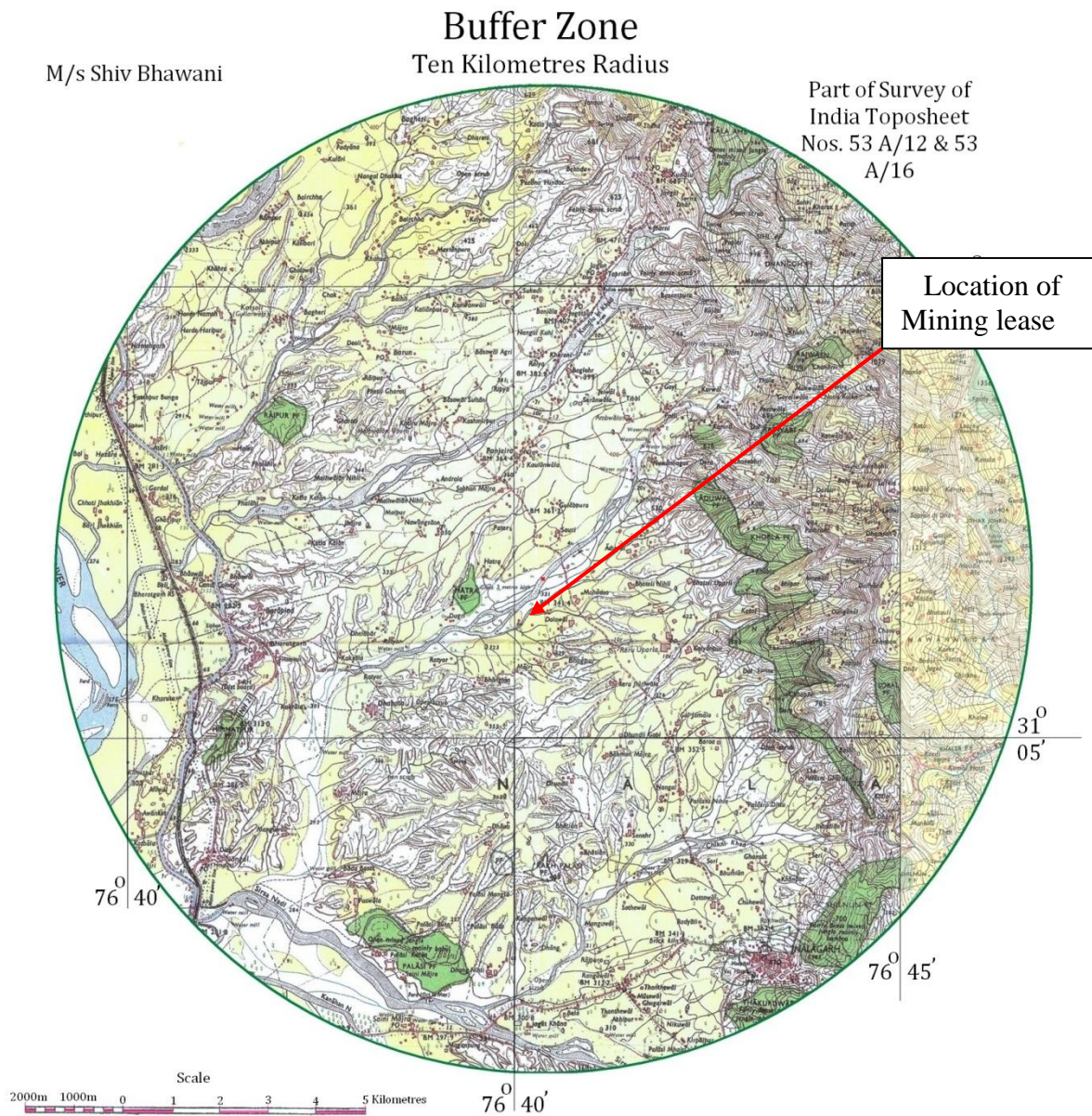


FIGURE 3.1: SHOWING CORE & BUFFER AREA UP TO 10 KMS

3.3 LAND USE PATTERN

Core Zone

The proposed Mining lease area is located on the riverbed of Pali Mahadev and is classified as gair mumkin khad as per revenue record. The land shall be used for undertaking mining activity.

Buffer Zone

Primarily the land of the buffer zone can be classified in following six categories as shown in figure -25.

- i. Forest
- ii. Grass And Scrub Land
- iii. Water Bodies
- iv. Arable Land Un-irrigated
- v. Arable Land Irrigated
- vi. Urban Settlement

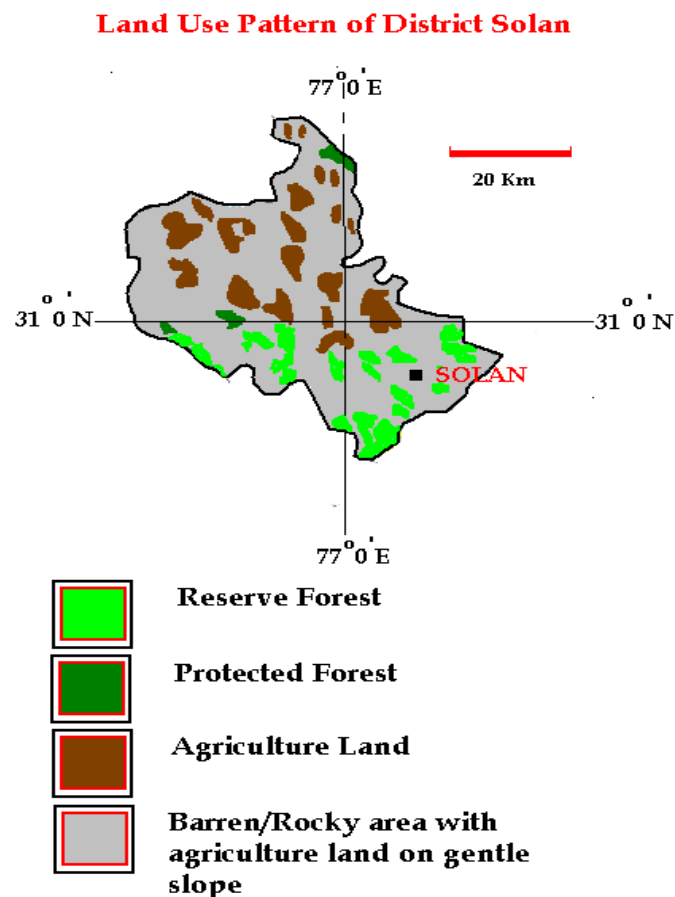


FIGURE-3.2: SHOWING GENERAL LAND USE PATTERN OF DISTRICT SOLON

The District Census 2001 classified the land available in surrounding villages into following five categories as shown in figure 3.3 and in percentage in fig 3.4.

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

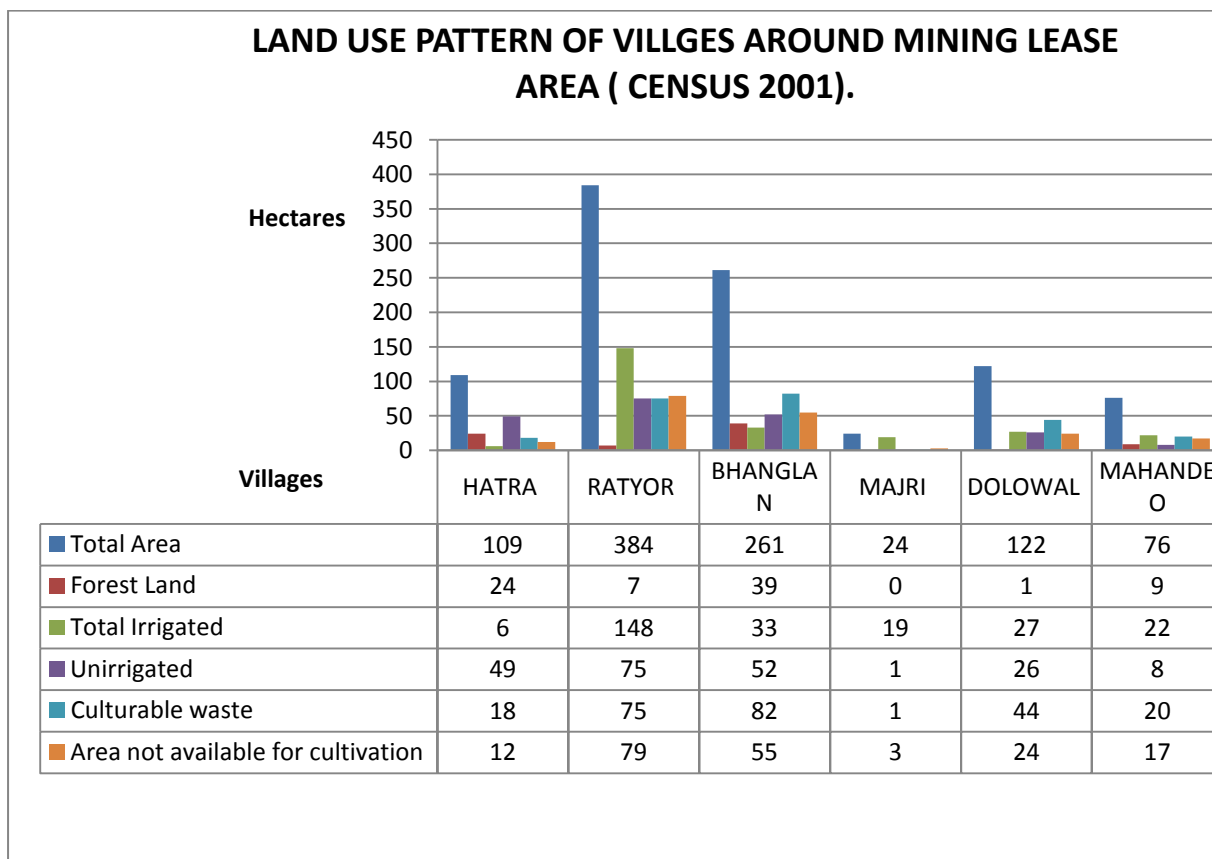


FIGURE 3.3SHOWING LAND USE PATTERN OF VILLAGES AROUND THE MINING LEASE AREA.

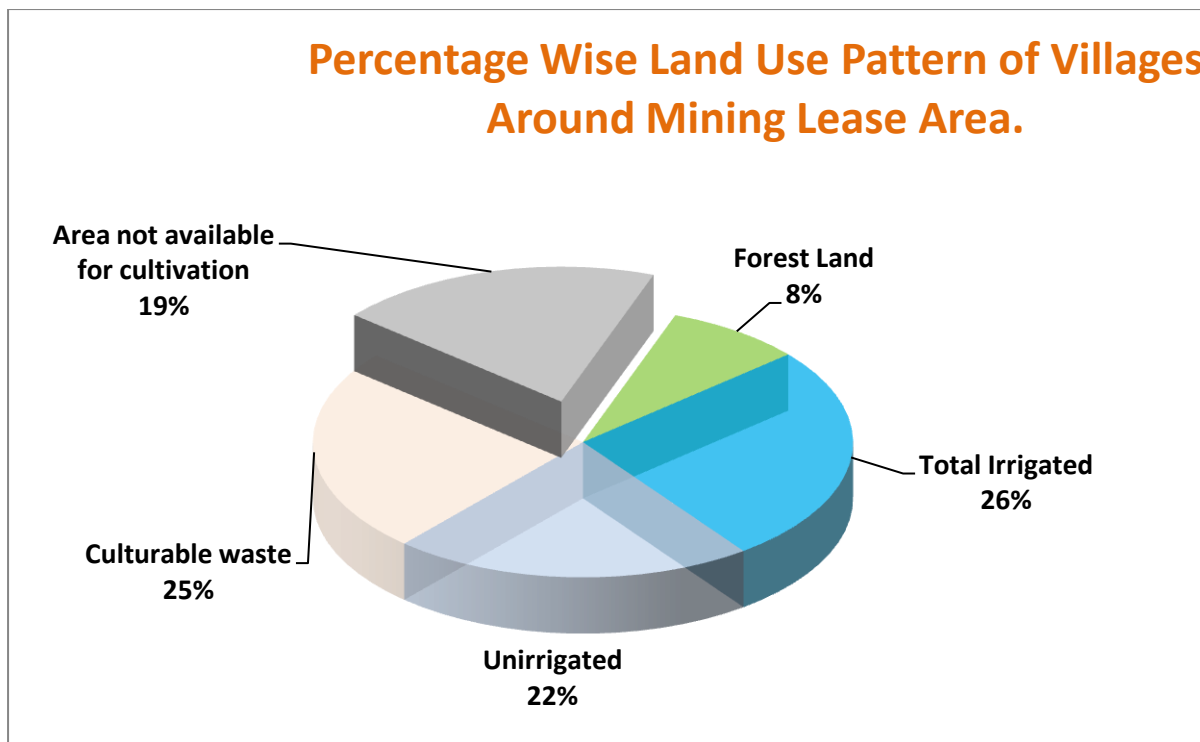


FIGURE 3. 4: SHOWING PERCENTAGE OF THE LAND USE PATTERN OF ZONE OF INFLUENCE

3.3.1 AGRICULTURE:-

From agriculture point of view the district can be divided into three distinct regions

1. Valley area of Nalagarh, Saproon and Kunihar
2. Mid Hills
3. Higher Hills of Solan, Kasauli and Kandaghat Teshil

Most of Nalagarh Dun Valley area consists of foot hills and Sirsa valley up to elevation of 1000 meters above mean sea level with sub tropical climate. The soils are mostly sandy loam in texture with scattered loamy patches. The area is highly prone to erosion due to weak geological formations and scanty vegetation. The moisture retention capacity is poor. 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 streams, shallow dug wells and medium to deep tube wells in the valley area.

Major food crops are grouped into three categories

1. Cerals
2. Pulses
3. Other food crops like Chillies, ginger, sugarcane and turmeric.

Area under Non- food crop is of two types i.e.

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

The area under each category of the crop is given below in figure 3.5 and percentage of area is given in figure 3.6. . The area under vegetables and their production is given in the figure 3.7

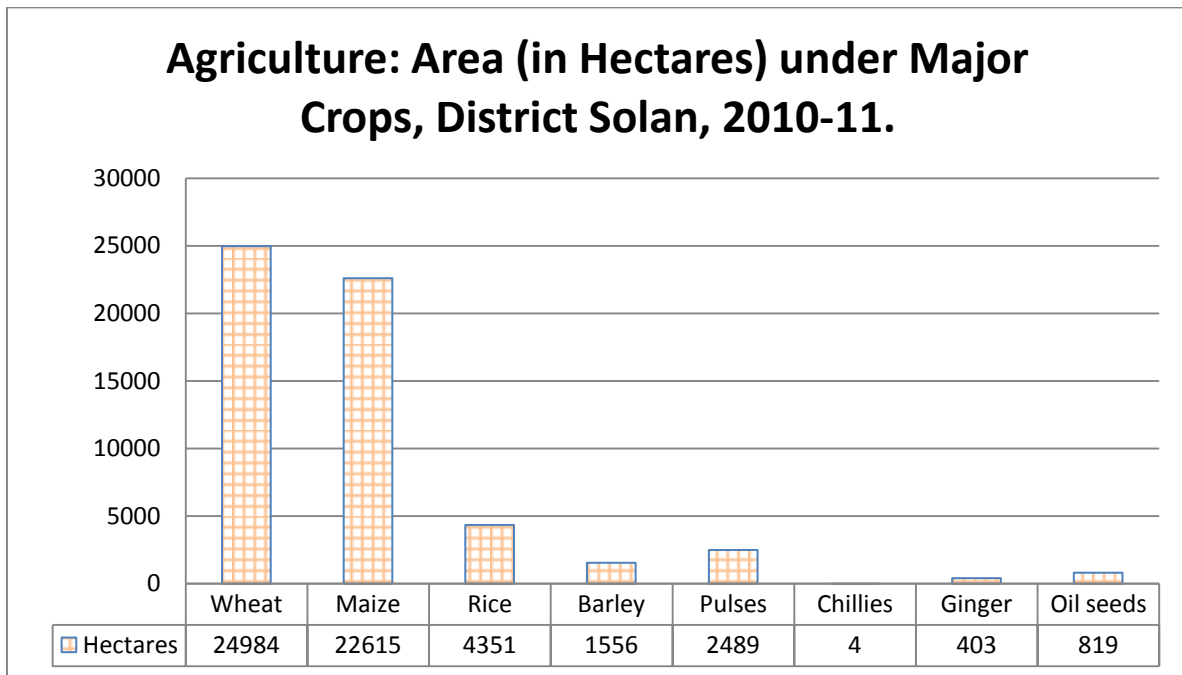


FIGURE 3.5 SHOWING AREA UNDER DIFFERENT CROPS IN SOLAN DISTRICT.

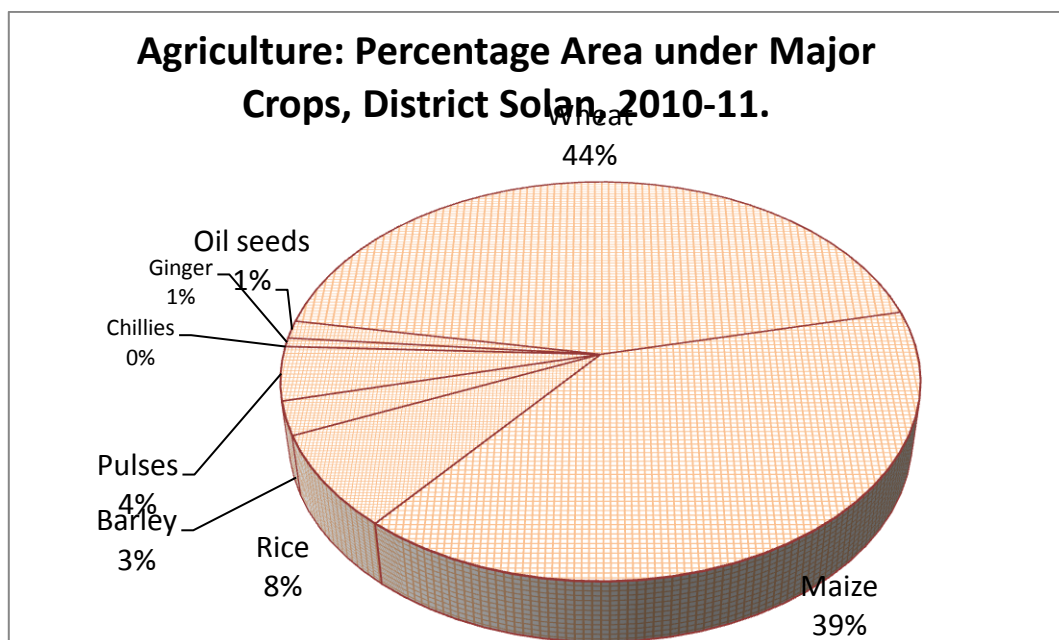


FIGURE 3.6 SHOWING PERCENTAGE WISE AREA UNDER EACH CROP IN DISTRICT SOLAN.

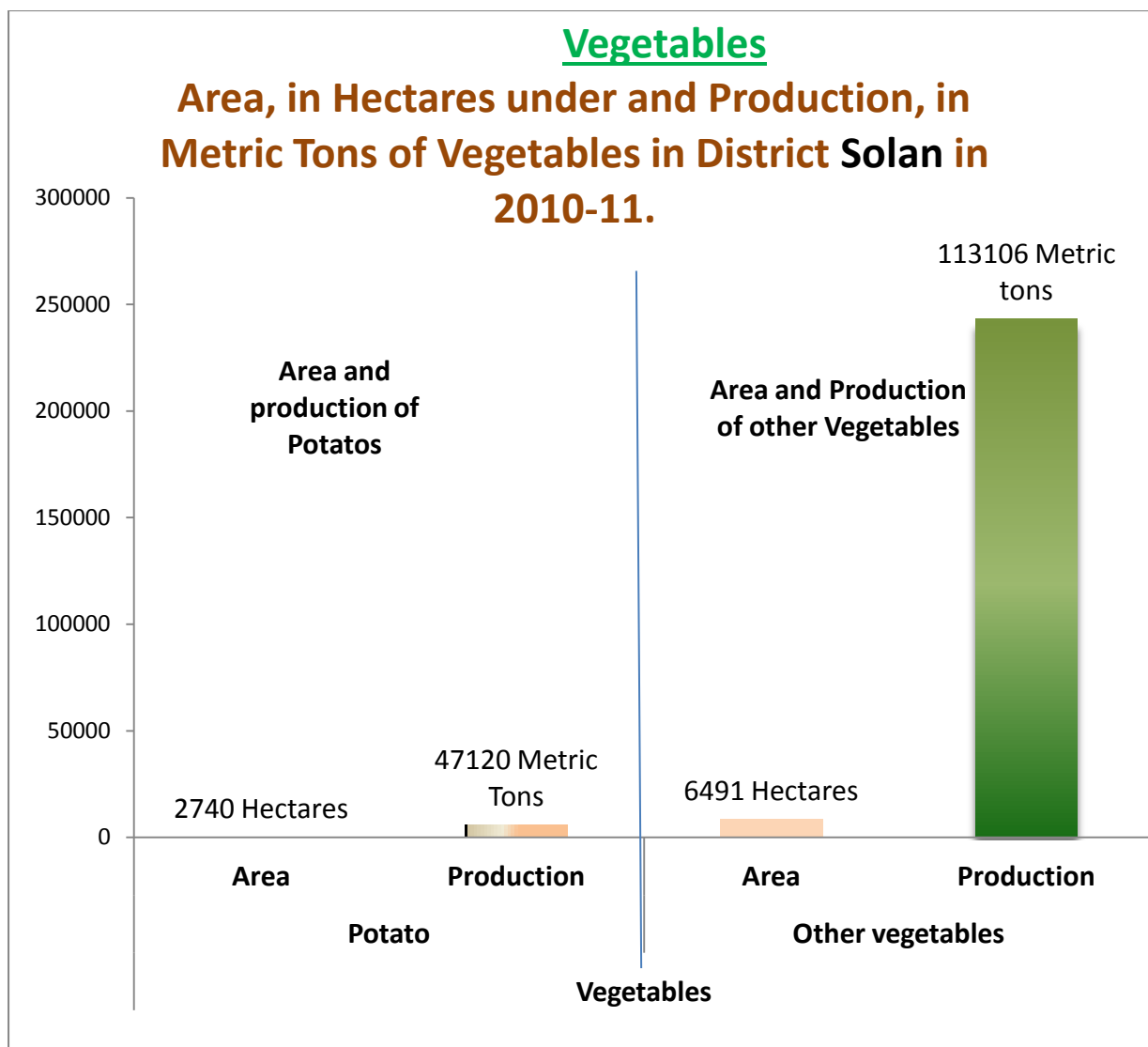


FIGURE 3.7: SHOWING AREA UNDER VEGETABLE IN HECTARE AND PRODUCTION IN METRIC TONS OF DISTRICT SOLAN.

3.3.2 LAND USE FOR HORTICULTURE:-

The topography and the agro- climatic conditions of the district are quite suitable for the production of the various fruits. The topography of the district can be grouped into three categories namely high hill areas located at a higher elevation, mid hill areas and low lying valley areas. Fruit of different varieties depending upon the terrain, climatic conditions and soil of area are grown in the district.

The main horticulture produce of the area are can be classified into following five categories.

1. Apple
2. Other temperate fruits

3. Subtropical fruits
4. Nuts and dry fruits
5. Citrus fruits

In the Nalagarh Dun valley following fruits are mainly grown

- i. Mango
- ii. Litchi
- iii. Mandarin
- iv. Sweet orange
- v. Lime
- vi. Lemon
- vii. Guava

The area under each fruit and percentage of area to total district area as well as the percentage of the area under fruit in each category as per 2010-11 survey is shown in figure 3.8

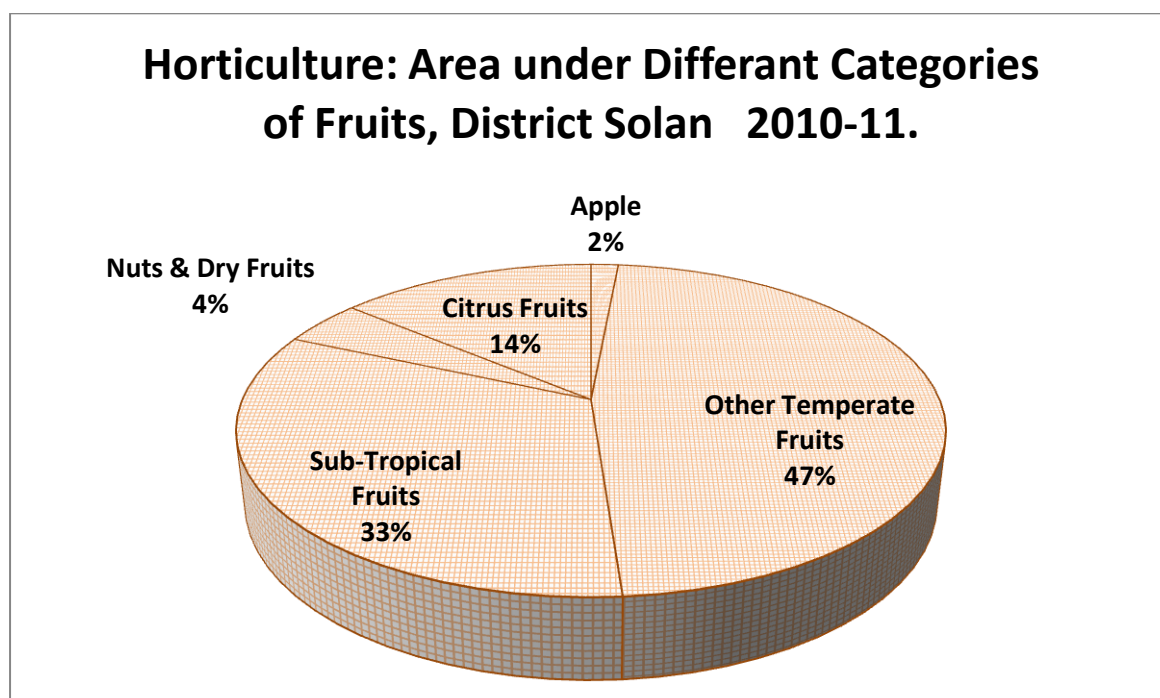


FIGURE 3.8: SHOWING AREA UNDER EACH CATEGORY OF FRUIT IN DISTRICT SOLAN.

3.4 WATER ENVIRONMENT

The Pali Mahadev Khad which flows in the South Westerly directions forms the main drainage channel for the area. It is a tributary of the River Satluj & joined by seasonal perennial streams. Drainage is dendrite type comprising primary, secondary and tertiary streams.

During the survey samples of water upstream and downstream of leased area were collected and analyzed. The ground water level of the study area is not likely to be affected, because the mining activities shall be carried on river bed and much above water table.

3.4.1 SURFACE WATER QUALITY

As stated above, the mining lease area is located on Pali Mahadev Khad, riverbed a tributary of Satluj River. It is joined by many seasonal / perennial streams of various dimensions both from north and south directions.

Requirement of water in the area is mostly met from dug wells & hand pumps. Drinking water is taken from tube wells existing in the area and for irrigation purposes, villagers mainly depend on Pali khad, tube wells and rainwater.

Water samples were collected & analyzed for ascertaining the water quality status in the study area during the period of post monsoon season in 2011, Dec.

The quality of surface water has been ascertained from the chemical analysis results of water samples collected from Pali khad up & down streams. Quality of water upstream & downstream of the mining area in the Pali Mahadev khad is almost similar. Water quality meets the criteria of Class A as per the classification of CPCB for designated use of water. The range of different chemical constituents in the surface water is given below in table 3.1.

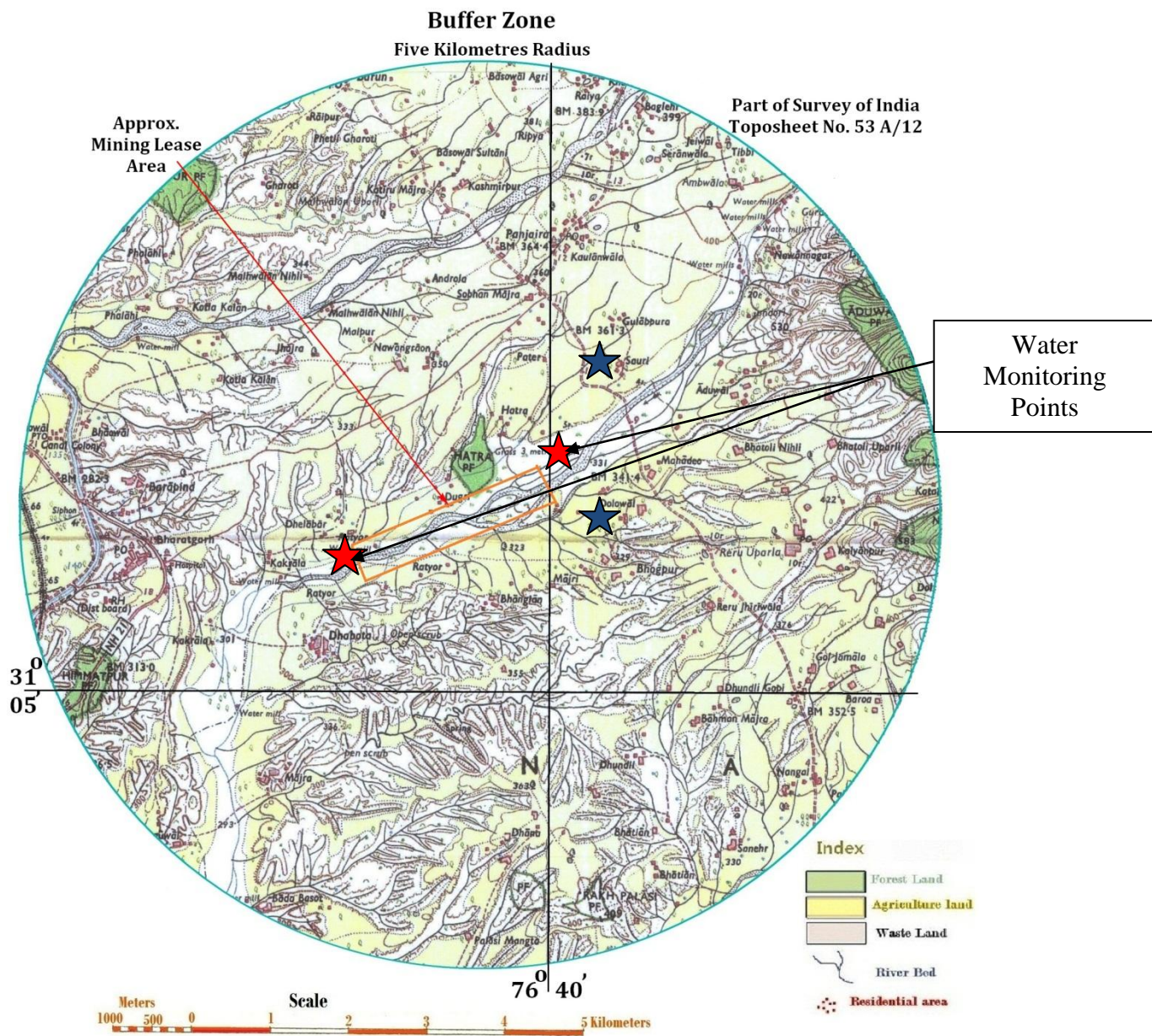


FIGURE 3.9 LOCATION OF WATER MONITORING

TABLE NO.-3.1 SURFACE WATER ANALYSIS RESULTS

S. No.	PARAMETER	Pali Khad Upstream	Pali Khad Down stream
1.	pH Value	7.99	7.9
2.	Temperature (°C)	23	23
3.	Turbidity NTU	0.5	0.5
4.	Chloride (as Cl), mg/l	14.7	14.2
5.	Nitrate, mg/l	16.4	15.5
6.	Fluoride mg/l	ND	ND
7.	Sodium mg/l	26.92	26.02
8.	Total Nitrogen mg/l	ND	ND
9.	Total Phosphorus mg/l	ND	ND
10.	Sulphate (as SO ₄) mg/l	42	44
11.	Biochemical Oxygen Demand, mg/l (3 days for 27° C)	Not Detected	Not Detected
12.	Chemical Oxygen demand, mg/l	4	4
13.	Copper (as Cu), mg/l	0.002	0.001
14.	Zinc (as Zn), mg/l.	Not Detected	BDL
15.	Lead (as Pb) mg/l .	Not Detected	BDL
16.	Total Chromium (as Cr), mg/l	0.006	0.006
17.	DO, mg/l	7.7	7.7
18.	Total Hardness (as CaCO ₃)mg/l	181	174
19.	Total Alkalinity, mg/l	192	188
20.	Total Coli form (MPN)	Nil	Nil
21.	Fecal Coliform (MPN)	Nil	Nil

3.4.2 GROUND WATER QUALITY

Ground water results show that the pH, DO, BOD & COD values found well within the permissible limit for drinking water (IS: 10500).

TABLE 3.2 GROUND WATER QUALITY

S. No.	PARAMETER	Ground Water Sample-I Sauri	Ground Water Samples II Dolowal
1.	pH Value	7.87	7.84
2.	Temperature (⁰ C)	23	23
3.	Turbidity NTU	0.5	0.5
4.	Chloride (as Cl), mg/l.	21.9	18.1
5.	Nitrate, mg/l..	10.2	12.1
6.	Fluoride	ND	ND
7.	Sodium mg/l	33.17	27.37
8.	Total Nitrogen	ND	ND
9.	Total Phosphorus	ND	ND
10.	Sulphate (as SO ₄) mg/l.	38	42
11.	Biochemical Oxygen Demand, mg/l (3 days for 27 ⁰ C)	Not Detected	Not Detected
12.	Chemical Oxygen demand, mg/l	8.8	2
13.	Copper (as Cu), mg/l.	0.003	0.003
14.	Zinc (as Zn), mg/l.	Not Detected	Not Detected
15.	Lead (as Pb) mg/l.	Not Detected	BDL
16.	Total Chromium (as Cr), mg/l	0.005	0.006
17.	DO, mg/l	6.8	6.7
18.	Total Hardness (as CaCO ₃)mg/l	275	270
19.	Total Alkalinity, mg/l	300	280
20.	Total Coliform	Nil	Nil
21.	Fecal Coliform	Nil	Nil

3.5 CLIMATIC CONDITION

The climate is sub-tropical interspersed between cold weather, hot weather and southwest monsoon. The cold weather commences in November and continues till the end of February, which is characterised by cloudless days and very cold nights with much fog and dew. May and June are usually the hottest months. During monsoon period (June to September) the weather remains humid.

The southwest monsoon sets in by the second half of June and withdrawal takes place in October. June to September are main rainy months though it continues till October. Cyclones and sudden storms may occur during May-June. In the post monsoon, a few thunderstorms occur, especially in October. Thereafter, the weather clears up and pleasant weather prevails throughout the valley. Precipitation occurs for some days during December and January. Rainfall is highly variable in the region due to its rugged topography and its geographical position. The rainfall generally increases up to the valleys from southwest to northwest and decreases beyond the highest range over the northern part of the region. The percentage contribution of rainfall is less than the southern part, perhaps due to decreasing influence of the monsoon. After April, the rainfall gradually increases till June and thereafter sharply during July and August. It decreases rapidly after the withdrawal of southwest monsoon in September. The precipitation occurs during pre-monsoon months associated with thunderstorms and constitutes 11% of the annual rainfall. Nearly 76% of the total rainfall is received during the five monsoon months from June to October. Rainfall during winter months constitutes 13% of total rainfall. The weighted annual rainfall based on available stations in study area is 1358 mm.

The daily maximum temperature during April to June varies from 37.2 to 38.6⁰C and shows moderate summer in the region. The highest temperature recorded is 39.1 C in the month of May and lowest 12.3⁰ C during April Month. The daily maximum temperature during July to September varies from 24.1 to 28.2⁰C and shows very little variation in temperature during monsoon season. The highest temperature recorded is 28.9⁰ C in the month of July and lowest 15⁰ during September month. During October to January, temperature varies from 25.4⁰C to 4.2⁰C.

The relative humidity of the area varies from 58 to 98%. The month of May is considered to be having the lowest humidity and higher humidity is observed during the month of August. The average annual rainfall for the district is around 1540 mm in the year 2005. The area is very humid round the year. Relative Humidity (%) varied between – 19.91% (1999) to 98.80% (1992).

3.5.2 Rainfall

The area received 910-1377 mm annual rainfall in past two years , 90% rainfall constitutes during the period middle of June to end of September. The normal annual rainfall at the district headquarters is 1370 mm . Data for past two years 2010-2012 of Solan district is given in figure below.

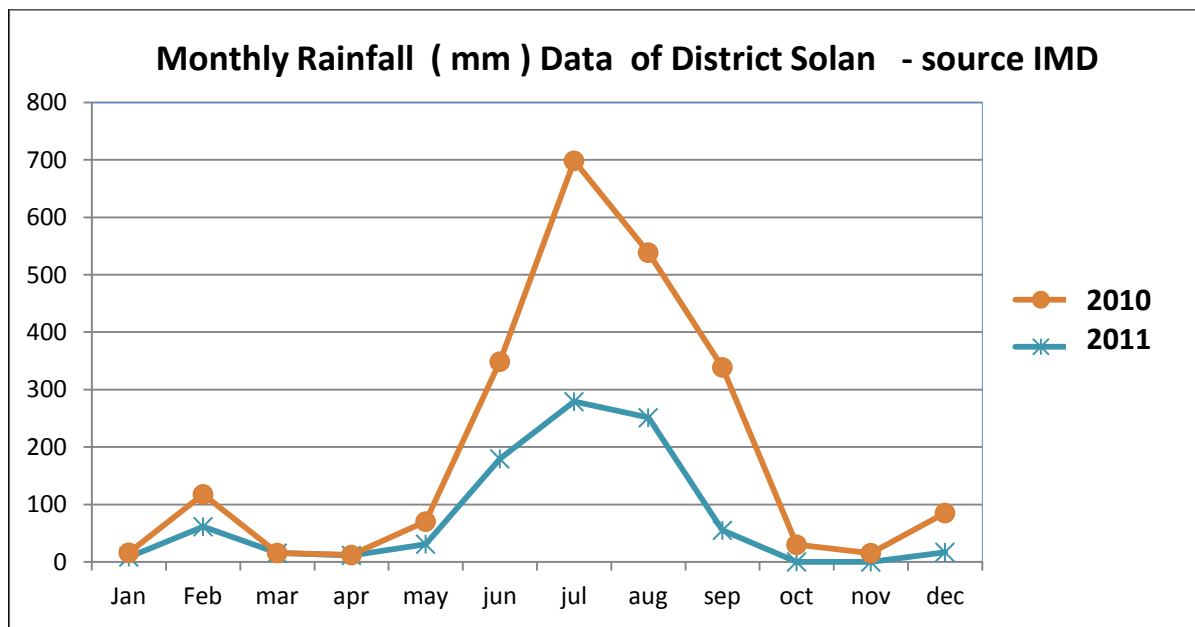


FIGURE- 3-10 SHOWING MONTHLY RAINFALL IN MM FOR DISTRICT SOLAN

3.6 ATMOSPHERIC CONDITION

Atmospheric conditions include micro meteorological condition and ambient air quality of the study area. Meteorological conditions with respect to wind velocity and direction in the study area was determined by locating a monitoring station at the mine. The monitored data is supplemented with meteorological data collected at Tehsil Nalagarh (tehsil H.Q.). the required data for interpretation the ambient air quality of the area was generated by establishing a monitoring network. Regular field observations as per the MoEF and CPCB were taken from the established monitoring stations.

METEOROLOGY

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. The nearest stations (Roop Nagar - Punjab) to the study area are located at 9 Km. from mine site.

Meteorological information available for this station is temperature, humidity and rainfall,

Meteorological Data from Roopnagar IMD Station

The data recorded at Ropar IMD Station for the study period October 2011 to Dec 2011 are summarized in table 3.3 and table 3.4.

TABLE -3.3 MEAN TEMPERATURE AND RELATIVE HUMIDITY RECORDED

Month	TEMPERATURE (°C)						RELATIVE HUMIDITY (%)			
	8: 00 AM		Mean	18.00 PM		Mean	8: 00 AM		18.00 PM	
	Max	Min.		Max	Min.		Max.	Min.	Max.	Min.
Oct 2011	33.4	28.2	31.4	24.8	15.8	19.63	74.52	30.47	98.81	98.73
Nov 2011	28.7	23.5	26.54	12.8	18.8	15.64	71.42	31.42	98.76	98.71
Dec2011	26.5	17.2	21.5	6.5	6.9	11.39	98.7	36.38	99.33	98.68

TABLE-3.4 WIND SPEED AND RAINFALL

Month	Wind Speed(Km./Hr.)				Total Rainfall(mm.)	No of rainy days
	8:00 AM		18.00 PM			
	Max.	Min.	Max.	Min.		
Oct 2011	8	1	2	0	0	0
Nov 2011	6.0	0	2	0	0	0
Dec2011	6.0	0	1	0	18	2

3.6.1. Micro Meteorology at Site

Micro meteorology data viz. temperature and relative humidity were recorded at site during the study period which are summarized in the table 3.3

TABLE 3.5 TEMPERATURE AND RELATIVE HUMIDITY NEAR MINE SITE

Month	Temperature(°C)		Rainfall in mm	Prominent wind direction/wind speed(Km./Hr.)
	Min.	Max.		
Oct 2011	12.6	33.9	0	NE/ 1.0
Nov 2011	8.7	29.5	0	NE/ 0.98
Dec 2011	3.2	27.8	18	NE /1.2

3. AMBIENT AIR QUALITY

The ambient air quality around this study area could be affected by several sources viz. few small neighboring sand, stone and bajari mine & Crusher plant , other industries in within 5 km radius and transportation ..

To establish the ambient air quality the studies were carried out during October 2011 to December 2011.

a. Ambient Air Sampling

Ambient air quality sampling was carried out with the help of High volume air Sampler and Respirable Dust sampler. The data generated for ambient air quality status within 10 km. radius of the proposed mine has been compiled along with micrometeorological conditions for particular season.

b. Location of Ambient Air sampling Stations

Four sampling stations were established around the core zone within 10 km. radius to study the present air quality. The locations are given in Table 3.4 and are marked in **Fig 3.11**

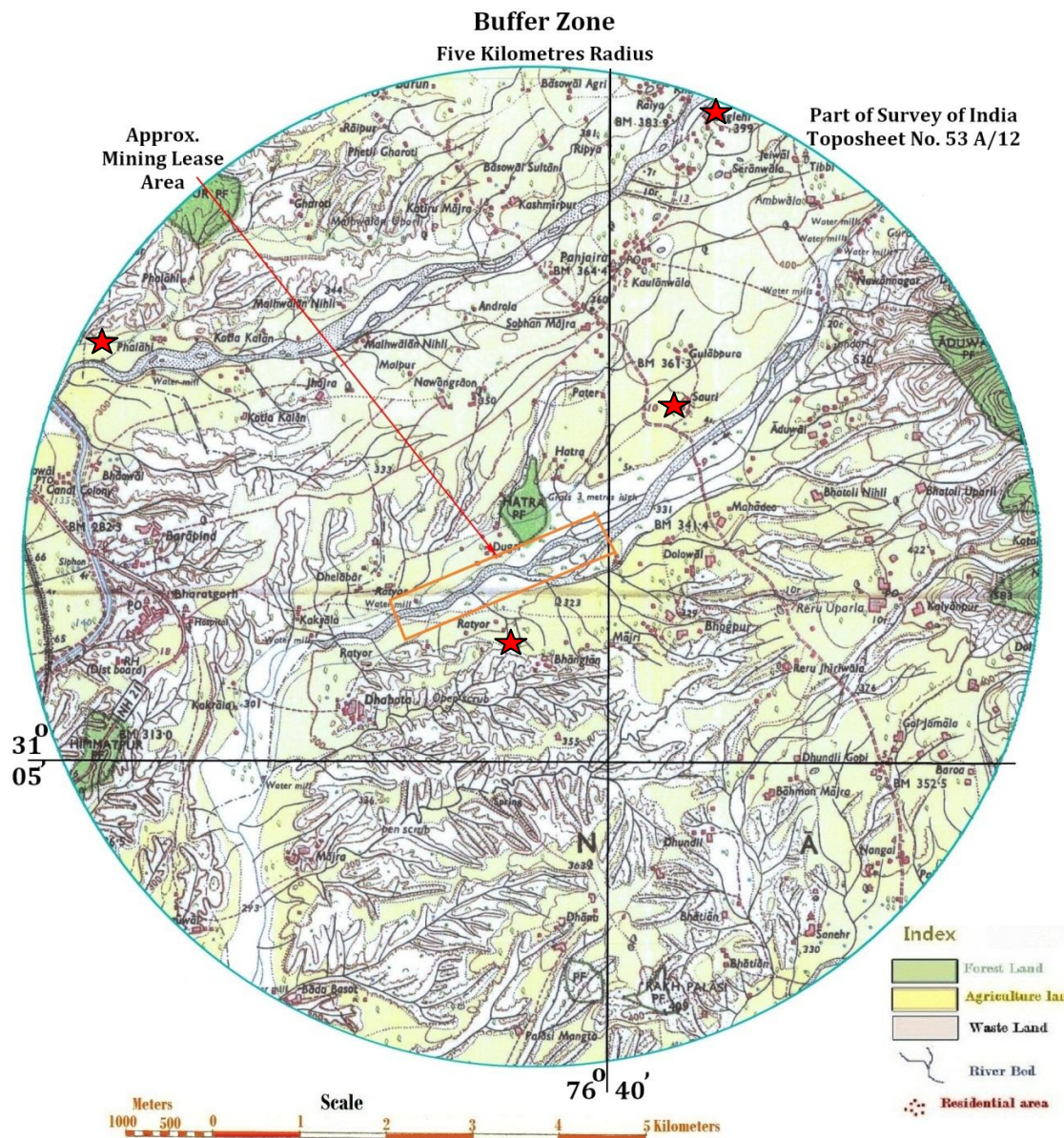


FIGURE 3.11 LOCATION OF AIR MONITORING STATION

TABLE 3.5 LOCATION OF AMBIENT AIR MONITORING STATIONS

Station Code.	Station Name	Location with respect to Site	
		Distance (Km)	Direction
A1	Mine Site	0.2	S
A2	Vill. Belhi	4.5	NW
A3	Vill. Kundlu	4	NE
A4	Vill. Sauri	2.0	NE

c. Sampling Schedule

Eight hourly samples were collected from each station round the clock, twice a week for continuous three months (. October 2011 –Dec 2011).

d. Air Quality parameter

The following parameters were analysed for each sample

- Suspended particulate matter(SPM)
- Sulphur dioxide(SO₂)
- Oxides of nitrogen(NO_x)
- Respirable particulate matter(RPM)
- Carbon Monoxide(CO)

The sampling and testing of ambient air quality parameters were carried out as per relevant parts of IS 5182. The brief details of testing procedure adopted are given in Table 3.6

TABLE 3.6 PROCEDURES FOR DETERMINING VARIOUS AIR QUALITY PARAMETERS

Parame ters	Testing Procedures
SPM	Gravimetric method using high volume samplers IS:5182(Part IV)1973
NO_x	Absorption in dil. NaOH and then estimated calorimetrically with sulphanilamide and N(I-Nephthyle) Ethylene diamine Dichloride and Hydrogen Peroxide (IS:5182 1975,Part VI)
SO₂	Absorption in Sodium Tetra Chloro-mercurate followe by Colorimetric estimation using P-Rosaniline hydrochloride and Formaldehyde (IS:5182 Part II 1969)
RPM	Respirable Particulate matter Sampling and analysis
CO	By Electronic CO detector

The detailed results of ambient air Quality are given in table 3.7 to 3.10.

TABLE -3.7 Ambient Air quality (SPM 24-hr Concentration in $\mu\text{g}/\text{M}^3$)

Station		Mine site	Belhi	Kundlu	Sauri
Sr No	Date	A1	A2	A3	A4
1.	4-5/10/11	88	94	100	97
2.	6-7/10/11	98	108	109	104
3.	8-9/10/11	107	146	150	156
4.	12-13/10/11	102	145	156	146
5.	15-16/10/11	111	147	172	151
6.	18-19 /10/2011	132	162	165	148
7.	20-21/10/11	130	163	163	178
8.	22-23/10/11	143	165	169	167
9.	26-27/10/11	134	174	180	187
10.	2-3/11/2011	152	173	173	171
11.	4-5/11/2011	146	196	199	180
12.	8-9/11/11	107	148	152	145
13.	10-11/11/11	137	175	166	160
14.	12-13/11/11	122	159	156	159
15.	16-17/11/11	145	173	164	159
16.	18-19/11/11	136	167	171	181
17.	23-24/11/11	122	152	150	153
18.	25-26/11/11	141	189	190	183
19.	6-7/12/11	56	84	87	85
20.	8-9/12/11	45	85	82	88
21.	12-13/12/11	105	135	134	135
22.	14-15/12/11	124	145	149	150
23	16-17/12/11	142	169	170	176
24	27-28/12/11	133	166	171	172
	Minimum	45	84	82	85
	Maximum	152	196	199	187
	Average	119.1	150.8	153.2	151.3
Silica content in SPM were found 3.9%					

TABLE -3.8 AMBIENT AIR QUALITY (RPM 24-HR CONCENTRATION IN µg/M3)

Station		Mine site	Belhi	Kundlu	Sauri
Sr. No.	Date	A1	A2	A3	A4
1.	4-5/10/11	43	64	60	67
2.	6-7/10/11	46	58	70	54
3.	8-9/10/11	48	46	51	59
4.	12-13/10/11	51	65	56	66
5.	15-16/10/11	40	47	72	51
6.	18-19 /10/2011	52	62	75	48
7.	20-21/10/11	48	68	63	58
8.	22-23/10/11	57	55	69	65
9.	26-27/10/11	60	64	70	59
10.	2-3/11/2011	58	53	63	61
11.	4-5/11/2011	54	74	77	53
12.	8-9/11/11	43	48	52	55
13.	10-11/11/11	58	75	56	60
14.	12-13/11/11	65	69	61	69
15.	16-17/11/11	76	73	54	76
16.	18-19/11/11	77	57	61	61
17.	23-24/11/11	57	62	60	65
18.	25-26/11/11	70	73	53	53
19.	6-7/12/11	40	34	38	35
20.	8-9/12/11	36	35	42	38
21.	12-13/12/11	46	38	44	45
22.	14-15/12/11	40	42	47	50
23	16-17/12/11	50	59	49	56
24	27-28/12/11	54	56	51	62
	Minimum	36	34	38	35
	Maximum	77	75	77	76
	Average	52.9	57.4	58.1	56.9

TABLE -3.9 AMBIENT AIR QUALITY(SOX 24-HR CONCENTRATION IN UG/CUM)

Station		Mine Site	Belhi	Kundlu	Sauri
Sr No	Date	A1	A2	A3	A4
1.	4-5/10/11	3.2	3.7	4.6	3.7
2.	6-7/10/11	4.2	3.8	2.7	2.5
3.	8-9/10/11	2.7	2.4	3.5	2.5
4.	12-13/10/11	3.5	4.5	4.5	4.6
5.	15-16/10/11	4.6	4.4	4.7	4.5
6.	18-19 /10/2011	5.4	6.6	4.7	5.4
7.	20-21/10/11	5.0	4.6	4.6	4.5
8.	22-23/10/11	5.9	5.5	5.6	5.6
9.	26-27/10/11	4.3	4.6	5.7	5.5
10.	2-3/11/2011	5.5	5.5	6.7	5.6
11.	4-5/11/2011	4.8	4.7	5.7	4.5
12.	8-9/11/11	4.4	4.4	4.5	5.5
13.	10-11/11/11	3.3	3.7	3.5	3.6
14.	12-13/11/11	4.7	5.6	5.6	4.6
15.	16-17/11/11	4.4	3.7	4.5	5.7
16.	18-19/11/11	4.9	4.5	4.6	4.6
17.	23-24/11/11	5.6	4.6	4.6	4.6
18.	25-26/11/11	5.0	4.7	5.5	5.5
19.	6-7/12/11	4.4	3.3	3.3	4.3
20.	8-9/12/11	2.3	3.3	3.4	3.3
21.	12-13/12/11	3.3	4.3	4.4	5.4
22.	14-15/12/11	6.4	4.4	4.4	4.5
23.	16-17/12/11	5.8	6.5	6.4	5.5
24.	27-28/12/11	6.7	6.5	6.5	6.6
	Minimum	2.7	2.4	2.7	3.3
	Maximum	6.7	6.6	6.7	6.6
	Average	3.6	3.7	4.6	3.7

TABLE -3.10 AMBIENT AIR QUALITY (NOX 24-HR CONCENTRATION IN UG/CUM)

Station		Mine site	Belhi	Kundlu	Sauri
Sr. No.	Date	A1	A2	A3	A4
1.	4-5/10/11	6.5	7.4	7.8	7.2
2.	6-7/10/11	6.8	7.5	8.7	7.7
3.	8-9/10/11	7.9	8.6	10.2	10.2
4.	12-13/10/11	5.6	6.2	8.5	8.2
5.	15-16/10/11	7.4	8.8	10.1	9.5
6.	18-19 /10/2011	10.7	10.1	11.4	10.3
7.	20-21/10/11	7.0	7.6	9.4	9.6
8.	22-23/10/11	7.3	8.2	10.6	10.8
9.	26-27/10/11	9.2	9.7	11.1	10.4
10.	2-3/11/2011	8.4	8.1	7.1	7.0
11.	4-5/11/2011	9.4	9.7	6.8	7.8
12.	8-9/11/11	8.0	8.1	8.7	9.5
13.	10-11/11/11	9.0	10.8	14.4	10.4
14.	12-13/11/11	9.1	10.5	11.5	10.5
15.	16-17/11/11	7.0	6.6	7.2	7.1
16.	18-19/11/11	7.8	12.8	9.3	9.3
17.	23-24/11/11	11.3	11	10.2	9.4
18.	25-26/11/11	10.5	10.4	9.5	9.8
19.	6-7/12/11	4.2	5.7	5.8	4.9
20.	8-9/12/11	4.8	6.0	6.7	5.7
21.	12-13/12/11	8.0	5.9	5.9	9.8
22.	14-15/12/11	8.5	6.2	9.1	12.0
23.	16-17/12/11	6.8	6.3	10.3	10.1
24.	27-28/12/11	6.0	6.6	11.6	9.4
	Minimum	4.2	5.7	5.8	4.9
	Maximum	11.3	12.8	14.4	12.0
	Average	7.8	8.3	9.2	9.0

The observed range of various parameters recorded has been compared with the National Ambient Quality Standards laid down by the Central Pollution Control Board and given in Table 3.11.

TABLE – 3.11
(Comparison of Air Monitoring Results)

Parameters	Mine site	Belhi	Kundlu	Sauri	NAAQS*	Residential & Rural Use
					Ind. & Mixed Use	
SPM Concentration						
Minimum	45	84	82	85	500	200
Maximum	152	196	199	187		
Average	119.1	150.8	153.2	151.3		
RPM Concentration						
Minimum	36	34	38	35	150	100
Maximum	77	75	77	76		
Average	52.9	57.37	58.08	56.91		
SO₂ Concentration						
Minimum	2.7	3.3	3.3	2.5	120	80
Maximum	6.7	6.6	6.7	6.6		
Average	3.6	4.6	4.8	4.7		
NO_x Concentration						
Minimum	4.2	5.7	5.8	4.9	120	80
Maximum	11.3	12.8	14.4	12.0		
Average	7.8	8.3	9.2	9.0		
CO Concentration						
<p>The CO readings were less than 1 ppm for most part of the sampling period.</p> <p>The CO level was recorded as 0.6- 0.8 ppm in the villages in the morning and evening hours.</p>					5000	

*NAAQS-National Ambient Air quality Standards.24-hr concentration in $\mu\text{g}/\text{m}^3$.

A Perusal of tables 3.10 shows that SPM, RPM, CO, NO_x & SO₂ are within limits prescribed for areas meant for “Residential and Rural use”. The air quality in the proposed project area and its surroundings is pollution free as there are no industries in the within 5 Km radius area and the density of vehicular traffic is not alarming. The forests cover around the site is fairly dense and serves as a carbon sink. All the pollutant gases in the atmosphere are also within safe limits. In addition to this, there are plenty of water vapours in the air, acting as a diluting factor and do not allow the dust to scatter much. The phenomenon like smog and acid rains have never been observed in these areas and neither such conditions exists nor seems to be occur in near future.

3.6.2 Wind Rose

Wind speed of a site plays a vital role in predicting the extent of air pollution. It gives a clear view about the extent to which air pollutants are carried before they touch the ground.

Wind rose is diagrammatic representative of wind speed in a specified direction with its arms representing sixteen directions; each arm gives a clear frequency distribution of wind speed.

Wind rose is generated with the meteorological information collected and wind rose diagram is plotted using software WRPLOT Veiw.

Fig 3.12 to 3.14 gives clear view of wind rose for three months viz. October 2011 to December 2011 each representing a wind speed per month.

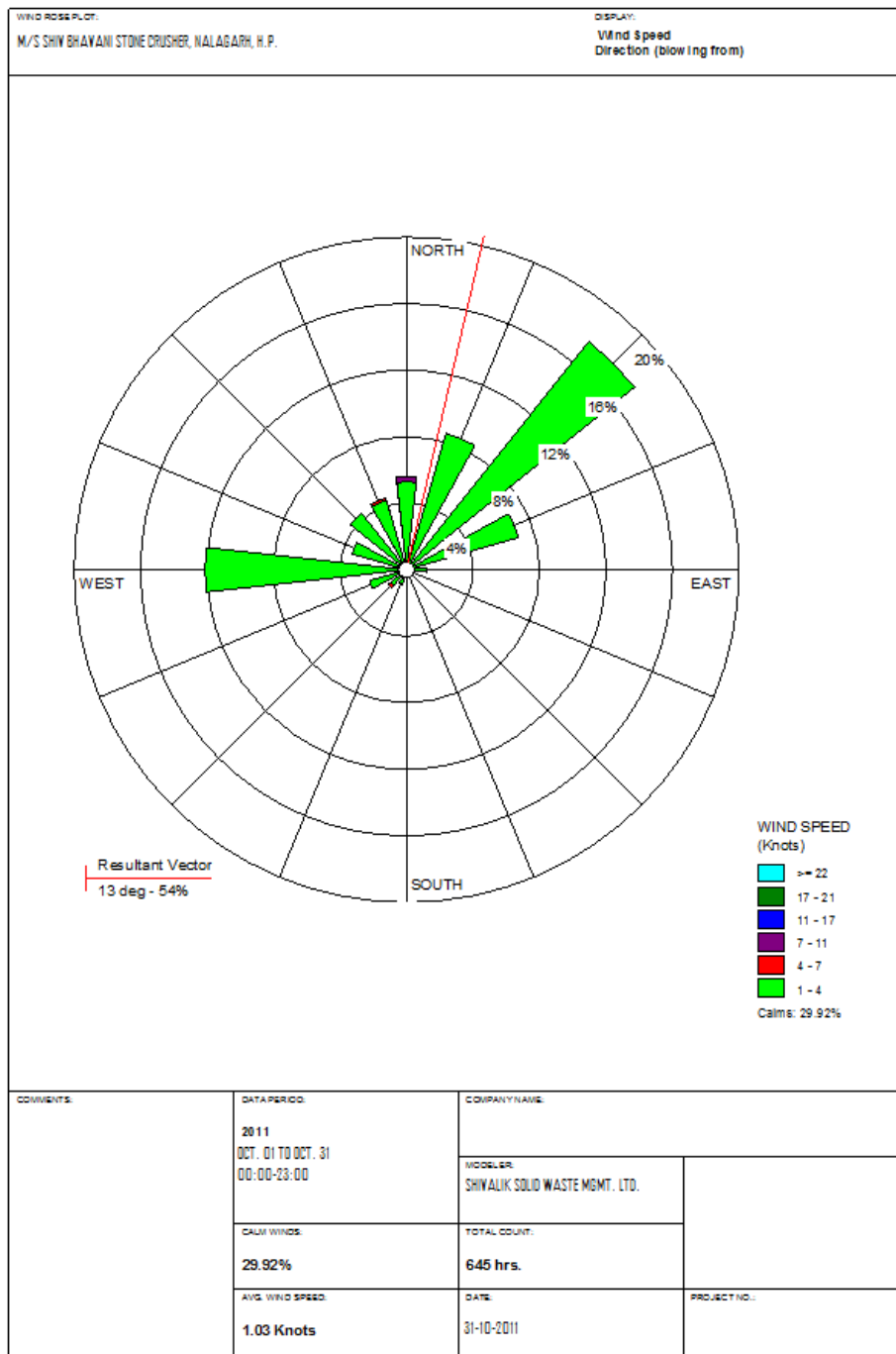


FIG 3.12 WINDROSE FOR THE MONTH OF OCTOBER 2011

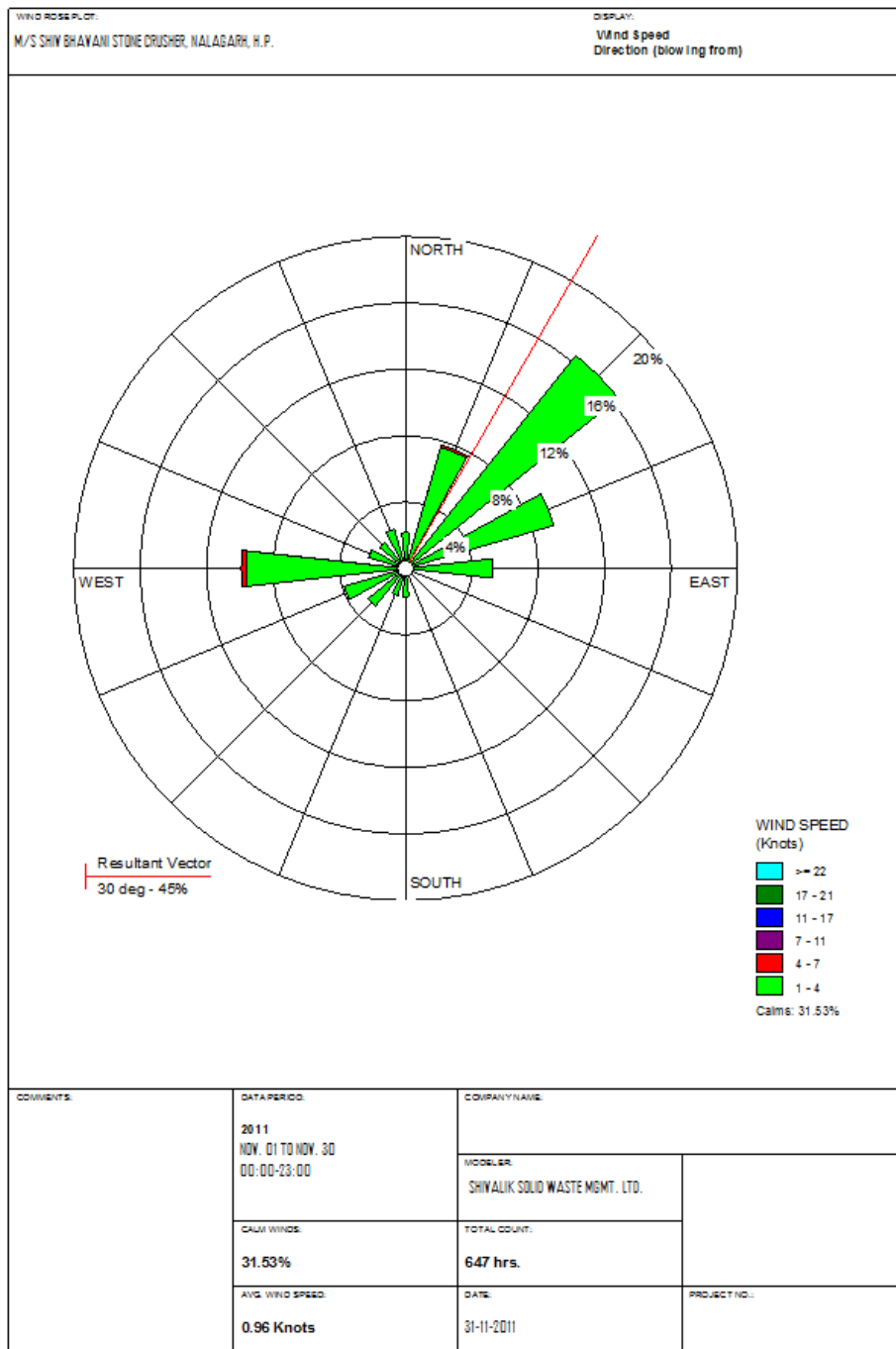


FIG 3.13 WINDROSE FOR THE MONTH OF NOVEMBER 2011

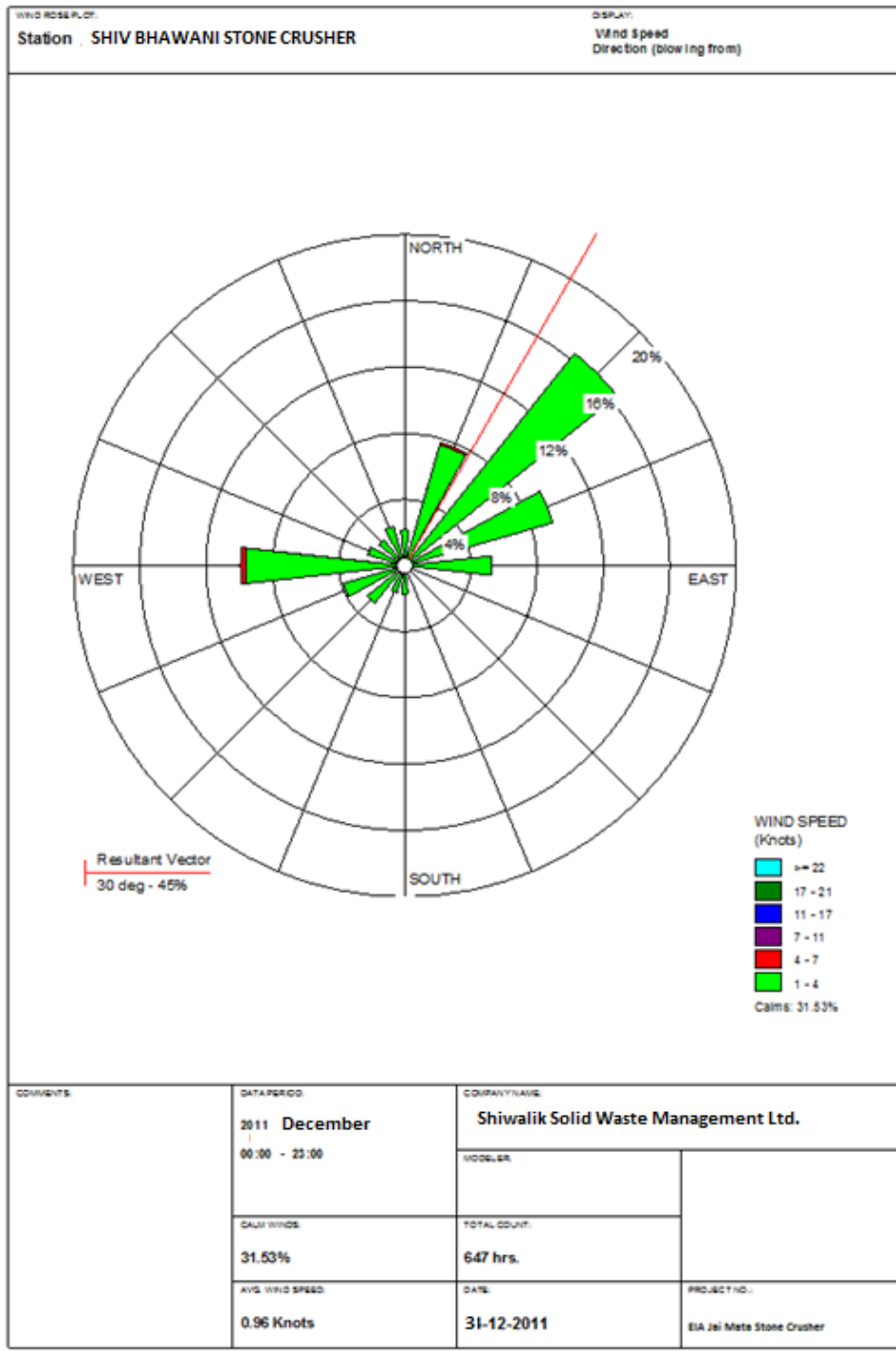


FIG 3.14 WINDROSE FOR THE MONTH OF DECEMBER 2011

3.7 NOISE ENVIRONMENT

3.7.1 Noise Analysis within the study area

The noise analysis within the study area was recorded using 4-20 sound level meter. The analysis reveals that the noise's well within the permissible range. The location of Noise level monitoring & the levels recorded are as stated in table 3.11

TABLE 3.11 NOISE LEVEL WITHIN THE STUDY AREA (Unit- dB)

S. No.	Name	Month	Noise level(Morning)	Noise level(Night)
			09:30am-10:30 am	10:30 pm-11:30 pm
N1	Mine Site	Oct 2011	40	38
N2	Near High way	Oct 2011	54	45
N3	Village Ratyod	Oct 2011	49	40

The results shows that the ambient air quality in the study area are well within the permissible standards in respect of noise, which are 65, 55 and 50 dB (A) in daytime and 55, 45 and 40 during night time for commercial, residential and silence zone respectively. The daytime noise level measured during 9.30 am to 10:30 pm and night time measured from 10:30 pm to 11:30 pm. The Noise levels are slightly higher compared to the other locations due to vehicular movement.

3.7.2 Traffic density

Traffic density measurements were performed at two locations near mine site and State Highway. The Monitoring was performed in October 2011

Traffic density measurements were made continuously for 24 hours by visual observations and counting of vehicles under three categories viz. heavy motor vehicles, light motor vehicles and two wheelers. Total numbers of vehicles per hour under the three categories were determined. The results of measurements at peak hours i.e. 9-11 am and 6-8pm are given in Table 3.12.

TABLE 3.12 TRAFFIC DENSITY

Traffic vehicle	No. of vehicles during peak hour near Mine site	No. of vehicles during peak hour at high way
H.M.V.	-	8
L.M.V.	-	10
2/3 wheelers	2	50
Grand Total	2	68

3.8 SOIL

The soil in the area is of reddish brown to yellowish brown colour, The soil samples have been collected from two locations for assessment of soil quality in project area. The location of Soil samples & the results of sample analysed in table 3.13.

TABLE – 3.13 SOIL SAMPLE ANALYSIS

S. No.	Parameters	Unit	Near Mine Site	Village Ratoyd
1.	Color	visual	Reddish Brown	Reddish Brown
2.	pH value	pH Scale	7.32	7.36
3.	Soil texture	-	Sandy Clay	Sandy Clay
4.	Electrical Conductivity	mS	0.112	0.116
5.	Permeability	Cm/Hrs	2.40 %	2.44
6.	Water Holding Capacity	Inch/foot	1.59	1.68
7.	Porosity	%	39.2	41.1

The result of soil samples analysed is presented in table 3.13(B) for physical and chemical parameters. The result of soil analysis shows that it is slightly alkaline in nature having pH values from 7.32 to 7.36. The soil texture varies is sandy clay.

3.11 BIOLOGICAL ASPECTS

Plant and animal communities are indicators of the environment. They respond not only to one environmental factor but also to an interactive group of factors. These communities influence and react sensitively to change in the balance of environmental stresses. Depletion of biodiversity is mainly due to intense anthropogenic pressure owing to “Population Explosion” mainly for expansion of agriculture, over grazing and illicit felling, shifting cultivation, development activities like irrigation,, construction of hydro-electric dams, road construction including mining activities – all leading to dysgenic selection. Rational use of the resources is therefore; quite important in the management of biodiversity, the habitat, species and gene pools prevalent in an area, because once it is lost, it becomes an uphill task to reverse the process. Therefore, a detailed knowledge of the diversity of the area definitely helps in managing the area properly following suitable practices.

The data of Flora and fauna in the core area buffer zone was collected from the local forest office is attached at annexure -IV . The biological study of the area has been conducted in order to understand the ecological status of the existing flora and fauna to generate baseline information and evaluate the probable impacts on the biological environment.

Aquatic Flora and Fauna

The following flora & fauna were found in the study area.

The Phytoplankton species broadly belonged Class Cyanophyceae, Chlorophyceae and Bacillariophyceae. The identified phytoplanktons are Oscillatoria sp., Chlorella sp, Microcystis sp., Phormidium sp., Merismopedia sp.,, Scenedesmus sp., Navicula sp., Nitzschia sp. and Euglena sp.

The available Zooplanktons at the study area are Brachionus sp., Keratella sp, Ceriodaphnia sp. and Moina sp.

3.13 SOCIO-ECONOMIC ENVIRONMENT

3.13.1 SOCIAL AND CULTURAL BACKGROUND

Proposed Mining project falls in the Solan district of Himachal Pradesh. Physiographically, the area lies within the outer lesser Himalayan zone. The greater portion of the district is drained by the river Sirsa and its tributaries

3.13.2 DEMOGRAPHIC STRUCTURE OF THE LOCAL POPULATION

Solan District is having 2388 villages/ 211 panchayats with a total population of about 5.76 lakh (according to 2011 census), where the majority i.e., 4.09 lakh people live in rural areas as compared to .91 in urban areas. In this district cultivators constitute the majority of the population. Industries are located in the region of Parwano, Baddi, Barotiwala and Nalagarh area. The sex ratio of the district is 884:1000. The literacy rate of Solan district is 85.02 % as compared to the state, which is around 77.13 %. The density of population is 298 per Sq Km.

There are 619 villages in the study area having a total population as per 2001 census of 153293 out of which 9443 live in urban area. Sex ratio is 1000: 863 forming 27637 households at an average of 5.5 persons per household. The total break-up of household and population is given in Table 3.20.

3.13.3 OCCUPATIONAL PATTERN

The occupational pattern of the population of the area has been studied. About 50% of the population is non agricultural-workers. Total agricultural workers account for 0.99% of total population.

3.13.4 INDUSTRIES IN THE VICINITY

There is no industry within 5 Km radius. Major industry ie JP Cement plant Rajban is located at distance of 6 Km towards North. The Nalagarh Industrial area is located about 6 km towards west. It has more than 40 industries which is mix of pharmaceutical formulation, textile ancillary units. Some of the major industries are GPI textiles, Godrej Hershey Ltd, TVS Motors etc.

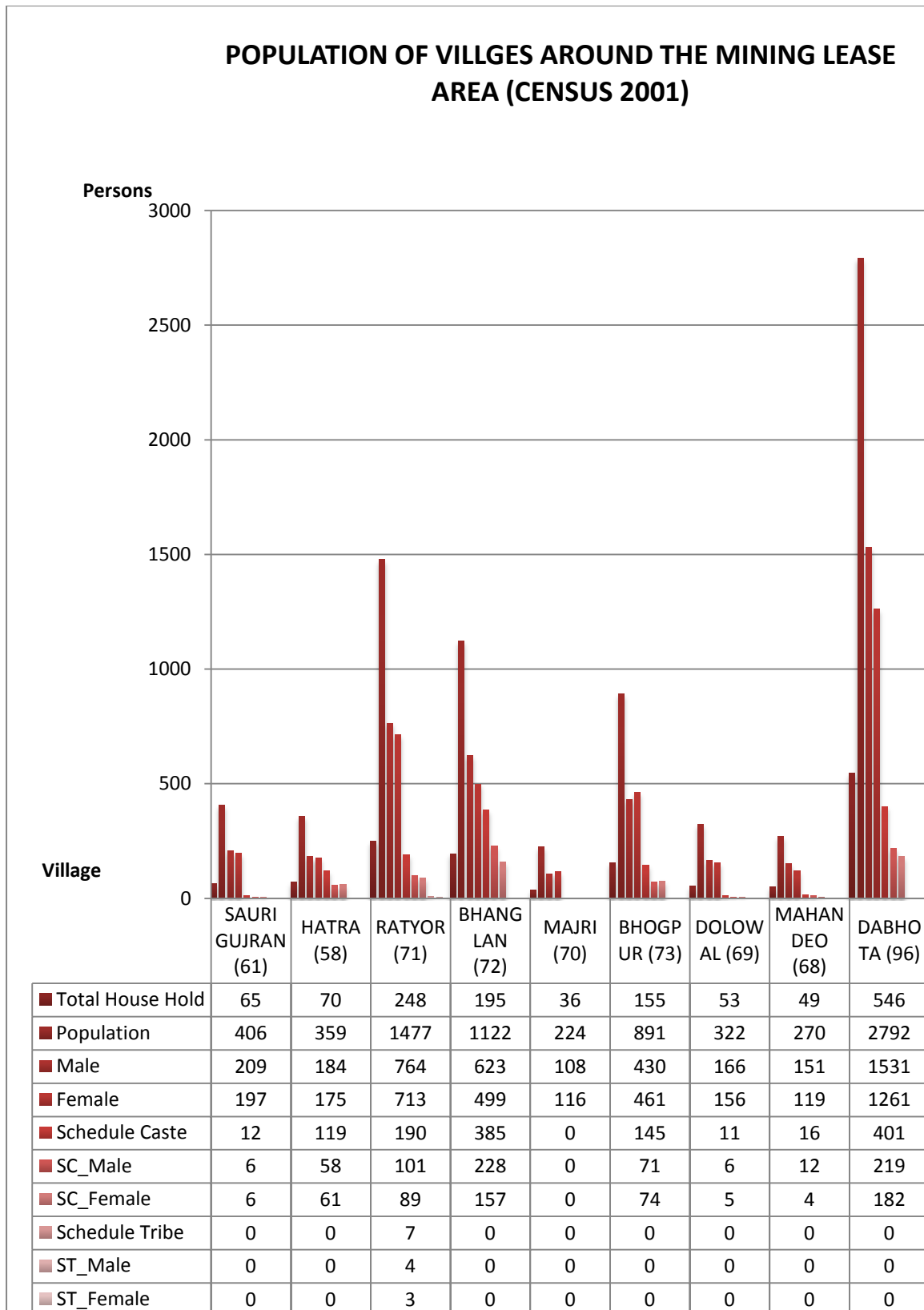


FIGURE 3.15 DEMOGRAPHY NEAR MINE AREA

3.13.5 AMENITIES

The village in close vicinity of the mine is well connected to Chandigarh which is the closest railway station at a distance of 40 km from the proposed lease area. The nearest airport is Chandigarh Airport which is about 70 Km from Ropar National highway connects Ropar to Chandigarh.

The basic amenities available in the area are described below:

a. **Educational Facilities**

The mining lease area is located in village which is about 8 Km from Nalagarh town, which has facility of all levels of school and colleges. The Nalagarh Block has 232 primary Schools, 42 Middle Schools, 16 higher secondary schools.

b. **Medical**

Nalagarh has facility of Civil Hospital besides many private clinics and nursing home. There are 11 PHC 2 dispensary and 35 health sub centre.

c. **Electricity**

Electricity for all purpose is available in all village of study area.

d. **Drinking water**

All the villages in the study area have water supply for domestic purposes. The source of water supply in most of the village is ground water.

e. **Transport**

The main mode of transportation is by road. A network of both paved (Pucca) and unpaved (Kucha) roads exist in the study area, Both are suitably interconnected. All the villages in the study area have either paved or unpaved approach roads More than 50% of the villages have paved approach roads.

Private vehicles and private bus services share the major responsibility of the transport in the study area. Numbers of buses, private and state govt. are operating on state highway. The existing local transport facility is, however not sufficient.

f. **Post and Telegraph**

Post office facility, telegraph office and telephone office and telephone, FAX, STD, ISD etc is located in nearest village Ratoyar at a distance of about 3 Km. The site also has connectivity through mobile network.

Nalagarh town with all modern facility is at distance of 6 Km.

g. **Place of Historical or Archaeological Interest.** Nalagarh is a gateway to Himachal Pradesh in North India, 300 km of north Delhi and 60 km from Chandigarh. The Fort which was built in 1421 during the reign of Raja Bikram Chand is located on a hillock at the foothills of the mighty Himalayas affording a panoramic view of the Shivalik hills beyond the Sirsa river.

CHAPTER – IV IDENTIFICATION OF IMPACTS

4.1 INTRODUCTION

Any human activity in any environment produces impact which may be beneficial or adverse. Depending on the nature of activities and existing status, the impact analysis, the mitigating action and future monitoring requirements are focused in the Environmental Management Plan for minimizing adverse impacts.

Effects of mining and collection of sand, stone and bajari on each of the environmental parameters are detailed below;

4.2 IMPACT ON LAND ENVIRONMENT

Topography

The mining lease falls in the bed of Pali Khad falling in villages Ratyor and Bhanglan. The Pali Khad is a tributary of the River Satluj. The lease area is situated in the Pali Khad, 3rd order primary tributary of Sarsa River (Secondary tributary of Satluj catchment). Pali Khad originate at a height of 1210 meters above mean sea level near Survey point 1029 [latitude 31^o 12' 8.3" longitude 76^o 44' 48"], near Ghot (Survey of India Topo-sheet No H43E12).

The highest point of the mining lease area is 325 meters above mean sea level and the lowest point of the lease area is 307 meters above mean sea level within HFL of Pali Khad. The project area is with meager slope and the topography is not likely to change as the mined material shall get replenished every year during monsoon.

Drainage

The Pali Khad, one of the important tributaries of the Sarsa River, carries the substantial drainage of the Nalagarh area. The Pali generally has a southwesterly flow. It has tributaries on the left bank side and on the right bank side indicating drainage pattern in the catchment is controlled by geological structures. Harvesting of river bed material and other associated activities may cause a few environmental degradations and the most serious ones anticipated are detailed hereunder;

- a) Damage of river bank due to access ramps to river bed, causing eyesore, damage to the vegetation, soil erosion, micro disturbance to ground water,
- b) Due to uneven alluvial bed of the river, availability of stone and sand bed thicknesses vary considerably and harvesters are tempted to remove more stone and dig stone from a pocket where thickness of stone is more and they cause ponding. In case the pits are excavated deeper below the ground

water table than the biodegradable materials especially flora waste gets accumulated in the stagnant water causing contamination and inducing environment conducive for mosquito breeding.

- c) The mining is confined in the central parts of the Khad and away from the banks hence these are not affected. During rainy season the flow of river is likely to get channelized.
- d) Destruction of river bank hinterland and flora due to extraction of sand and stone by creating approach road from riverbed.
- e) Combination of at these activities results in offensive look

4.3. IMPACT ON WATER ENVIRONMENT

Damage in the water body, depends on its assimilative capacity. To find out assimilative capacity of receiving water body, water samples were collected from different Bore Wells, and surface water bodies. The study indicates that assimilative capacity of the River water bodies still exists, but effective measures should be taken to check water pollution due to siltation such as provision of bunding. Mining operation shall be undertaken up to the depth of one meter, hence there shall not be noticeable effect on surrounding ground water resources due to mining.

The stone, sand and bajari mining activity will not have any significant impact on the water environment of the region.

4.4. IMPACT ON HYDROLOGICAL CONDITIONS

The study area itself being part of Pali Khad course carries surface as well as ground water (under current). The flow of surface/ground water (sub surface flow) is following the trend of topography, which is in the North-East to southwest direction.

The area is part of dry river bed for more than nine months in a year except for the rainy season. The stone, bajri & sand mining up to the depth of one metre will have insignificant impact on water regime.

The ground water table which will be more than two metres below the surface of river bed in the mining area during the dry seasons will not be disturbed as ultimate working depth will be one metre below the surface level from i.e. 325 mRL upstream level and 307 mRL in the downstream boundary. Thus the mine operation will not affect the hydrological conditions of the area. At the end of mining operations every yearly season, the flood waters would replenish the mined material, thus it will be positive impact on the ground water scenario in the subsequent mining period.

SCHEMATIC REPRESENTATION OF SITE ELEVATION, WORKING DEPTH & GROUND WATER

TOP LEVEL	325 mRL to 307 mRL
PRESENT DEPTH OF WATER TABLE DURING DRY SEASON	323 to 305(2 m bgl)
ULTIMATE MINING DEPTH STONE, SAND & BAJRI	324 mRL to 304mRL(1 m bgl)
WATER TABLE	324 to 306 mRL (Post monsoon)
	323 to 305 mRL (Pre monsoon)

Proposed working will not intersect Ground water

4.5. IMPACTS ON CLIMATE

Temperature

The temperature pattern is a regional behaviour and is not likely to be affected by the mining activity over a small area. Some local marginal effect may be perceived due to mining, and creation of pits in the lease area.

Rainfall

The trend of rainfall, as studied and discussed in the last chapter forms a part of a regional pattern, not dependent on the relatively small area of mining activity. The mining operation, therefore, is not likely to have any adverse impacts on rainfall pattern.

Wind Speed

The wind speed in any area is dependent upon local topography and generation of elevation and depression of pressure changes in the region. The controlling factors for the pressure changes lie much beyond the control of small area under mining operations. Thus, no adverse impact on the regional wind speed is anticipated due to the mining operations.

Humidity

The pattern of relative humidity depends mainly on the rainfall, wind, temperature and other weather phenomenon that are regional in behaviour. The mining operation is not likely to have any impact on the relative humidity in the surrounding.

4.6. IMPACTS ON AIR ENVIRONMENT

As explained in the previous chapter, the ambient air quality monitoring results show that all the parameters such as SPM, SO₂, NO_x and CO are within the limits prescribed by CPCB for “Residential and Rural” areas.

The major contribution to pollution in air shall be from transportation of mined material to stone crusher unit located at an average distance of 6.2 Km. Caline-4 model has been used for assessment of impact due to transportation on receptor i.e. nearby villages. The results are shown in annexure- There is no increase in levels of CO showing negligible impact.

The collection and loading & unloading will lead to momentary rise in the suspended particulate matter (SPM). The dust liberated in mining and other related operations is injurious to health if inhaled in sufficient quantity. The sand collection and lifting is a manual operation. Therefore the dust generated is not so significant as compared to mining process of other hard minerals like the process of drilling, blasting, mechanized loading etc. As such there will be no noticeable impact on air quality.

The impact of the proposed mining activity on the air quality has been predicated using Caline -4 model which is a computerized air quality model specifically designed for computing concentration and deposition impacts from transportation sources. CALINE4 is a line source air quality model developed by the California Department of Transportation (Caltrans). It is based on the Gaussian diffusion equation and employs a mixing zone concept to characterize pollutant dispersion over the roadway. Concentration and deposition are computed at 5 receptor locations and the results are summarized in Annexure-I at the end of the Chapter.

A perusal of annexure- shows that the pollutant concentrations in the ambient air will remain well below the National Ambient Air Quality Standard prescribed by CPCB. The incremental impacts of transportation of mineral on CO shall be negligible at peak hours.

4.7. IMPACTS ON NOISE AND VIBRATION ENVIRONMENT

The exposures to excessive noise levels can lead to:

- Disturbed sleep, insomnia and fatigue.
- Decrease in speech reception, communication, distraction and diminished concentration thus adversely affecting the performance efficiency.
- Irreparable cardiovascular, respiratory and neuralgic damages in certain extreme cases.

The area in general represents calm surroundings. There is no heavy traffic, industry or noisy habitation near the proposed leased mining area. 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. 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 shall not be used for lifting of sand and stone, 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 to the stone crushing unit located at distance of about 6 kms. through village road/ State Road.

The noise levels for different transport equipment in this mine are given in Table 4.2

TABLE 4.2 NOISE GENERATED BY DIFFERENT MACHINERY

S. No.	Equipment	Noise level (dBA)
1.	Tractor trolley	65-75
2.	Trucks	65-80

The movement of trucks and tractor trolley through village road generating noise of 65-80 dBA will result into momentary rise in noise level up to 40-50 dBA at receptor location i.e. habitations in village during day time. These shall be well within the prescribed standards as shown in the table below.

TABLE – 4.4.1 AMBIENT AIR QUALITY STANDARD IN RESPECT OF NOISE

Area code	Category of Area	Limits in dBA leq	
		Day time	Night time
(A)	Industrial area	75	70
(B)	Commercial area	65	55
(C)	Residential area	55	45
(D)	Silence zone	50	40

With the resultant value being less than the prescribed ambient noise levels, there is no likelihood of adverse impact of noise, from the transportation activity, on the surrounding background noise level.

During mining operation ie collection of stone and loading into transporting vehicle noise levels shall be higher but well within limit of the noise levels in the working area when

compared with standards prescribed by occupational safety and health administration (OSHA-USA) & CPCB- New Delhi .

4.8 IMPACTS ON 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 save the flora around the project area from river widening, excessive erosion and floods. It was found that the proposed mining activity will not have any significant impact on the biological environment of the region.

The proposed mining activity is on the Pali riverbed. Since the river is mostly seasonal there shall be no significant impact on the aquatic flora and fauna downstream of the mining site due to increase in suspended particulate matter, movement of vehicle, removal of sand, stone and bajari shall disturb substratum only up to one meter that too in dry season when there is almost no water to support aquatic flora and fauna.

4.9 IMPACTS DUE TO SOLID WASTE

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 23000 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 except increase in turbidity of river water.

The generation of waste during five years of mining according to approved mining plan is as given in the table 4.5 below:

TABLE 4.5 SHOWING GENERATION OF WASTE IN FIVE YEARS.

YEAR	SILT	CLAY	TOTAL
First Year	11300	10400	21700
Second Year	11300	10400	21700
Third Year	11600	10600	22200
Fourth Year	11900	10900	22800
Fifth Year	12000	11000	23000
Total	58100	53300	111400

4.10 IMPACTS ON SOIL

Practically, no soil cover is available on the mineralized zone. The conservation of top soil is not required as it is not available in proposed mining area. The impact on soil in the lease area will be negligible.

4.11 IMPACT OF CUMMULATIVE MINING IN SOAN RIVER

There are two numbers of mining leases in upstream of proposed mining lease within 10 kms radius from the present lease in the Pali river bed. The mining of sand stone and Bajari is being carried out in accordance with the approved mining plan which is prepared keeping in view the sustainability of river.

The quantum of sand, stone and bajari extracted is at present less than to the replenishment.

4.12 IMPACTS ON SOCIO-ECONOMIC ENVIRONMENT**4.12.1 HUMAN SETTLEMENT**

The villages and their inhabitants in the buffer zone will not be disturbed from their settlements due to the mining operations.

There is no inhabitation within the lease area being on riverbed. Therefore neither villages nor any part of village or any hamlet will be disturbed during the entire life of the mine. As the mining operations will not disturb or relocate any village or settlement, no adverse impact is anticipated on any human settlement.

4.12.2 EMPLOYMENT

The area is considered as industrially backward. The populations in general do not have opportunities of earning from employment. The only occupation is to depend on is agriculture, which is seasonal. In the absence of any high employment potential activities, the people are economically backward. The mining operations

shall be providing employment 28 to 20 persons directly and to about 200 persons indirectly in the associated activities like such as stone crushing, transportation followed by construction activities etc. . Most of the local people are likely to be benefited. This project operation will provide livelihood to the poorest section of the society

4.12.3 AGRICULTURE

The agricultural activities are seen in the areas where there is sufficient soil cover. The buffer zone will remain undisturbed and no adverse impact is envisaged.

4.12.4 SENSITIVE TARGETS

There are no places of Tourist, religious & historical importance in core zone. The proposed mining activity is of very small magnitude; therefore no adverse impacts are anticipated.

4.12.5 SOCIO ECONOMIC STATUS

There are some people who are engaged in trading of stone, sand and bajri. Therefore due to mining of these minerals the per capita income of local people has been improved.

The job/ business opportunities have improved the economic condition of the people. They are in a position to utilize this money for purchase of tractors, trucks, jeeps, etc. which may be put into use for business purposes. Part of money has also been utilized in starting of some business as per person's skills.

The results of the field survey conducted based on a questionnaire prepared to understand the knowledge and perception of the people living around the project area, gives a clear idea about the need for the project. The awareness level regarding the proposed mining activity is very high.

The proposed mining activity is expected to provide stimulus to socio-economic activities in the region and thereby accelerate further development processes. However, there is an apprehension that local people may get engaged in illegal activities if they are not involved in the proposed mining operation or the project is shelved.

CONCLUSION

All possible environment aspects have been adequately assessed and necessary control measures have been formulated to meet statutory requirements. Thus implementing this project will not have any appreciable negative impacts.

ANNEXURE_I

**CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 1**

**JOB: SHIV BHAWANI STONE CRUSHER
RUN: Hour 1
POLLUTANT: Carbon Monoxide**

I. SITE VARIABLES

**U= 1.0 M/S Z0= 100. CM ALT= 400. (M)
BRG= 13.0 DEGREES VD= .0 CM/S
CLAS= 7 (G) VS= .0 CM/S
MIXH= 1000. M AMB= 1.5 PPM
SIGTH= 54. DEGREES TEMP= 20.0 DEGREE (C)**

II. LINK VARIABLES

LINK	* LINK COORDINATES (M) *	EF	H	W
DESCRIPTION	* X1 Y1 X2 Y2 * TYPE	VPH	(G/MI)	(M) (M)
A. Link A	* 0 200 200 500 * AG	15	30.0	.0 10.0
B. Link B	* 200 500 500 5000 * AG	35	30.0	.0 10.0
C. Link C	* 500 5000 5000 500 * AG	23	30.0	.0 10.0
D. Link D	* 5000 500 500 2500 * AG	28	30.0	.0 10.0

III. RECEPTOR LOCATIONS

RECEPTOR	* COORDINATES (M)		
	* X	Y	Z
1. MAJRA	* 0	100	1.8
2. DABHOTA	* 200	500	1.8
3. BHANGLAN	* 500	5000	1.8
4. ROTYOR	* 5000	500	1.8
5. BHOGPUR	* 500	2500	1.8

IV. MODEL RESULTS (PRED. CONC. INCLUDES AMB.)

RECEPTOR	* PRED	* CONC/LINK			
	* CONC	* (PPM)			
	* (PPM)	* A	B	C	D
1. MAJRA	* 1.5	* .0	.0	.0	.0
2. DABHOTA	* 1.6	* .0	.0	.0	.0
3. BHANGLAN	* 1.5	* .0	.0	.0	.0
4. ROTYOR	* 1.5	* .0	.0	.0	.0
5. BHOGPUR	* 1.5	* .0	.0	.0	.0

CHAPTER –V

ANALYSIS OF ALTERNATIVES

5.1 MINING METHODOLOGY (See also Section-2.8): NOT APPLICABLE

This is river bed mining where the material will be lifted manually into tractor-trolley. No new technology is involved. The mining shall be done as per laid down procedures and given in mining plan

5.2 LAND USE : NOT APPLICABLE

Acquisition of land is not involved

CHAPTER –VI

ENVIRONMENTAL MONITORING PROGRAM

6.1 INTRODUCTION

The following monitoring programme is proposed for the project to undertaken on commencement of mining activity. 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

6.2 METHODOLOGY

The proponent shall follow the standard methods for quarterly monitoring various environmental parameters i.e. Air Water and Soil. The deposition rate of mineral on river bed shall also be monitored.

The estimated cost of EMP is given in Table 6.1

TABLE:6.1 EXPENDITURE ON TYPICAL ENVIRONMENTAL MEASURES AS PER MINING PLAN

S.No	Title	Capital Cost Rs in Lakhs	Recurring Cost Rs in Lakhs
	Monitoring of Air, Water ,Soil,etc.	-	2.00
	Air Pollution Control- Management of Haulage Roads including Sprinkling.	Establishment of Stone Crusher	2.00
	Plantation and check dams as per Mining plan.	2,98	0.1
	Disposal and spreading of Silt/clay as per Mining Plan.	-	0.75
	Occupational Health Measures Provision of PPE and other Miscellaneous expenditure.	0.5	0.1
	Contribution to the area	In terms of provision of free building material to schools, religious buildings or other activities in consultation with Panchayat.	
	Total	3.48	4.95

CHAPTER –VII

ENVIRONMENT MANAGEMENT PLAN

7.0 INTRODUCTION

The environment management plan has been developed with a view to bring down the levels of impacts as discussed in the last chapter within limits. In each of the areas of impact, measures have to be taken to reduce potentially significant adverse impacts and where these are beneficial in nature, such impacts are to be enhanced/ augmented so that the overall adverse impacts are reduced to as low level as possible. Measures to be taken for each of the impact areas are detailed in the following paras:

7.1 LAND

Degradation of land is not a very significant adverse impact of riverbed 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;

- No stone, sand and bajri will be collected from within 1/5 of the width of river or 5.0 m from bank, especially from outer bank of the meandering river. Safe clearance should be mainly determined by the width of the river bed.
- Creation of ponds and pits on the river bed shall not be allowed.
- Minimal damage to the flora standing on the river bank.
- Operations during daylight only.
- No foreign material should be allowed to remain/spill in river bed and catchment area, or no pits/pockets will be allowed to be filled with such material,
- Stockpiling of harvested bajri, stone and sand on the river bed or river bank shall be avoided.

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 river bed, as cutting river banks should be avoided and ramps are to be maintained. Access points to the river bed are to be decided based on the following-

- Least steepness of river bank,
- Less damage to riverside vegetation and least human activity,
- Where steepness cannot be avoided access ramps should be constructed,

- Haulage roads parallel to the river bank and roads connecting access (ramps) to the river bed shall be away from bank, preferably a minimum of 100m away,
- Access roads from the public roads and up to the river bank should be aligned in such a way that it would cause least environmental damage,
- For particular operations approaching river bed from both the banks should be avoided.

Plantation and Soil Conservation

There is no soil over mineralized area; however the receding floods in the monsoon season deposit some clay /soil carried down by river water. It is hardly a few millimetres thick and of not much consequence.

Even in the areas of no mining activity the process of deposition in one season and transportation of previously deposited material in the next season takes place along with deposition of fresh material by receding floods.

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.

Plantation activity shall be undertaken in consultation with village Panchayat near the river banks, village roadside or Panchayat waste lands to improve the land quality, aesthetics and reduce soil erosion.

Post mining land use

As the mining lease area is part of active river course and suffer floods every monsoon season, the land degradation impact due to the excavation of sand, stone and bajari undertaken during dry period of the year will get replenished by fresh material and there shall be not be any change in land use pattern in core zone ie mining lease area.

In view of the above, the mining lease area would remain active river course during and post mining operation.

7.2 WATER POLLUTION CONTROL MEASURES

7.2.1 SURFACE WATER

The major source of surface water pollution due to stone 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.
- Drains and their Catchments will be constructed just beside the access roads so that the storm water gets settled before flowing to the river.
- The washing of trucks and tractor trolleys in the river will be avoided.
- Plantation along the river banks will be undertaken on degraded Panchayat waste land to improve its quality and utility.

7.2.2 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.

7.3 AIR POLLUTION CONTROL MEASURES

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 SPM levels in ambient air.

Dust particles generated during various mining activities when become airborne lead to increase in SPM 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 steps shall be adopted to prevent air pollution due to airborne dust.

- Green belts shall be developed on Panchayat land preferably on river bank.
- Dust mask provided to the workers engaged at dust generation points like excavations, loading and unloading points.
- The only air pollution sources are the road transport network of the trucks. The dust suppression measures like water spraying will be done on the roads.
- Utmost care will be taken to prevent spillage of sand and stone from the trucks.
- Overloading will be prevented. The trucks/ tractor trolley will be covered by tarpaulin covers
- Plantation activities in consultation with village Panchayat along the roads will also reduce the impact of dust in the nearby villages.

7.4 NOISE POLLUTION CONTROL MEASURES

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.

As the only impact is due to transportation of stone to the stone crushing unit and sand to the market through village roads, the following control measures shall be taken to keep the ambient noise levels well within limits:

- Minimum use of horns and speed limit of 10 kms in the village area.
- Timely maintenance of vehicles and their silencers to minimize vibration and sound.
- Phasing out of old and worn out trucks.
- Provision of green belts in consultation with village panchayat along the road networks.
- Care will be taken to produce minimum sound during sand and stone loading.

7.5 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 save the flora around the project area from river widening, excessive erosion and floods. It was found that the sand and stone mining activity will not have any significant impact on the biological environment of the region.

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
- Provide forage and browse for wild life

7.6 SOCIO-ECONOMIC ENVIRONMENT

This project operation will provide livelihood to the poorest section of the society. The overall impact of riverbed mining of sand stone and bajari 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.

The mining activity in the lease area will thus give direct employment to about 18-20 persons engaged in extraction of stone, bajri and sand; loading of material into tractor trolleys and tipper trucks. 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.

Anticipated impacts and evaluation

The results of the field survey conducted based on a questionnaire prepared to understand the knowledge and perception of the people living around the project area, gives a clear idea about the need for the project. The awareness level regarding the proposed mining activity is very high.

The proposed mining activity is expected to provide stimulus to socio-economic activities in the region and thereby accelerate further development processes. However, there is an apprehension that local people may get engaged in illegal activities if they are not involved in the proposed mining operation or the project is shelved or there is inordinate delay in its execution.

CHAPTER-VIII

ADDITIONAL STUDIES AND PROJECT BENEFITS

8.1 ADDITIONAL STUDIES

No additional studies are relevant with the nature of the project. The project is a category 'B' project at S.No. 1(a) $<50 \text{ ha} \geq 5 \text{ ha}$.of mining lease area in respect of non coal mine lease, categorized as category A project due to applicability of general condition. i.e. within a distance of 10 km from interstate boundary

The project is mining of sand, stone and bajari from river bed measuring 36.8845 Hectare for maximum mining of 94500 MT/annum. Total material handling every year shall be- 94500 MT No blasting shall be done.

8.2 PROJECT BENEFITS

The project shall provide raw material for in infrastructure development, increase employment opportunity and improve the socioeconomic condition of the area.

CHAPTER-IX

CORPORATE SOCIAL RESPONSIBILITY

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



H.P. STATE POLLUTION CONTROL BOARD
HIM PARIVESH, PHASE-III
NEW SHIMLA-171009


Proceeding of the Committee


The committee constituted vide this office letter No.PCB/CWPIL No.15/2009 & 586/2010/Consent Branch/2012-139-47 dated 2.4.2013 convened a meeting on **10th April, 2013** and examined the details of Project of M/s.Shiv Bhawani Stone Crusher (Prop. Sunil Kumar Garg), (Khasra No.2232/1324,2261/1535,2265/1539,1804,1923/1, 904/843/3, 856/180,199/1 and Area ~~36.8845~~ Ha) VPO Dabhota, Tehsil Nalagarh, Distt. Solan, H.P. The following were present in the meeting:


1. Sr. Environmental Engineer, HQ.
2. Pr. Scientific Officer, HQ.
3. Assistant Env. Engineer, HQ & In-Charge Consultancy Division.
4. Env. Planner (Planning Division).
5. Jr. Env. Engineer (Consent Division).


The committee examined the broad pros and cons of the above project and made the following observations:


Positive Effects	Ill Effects(Negative Effects)
<ul style="list-style-type: none"> • Direct and indirect employment to the local people. • Cheaper and easy availability of raw materials such as bajri, sand stone in the area. • Improvement in local business and infrastructure facilities 	<ul style="list-style-type: none"> • The project activity may change the natural flow regime of the region. • The project may also affect the aquatic life in the meandering rivers. • Impacts on air, water and noise: Mininig operations shall have increased vehicular activities (trucks and trolley activity) thus increased level of air pollutants such as high SPM, NOx, SO2 and CO levels. Water quality and noise impacts are likely to be affected. However, no hazardous chemical activity is expected because of mining activity or crusher. • Soil degradation/erosion near mining site may aggravate. • Faecal concentration is likely to increase due to open defecation.


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