

DRAFT
ENVIRONMENTAL IMPACT ASSESSMENT REPORT
AND
ENVIRONMENTAL MANAGEMENT PLAN

For

Sand Bajri Boulder Mining Project
Khata No: 109: Khasra No: 1, 17 22ma, 23ma, 84ma,
Village-Jhalakudi, Tehsil- Poornagiri District-Champawat (Uttarakhand)
Lease area: Area: 5.83 ha
Production: Capacity- 3,32,310 TPA



Submitted to
Uttarakhand Pollution Control Board (UKPCB)

PROJECT PROPONENT:
Managing Director, Kumaon Mandal Vikas Nigam Limited (KMVN)

ENVIRONMENT CONSULTANT
Paramarsh
Servicing Environment and Development
(Accredited by QCI / NABET)
Add: M.S.-1/10, Sector A, (Near St. Anthony School,
Ram Ram Bank Chauraha), Aliganj, Lucknow-226024

INDEX

CHAPTER (S)	Particulars	Page No.
	TOR Letter	
Chapter - 1	<p>1.0. INTRODUCTION</p> <p>1.1. Purpose of the Report</p> <p>1.2. Identification of Project & Project Proponent</p> <p>1.3. Brief description of nature, size and location of the project</p> <p>1.4. Status of Regulatory Clearances of the Project.</p> <p>1.5. Scope of the study</p> <p>1.6. Generic Structure of Environmental Impact Assessment Report.</p>	1 – 9
Chapter – 2	<p>2.0. PROJECT DESCRIPTION</p> <p>2.1. Type of Project</p> <p>2.2. Need Form The Project</p> <p>2.3. Location Details</p> <p>2.4. Mining</p> <p>2.5. Site Facilities And Utilities</p> <p>2.6. Statutory Requirements</p>	10-20

Chapter – 3	<p>3.0. BASELINE ENVIRONMENTAL STATUS</p> <p>3.1.Introduction</p> <p>3.2.Study Period</p> <p>3.3.Study Area</p> <p>3.4.Meteorology</p> <p>3.5.Air Environment</p> <p>3.6.Noise Levels</p> <p>3.7.Water Environment</p> <p>3.8.Soil</p> <p>3.9.Land Use/ Land Cover Mapping</p> <p>3.10.Traffic Study</p> <p>3.11.Biological Environment</p> <p>3.12.Socio – Economic Report</p>	20– 59
Chapter - 4	<p>4.0. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION</p> <p>4.1.Details of the Investigated Environmental Impacts</p> <p>4.2.Impacts on Drainage</p> <p>4.3.Water Environment</p> <p>4.4. Impact on Land Use.</p> <p>4.5.Impact on soil</p> <p>4.6.Impact on Air Quality</p> <p>4.7. Proposed mitigation measures for duct suppression.</p> <p>4.8.Impact on noise environment</p> <p>4.9.Greenbelt and plantation</p> <p>4.10.Biological Environment</p> <p>4.11.Socio – Economic Environment</p> <p>4.12.Occupational Hazards and Safety</p> <p>4.13.Public Health Implications</p> <p>4.14.Corporate Social Responsibility</p>	60-72

Chapter – 5	<p>5.0. ANALYSIS OF ALTERNATIVE TECHNOLOGY AND SITE</p> <p>5.1 Site Alternatives under Consideration</p> <p>5.2 Analysis of Alternative Technology</p>	73
Chapter – 6	<p>6.0. ENVIRONMENTAL MONITORING PROGRAMME</p> <p>6.1. Introduction</p> <p>6.2. Implementation Schedule of Mitigation Measures.</p> <p>6.3. Institutional Arrangements for Environment</p> <p>6.4. Protection and Conservation</p> <p>6.5. Environment Monitoring Programme</p> <p>6.6. Reporting Schedules</p>	74-78
Chapter – 7	<p>7.0. ADDITIONAL STUDIES</p> <p>7.1. Risk Assessment</p> <p>7.2. Disaster Management Plan</p>	79-82
Chapter – 8	<p>8.0. ENVIRONMENT MANAGEMENT PLAN</p> <p>8.1. Air Quality Management</p> <p>8.2. Noise Pollution Control</p> <p>8.3. Water Quality Management</p> <p>8.4. Waste Management</p> <p>8.5. Biological Management Measures</p> <p>8.6. Greenbelt Development Plan</p> <p>8.7. Occupational Hazards and Safety</p> <p>8.8. Environmental Policy</p>	83-89

Chapter – 9	<p>9.0. PROJECT BENEFITS</p> <p>9.1. Improvement in the Physical Infrastructure.</p> <p>9.2. Improvement in the Social Infrastructure.</p> <p>9.3. Employment Potential</p> <p>9.4. Policy and Action Plan on Social Responsibility</p>	90-91
Chapter – 10	<p>10.0. SUMMARY & CONCLUSION</p> <p>10.1. Purpose of the Report</p> <p>10.2. Identification of Project & Project Proponent</p> <p>10.3. Brief Description of Nature, Size and Location of the Project.</p> <p>10.4. Impact on land use & reclamation of Mined outareas</p> <p>10.5. Land use pattern</p> <p>10.6. Baseline Environmental Status.</p> <p>10.7. Anticipated Environmental Impacts</p> <p>10.8. Environmental Management Plan</p> <p>10.9. Analysis of Alternatives</p> <p>10.10. Environmental Monitoring Program</p> <p>10.11. Cost Estimates</p> <p>10.12. Additional Studies</p> <p>10.13. Public Consultation</p> <p>10.14. Project Benefits</p> <p>10.15. Conclusions</p>	92-109
Chapter – 11	<p>11.0. DISCLOSURE OF CONSULTANTS ENGAGED.</p>	110- 112

ANNEXURES

S.NO.	List of Annexure	Content
1.	ANNEXURE-I	ToR (Terms if References)
2.	ANNEXURE-II	Copy of Letter of Intent
3.	ANNEXURE-III	Copy of Joint Inspection Report
4.	ANNEXURE-IV	Copy of Khasra Map
5.	ANNEXURE-V	Copy Of Khatoni
6.	ANNEXURE-VI	Cluster Certificate
7.	ANNEXURE-VII	NOC from Gram Panchayat For Plantation
8.	ANNEXURE-VIII	Copy of Approved Mining Plan

DEC. 2021

CHAPTER-1 INTRODUCTION

PURPOSE OF THE REPORT

Environmental Impact Assessment (EIA) is a decision making tool, in the hands of the Authorities which brings forth the factual position about a project that enables them in arriving at an appropriate conclusion for the proposed projects, to retain them if environmentally sound, and reject if found having deleterious overall impact. EIA identifies the extent of the environmental, social and economic impacts of a project prior to decision-making. EIA systematically examines both beneficial and adverse impacts of the proposed project over and above the prevailing conditions of environmental parameters and ensure that these impacts are taken into account during the project designing stage itself and the values of the combined impacts are never allowed to exceed and remain within the statutory norms. This process has been envisioned and set in motion by the Ministry of Environment and Forests for sustainable development and the final decision is arrived at only, when those to whom it matters are made known of the salient features of the project being envisaged close to them. Environmental Impact Assessment report is prepared to comply with the Terms of Reference (ToR) received from SEIAA, Uttarakhand, under EIA Notification of the MoEF dated 19-8-2006, and its subsequent amendments and EIA Guidance Manual for Mining of Minerals of MoEF, Govt. of India, for seeking environmental clearance for mining of Sand Bajri & Boulder (Minor-Mineral) mining on the bed of Ladhiya river Khata No: 109: Khasra No: 1, 17 22ma, 23ma, 84ma, Area: 5.83 ha Village-Jhalakudi, Tehsil- Poornagiri District-Champawat (Uttarakhand) in the applied mining lease area measuring 5.83 ha. The proposed project falls under Category "B1" as per EIA Notification 2006 its amendment 2009, 2011, 2012 & 2016 of the Ministry of Environment and Forests, New Delhi.

IDENTIFICATION OF PROJECT & PROJECT PROPONENT

The Proposed Sand Bajri Boulder mining project Letter of Intent has been issued to Kumaon Mandal Vikas Nigam Limited (KMVN) via letter no. 2240/ khanna/Aashya Patra/KMVN/Bhu.Khni./2018-19, dated 9 December, 2020. (कार्यालय के पत्र संख्या 2240 / खनन / आशय पत्र / के०एम०वि०एन० / भू०खनि०ई० / 2018-19, दिनांक 09 दिसम्बर 2020 एवं संशोधित कार्यालय ज्ञाप संख्या 140/ खनन / आशय पत्र / के०एम०वि०एन० / भू०खनि०ई० / 2018-19, दि० 15 अप्रैल, 2021 के द्वारा प्रबन्ध निदेश मण्डल विकास निगम के पक्ष में जनपद चम्पावत की तहसील पूर्णागिरी के ग्राम झालाकूडी के खसरा संख्या 01, 17, 22 म, 23 म, 84 म मध्ये 5.83 है० उपखनिज क्षेत्र में 05 की अवधि के लिए उपखनिज बालू, बजरी,

कोल्डर के चुगान / खनन पट्टा स्वीकृत किये जाने हेतु ई०आई०ए० नोटिफिकेशन, 2006 के अन्तर्गत पर्यावरणीय अनुमति एवं अन्य वांछित अनुमतियां प्राप्त किये जाने हेतु आशय (Letter of Intent) निर्मित किया गया है से सम्बन्धित प्रस्तुत खनन योजना जोकि श्री संदीप कुमार, आर० क्यू०पी / तकनीकी एवं पर्यावरण सुरक्षा के दृष्टिकोण से उगत उत्तराखण्ड उपखनिज परिहार नियमावली गात नीति-2016 के विन्दु सं०- बिन्दु-22(2) के अन्तर्गत प्रदत्त अधिकार का प्रयोग करते हुए प्रस्तुत शर्तों के अधीन किया है। The proposed Sand Bajri Boulder mining project in village- Jharakudi. Tehsil- Poornagiri, District- Champawat, State Uttarakhand, Khata no 109, Khasra no.01, 17, 22m, 23m. 84m (as per amended LO attached as annexure). Area- 5.83 ha As per MoEF, New Delhi Gazette Notification dated 14th September 2006 and amended thereof, the proposed mining project is categorized as category "B1" project, Mining Plan for the project under guidelines is discussed in the preceding chapters of this report.

General Information on Mining of Minerals

Uttarakhand, Located at the foothills of the Himalayan Mountain ranges, it is largely a hilly State. It is rich in natural resources especially water and forests with many glaciers, rivers, dense forests and snow-clad mountain peaks. Heavy rains are common in Uttarakhand districts. The river along its course brings huge quantity of material consisting of sand, boulder & bajri during every monsoon. This material has to be removed every year in order to channelize the river course and to prevent it from widening.

Environmental Clearance:

As per EIA notification, 2006 and its subsequent amendments later, the project activity has been categorized as Category-B1 project, as the mining lease area is 30 hectare.

The Environmental Clearance process for the project will comprise of three stages. These stages in sequential order are given below:-

- Scoping,
- Public consultation &
- Appraisal

Scoping of the EIA study (in the form of Terms of Reference) has already been carried out by SEAC UK in its meeting dated 30th September, 2021 examined the proposal submitted by you. After through discussion and deliberation, it has been conveyed that SEAC desires Rapid EIA report of this proposal

after due public consultation conducted by Uttarakhand Environment Protection and Pollution Control Board. The terms of reference (TOR) for the EIA report is being out lined below:

- Guidance Manual of Environmental Impact Assessment For Mining of Minerals, Ministry of Environment and Forests, 2010
- Form-1 as per EIA Notification, 14th September, 2006
- Sedimentation study of the river
- Pre-feasibility Report
- In addition, other relevant standards for individual activities such as sampling and testing of environmental attributes have been followed.
- ToR prescribed by MoEF

Terms of Reference (TOR)

The lease over an area of 5.83 ha was granted to Kumaon Mandal Vikas Nigam Limited (KMVN). Environmental Impact Assessment report is prepared to comply with the Terms of Reference (ToR) received from SEAC UK SIA/UK/MIN/65776/2021 on dated 8th Oct 2021 vide letter No 245/SEAC . After through discussion and deliberation, it has been conveyed that SEAC desires Rapid EIA report of this proposal after due public consultation conducted by Uttarakhand Environment Protection and Pollution Control Board. The terms of reference (ToR) for the EIA report is being out lined below:

The points have been raised by the SEAC, in the ToR and the report is prepared as per these points

S. No.	TOR Points	Compliance
1	Year-wise production details since 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994. It may also be categorically informed whether there had been any increase in production after the EIA Notification 1994 came into force, w.r.t. the highest production achieved prior to 1994.	NA:
2	A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.	कार्यालय के पत्र संख्या 2240 / खनन / आशय पत्र / केएमविन / भूखनिई / 2018-19, दिनांक 09 दिसम्बर 2020 एवं संशोधित कार्यालय

		<p>ज्ञाप संख्या 140/ खनन / आशय पत्र / के०एम०वि०एन० / भू०खनि०ई० / 2018 -19, दि० 15 अप्रैल, 2021 के द्वारा प्रबन्ध निदेश मण्डल विकास निगम के पक्ष में जनपद चम्पावत की तहसील पूर्णागिरी के ग्राम झालाकूडी के खसरा संख्या 01, 17, 22म, 23म, 84म मध्ये 5.83 है० उपखनिज क्षेत्र में 05 की अवधि के लिए उपखनिज बालू, बजरी, कोल्डर के चुगान / खनन पट्टा स्वीकृत किये जाने हेतु ई०आई०ए० नोटिफिकेशन, 2006 के अन्तर्गत पर्यावरणीय अनुमति एवं अन्य वांछित अनुमतियां प्राप्त किये जाने हेतु आशय (Letter of Intent) निर्मित किया गया है से सम्बन्धित प्रस्तुत खनन योजना जोकि श्री संदीप कुमार, आर० क्यू०पी / तकनीकी एवं पर्यावरण सुरक्षा के दृष्टिकोण से उगत उत्तराखण्ड उपखनिज परिहार नियमावली गात नीति-2016 के विन्दु सं०- बिन्दु-22(2) के अन्तर्गत प्रदत्त अधिकार का प्रयोग करते हुए प्रस्तुत शर्तों के अधीन किया है।</p>
3	<p>All documents including approved mine plan, EIA and Public Hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management, mining technology etc. and should be in the name of the lessee The above reports should also match with the latest District Survey Report (DSR) notification no-2827 dated 25 July, 2018 Data obtained from this DSR should be incorporated in the EIA Report for Impact Identification, Interpretation, Prediction,</p>	<p>Lease grant to Kumaon Mandal Vikas Nigam Limited (KMVN) Thandi Sadak, Tallital Nainital, , Uttarakhand Lease Area: 5.83 ha Production: 332310 TPA</p>

	Carrying Capacity and Mitigation	
4	All corner coordinates of the mine lease area, superimposed on a High Resolution Imagery/ toposheet, topographic sheet, geomorphology and geology of the area should be provided. Such an imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).	All the coordinates of lease area are given on lease map Which annexed in report The lease area is clearly showing on Topo-sheet map and the landforms indicated the Geomorphological features & other ecological features within core and buffer zone of 10 km
5	Information should be provided in Survey of India Toposheet in 1:50,000 scale indicating geological map of the area, geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil characteristics.	The Proposed Sand Bajri Boulder mining project Letter of Intent has been issued to Kumaon Mandal Vikas Nigam Limited (KMVN) via letter no. 2240/ khanna/ Aashya Patra/ KMVN/Bhu.Khni. /2018-19, dated 9 December, 2020
6	Details about the land proposed for mining activities should be given with information as to whether mining conforms to the land use policy of the State; land diversion for mining should have approval from State land use board or the concerned authority.	कार्यालय के पत्र संख्या 2240 / खनन / आशय पत्र / के०एम०वि०एन० / भू०खनि०ई० / 2018-19, दिनांक 09 दिसम्बर 2020 एवं संशोधित कार्यालय ज्ञाप संख्या 140/ खनन / आशय पत्र / के०एम०वि०एन० / भू०खनि०ई० / 2018 -19, दि० 15 अप्रैल, 2021 के द्वारा प्रबन्ध निदेश मण्डल विकास निगम के पक्ष में जनपद चम्पावत की तहसील पूर्णागिरी के ग्राम झालाकूडी के खसरा संख्या 01, 17, 22म, 23म, 84म मध्ये 5.83 है० उपखनिज क्षेत्र में 05 की अवधि के लिए उपखनिज बालू बजरी, कोल्डर के चुगान

		<p>/ खनन पट्टा स्वीकृत किये जाने हेतु ई०आई०ए० नोटिफिकेशन, 2006 के अन्तर्गत पर्यावरणीय अनुमति एवं अन्य वांछित अनुमतियां प्राप्त किये जाने हेतु आशय (Letter of Intent) निर्मित किया गया है से सम्बन्धित प्रस्तुत खनन योजना जोकि श्री संदीप कुमार, आर० क्यू०पी / तकनीकी एवं पर्यावरण सुरक्षा के दृष्टिकोण से उगत उत्तराखण्ड उपखनिज परिहार नियमावली गात नीति-2016 के विन्दु सं०- बिन्दु-22(2) के अन्तर्गत प्रदत्त अधिकार का प्रयोग करते हुए प्रस्तुत शर्तों के अधीन किया है। There is no any land diversion proposed for mining and therefore no need for any approval from concern authority.</p>
7	<p>It should be clearly stated whether the proponent Company has a well laid down Environment Policy approved by its Board of Directors? If so, it may be spelt out in the EIA Report with description of the prescribed operating process/procedures to bring into focus any infringement/deviation/violation of the environmental or forest norms/ conditions? The hierarchical system or administrative order of the Company to deal with the environmental issues and for ensuring compliance with the EC conditions may also be given. The 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, may also be</p>	<p>Environment Policy and Management cell has been laid down as per IS:14001:2014. Continual improvement by consumer feedback, periodic monitoring and review. Minimization of waste management by adopting best practices. Optimum utilization of natural resources. By adopting approved /Govt. norms for mining purposes and environment conservation. EMC shall comprise of</p>

	detailed in the EIA Report	Environmental officer, who shall report to management and govt. authorities as and when required.
8	Issues relating to Mine Safety, including subsidence study in case of underground mining and slope study in case of open cast mining, blasting study etc should be detailed. The proposed safeguard measures in each case should also be provided	It is open-cast sand mining project, PPEs (Mask, Gloves, gum boots, helmet, etc.) will be provided to mining workers during mining activity. It is a sand mining project hence there is no need of blasting.
9	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 waste generation etc. should be for the life of the mine / lease period	The study area comprises of 10.0 km zone around the mine lease periphery as shown in the study area. Approx 150 gm/person/day (MSW Rule 2016) 15.0 kg/ day solid waste will be generated from the sites and for their management color coded dustbin will be available at the site.
10	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary. national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of	The proposed activity will not alter the Land use because of after mining it will refill by overburden. Land use map given in next slide.

	land. use should be given.	
11	Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given.	The mining lease area is Government land and lease is allotted for Sand Bajri & Boulder (Minor-Mineral) mining. There is no Rehabilitation & Resettlement of population; therefore R&R plan and compensation are not required.
12	A Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests, the site may be inspected by the State Forest Department along with the Regional Office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the Expert Appraisal Committees	The Lease of proposed project has been allotted by Govt. and there is no such Protected area are falling within 10 Km of the study area hence there is no need for NOC from the Competent Authority.
13	Status of forestry clearance for the broken up area and virgin forestland involved in the Project including deposition of net present value (NPV) and compensatory afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.	Not applicable

14	Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated	Not applicable
15	The vegetation in the RF / PF areas in the study area, with necessary details, should be given.	There are no any RF/PF areas in the study area. Top sheet map showing on earlier slide.
16	A study shall be got done to ascertain the impact of the Mining Project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly, detailed mitigative measures required, should be worked out with cost implications and submitted	Within 10 km buffer zone of the mining lease area National Parks, Sanctuaries, Biosphere Reserves Wildlife Corridors, Tiger/Elephant Reserves are not found
17	Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/Elephant Reserves/(existing as well as proposed), if any, within 10 km of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the Standing Committee of National Board of Wildlife and copy furnished.	No National Parks, Sanctuaries, Biosphere Reserves Wildlife Corridors, Tiger/Elephant Reserves are falling within 10 Km of the study area. The location map is shown in Chapter:3
18	A detailed biological study of the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] shall be carried out. Details of flora and fauna, endangered, endemic and RET Species duly authenticated, separately for core and buffer zone should be furnished based on such	A detailed biological study (of 10 Km radius study area) was conducted by Ecology and Biodiversity Expert and the details are incorporated in the EIA/EMP Report.

	<p>primary field survey, clearly indicating the Schedule of the fauna present. In case of any scheduled- I fauna found in the study area, the necessary plan alongwith budgetary provisions 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>Detailed study for biological environment is carried out and detail of flora and fauna in core and buffer zone is given in Chapter No:3</p>
19	<p>Proximity to Areas declared as Critically Polluted' or the Project areas likely to come under the 'Aravali Range, (attracting court restrictions for mining operations), should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the SPCB or State Mining Department should be secured and furnished to the effect that the proposed mining activities could be considered</p>	<p>Proposed project area is fallen in Khata No: 109: Khasra No: 1, 17 22ma, 23ma, 84ma, Area: 5.83 ha Village-Jhalakudi, Tehsil- Poornagiri District-Champawat . Area are not come in any Proximity to Areas declared as Critically Polluted'</p>
20	<p>R&R Plan/compensation details for the Project Affected People (PAP) should be furnished While preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCS /STS and other weaker sections of the society in the study area, a need based sample survey, family-wise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the State Government. It may be clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to shifting of</p>	<p>The mining lease area is Government land and as per the Socio-Economic Survey, There is no Project Affected Person (PAP) by the proposed mining activities. Hence, no R&R Plan is envisaged; as there is no displacement of people from their respective areas.</p>

	village(s) including their R&R and socio-economic aspects should be discussed in the Report.	
21	One season (non-monsoon) [i.e. March-May (Summer Season); October-December (post monsoon season); December-February (winter season)] primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and EMP Report Site-specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the pre-dominant downwind direction. The mineralogical composition of PM10, particularly for free silica, should be given	Environmental baseline monitoring data and results are given in Chapter 3. Base line monitoring done pre monsoon of year 2021 (Oct 2021 to Dec 2021)
22	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 pre-dominant wind direction may also be indicated on the map	Air quality modeling was carried out and impact of Air quality has been incorporated in the EIA/EMP report. Max. Predicted cumulative ground level concentration (GLC) of PM ₁₀ , SO _x , and NO _x . The predominant over all wind patterns for the study period
23	The water requirement for the Project, its availability and source should be furnished. A detailed water	Water requirement in this project site is 8.5 KLD. Water

	balance should also be provided. Fresh water requirement for the Project should be indicated	will be taken from existing water sources from nearby villages or tanker supplier. The details are incorporated in the EIA/EMP report. Total Water Requirement= 8.5 KLD Dust Suppression and Plantation= 7.5 KLD Domestic Purpose= 1.00 KLD
24	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided	Water requirement will be met by tanker supply therefore permission from Central Ground Water Authority for pumping of groundwater is not required.
25	Description of water conservation measures proposed to be adopted in the Project should be given Details of rainwater harvesting proposed in the Project, if any, should be provided.	It is mining project. Area is porous and slope gradient high. Due to high drainage density and porous of land water can rainwater harvesting is not possible.
26	Impact of the Project on the water quality, both surface and groundwater, should be assessed and necessary safeguard measures, if any required, should be provided.	Surface Water: No permanent infrastructure will be developed which may obstruct the surface water, Ground Water: The ground water quality will not be changed because mining activity will not intersect the ground water table
27	Based on actual monitored data, it may clearly be	The maximum working depth of

	<p>shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect groundwater table, a detailed Hydro Geological Study should be undertaken and Report furnished. The Report inter-alia shall include details of the aquifers present and impact of mining activities on these aquifers. Necessary permission from Central Ground Water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished</p>	<p>mining will be 3.0 m bgl in river bed. So mining depth will not intersect the ground water table. Hence permission is not required from CGWA. Water requirement will be met from bore well.</p>
28	<p>Details of any stream, seasonal or otherwise, passing through the lease area and modification/diversion proposed, if any, and the impact of the same on the hydrology should be brought out.</p>	<p>No any seasonal stream, passing through the lease area and nor any modification /diversion proposed</p>
29	<p>Information on site elevation, working depth, groundwater table etc. Should be provided both in AMSL and bgl. A schematic diagram may also be provided for the same.</p>	<p>Site Elevation: 608 mRL The highest level of lease hold is 618.25 mRL towards western side & while lowest level is 608.16 mRL</p>
30	<p>A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the Project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given.</p>	<p>Plantation will mainly be done along the road side /gram panchayat land and along the river bank and Gram Panchayat land). No. of plants to be planted 500 sapling</p>

	The plant species selected for green belt should have greater ecological value and should be of good utility value to the local population with emphasis on local and native species and the species which are tolerant to pollution	
31	Impact on local transport infrastructure due to the Project should be indicated. Projected increase in truck traffic as a result of the Project in the present road network (including those outside the Project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be covered. Project Proponent shall conduct Impact of Transportation study as per Indian Road Congress Guidelines	Excavated sand will be carried Sand Bajri & Boulder (Minor-Mineral) will be carried out through NH 9 The area is about 18 Km from Champawat & is approachable 800 m foot track from PWD road.
32	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report	Onsite shelter facilities provided to day worker
33	Conceptual post mining land use and Reclamation and Restoration of mined out areas (with plans and with adequate number of sections) should be given in the EIA report	Noted : Reclamation and Restoration of mined out areas are given in Report
34	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the	Labourers will be provided with onsite basic first aid (first aid box) facility and personal protective equipments (PPE), including boots, helmets and gloves Regular medical check will be

	mining area may be detailed.	<p>done (including the test for silicosis) for all the labours and cost to be borne by the project proponent.</p> <p>Training of the workers regarding use of safety appliances and first aid.</p> <p>Training shall also includes emergency response including location and proper use of emergency equipment's procedure for raising alarm and notifying contractor and proper response action for each foreseeable emergency situations.</p> <p>In case of severe injury, immediate action will be taken to take the injured to the nearest hospital/ dispensary and entire cost will be borne by the project proponent</p>
35	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.	The proposed site is away from the nearest habitat yet periodically health check-up camp will be organized under the CER activity.
36	Measures of socio economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions	<p>Job Opportunity to local community for betterment of livelihood, amenities etc.</p> <p>Direct and in-direct</p>

	<p>may be given with time frames for implementation</p>	<p>employment. Skill development and training programme (Carpentry, Welding, Masonry works, plumbing, Tailoring etc.) for the local community will be conducted.</p>
37	<p>Detailed environmental management plan (EMP) to mitigate the environmental impacts which should inter-alia include the impacts of change of land use, loss of agricultural and grazing land if any. Occupational health impacts besides other impacts specific to the proposed Project.</p>	<p>Noted</p>
38	<p>Public Hearing points raised and commitment of the Project Proponent on the same along with time bound Action Plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project.</p>	<p>Noted</p>
39	<p>Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.</p>	<p>NA</p>
40	<p>The cost of the Project (capital cost.and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.</p>	<p>Detail cost of Project is as follows: Project Cost- 20.0 Lakhs/annum CER 2% Capital Cost- 3.60Lakh Recurring Cost- 0.40 Lakh Total EMP Cost- 4.0 Lakh</p>

41	A Disaster management Plan shall be prepared and included in the EIA/EMP Report.	<p>Though no mining activities is envisaged during monsoon season (June to September), yet the inundation cannot be ruled out due to flash flood in the catchment during non-monsoon season. Following precautionary measures shall be undertaken in respect of mining operation during non-monsoon season and before the onset of monsoon.</p> <p>A careful assessment of the danger of inundation from surface water shall be made before onset of monsoon season every year and adequate precautions against such dangers shall be implemented. Effectiveness of precautions, obstruction in normal drainage system etc. shall be checked regularly.</p> <p>During May no mining pit excavation shall be carried out adjacent to the bank offset line. Standing orders for withdrawal of persons and mining equipment from mine in case of apprehend danger shall be framed and enforce</p>
----	--	--

42	Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc	Job Opportunity to local community for betterment of livelihood, amenities etc. Direct and in-direct employment. Skill development and training programme (Carpentry, Welding, Masonry works, plumbing, Tailoring etc.) for the local community will be conducted.
43	Besides the above, the below mentioned general points are also to be followed:	
a	Executive Summary of the EIA/EMP Report	Noted
b	All documents to be properly referenced with index and continuous page numbering	All documents to be properly referenced with index and continuous page numbering.
c	Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources should be indicated.	Noted
d	Project Proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the MoEF&CC/NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the Project	Analysis/testing reports are enclosed the report
e	Where the documents provided are in a language other than English, an English translation should be provided.	

f	The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry. shall also be filled and submitted	Noted
g	While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF&CC vide O.M. No. J-11013/41/2006-IA.II (I) dated 4th August, 2009, which are available on the website of this Ministry, should be followed.	Noted
h	Changes, if any made in the basic scope and project parameters (as submitted in Form-I and the PFR for securing the TOR) should be brought to the attention of MoEF&CC with reasons for such changes and permission should be sought, as the TOR may also have to be altered. Post Public Hearing changes in structure and content of the draft EIA/EMP (other than modifications arising out of the P.H. process) will entail conducting the PH again with the revised documentation.	Noted
i	As per the circular no. J-11011/618/2010-IA.II(1) dated 30.5.2012, certified report of the status of compliance of the conditions stipulated in the environment clearance for the existing operations of the project, should be obtained from the Regional Office of Ministry of Environment, Forest and Climate Change, as may be applicable	Compliance of the conditions is followed after getting environment clearance
j	The EIA report should also include	
i	Surface plan of the area indicating contours of main topographic features, drainage and mining area,	Topographic feature and drainage given in report

ii	Geological maps and sections and	Geological maps and sections are enclosed in report
iii	Sections of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area	Noted

1.4 Post-Environmental Clearance Monitoring

For category B projects, irrespective of its clearance by MoEF/SEIAA, the project proponent shall prominently advertise in the newspapers indicating that the project has been accorded environmental clearance and the details of MoEF website where it is displayed.

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

1.5 Transferability of Environmental Clearance

A prior environmental clearance granted for a specific project or activity to an applicant may be transferred during its validity to another legal person entitled to undertake the project or activity on application by the transferor or the transferee with a written “no objection” by the transferor, to, and by the regulatory authority concerned, on the same terms and conditions under which the prior environmental clearance was initially granted, and for the same validity period.

1.6 Generic Structure of Environmental Impact Assessment Document

1.6.1 Preparation of EIA

The EIA includes the following details:

- 1) Study of the reports like Geological report, Pre-Feasibility Report (PFR) or mining plan made available by the client.
- 2) Present Environmental Setting

3) Identification, prediction and evaluation of Anticipated Environmental Impact due to the proposed mine and related facilities.

The environmental impacts would be anticipated in core and buffer zone on:

- Topography and drainage,
- Climate,
- Water quality (Surface/Ground),
- Hydro-geological Regime,
- Air quality,
- Noise Levels,
- Soil Quality,
- Flora and Fauna,
- Traffic density survey,
- Land-Use,
- Socio-Economic Conditions,
- Habitat,
- Health, culture, human environment including public health, occupational health and safety
- Sensitive Places/Historical Monuments.

This EIA Report is prepared in accordance with has been divided into twelve chapters (in addition to Executive Summary) as briefed hereunder:

Chapter 1 – Introduction

The chapter provides description of project background, site and surroundings, objectives, scope and organization of the study and format of this report.

Chapter 2 – Project Description

This chapter provides information on project and capacity; need for the project; location; size or magnitude of operation; technology and process description; maps showing project layout, component of projects etc.

Chapter 3 – Analysis of Alternatives (Technology and Site)

This chapter will include a comparison of alternatives in this chapter to determine the best method of achieving the project objectives with minimum environmental impacts or indicates the most environmentally friendly and cost effective options, if any.

Chapter 4– Description of the Environment

This chapter deals with the methodology and findings of field studies undertaken with respect to ambient air, meteorology, water, soils, noise levels, ecology to define the various existing environmental status in the area of the project. This also deals with the infrastructural development as a part of project and sources of pollution from the proposed mining project.

Chapter 5 – Anticipated Environmental Impacts and Mitigation Measures

In this chapter, the potential impacts of the proposed mining and allied activities, which could cause significant environmental concerns, are identified and discussed. This discussion will form the basis for environmental management activities.

Chapter 6 – Environmental Monitoring Program

This chapter will include ascertaining the environmental impacts; state of pollution within the mine lease and in its vicinity; planning for predictive or corrective actions in respect of pollution to keep it within permissible limits.

Chapter 7 – Additional Studies

This chapter will include outcomes of public consultation, risk assessment, social impact assessment, R&R action plan, biodiversity conservation plan, watershed management etc.

Chapter 8 – Project Benefits

This chapter deals with improvements in the physical infrastructure, social infrastructure, employment potential and other tangible benefits due to proposed project activity.

Chapter 9 – Environment Cost benefit Analysis

The net benefits are analyzed from a social (cost-benefit analysis) and a private (financial analysis) perspective

Chapter 10 – Environmental Management Plan

This chapter will include the description of administrative aspects of ensuring that the mitigation measures suggested are implemented and their effectiveness is monitored, after approval of the EIA.

Chapter 11 – Summary & Conclusion

This will constitute the summary of EIA Report.

Chapter 12 – Disclosure of Consultant

This will includes the names of the consultants engaged in preparation of EIA and nature of consultancy rendered.

Draft EIA Report of Sand Bajri Boulder Mining Project Khata No: 109: Khasra No: 1, 17 22ma, 23ma, 84ma, Area: 5.83 ha Village-Jhalakudi, Tehsil- Poornagiri District-Champawat (Uttarakhand)

CHAPTER – 2 PROJECT DESCRIPTION

TYPE OF PROJECT

The Sand, Bajri and Boulder are available everywhere and is being used from the time immemorial for wide applications in our daily life like infrastructure, building construction, highways, roads, townships, multiplexes, foundations of buildings and industrial units etc. and is an integral part of development. Over the millennia, the weathering effect, the flow of water at high velocities in rivers and the pressure of water from the high mountainous reservoirs converted and pushed the hard ground underneath into sand, gravel etc. which travelled as sediments with the flow. This sand gets deposited along the river course wherever conditions were favorable. In deep past this settled sand was not extracted in a quantity in which it is deposited, since due to less population the requirement was not enough. As a result of continuous deposit of sand, bajri etc, the river course continued changing by widening itself, eroding the fields and expanding. This started resulting in floods, inundation and breaking their banks, causing devastation of property and loss of life. There has been a severe impact on every aspect of the environment. Thus there was a need for channelization of rivers for which extraction of sand through mining was expedient. The haphazard mining of river bed material being practiced for now long through unregulated, uncontrolled and illegal manner added almost an irreversible damage to the environment, which became a cause of serious concern. Though sand is very important mineral source for development, its mining through scientific methods have also become equally imperative. It is for this purpose that "mining plan' is being drawn so that all its aspects are taken care of justifiably, according to law, protecting the environment, removing all adverse impacts and creating a direct and indirect employment opportunities, improving socio-economic conditions of the local inhabitants and all round status of life, achieving thereby a sustainable development. Besides above, the process of mining of minor minerals is a constant source of revenue generation to the State Government to Royalty.

NEED FOR THE PROJECT

Collection of minor minerals (Sand, Bajri, Boulder) from the river beds has been undertaken in order to: Protect the forest lands, agricultural crops, inhabitations from the havoc of floods. For better channelization of River course, prevention of land cutting of adjacent agricultural lands. The extracted material will meet the huge demand of construction material like coarse and fine aggregates required in building construction and infrastructure works, road material for construction and maintenance of roads / highway. The mining project shall provide direct employment to nearby peoples. Additional jobs will be created by way of transportation.

LOCATION DETAILS

Project location & surroundings of the project are described in the Table No. 2.1 given below:

Table No.2.1:- Details of the Project Location & Surroundings

Sr. No.	Particular	Details	
A.	Nature of the Project	Sand Bajri Boulder Mining Project	
1.	MLArea	5.83 ha	
2.	Proposed Production Capacity	3,32,310 tonnes per annum Total Lease Area -5.83 ha	
3.	Lease Period of Mine	Lease. Period 5.0 yr	
C.	Method of Mining		
1.	Method	Open-Cast semi-mechanized Mining	
2.	Blasting/Drilling	Not proposed	
D.	Project Location		
1.	Village	Village-Jhalakudi	
2.	Tehsil	Poornagiri	
3.	District	Champawat	
4.	State	Uttarakhand	
5.	TopoSheetNo.	-	
6.	Lease Area Coordinates	The area lies	
		Poi nt A	latitude 29°11'47.70"N

				3'27.21"E	
		B	29°11'47.03"N	80° 3'36.90"E	
		C	29°11'48.40"N	80° 3'52.90"E	
		D	29°11'48.70"N	80° 4'0.96"E	
		E	29°11'47.03"N	80° 4'0.85"E	
		F	29°11'45.40"N	80° 3'58.02"E	
		G	29°11'42.09"N	80° 3'52.10"E	
		H	29°11'46.10"N	80° 3'52.00"E	
		I	29°11'46.90"N	80° 3'52.80"E	
		J	29°11'46.30"N	80° 3'49.80"E	
		K	29°11'45.30"N	80° 3'36.90"E	
		L	29°11'46.40"N	80° 3'29.90"E	
E.	Cost Details				
1.	Project Cost	Rs.20.0 Lakh			
F.	Water Demand				
1.	Requirement	8.5 KLD			
2.	Source of water	Nearby villages & natural springs.			
G.	Man Power Requirement	50			
H.	Environmental Setting				
1.	Nearest Village	Naulapani 0.50 km S Jhalakundi 2.50 E			
2.	Nearest Town	Tanakpur – 14.50 km (SE) Champawat 16.0 km N			
3.	Nearest National/ StateHighway	NH-125 about 0.5 * km (W)			
4.	Nearest Railway Station	Tanakpur Railway Station- 15.0 km (S)			
5.	Nearest Airport	Airport: Pantnagar Airport – 50.0* km (W)			
6.	Ecological Sensitive Areas (National Park, Wild Life Sanctuaries ,Biosphere Reserve etc.) within 10 kmradius	Danda range 9.0 km SE Boom rang 12.50. SE			
7.	Water bodies within 10 km radius of the mine site.	River bank of Ladhiya river Sharad River 13.0 S			
8.	Archaeologically important	None			

	Place	
9.	Seismic Zone	IV

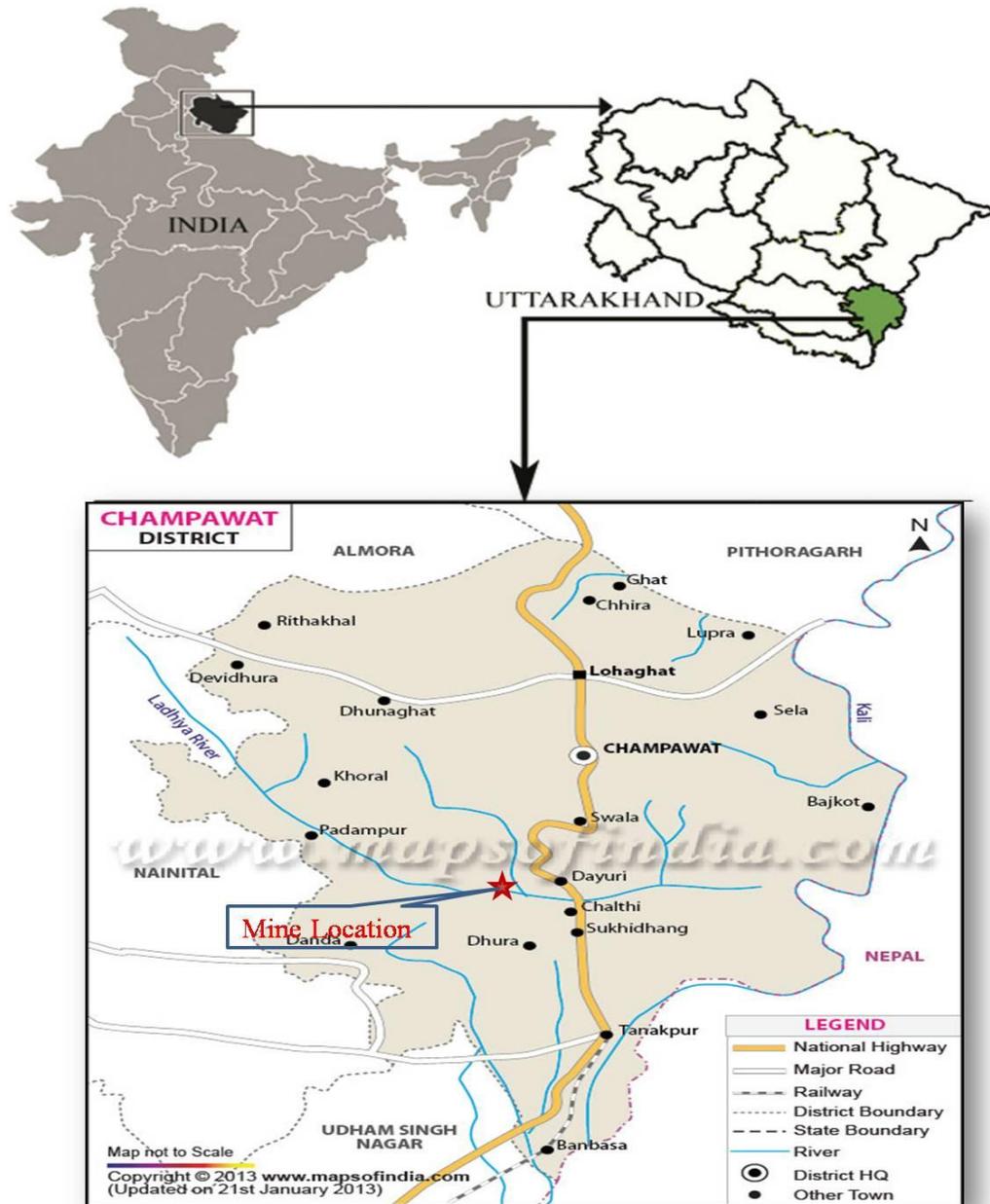
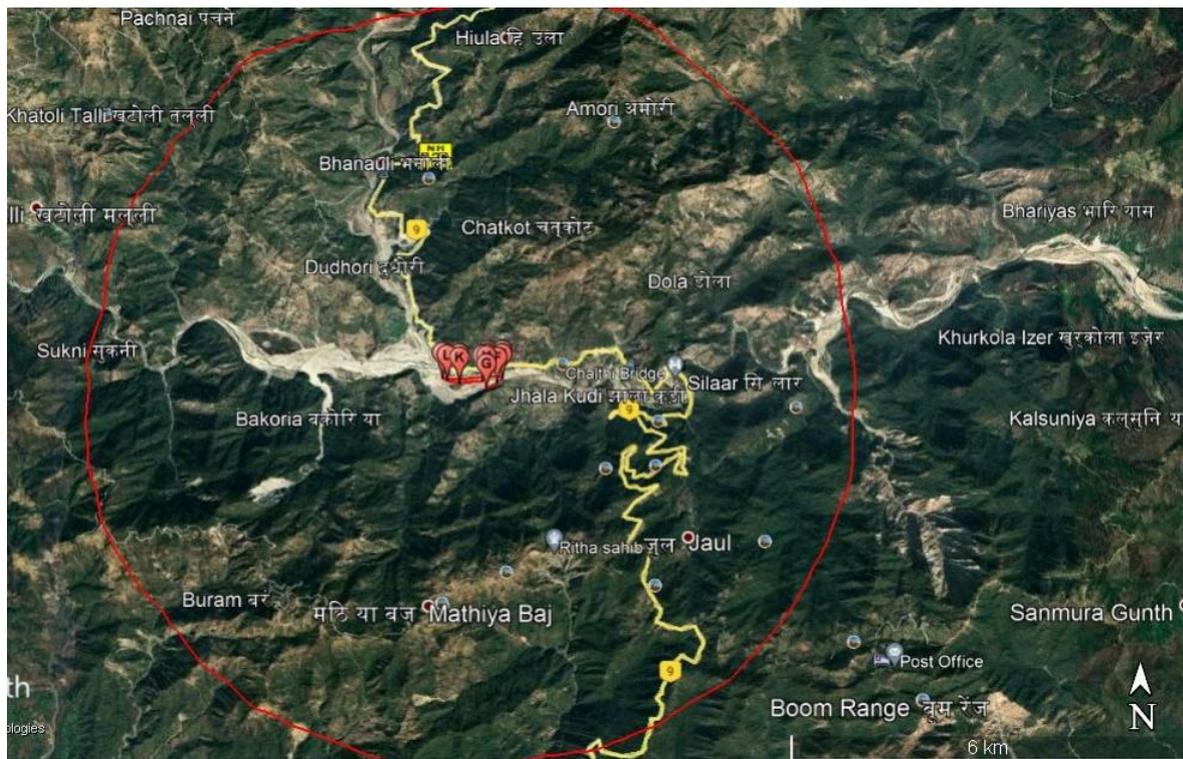


Figure: 1.1 - Project Location

500 m Buffer Zone from the Mine Location



5.0 km Buffer Zone from the mine Location



is very high (about 20 cm. yearly). Summers are too hot and winters are too cold and foggy in Terai region. The climate of Shivalik is more or less same but the lower region of Himalayas experience cold climate throughout the year. In summers, Champawat district is pleasant. The temperature varies from 1 degree Celsius in the year to 35 degree Celsius. Summer months are May, June and July whereas Dec and Jan are very cold.

REGIONAL GEOLOGY

The Himalayas is widely believed to have been evolved through the convergence of two continental crustal plates viz. The Indian Plate and the Eurasian plate. The Indian plate subducted beneath the passive Eurasian plate and resulting in development of the Himalayan Mountain chain at the leading age of the Indian plate. The Uttarakhand Himalayas, revealing a multistage development can be divided into four NW-SE curvilinear tectonic belts, each characterized by prominent dislocation zone. These tectonic belts from North to South are as follows:

NORTH

Tethyan Himalayan Belt: Mainly Neo-proterozoic to Cretaceous sediments

Tethyan Fault (STDS)

Higher Himalayan Belt – Regionally metamorphosed Proterozoic rocks of green Schist to amphibolites facies

Main Central Thrust (MCT)

Lesser Himalayan Belt – Mainly Proterozoic sequence with Cambrian, Permian and Cretaceous – Eocene massive transgressive facies and dics (nappes) of crystalline rocks.

Main Boundary Fault (MBF)

Sub Himalayan Belt - continental sediments of neogene age.

Foot hill Fault (FHF)

Quaternary sediments - Gangetic Alluvium sediments of Quaternary age.

SOUTH

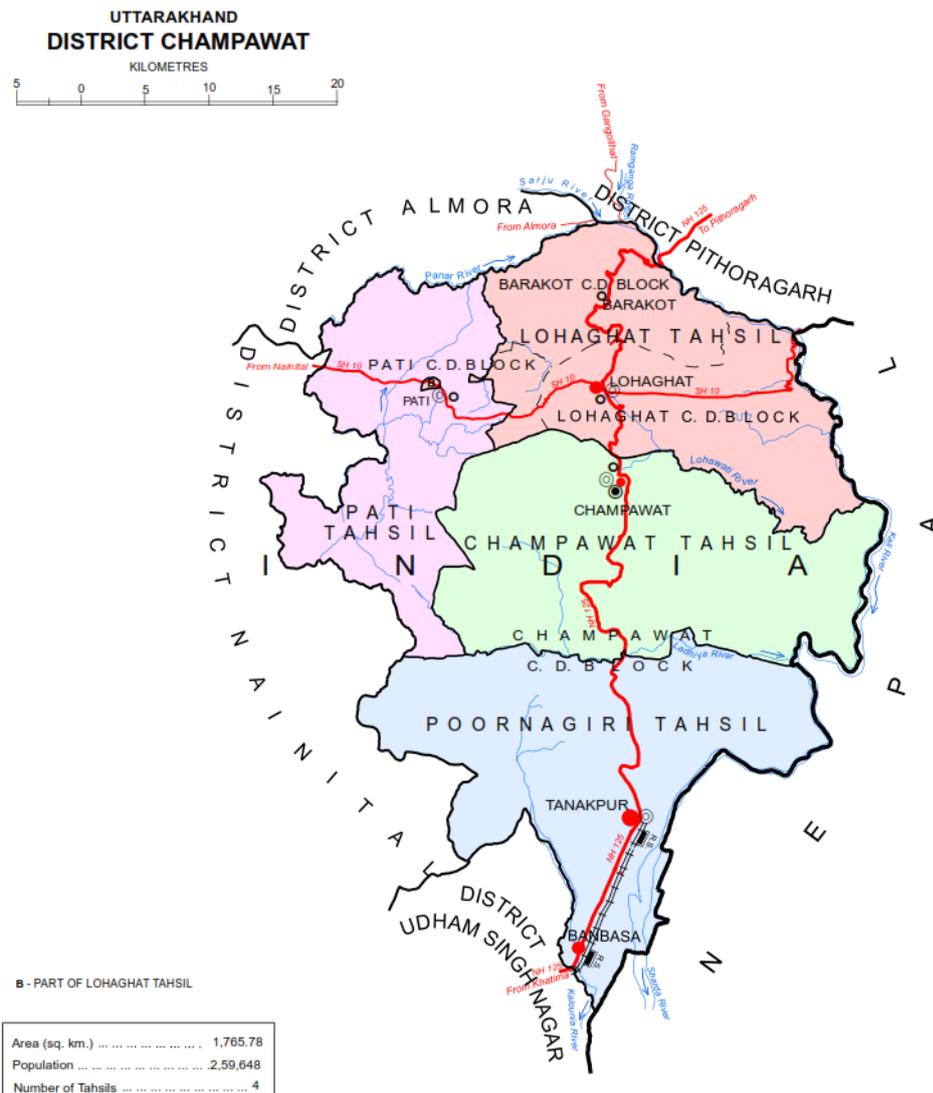
Sub-Himalayan Belt:

The part of Himalaya falling in the state of Uttarakhand is made up essentially of Siwalik sediments encompassing Neogene period. The northern boundary of this group represents the main boundary fault (MBF). The MBF is a WNW-ESE trending reverse along which the Pre-Siwalik sequences have moved over the Siwalik. The Siwalik is folded into open upright folds, with low plunges and the axial traces of the fold confirm the Himalayan trend. The rocks show intense deformation near the MBF. However, the deformation is less intense in the Southern part of this belt. Along the Foot fill fault (FHF), the Siwalik rocks are thrust over the Gangetic Alluvium.

LOCAL GEOLOGY

Geologically, district Champawat comprises of diverse rock types. The geological set up is very complex

due to the repeated tectonic disturbances caused by different orogenic cycles. Valdiya (1980) carried out extensive geological and structural mapping in the area. The salient features of geology are depicted in the geological map of the Champawat district. The rock succession exposed in the district mainly falls in two groups namely, Ramgarh and Almora Group of rocks apart from the Siwalik Group of Tertiary rocks at the southern side of the district, which is Late Tertiary to Quaternary, exposed all along the foothill belt of the Sub-Himalaya.



The Champawat district is represented by highly rugged topography. It may be divided into three major Units the high Denudational Mountains, river valleys and the plains. The southern part of the district is comprised of Siwalik Group of rocks. It has a comparatively wide and mature topography with gentle slopes. Besides, morainous plains, river terraces, structural valleys, lineament, fault and thrusts are the other geomorphic units commonly observed in Champawat district. The geomorphology of an area plays a very significant role in the groundwater movement and occurrence.

The soil types are controlled by the topography and rock types. The soils, on the fluvial valleys, moderately deep, well drained fine loamy soils with loamy surface with slight erosion. The soils occurring on the cliffs side are very shallow, excessively drained, whereas the soils on the Summits and Ridges moderately shallow, excessively drained, coarse loamy soils with loamy surface and moderate association. Soils occurring in the Lesser Himalayan range are moderately shallow, somewhat excessively drained, thermic, loamy skeletal soils on moderately steep slopes with loamy surface, moderate erosion. The Lesser Himalayan range is mainly composed of highly compressed and altered rocks like granite, phyllites, quartzite etc. and a major part of it is under forest. Intermittent sparse patchy terraced cultivation is also practiced on fairly steep hill slopes whereas dry and wet cultivation are prevalent on the uplands and low-lying valleys respectively. The broader valley slopes dominantly deep, well drained, fine-loamy, moderately acidic and slightly stony.

CLIMATIC DATA FROM SECONDARY SOURCES

The climate of the district is very differential. Terai area is hot whereas the hilly region is comparatively cold. Mainly climate varies from sub-tropical monsoon type to tropical upland type. Severe winter and comparatively higher rainfall is the main features of northern part. Larger part of the district is situated on the southern slopes of outer Himalayas. Rainfall spatially is highly variable depending upon the altitude. High mountain ranges are covered with snow. The climatic condition of Terai and plains are similar, the seasonal rain is very high (about 20 cm. yearly). Summers are too hot and winters are too cold and foggy in Terai region. The climate of Shivalik is more or less same but the lower region of Himalayas experience cold climate throughout the year. In summers, Champawat district is pleasant. The temperature varies from 1 degree Celsius in the year to 35 degree Celsius. Summer months are May, June and July whereas Dec and Jan are very cold. Rainfall reaches its maximal in the monsoon season that occurs between June to September. Rainfall, spatially, is highly variable depending upon the altitude. In the Lesser Himalayan Zone (1000-3000 m above mean sea level) maximum rainfall occurs about 70 to 80% in southern half. July and August are the rainiest months. Rainfall rapidly decreases after September and it is the least during November. The overall average annual rainfall in district Champawat is 1085.62 mm. The annual rainfalls in the district for the year 2007 is 1747 mm.

SURFACE DRAINAGE PATTERN

Ladhiya, Sarju, Kali/Sarda River and their tributaries like Lohawathi drain the district. Prominent of the tributaries are Panar, Ratiya, Gandhak and Lohawathi apart from major gad/gadheras like Nanathira, Lateshwar, Amkhadiaya, Goli, Quareli, Bardholi, and some

local gadheras. The main drainage patterns are dendritic, sub-dendritic, trellis, subrectangular. The major rivers i.e. Ladhiya and Sharda are of antecedent type, whereas the drainage in the structurally disturbed area is of subsequent type. The perennial rivers are primarily fed by snowmelt with relatively smaller contribution from ground water. However, during the lean period; the rivers are fed by ground water occurring as base flow.

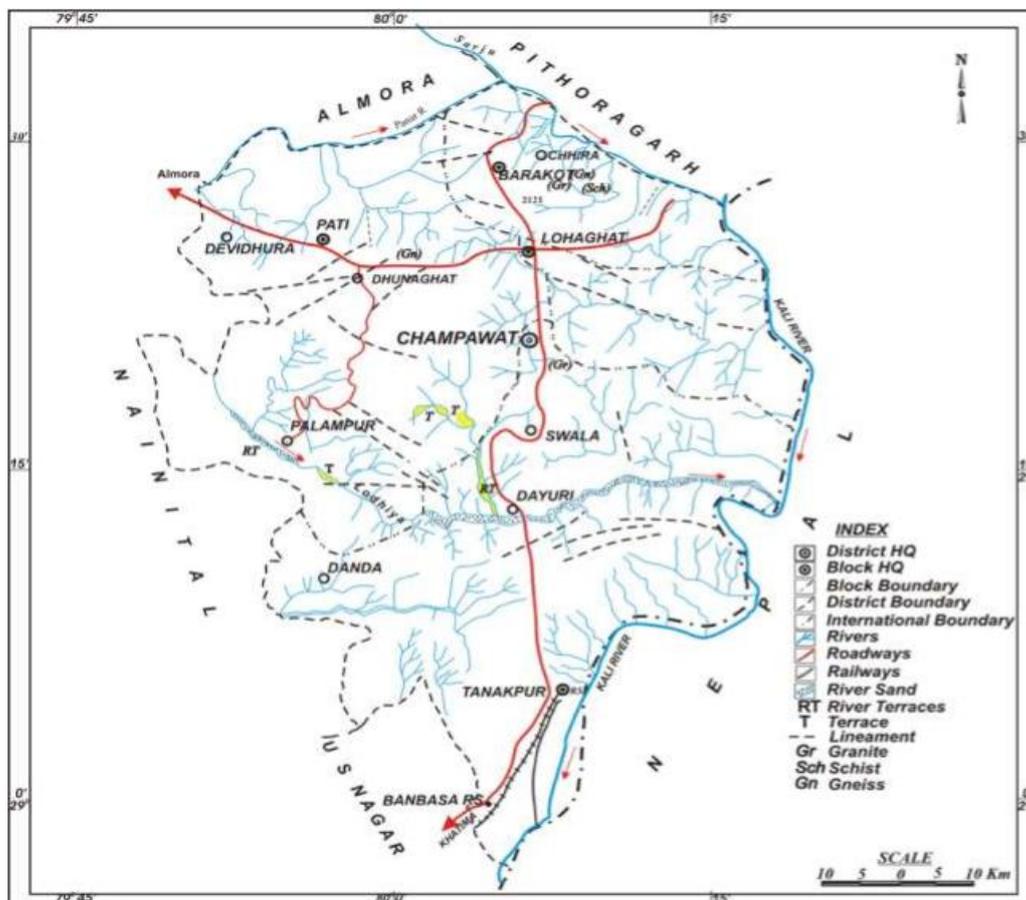


Fig. 2.3: Surface Drainage map

MINING

It will be opencast semi mechanized mine. The preproduction & development plan prepared & appended. The estimation of manpower shall be carried out. The overburden & interburden shall be removed deployment of an excavator as well as with the help of rock breaker. The Sand, Bajri and Boulder are available everywhere and is being used from the time immemorial for wide applications in our daily life like infrastructure, building construction, highways, roads, townships, multiplexes, foundations of buildings and industrial units etc.

and is an integral part of development. Over the millennia, the weathering effect, the flow of water at high velocities in rivers and the pressure of water from the high mountainous reservoirs converted and pushed the hard ground underneath into sand, gravel etc. which travelled as sediments with the flow. This sand gets deposited along the river course wherever conditions were favorable. In deep past this settled sand was not extracted in a quantity in which it is deposited, since due to less population the requirement was not enough. As a result of continuous deposit of sand, bajri etc, the river course continued changing by widening itself, eroding the fields and expanding.

Method of Mining

In Mining of Sand Bajri Boulder Mining is being done since long time therefore no specific method of exploration is required as the RBM are deposited all along the river-bed and are very well exposed on the surface. Moreover, these sediments are accumulated / replenished every year during rainy season by river waters to almost equal to extracted level and sometimes more or less depending on the intensity of rains in the catchment area and may deplete in the years with scanty rain in the catchment area. Adequate quantity of Sand Bajri Boulder Mining reserves in mixed state is available as of now for meeting consumer demand. Since regular Sand Bajri Boulder Mining lifting is practiced along the river course, and more or less same level is seen after rains, so it is understood that sediments load carried is near equal to what is lifted.

Estimation of total Reserve

The reserve estimation has been done by cross -sectional method. Cross-sections are drawn and the average surfaces areas of two adjacent cross-sections are multiplied by the strike influence calculate the volume. All the Quantities estimated as of Sand Bajri Boulder Mining occurring up to 3.0m below from surface have been considered under proved category and the 5.0m thickness is the cumulative average thickness at three sections lines.

Estimation of Reserves:

United Nations Framework Classification of Mineral Reserves/ Resources: Reserves have been designated by UNFC in three digit code based system with the economic viability axis representing the first digit. Each digit is provided with codes 1, 2 and 3 in decreasing order. The highest category of resources under UNFC system has code (111) and for lowest category the code is (334). Reserve out of River bed mining is estimated as below:

a) Geological Reserves Volume of RBM has been calculated by multiplying the surface area

with thickness of the deposit. The recovery of mineral is taken as 100%. The reserves have been calculated by following formula:

Annual Programme and Plan for Excavation

1 Year Development: During this year 3,32,310 MT of sand production is proposed from the surface level of 618.25 m to 608.16 m (MRL). Mining will be carried out in slice of 1.5m layer and the ultimate depth of the pit will be kept 3m yearly. Proposed lease area shall be replenished yearly. The mineable area, depth and reserve etc. are given in Table 5 and the planning of 1st year is enclosed as Plate No- 6. Mineable Reserve (tonnes) = Mineable Area*Depth*Bulk Density

Proposed method of mining

It will be an open cast mine and Sand Bajri Boulder Mining will be exploited by bar scalping/trenching or skimming method and mining operation shall be mechanized with human interface using scrapers/EMM and chain/ Tyre mounted bulldozers for rescue and salvage. Sand Bajri Boulder Mining shall be loaded manually using loaders in dumpers. Trucks/ loaders in to dumpers. Sand shall be dispatched to various parties through, trucks, tippers/tractor trolleys & dispatched to various parties. The height & width of benches shall be kept 1.0 m & 12.0m & over all pit slope shall be maintained less than 20° Ultimate depth of pit shall be kept 3.0m from the surface.

Loading &Transport

Mode of transportation of the mixed material is by trucks/dumpers of 5 to 10 tones capacity. Trucks of larger size may also be used where the material is to be carried to a long distance for out-bound transportation. Mining area is connected with a 'Kucha' road of say 2.0Km up to the nearest pucca road near village Bindupuri and thereafter it is metalled road up to destination. The approach road is adequate to permit easy maneuverability of trucks and it also provides cross - over and changing points. Water will be sprayed regularly by tractor mounted water sprinklers to suppress fugitive dust generation.

SITE FACILITIES AND UTILITIES WATER SUPPLY

Water requirement for the proposed project will be provided for the workers for drinking & domestic purpose. Water will also be provided for dust suppression. Fresh water will be only used for drinking purpose.

Temporary Rest Shelter:

- ❖ A temporary rest shelter will be provided for the workers near to the site for rest.
- ❖ Provisions will also be made for following in the rest shelter
- ❖ First aid box along with anti-venoms to counteract poison produced by certain species of smallinsects, if any.
- ❖ Sanitation facility i.e. septic tank or community toilet facility will be provided for the workers.

STATUTORY REQUIREMENTS

It is accepted that effective resource management cannot be done in isolation. The proponent therefore vigorously pursues approaches towards coordination and integration where possible, so as to lead to coordinated regulatory systems.

Various acts dealing with matters relating to the conservation and protection of the environment and which a holder of a mining authorization must also take cognizance of include inter alia, the following:

- Uttarakhand Mineral Policy, 2011
- Uttarakhand Minor Mineral Concession Rules, 2001
- The Mines Act, 1952
- The Mines and Mineral (Development and Regulation) Act, 1957
- Mines Rules, 1955
- Mineral Concession Rules, 1960
- Mineral Conservation and Development Rules, 1988
- The Water (Prevention and Control of Pollution) Act, 1974
- The Air (Prevention and Control of Pollution) Act, 1981
- The Environment (Protection) Act, 1986
- The Forest (Conservation) Act, 1980

CHAPTER 3 BASELINE ENVIRONMENT STATUS

INTRODUCTION

The main objectives of describing the environment, which may be potentially affected, are (i) to assess present environmental quality and the environmental impacts and (ii) to identify environmentally significant factors that could preclude Mine development. This chapter discuss about the present scenario of the study area with reference to the prominent environmental attributes. The study area covers 10 Km radius of the mine lease area. Baseline data has been collected out during the **Oct 2021 to Dec 2021 by NABL MoEF & CC Accredited Lab, (Baseline data enclosed as Annexure III)** in accordance with the Guidelines for EIA issued by the Ministry of Environment Forests and Climate Change, Govt. of India and CPCB, New Delhi. The impact identification always commences with the collection of baseline data such as Ambient Air Quality, Micro-Meteorology, Ground and Surface Water Quality, Noise levels, Soil Quality, Land use pattern, Biological Environment and Socio-economic aspects, Solid and Hazardous waste, Risk Assessment, Geology and Hydrology within the study zone of 10 Km. radius. Apart from these, secondary data have been collected from Census Handbook, Revenue Records, Statistical Department, Soil Survey and Land use Organization, District Industries Centre, Forest Department, Central Ground Water Authority, Botanical Survey of India, Zoological Survey of India, Geological Survey of India etc. The generation of primary data as well as collection of secondary data and information from the site and surroundings was carried out during winter season.

The EIA study is being done for the Mine Lease (core zone) and area within 10 Km distance from mine lease boundary (buffer zone), both of which together comprise the study area. The following data, through field survey and other sources, has been collected for preparing the EIA/EMP for the proposed mining area with related facilities.

- ★ Physical environment (Air, Water, Soil and Noise) baseline data.
- ★ Relevant meteorological data, for previous decades from Indian Meteorological Department (IMD) and primary data.
- ★ Land use pattern within core zone and buffer zone (10 Km distance around the core zone) based on Survey of India Toposheet map, ground truth and satellite image.
- ★ Identification of water bodies, hills, roads etc. within 10 Km radius.

- ★ Eco-sensitive places, sanctuaries, biosphere reserves within 10 Km radius.
- ★ Religious places / historical monuments and tourist places within 10 Km radius.
- ★ Details of fauna and flora within a distance of 10 Km from the project site and information about forests, if any.
- ★ Demography and Socio-economic based on last available Census data for entire study area.
- ★ Major industries within 10 Km radius.
- ★ Study of present environmental protection and mitigation measures in nearby operating similar projects, if any.

This section contains the description of baseline studies of the area within 10 Km radius surrounding the proposed Sand/moram Mine, Banda, Uttar Pradesh. The study was undertaken for prevailing environment in respect of land, air, water (both ground and surface), soil, noise, biological (both flora and fauna). The data collected has been used to understand the existing environment scenario around the proposed mining project against which the potential impacts of the proposed project can be assessed.

3.1 LAND ENVIRONMENT

Area statistics of land use classes has been generated within 10 Km radius of mine lease area (Core zone and Buffer zone) and given in **Table 3.1**.

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

3.1.1 Data Used

Indian Remote Sensing satellite IRS-P6, LISS III, multi-spectral digital data has been used for the preparation of land use/ land cover map of present study. Survey of India reference map on 1:50,000 scales have been used for the preparation of base map and geometric correction of satellite data. Ground truth has been carried out to validate the interpretation accuracy and reliability of remotely sensed data, by enabling verification of the interpreted details and by supplementing with the information, which cannot be obtained directly on satellite imagery.

3.1.2 Methodology for Baseline Data Generation

Land use / Land cover map preparation, Base map creation; Geometric and Radiometric correction of satellite image has been processed using ERDAS Imagine 9.2 and Arc GIS 9.3 Software.

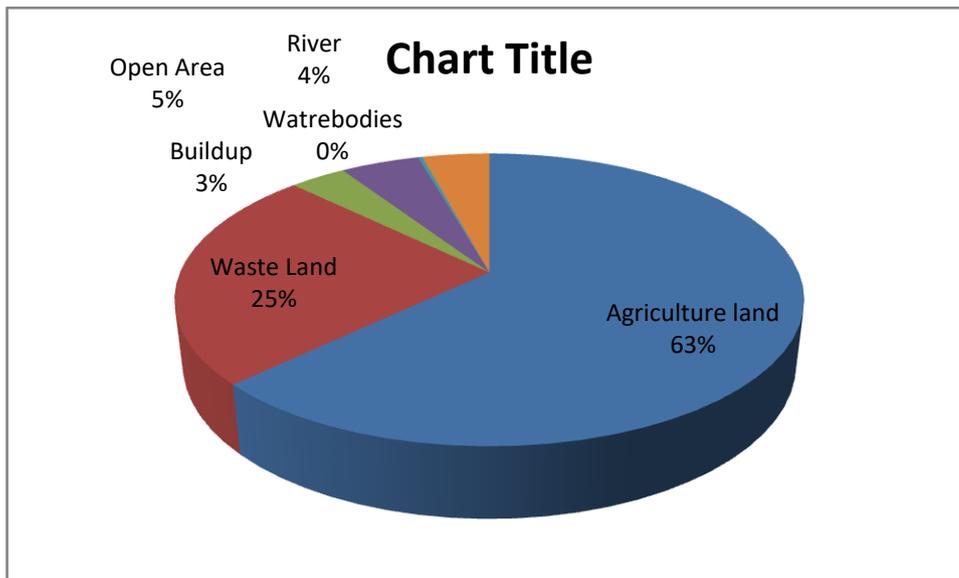
3.1.3 Observation of Land Use Study

In the present study, both digital image processing and using visual interpretation technique were used to generate output of Land use / Land cover map of study area on 1: 50,000 scale (as shown in **Figure 3.1**). Land use pattern of the study area (10 Km distance from the mine site.

Table 3.1 Land Use Pattern of the Study Area

Land Use	Area (in ha.)	% Area
Agriculture land	19747.95	62.83
Waste Land	7690.67	24.47
River	1300.29	4.14
Buildup	1086.20	3.46
Open Area	1522.57	4.84
Water bodies	81.86	0.26
Total	31429.53	100 %

(Source: lulc_bhuvan_nrsc)



3.1.4 Description of Land Use

The study area is prominently covered by Agriculture land (63.00%). open land covers 4.84 % of the study area. The water bodies cover 0.26 % while Buildup Area is covering 3.46 % of the study area. Waste land constitutes about 24.47 % of the study area.

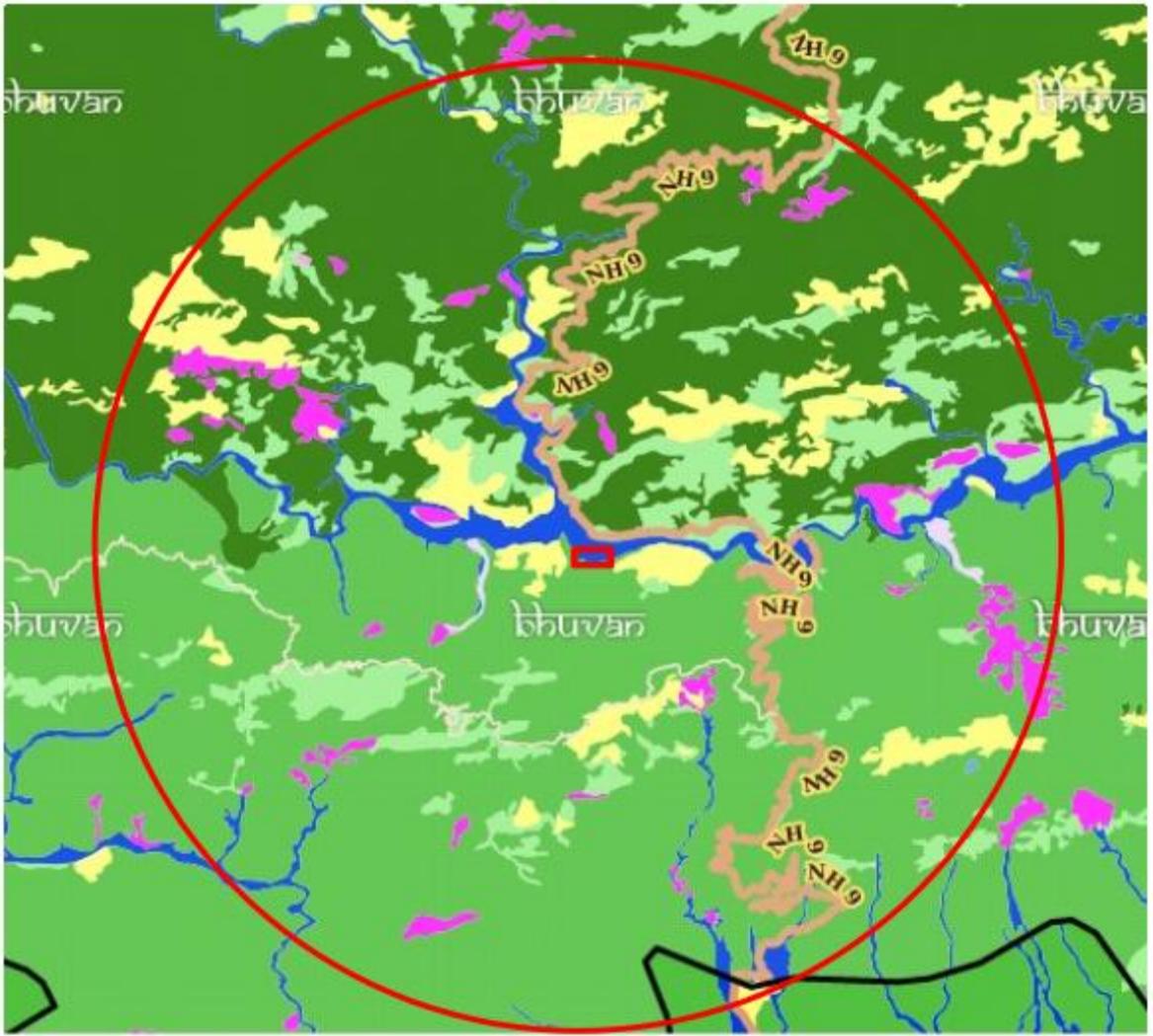


Figure 3.2: Land Use Pattern of the Study Area (10 Km Radius from the Mine Site)

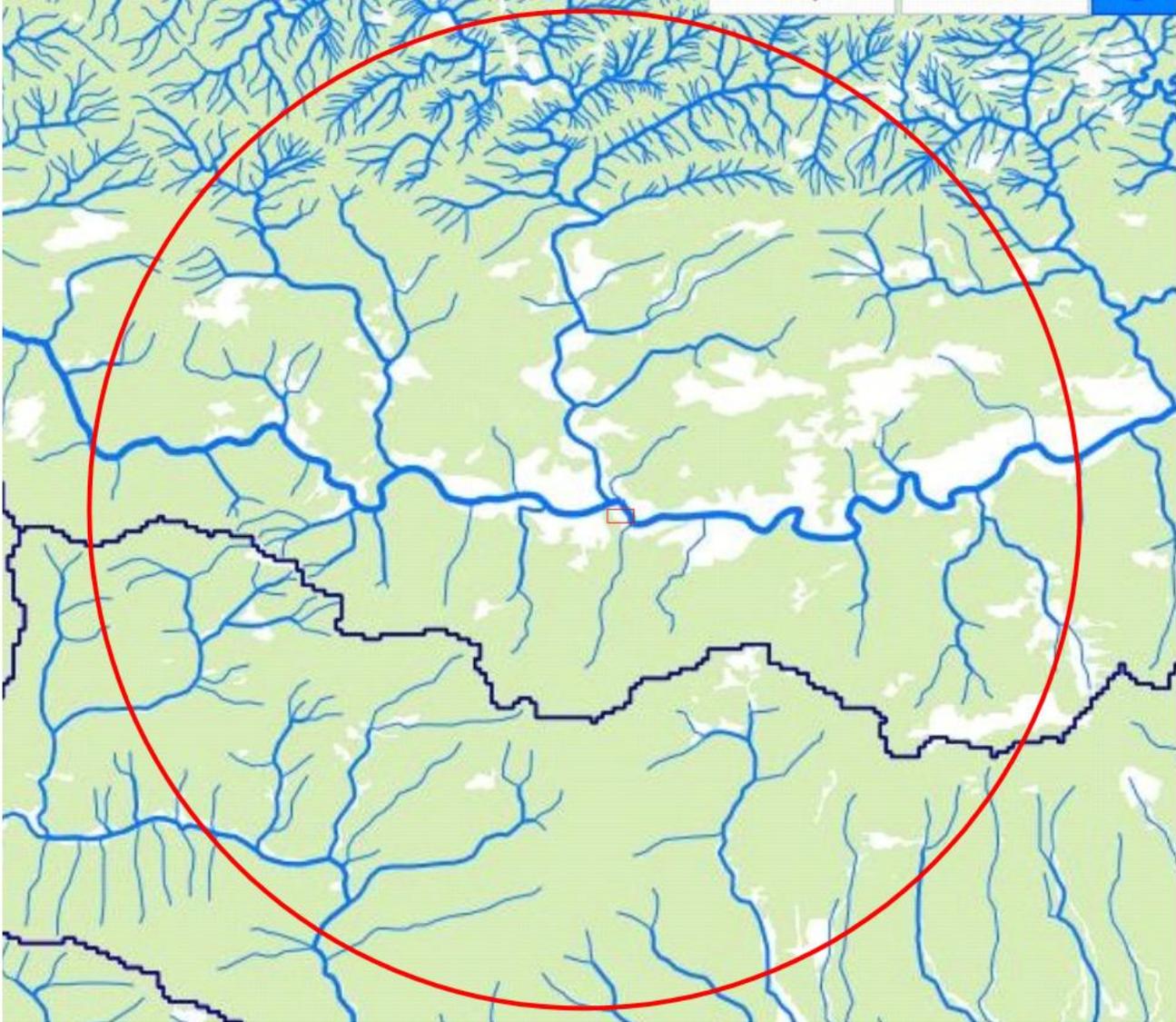


Figure 3.3 Drainage map of the Study Area (10 Km Radius from the Mine Site)

3.1.5 CROPPING PATTERN

The economy of Champawat district is based mainly on agriculture. The soils here are mostly fertile and in spite of many projects of irrigations as seen in the previous pages, the uncertainty of irrigation and its dependence on rains has made this tract adopt mostly the traditional farming. This is one area where despite the Govt's push for hybrid seeds and commercial agriculture and despite several droughts and floods which affect the seeds most, the farmers have been able to save some of their traditional seeds.

There are two main crops: Kharif and Rabi; the one between July and October and the other between November and March. The old records in the imperial gazetteer or the district gazetteer mentions cotton as one of the major crops here. But that has vanished now. The main crops grown presently are as follows:

Kharif: Paddy, Jowar, Bajra, Til, Moong, Urd, Arhar and Sanai are the main crops taken these days. Paddy is normally taken as mono crop while others are mixed sown. 100 years ago cotton was taken as a mixed crop along with other crops in Kharif. Presently Government is pushing Soyabean replacing all other Kharif crops. This tendency ultimately will starve this district.

Rabi: Wheat, barley along with gram, linseed, mustard, Masoor and Peas are the major crops. There is a tendency for mixed cropping and regional variation in choices of the crops depending upon the geographical situation and the availability of irrigation.

Zaid: the third crops are usually taken in the river beds; that includes Kakri. Tarbooj (water melon), Kharbooja and some vegetable.

Cropping Pattern of Pauri Garhwal Rabi

Season

Rabi season generally occurs from November. ~ December. to March.~April. But at project site, it is observed from Dec. ~ Jan. to May~ June. The main crops during the Rabi season are wheat, barley, ray, sarson (mustard), pea, gram, and masur. Almost, all the crops are grown in the entire region. Whereas, in the plains of Tarai, Bhabar, Doon and Dwar, particularly in some parts of Pauri district, wheat, gram and pea are grown

extensively. In the elevated regions, barley, mustered oil, rai, and masur (a local variety of pulses) along with wheat, gram and pea are grown.

Kharif season

The period of the Kharif season is from May~June. to Sep. ~ Oct., but in high elevation areas lasts from Jun. ~July to Oct.~ Nov. In the hilly terrain, the traditional millets are also grown extensively. It is found that millets crops are grown in the sloppy land and help to reduce the soil erosion. Rice and wheat dominate the agricultural realm from one corner of the region to the other, obviating the culture of the other crops. In the region whatever may be the type of soil or the amount of rainfall the dominance of food grains in the cropping pattern is everywhere obvious (Sati 1993). The main agricultural crops grown in the region are rice, Mandua and sawan (both are small millets) in the Kharif crop season, wheat, and barley in the Rabi crop season. Food grains such as rice, wheat, and pulses are mostly grown in valley areas and the areas with irrigation facilities.

Agriculture Crops- The crops of Tehri & Pauri Garhwal include the following:-

TABLE: 2.19 LIST OF AGRICULTURE CROPS IN STUDY AREA

S. No	Common Name	Botanical Name	Family
1	Wheat	<i>Triticum aestivum</i>	Poaceae
2	Barley	<i>Hordeum vulgare</i>	Poaceae
3	Maize	<i>Zea mays</i>	Poaceae
4	Moth	<i>Lens Culinaris</i>	Fabaceae
5	Moong	<i>Vigna radiata</i>	Fabaceae
6	Cabbage	<i>Brassica oleraces</i>	Brassicaceae
7	Brinjal	<i>Solaunum melongena</i>	Solanaceae
8	Chilli	<i>Capsicum annum</i>	Solanaceae
9	Bean	<i>Chaseolus vulgaris</i>	Fabaceae
10	Tomato	<i>Lucopersicum esculentum</i>	Solanaceae
11	Palak	<i>Spinacea oleracea</i>	Amaranthaceae
12	Potato	<i>Solanum tuberosum</i>	Solanaceae
13	Ginger	<i>Zingber officinale</i>	Zingiberaceae

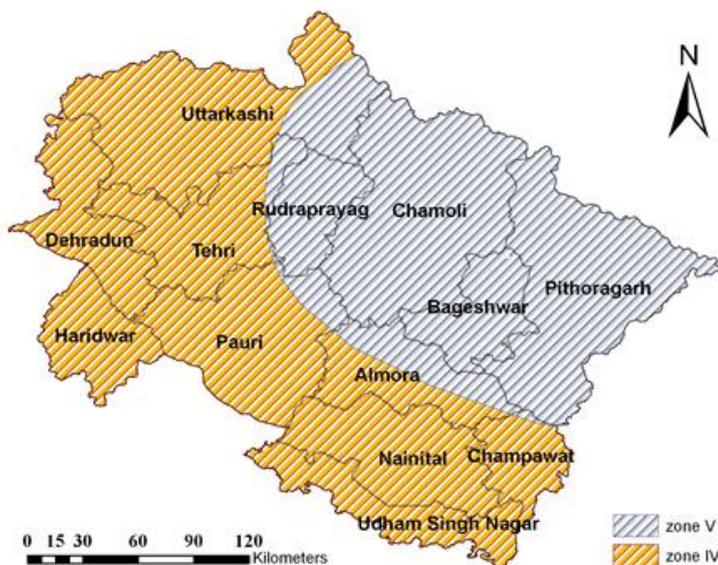
3.1.6 PHYSIOGRAPHY OF THE MINE AREA

The applied area along River Ken has mild slope towards West to South-east. Geologically, district Champawat comprises of diverse rock types. The geological set up is very complex due to the repeated tectonic disturbances caused by different orogenic cycles. Valdiya (1980) carried out extensive geological and structural mapping in the area. The salient features of geology are depicted in the geological map of the Champawat district. The rock succession exposed in the district mainly falls in two groups namely, Ramgarh and Almora Group of rocks apart from the Siwalik Group of Tertiary rocks at the southern side of the district, which is Late Tertiary to Quarternary, exposed all along the foothill belt of the Sub-Himalayaa.

3.1.7 SEISMICITY OF THE AREA

Many parts of the Indian subcontinent have historically high Seismicity. Seven catastrophic earthquakes of magnitude greater than 8 (Richter scale) have occurred in the western, northern and eastern parts of India and adjacent countries in the past 100 years. By contrast, peninsular India is relatively less seismic, having suffered only infrequent earthquakes of moderate strength. The main seismogenic belts are associated with the collision plate boundary between the Indian and Eurasian plates. The project site as well as study area lies in Zone-IV of Seismic Zoning Map (Figure-3.3), and thus can be said to be located in an area of moderate seismic hazard by national standards. Hence the risk of earthquake at the site persists though there has been no incident in the near past.

UTTARAKHAND EARTHQUAKE ZONATION



Information on the existing environmental status is essential for assessing the likely environmental impacts of the project. In order to get an idea about the existing state of the environment, various environmental attributes such as meteorology, air quality, water quality, soil quality, noise level, ecology and socio-economic environment have been studied/ monitored.

STUDY PERIOD

Primary Baseline monitoring data used for air, water, noise and soil quality monitoring has been conducted at project site and four other locations from Oct 2021 to Dec 2021 Apart from field monitoring, additional data was also collected from secondary sources like irrigation department, India Meteorological Department (IMD), Central Ground Water Board, Geological Survey of India, State Ground Water Department, State Pollution Control Board, Census of India and Local Forest Department, Non - Governmental Agencies, etc.

STUDY AREA

The present report covers baseline environmental data generated in the study area (10 Km radius around the project site for land use and the sample selection for air, water, soil and noise monitoring).

BASELINE MONITORING OF ENVIRONMENTAL COMPONENTS

In order to get an idea about the existing state of the environment, various environmental attributes such as meteorology, air quality, water quality, soil quality,

noise level, ecology and socio-economic environment have been studied/monitored

MeteorologyClimate

Based on long-term climatological data of the district, it is surmised that January is the coldest month with mean maximum temperature of 19.6°C and the mean minimum temperature of 4.6°C. Temperature becomes highest usually during June, having mean minimum and mean maximum temperatures of 32.6°C and 36.5°C respectively. Relative Humidity in the area increases rapidly with the onset of monsoon and reaches maximum (85% in the morning and 84% in the evening) during August, when peak monsoon period sets in. Relative Humidity is minimum during the summer months (from April to June) with May being the driest month (47% in morning and 25% in evening). Skies are heavily clouded during the monsoon months and for short spells when the district is affected by Western Disturbances. Two broad wind patterns are observed in the district viz. north easterly to easterly (May to September) and south easterly to westerly (October to March). The average wind speed is minimum (0.8 km/hr) in December and maximum in July (4.1 km/hr) whereas the average annual wind speed is 2.3 km/hr.

Air Environment

The prime objective of the baseline study with respect to ambient air quality is to establish the present air quality and its conformity to National Ambient Air Quality Standards. This data has been further used during impact assessment to predict the final air quality. This section describes the sampling locations, frequency of sampling and methodology adopted for monitoring ambient air quality.

To quantify the impact of the project on the ambient air quality, it is necessary at first to evaluate the existing ambient air quality of the area. The existing ambient air quality, in terms of Particulate Matter – 10 (PM10), Particulate Matter- 2.5 (PM2.5), Sulphur-dioxide (SO₂) and Oxides of Nitrogen (NO₂), has been measured through a planned field monitoring.

To assess the ambient air quality level, 5 monitoring stations were set up. Table 3.1 gives location of the ambient air quality monitoring stations.

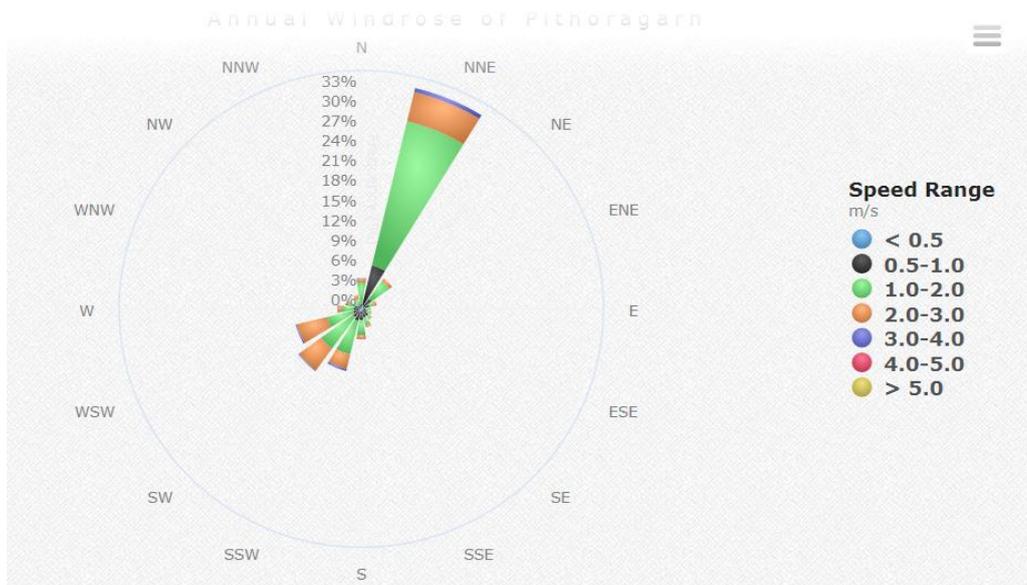
Windrose of Champawat shows that dominant wind blow from the NNE much of the time - about 34.24% of all hourly wind directions. Approximately 0.73% (max) of the time the wind blows from the NNE at speeds between 1 and 2 m/s. Further, at Champawat much of the time winds blow at speeds between 1 and 2 m/s - which is 54.39% of the time. About 5.38% of time winds were CALM *i.e.* wind speeds less than 0.5m/s.

This table shows the frequency and speed of wind blowing from each direction in Pithoragarh.

Table of Frequencies (%)

Direction	< 0.5	0.5-1.0	1.0-2.0	2.0-3.0	3.0-4.0	4.0-5.0	> 5.0	Total
N	0.23	0.55	3.24	0.50	0.09	0.00	0.00	4.61
NNE	0.59	6.16	22.33	4.52	0.64	0.00	0.00	34.24
NE	0.37	1.51	3.29	0.50	0.00	0.00	0.00	5.67
ENE	0.41	0.78	0.78	0.41	0.00	0.00	0.00	2.38
E	0.27	0.37	0.64	0.09	0.00	0.00	0.00	1.37
ESE	0.27	0.64	0.59	0.09	0.00	0.00	0.00	1.59
SE	0.27	1.05	0.46	0.18	0.00	0.00	0.00	1.96
SSE	0.41	0.91	1.23	0.32	0.00	0.00	0.00	2.87
S	0.41	1.28	2.28	0.59	0.00	0.00	0.00	4.56
SSW	0.46	1.37	5.25	2.24	0.32	0.00	0.00	9.64
SW	0.55	0.96	5.89	4.06	0.14	0.00	0.00	11.60
WSW	0.23	1.00	4.02	4.61	0.18	0.00	0.00	10.04
W	0.41	0.73	1.74	0.59	0.09	0.00	0.00	3.56
WNW	0.18	0.78	1.05	0.37	0.00	0.00	0.00	2.38
NW	0.14	0.41	0.73	0.05	0.00	0.00	0.00	1.33
NNW	0.18	0.55	0.87	0.59	0.00	0.00	0.00	2.19
Total	5.38	19.05	54.39	19.71	1.46	0.00	0.00	100

FIGURE 3.1 WIND ROSE Oct 2021 to Dec 2021



AMBIENT AIR QUALITY

The study area represents mostly rural and urban environment. The baseline status of the ambient air quality has been assessed through a scientifically designed ambient air quality network

Table 3.1: Location of Ambient Air Quality Monitoring Stations

S.No	Monitoring station	Distance Direction	& Lat & Long	
1	Project site	00	29°11'38.34"N 3'21.85"E	80°
2	Suwala	6.20 km N	29°15'10.60"N 4'14.57"E	80°
3	Khatoli Talli	6.0 km NW	29°13'54.16"N 0'21.60"E	80°
4	Basanjoga	6.5 km W	29°11'26.21"N 79°57'20.32"E	
5	Dhura	3.80 km S	29° 9'39.48"N 3'30.98"E	80°
6	Buram	4.0 km SE	29° 9'39.54"N 3'29.85"E	80°

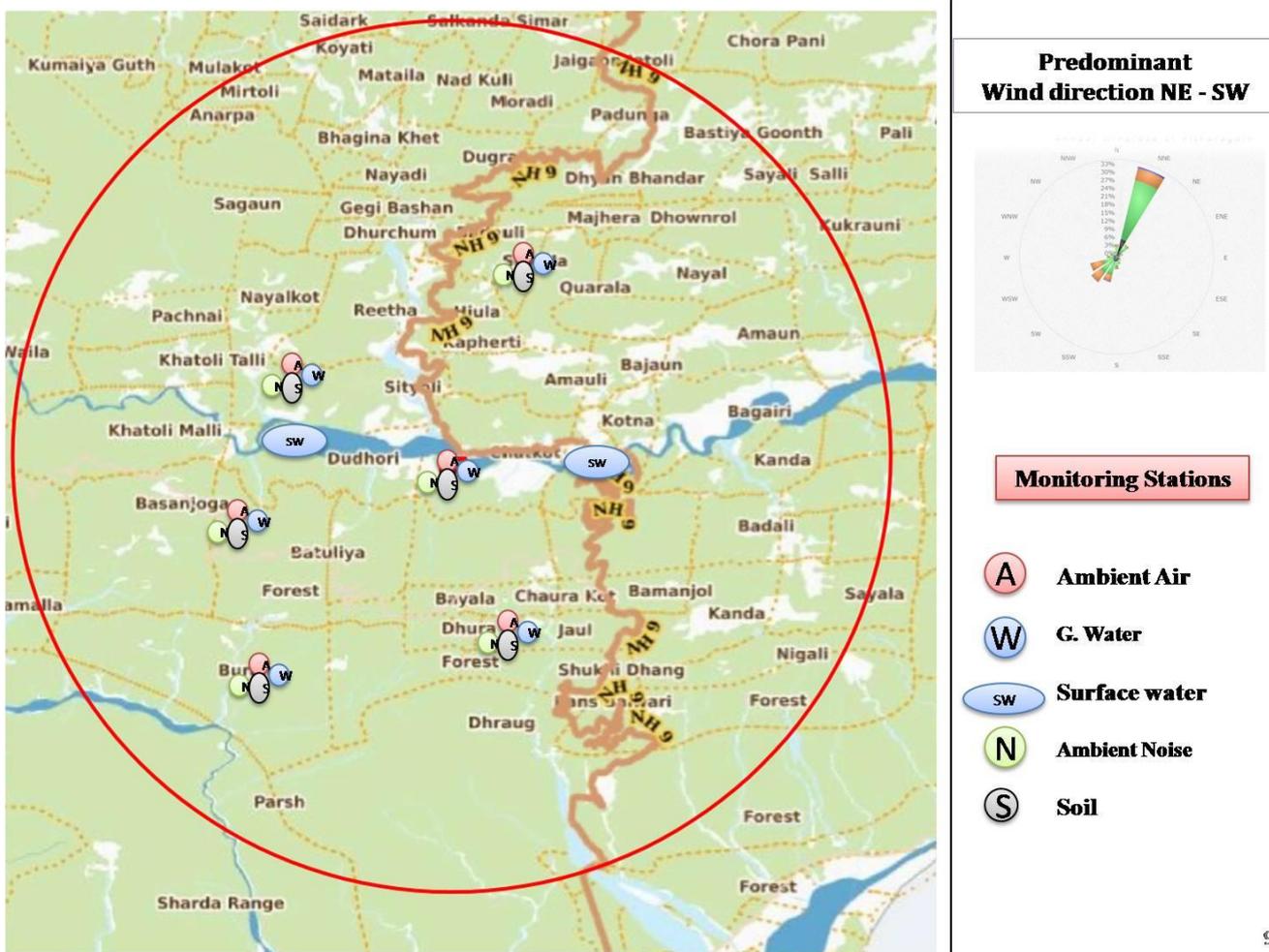


Figure: 3.1. Air quality monitoring location

(a) Monitoring Schedule

Ambient air quality monitoring was carried out twice a week with a frequency of 24 hours for 12 weeks.

(b) Methods of Sampling and Analysis

The brief methodology of the parameter analyzed is as follows:

- I. Particulate Matter (PM2.5): (CPCB Method) Particulate Matter (PM2.5) was analyzed by Fine Particulate Sampler Envirotech Model APM 550. PM 2.5 was collected on 47 mm diameter filter paper. The mass concentration of (PM2.5) fine particles in ambient air was calculated as the total mass of collected particles divided by the volume of air sampled.
- II. Particulate Matter (PM10): Particulate Matter (PM10) was carried out by Respirable Dust Sampler Envirotech Model APM 460 BL. The cyclone of this instrument is used for fractionating the dust into two fractions. PM 10 dust is accumulated on the filter paper (8"×10" size) while coarse dust is collected in a cup placed under the cyclone. PM 10 was calculated as per IS: 5182 (Part

23):2006. The mass of these particles was determined by the difference in filter weight prior to and after sampling. The concentration of PM 10 in the designated size range was calculated by dividing the weight gain of the filter by the volume of air sampled.

- III. Sulphur dioxide (SO₂): SO₂ was monitored with the help of APM 411 assembly attached with APM 460 BL using the impinge. It was absorbed by aspirating a measured air sample through a solution of Potassium tetrachloromercurate (TCM). This procedure resulted in the formation of a dichlorosulphitemercurate complex. The complex was made to react with pararosaniline and methylsulphonic acid. The absorbance of the solution was measured by means of spectrophotometer.
- IV. Nitrogen Dioxides: NO₂ was monitored with the help of APM 411 assembly attached with APM 460 BL using the impinge. It was collected by bubbling air through a solution of sodium hydroxide and sodium arsenite. The concentration of nitrite ion produced during sampling was determined calorimetrically by reacting with the nitrite ion with phosphoric acid, sulphanilamide and NEDA and absorbance of highly colored azo-dye was measured at 540nm.

(c) Results and Discussion

The results of AAQ are given and summarized in the tables below. The results on comparison with National Ambient Air Quality Standards (NAAQS), 2009 of Central Pollution Control Board (CPCB) show that the values of ambient air quality parameters are well within the stipulated limits at various monitoring locations.

The results of ambient air quality monitoring are summarized below in the Tables 3.2:

Location: AQ-1 Project Site)

Sampling Protocol :	UTRL/STP/AIR/01
Analysis Duration :	04/10/2021 To 31/12/2021
	Sample Drawn By : UTRL

TEST RESULT

S.No	Date	Particulate Matter PM10 (µg /m ³)	Particulate Matter PM2.5 (µg /m ³)	Sulphur Dioxide SO ₂ (µg /m ³)	Nitrogen Dioxide NO ₂ (µg /m ³)	Carbon monoxide CO (mg /m ³)
		IS:5182(Part-23)	IS:5182(Part-24)	IS:5182(Part-2)	IS:5182(Part-6)	IS:5182(Part-X)
1	10/1/2021	66.90	34.47	9.98	21.23	0.55
2	10/4/2021	68.85	31.69	8.54	18.70	0.53
3	10/8/2021	68.46	32.34	8.60	20.86	0.59
4	10/11/2021	67.39	34.89	7.63	20.49	0.57

5	10/15/2021	64.69	31.60	7.37	21.86	0.52
6	10/18/2021	69.77	33.38	10.32	19.80	0.54
7	10/22/2021	65.93	31.91	7.35	18.09	0.51
8	10/25/2021	69.84	34.71	10.05	17.85	0.58
9	10/29/2021	64.67	33.98	9.11	17.72	0.56
10	11/2/2021	63.19	31.80	9.53	20.05	0.52
11	11/6/2021	62.37	30.95	7.46	19.31	0.57
12	11/9/2021	67.66	31.44	7.89	18.06	0.53
13	11/13/2021	66.99	33.19	8.46	21.60	0.59
14	11/16/2021	63.15	32.58	8.96	20.01	0.56
15	11/20/2021	62.61	31.47	9.41	17.20	0.52
16	11/23/2021	68.54	34.72	8.97	18.00	0.55
17	11/27/2021	64.33	32.46	9.46	20.38	0.51
18	11/30/2021	63.92	30.64	10.40	19.38	0.54
19	12/4/2021	67.00	32.51	9.49	17.03	0.53
20	12/7/2021	66.20	34.37	10.92	20.06	0.57
21	12/11/2021	65.33	32.89	8.93	17.56	0.59
22	12/14/2021	67.28	33.33	9.47	19.09	0.56
23	12/18/2021	68.76	34.53	7.88	19.10	0.54
24	12/21/2021	68.19	31.02	9.28	18.25	0.51
Minimum		62.37	30.64	7.35	17.03	0.51
Maximum		69.84	34.89	10.92	21.86	0.59
Average		66.33	32.79	8.98	19.24	0.55
98th Percentile		69.81	34.81	10.68	21.74	0.59
NAAQS,For 24 Hourly Monitoring		100.0	60.0	80.0	80.0	4.0

Location : AQ-2 Suwala

Sampling Protocol :	UTRL/STP/AIR/01	
Analysis Duration :	04/10/2021 To 31/12/2021	Sample Drawn By : UTRL

TEST RESULT

S.No	Date	Particulate Matter PM10 ($\mu\text{g}/\text{m}^3$)	Particulate Matter PM2.5 ($\mu\text{g}/\text{m}^3$)	Sulphur Dioxide SO ₂ ($\mu\text{g}/\text{m}^3$)	Nitrogen Dioxide NO ₂ ($\mu\text{g}/\text{m}^3$)	Carbon monoxide CO (mg/m^3)
		IS:5182(Part-23)	IS:5182(Part-24)	IS:5182(Part-2)	IS:5182(Part-6)	IS:5182(Part-X)
1	10/1/2021	66.57	34.24	9.48	20.23	0.53
2	10/4/2021	65.56	33.57	8.03	17.70	0.52
3	10/8/2021	68.61	32.62	9.23	19.92	0.56
4	10/11/2021	62.71	33.38	7.11	19.49	0.55
5	10/15/2021	64.19	31.91	6.79	20.67	0.50
6	10/18/2021	69.03	33.50	9.81	18.76	0.57
7	10/22/2021	62.75	35.27	8.13	17.16	0.54
8	10/25/2021	64.74	31.19	9.60	17.29	0.59
9	10/29/2021	64.91	32.93	8.50	18.74	0.57
10	11/2/2021	62.96	32.49	10.04	18.85	0.55
11	11/6/2021	63.69	31.17	8.07	20.56	0.53

12	11/9/2021	67.03	35.14	8.52	19.33	0.58
13	11/13/2021	63.39	33.98	9.11	20.71	0.56
14	11/16/2021	63.71	32.77	9.57	21.23	0.52
15	11/20/2021	65.20	32.72	9.83	18.06	0.51
16	11/23/2021	67.36	33.31	8.21	19.27	0.53
17	11/27/2021	64.19	31.08	10.13	21.72	0.57
18	11/30/2021	61.95	33.48	10.91	18.67	0.56
19	12/4/2021	61.55	31.38	8.98	18.21	0.51
20	12/7/2021	65.01	32.57	10.47	21.38	0.55
21	12/11/2021	62.91	30.57	8.58	18.79	0.56
22	12/14/2021	63.02	33.48	8.95	20.29	0.52
23	12/18/2021	68.01	32.03	7.33	18.03	0.51
24	12/21/2021	64.05	33.98	8.83	19.59	0.57
Minimum		61.55	30.57	6.79	17.16	0.50
Maximum		69.03	35.27	10.91	21.72	0.59
Average		64.71	32.86	8.92	19.36	0.54
98th Percentile		68.84	35.21	10.71	21.56	0.59
NAAQS,For 24 Hourly Monitoring		100.0	60.0	80.0	80.0	4.0

Location: AQ-3 Khatoli Talli

Sampling Protocol :	UTRL/STP/AIR/01	
Analysis Duration :	04/10/2021 To 31/12/2021	Sample Drawn By : UTRL

TEST RESULT

S.No	Date	Particulate Matter PM10 ($\mu\text{g}/\text{m}^3$)	Particulate Matter PM2.5 ($\mu\text{g}/\text{m}^3$)	Sulphur Dioxide SO ₂ ($\mu\text{g}/\text{m}^3$)	Nitrogen Dioxide NO ₂ ($\mu\text{g}/\text{m}^3$)	Carbon monoxide CO (mg/m ³)
		IS:5182(Part-23)	IS:5182(Part-24)	IS:5182(Part-2)	IS:5182(Part-6)	IS:5182(Part-X)
1	10/1/2021	64.38	33.91	8.67	18.99	0.56
2	10/4/2021	60.45	34.47	7.21	17.17	0.54
3	10/8/2021	67.66	32.69	8.55	20.90	0.59
4	10/11/2021	61.92	32.14	8.24	18.78	0.56
5	10/15/2021	66.18	33.50	8.43	19.50	0.53
6	10/18/2021	67.98	35.14	9.22	17.85	0.55
7	10/22/2021	66.41	31.47	7.44	17.76	0.51
8	10/25/2021	67.21	31.69	10.47	18.64	0.50
9	10/29/2021	65.40	33.92	8.98	19.68	0.55
10	11/2/2021	62.15	34.23	9.77	19.98	0.59
11	11/6/2021	66.48	31.71	7.40	21.75	0.57
12	11/9/2021	63.72	32.65	9.12	20.42	0.53
13	11/13/2021	70.07	35.09	10.16	21.80	0.52
14	11/16/2021	64.10	31.71	10.47	20.08	0.56
15	11/20/2021	63.68	32.54	10.46	17.41	0.53
16	11/23/2021	69.51	34.20	9.17	18.40	0.57
17	11/27/2021	64.45	32.46	10.85	20.56	0.59
18	11/30/2021	64.39	33.98	9.95	17.35	0.55

19	12/4/2021	60.57	35.32	8.18	17.35	0.56
20	12/7/2021	64.55	33.68	9.47	21.55	0.54
21	12/11/2021	68.22	30.81	7.81	20.05	0.53
22	12/14/2021	66.02	32.26	9.53	18.28	0.50
23	12/18/2021	62.04	34.14	7.79	17.22	0.54
24	12/21/2021	64.83	34.14	10.43	18.70	0.59
Minimum		60.45	30.81	7.21	17.17	0.50
Maximum		70.07	35.32	10.85	21.80	0.59
Average		65.10	33.24	9.07	19.17	0.55
98th Percentile		69.81	35.24	10.68	21.78	0.59
NAAQS,For 24 Hourly Monitoring		100.0	60.0	80.0	80.0	4.0

Location : AQ-4 Basanjoga

Sampling Protocol :	UTRL/STP/AIR/01	
Analysis Duration :	04/10/2021 To 31/12/2021	Sample Drawn By : UTRL

TEST RESULT

S.No	Date	Particulate Matter PM10 (µg /m ³)	Particulate Matter PM2.5 (µg /m ³)	Sulphur Dioxide SO ₂ (µg /m ³)	Nitrogen Dioxide NO ₂ (µg /m ³)	Carbon monoxide CO (mg /m ³)
		IS:5182(Part-23)	IS:5182(Part-24)	IS:5182(Part-2)	IS:5182(Part-6)	IS:5182(Part-X)
1	10/2/2021	65.92	32.95	7.95	17.64	0.54
2	10/5/2021	62.48	31.49	8.46	19.01	0.52
3	10/9/2021	37.39	30.86	9.22	20.08	0.56
4	10/12/2021	61.30	35.70	9.95	18.10	0.53
5	10/16/2021	67.60	32.34	8.53	20.49	0.57
6	10/19/2021	63.42	30.32	7.93	20.56	0.59
7	10/23/2021	65.85	31.60	7.90	19.34	0.55
8	10/26/2021	67.10	35.67	9.94	18.08	0.54
9	10/30/2021	64.31	32.20	9.53	17.65	0.58
10	11/3/2021	62.54	31.24	9.48	20.61	0.56
11	11/7/2021	67.22	32.34	8.04	19.75	0.53
12	11/10/2021	63.47	33.57	9.97	18.99	0.51
13	11/14/2021	68.50	31.30	9.63	20.56	0.54
14	11/17/2021	64.13	34.23	8.67	17.96	0.59
15	11/21/2021	65.04	34.77	9.95	19.31	0.57
16	11/24/2021	68.99	35.85	8.02	17.99	0.55
17	11/28/2021	62.09	33.43	10.05	20.08	0.53
18	12/1/2021	62.37	35.14	7.82	17.85	0.51
19	12/5/2021	61.13	33.98	7.15	18.28	0.54
20	12/8/2021	67.16	31.65	8.66	21.23	0.52
21	12/12/2021	68.65	30.74	8.74	21.03	0.58
22	12/15/2021	65.02	34.16	8.77	19.45	0.56
23	12/19/2021	63.16	34.29	9.49	18.78	0.57
24	12/22/2021	64.01	32.76	10.11	21.50	0.55

Minimum	37.39	30.32	7.15	17.64	0.51
Maximum	68.99	35.85	10.11	21.50	0.59
Average	63.70	33.02	8.91	19.35	0.55
98th Percentile	68.83	35.78	10.08	21.38	0.59
NAAQS,For 24 Hourly Monitoring	100.0	60.0	80.0	80.0	4.0

Location: AQ-5 Dhura

Sampling Protocol :	UTRL/STP/AIR/01	
Analysis Duration :	04/10/2021 To 31/12/2021	Sample Drawn By : UTRL

TEST RESULT

S.No	Date	Particulate Matter PM10 ($\mu\text{g}/\text{m}^3$)	Particulate Matter PM2.5 ($\mu\text{g}/\text{m}^3$)	Sulphur Dioxide SO ₂ ($\mu\text{g}/\text{m}^3$)	Nitrogen Dioxide NO ₂ ($\mu\text{g}/\text{m}^3$)	Carbon monoxide CO (mg/m^3)
		IS:5182(Part-23)	IS:5182(Part-24)	IS:5182(Part-2)	IS:5182(Part-6)	IS:5182(Part-X)
1	10/2/2021	63.35	34.41	8.55	19.22	0.57
2	10/5/2021	65.02	31.51	9.14	20.78	0.55
3	10/9/2021	60.86	34.16	9.60	20.93	0.53
4	10/12/2021	64.47	35.57	10.47	19.52	0.54
5	10/16/2021	68.21	34.77	9.12	21.15	0.52
6	10/19/2021	66.07	32.92	7.48	19.54	0.56
7	10/23/2021	64.39	31.60	7.37	17.78	0.51
8	10/26/2021	68.02	34.29	9.36	18.40	0.58
9	10/30/2021	69.60	31.40	8.69	19.03	0.53
10	11/3/2021	66.66	34.41	10.09	21.27	0.51
11	11/7/2021	68.15	35.62	8.67	20.29	0.58
12	11/10/2021	63.26	31.49	10.68	18.64	0.59
13	11/14/2021	65.69	34.53	8.86	17.41	0.53
14	11/17/2021	63.99	31.38	9.53	17.84	0.56
15	11/21/2021	67.30	33.00	9.22	19.15	0.54
16	11/24/2021	70.15	31.17	7.37	19.64	0.52
17	11/28/2021	62.02	33.52	9.52	21.07	0.51
18	12/1/2021	65.20	34.32	8.70	19.30	0.55
19	12/5/2021	62.64	30.86	7.68	17.29	0.58
20	12/8/2021	68.65	34.84	9.39	21.27	0.54
21	12/12/2021	68.20	33.80	9.09	19.80	0.56
22	12/15/2021	69.11	35.52	9.74	18.98	0.53
23	12/19/2021	64.07	31.49	10.12	17.72	0.59
24	12/22/2021	63.86	33.86	10.47	21.01	0.52
Minimum		60.86	30.86	7.37	17.29	0.51
Maximum		70.15	35.62	10.68	21.27	0.59
Average		65.79	33.35	9.12	19.46	0.55
98th Percentile		69.90	35.60	10.58	21.27	0.59
NAAQS,For 24 Hourly Monitoring		100.0	60.0	80.0	80.0	4.0

Location: AQ-6 Buram

Sampling Protocol :	UTRL/STP/AIR/01	
Analysis Duration :	04/10/2021 To 31/12/2021	Sample Drawn By : UTRL

TEST RESULT

S.No	Date	Particulate Matter PM10 ($\mu\text{g}/\text{m}^3$)	Particulate Matter PM2.5 ($\mu\text{g}/\text{m}^3$)	Sulphur Dioxide SO ₂ ($\mu\text{g}/\text{m}^3$)	Nitrogen Dioxide NO ₂ ($\mu\text{g}/\text{m}^3$)	Carbon monoxide CO (mg/m^3)
		IS:5182(Part-23)	IS:5182(Part-24)	IS:5182(Part-2)	IS:5182(Part-6)	IS:5182(Part-X)
1	10/2/2021	64.03	32.03	9.18	20.56	0.53
2	10/5/2021	64.61	33.98	8.27	19.40	0.51
3	10/9/2021	61.95	34.71	7.68	20.64	0.55
4	10/12/2021	64.64	31.91	9.98	17.54	0.57
5	10/16/2021	67.61	31.67	9.62	18.75	0.56
6	10/19/2021	69.50	34.78	7.79	17.35	0.59
7	10/23/2021	63.89	35.14	8.52	18.40	0.54
8	10/26/2021	66.74	32.23	8.98	19.31	0.53
9	10/30/2021	69.07	33.26	8.02	21.55	0.55
10	11/3/2021	64.83	33.00	10.47	20.64	0.56
11	11/7/2021	62.95	31.87	9.41	18.80	0.54
12	11/10/2021	61.10	30.97	9.39	17.72	0.53
13	11/14/2021	66.93	32.01	7.92	18.33	0.54
14	11/17/2021	63.71	34.71	8.80	20.26	0.58
15	11/21/2021	67.86	34.96	8.58	21.53	0.59
16	11/24/2021	67.87	31.24	7.11	20.23	0.53
17	11/28/2021	61.41	30.66	10.13	18.84	0.55
18	12/1/2021	65.34	33.92	9.39	17.11	0.58
19	12/5/2021	63.32	34.47	8.04	17.90	0.54
20	12/8/2021	69.71	31.71	10.05	20.64	0.52
21	12/12/2021	64.77	33.92	8.43	18.76	0.51
22	12/15/2021	69.17	35.24	7.70	17.71	0.59
23	12/19/2021	67.07	30.43	9.91	19.15	0.55
24	12/22/2021	65.12	35.44	9.21	21.41	0.56
Minimum		61.10	30.43	7.11	17.11	0.51
Maximum		69.71	35.44	10.47	21.55	0.59
Average		65.55	33.10	8.86	19.27	0.55
98th Percentile		69.62	35.35	10.31	21.54	0.59
NAAQS, For 24 Hourly Monitoring		100.0	60.0	80.0	80.0	4.0

The values of PM2.5, PM10, SO₂ & NO_x at project site and four other monitoring locations are presented above in Table 3.2. All the parameters are well within the stipulated limits of NAAQS, 2009.

Noise Levels

Noise is one of the most undesirable and unwanted by-products of our modern life style. It may not seem as insidious or harmful as air and water pollutants but it affects human health and well-being and can contribute to deterioration of human well-being in general and can cause neurological disturbances and physiological damage to the hearing mechanism in particular. It is therefore, necessary to measure both the quality as well as the quantity of noise in and around the site.

(a) Methodology

The intensity of sound energy in the environment is measured in a logarithmic scale and is expressed in a decibel, dB (A) scale. In a sophisticated type of sound level meter, an additional circuit (filters) is provided, which modifies the received signal in such a way that it replicates the sound signal as received by the human ear and the magnitude of sound level in this scale is denoted as dB (A). The sound levels are expressed in dB (A) scale for the purpose of comparison of noise levels, which is universally accepted by the international community.

Noise levels were measured using an Integrating sound level meter manufactured by Pulsar Instruments Plc, Model NO. 91 (SL.No.B21625). It has an indicating mode of Lp and Leq Keeping the mode in Lp for few minutes and setting the corresponding range and the weighting network in “A” weighting set the sound level meter was run for one hour time and Leq was measured at all locations.

The day noise levels have been monitored during 6.00 am to 10.00 pm and night noise levels, during 10.00 pm to 6.00 am at all the 4 locations, which covers residential areas, commercial, industrial areas, silence area within 10 km radius of the study area.

(b) Sampling Locations

A preliminary survey was undertaken to identify the major noise generating sources in the area. The noise survey was conducted to assess the background noise levels in different zones. Gazettes Notification (S.O. 123(E)) of MoEF&CC dated December 14, 2000 on ambient air quality standards has different noise levels for different zones viz. industrial, residential and silence zones. Five sampling locations were selected for sampling of noise levels. The sampling locations are given in Table - 3.3 below.

Table 3.3 Noise Level Monitoring Locations

S.No	Monitoring satiation	Distance & Direction	Lat & Long
1	Project site	00	29°11'38.34"N 80° 3'21.85"E
2	Suwala	6.20 km N	29°15'10.60"N 80° 4'14.57"E

3	Khatoli Talli	6.0 km NW	29°13'54.16"N 0'21.60"E	80°
4	Basanjoga	6.5 km W	29°11'26.21"N 79°57'20.32"E	
5	Dhura	3.80 km S	29° 9'39.48"N 3'30.98"E	80°
6	Buram	4.0 km SE	29° 9'39.54"N 3'29.85"E	80°

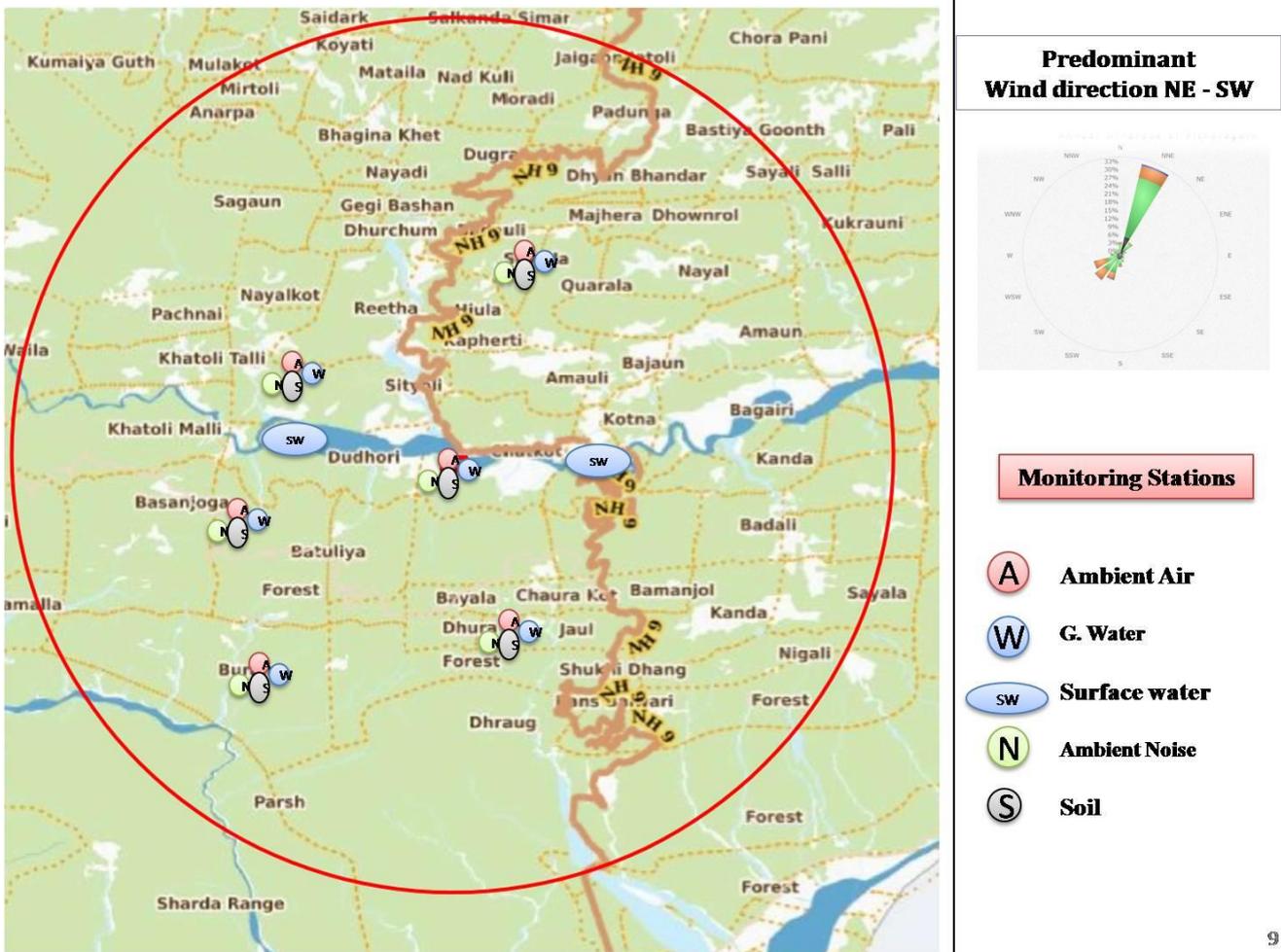


Fig: 3.2 Noise quality monitoring location

Ministry of Environment Forests and Climate Change (MoEF&CC) has notified the noise standards vide gazette notification dated December 14, 2000 for different zones under the Environment Protection Act (1986). These standards are given in Table - 3.4.

Table 3.4 Ambient Noise Quality Standards

Area Code	Category of Area	Noise dB(A) Leq	
		Day time*	Night time*
A	Residential Zone	55	45
B	Silence zone	50	40
C	Industrial Zone	75	70
D	Commercial Zone	65	55

Note:

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

(c) Results and Discussion

The noise level monitoring results of Oct 2021 to Dec 2021 are presented below in Table 3.5. The ambient noise level in study area during the day time varies from 44.46 to 39.42 dB (A) during day time and 42.63 to 35.66 dB (A) during night which is within the specified limits of CPCB.

Table 3.5: Hourly Leq Noise Level in Study Area (Oct 2021 Dec 2021)

Sampling Protocol :	UTRL/STP/Noise	Location :	NQ1 (Project Site)
Analysis Duration :	04/10/2021 To 31/12/2021	Sample Drawn By :	UTRL

TEST RESULT

S.No	Date	Observed Value Leq, dB(A)		LIMIT as per CPCB Guidelines Leq, dB(A)	
		DAY*	NIGHT*	DAY*	NIGHT*
1	10/1/2021	66.6	55.3	75.0	70.0
2	10/4/2021	64.7	58.7		
3	10/8/2021	61.2	55.7		
4	10/11/2021	67.3	56.4		
5	10/15/2021	62.4	52.6		
6	10/18/2021	67.1	54.5		
7	10/22/2021	66.7	57.4		
8	10/25/2021	63.2	52.9		
9	10/29/2021	64.4	57.8		
10	11/2/2021	66.1	54.6		
11	11/6/2021	65.3	55.1		
12	11/9/2021	63.8	54.3		
13	11/13/2021	66.2	58.7		
14	11/16/2021	64.2	53.5		
15	11/20/2021	64.1	55.2		
16	11/23/2021	65.1	54.9		
17	11/27/2021	62.4	58.5		
18	11/30/2021	64.1	57.4		

19	12/4/2021	65.3	55.7
20	12/7/2021	64.5	52.8
21	12/11/2021	67.4	51.4
22	12/15/2021	66.8	53.8
23	12/18/2021	62.1	52.4
24	12/22/2021	66.1	55.5
Minimum		61.2	51.4
Maximum		67.4	58.7
Average		64.9	55.2
Day time		(6.00AM TO 10.00PM)	
Night time		(10.00PM TO 6.00AM)	

Sampling Protocol :	UTRL/STP/Noise	Location :	NQ2 Suwala
Analysis Duration :	04/10/2021 To 31/12/2021	Sample Drawn By :	UTRL

TEST RESULT

S.No	Date	Observed Value Leq, dB(A)		LIMIT as per CPCB Guidelines Leq, dB(A)	
		DAY*	NIGHT*	DAY*	NIGHT*
1	10/1/2021	52.6	40.8	55.0	45.0
2	10/4/2021	50.2	42.4		
3	10/8/2021	49.6	40.5		
4	10/11/2021	51.5	40.2		
5	10/15/2021	49.6	41.6		
6	10/18/2021	52.3	39.4		
7	10/22/2021	49.2	43.5		
8	10/25/2021	53.2	41.2		
9	10/29/2021	52.8	38.5		
10	11/2/2021	52.4	39.6		
11	11/6/2021	50.1	42.3		
12	11/9/2021	52.8	37.7		
13	11/13/2021	48.5	42.6		
14	11/16/2021	53.4	37.4		
15	11/20/2021	51.7	43.1		
16	11/23/2021	48.5	39.5		
17	11/27/2021	50.7	42.2		
18	11/30/2021	53.2	40.3		
19	12/4/2021	53.2	38.6		
20	12/7/2021	51.5	42.2		
21	12/11/2021	48.5	40.7		
22	12/15/2021	52.6	38.9		
23	12/18/2021	52.5	43.5		
24	12/22/2021	50.7	39.2		
Minimum		48.5	37.4		
Maximum		53.4	43.5		
Average		51.3	40.7		
Day time		(6.00AM TO 10.00PM)			

Night time	(10.00PM TO 6.00AM)	
Sampling Protocol :	UTRL/STP/Noise	Location : NQ3 Khatoli Talli
Analysis Duration :	04/10/2021 To 31/12/2021	Sample Drawn By : UTRL

TEST RESULT

S.No	Date	Observed Value Leq, dB(A)		LIMIT as per CPCB Guidelines Leq, dB(A)	
		DAY*	NIGHT*	DAY*	NIGHT*
1	10/1/2021	50.5	41.1	55.0	45.0
2	10/4/2021	52.1	42.7		
3	10/8/2021	49.5	39.1		
4	10/11/2021	51.2	38.7		
5	10/15/2021	51.8	42.5		
6	10/18/2021	48.4	41.5		
7	10/22/2021	51.3	40.6		
8	10/25/2021	50.8	38.1		
9	10/29/2021	52.2	39.7		
10	11/2/2021	53.5	42.2		
11	11/6/2021	50.3	40.1		
12	11/9/2021	52.5	37.8		
13	11/13/2021	49.8	43.3		
14	11/16/2021	50.2	40.5		
15	11/20/2021	52.4	38.4		
16	11/23/2021	51.5	42.2		
17	11/27/2021	51.5	39.1		
18	11/30/2021	50.9	41.8		
19	12/4/2021	48.5	40.1		
20	12/7/2021	51.3	39.3		
21	12/11/2021	48.7	40.7		
22	12/15/2021	53.7	43.1		
23	12/18/2021	48.5	42.8		
24	12/22/2021	51.3	40.5		
	Minimum	48.4	37.8		
	Maximum	53.7	43.3		
	Average	50.9	40.7		
Day time		(6.00AM TO 10.00PM)			
Night time		(10.00PM TO 6.00AM)			

Sampling Protocol :	UTRL/STP/Noise	Location : NQ4 Basanjoga
Analysis Duration :	04/10/2021 To 31/12/2021	Sample Drawn By : UTRL

TEST RESULT

S.No	Date	Observed Value Leq, dB(A)		LIMIT as per CPCB Guidelines Leq, dB(A)	
		DAY*	NIGHT*	DAY*	NIGHT*
1	10/1/2021	49.5	40.6	55.0	45.0

2	10/4/2021	51.1	38.4
3	10/8/2021	52.1	39.5
4	10/11/2021	48.6	43.2
5	10/15/2021	50.9	41.6
6	10/18/2021	52.6	40.1
7	10/22/2021	50.1	38.5
8	10/25/2021	51.4	43.5
9	10/29/2021	50.7	40.3
10	11/2/2021	48.6	41.2
11	11/6/2021	51.3	40.4
12	11/9/2021	49.6	37.8
13	11/13/2021	50.5	40.5
14	11/16/2021	48.7	40.2
15	11/20/2021	50.2	42.5
16	11/23/2021	53.5	40.5
17	11/27/2021	48.4	39.9
18	11/30/2021	50.7	38.7
19	12/4/2021	51.3	42.3
20	12/7/2021	53.8	41.7
21	12/11/2021	49.4	42.1
22	12/15/2021	51.8	39.5
23	12/18/2021	52.4	42.8
24	12/22/2021	50.5	41.8
Minimum		48.4	37.8
Maximum		53.8	43.5
Average		50.7	40.7
Day time		(6.00AM TO 10.00PM)	
Night time		(10.00PM TO 6.00AM)	
Sampling Protocol : UTRL/STP/Noise		Location : NQ5 Dhura	
Analysis Duration : 04/10/2021 To 31/12/2021		Sample Drawn By : UTRL	

TEST RESULT

S.No	Date	Observed Value Leq, dB(A)		LIMIT as per CPCB Guidelines Leq, dB(A)	
		DAY*	NIGHT*	DAY*	NIGHT*
1	10/2/2021	51.4	39.5	55.0	45.0
2	10/5/2021	52.1	41.7		
3	10/9/2021	51.3	39.6		
4	10/12/2021	52.2	42.5		
5	10/16/2021	52.8	39.1		
6	10/19/2021	49.2	42.6		
7	10/23/2021	52.1	41.4		
8	10/26/2021	52.9	41.2		
9	10/30/2021	48.8	38.5		
10	11/3/2021	51.6	39.6		
11	11/7/2021	50.7	42.3		
12	11/10/2021	53.6	37.9		
13	11/14/2021	49.8	42.6		

14	11/17/2021	50.2	40.4
15	11/21/2021	52.4	43.1
16	11/24/2021	51.4	42.5
17	11/28/2021	50.6	43.2
18	12/1/2021	50.1	41.3
19	12/5/2021	52.5	39.8
20	12/8/2021	50.1	42.5
21	12/12/2021	48.2	41.4
22	12/16/2021	51.7	43.6
23	12/19/2021	48.6	41.2
24	12/23/2021	52.4	40.3
Minimum		48.2	37.9
Maximum		53.6	43.6
Average		51.1	41.2
Day time		(6.00AM TO 10.00PM)	
Night time		(10.00PM TO 6.00AM)	

Sampling Protocol :	UTRL/STP/Noise	Location :	NQ6 Buram
Analysis Duration :	04/10/2021 To 31/12/2021	Sample Drawn By :	UTRL

TEST RESULT

S.No	Date	Observed Value Leq, dB(A)		LIMIT as per CPCB Guidelines Leq, dB(A)	
		DAY*	NIGHT*	DAY*	NIGHT*
1	10/2/2021	47.9	38.5	55.0	45.0
2	10/5/2021	50.4	40.3		
3	10/9/2021	49.5	38.7		
4	10/12/2021	52.3	41.6		
5	10/16/2021	49.3	40.8		
6	10/19/2021	51.5	39.4		
7	10/23/2021	48.7	37.5		
8	10/26/2021	49.2	41.6		
9	10/30/2021	51.3	39.5		
10	11/3/2021	52.4	37.6		
11	11/7/2021	50.6	41.3		
12	11/10/2021	53.1	38.7		
13	11/14/2021	49.5	42.6		
14	11/17/2021	52.8	38.4		
15	11/21/2021	51.4	41.5		
16	11/24/2021	48.5	38.1		
17	11/28/2021	51.7	37.2		
18	12/1/2021	49.4	40.7		
19	12/5/2021	49.2	39.8		
20	12/8/2021	50.9	42.2		
21	12/12/2021	51.5	40.7		
22	12/16/2021	52.8	38.9		
23	12/19/2021	50.7	41.5		

24	12/23/2021	51.6	40.2	
Minimum		47.9	37.2	
Maximum		53.1	42.6	
Average		50.7	39.9	
Day time		(6.00AM TO 10.00PM)		
Night time		(10.00PM TO 6.00AM)		

WATER ENVIRONMENT

(a) Water Quality

Water quality assessment is one of the essential components of EIA study. Such assessment helps in evaluating the existing health of water body and suggesting appropriate mitigation measures to minimize the potential impact from development projects. Water quality of ground water has been studied in order to assess proposed water-uses in construction, drinking, cooling and horticulture purpose.

The water quality at project site and other locations within the 10 km impact zone was monitored during Oct 2021 to Dec 2021. The locations of the monitoring are given below in Table – 3.6 Results of monitoring of ground water quality is presented in Table 3.8:

Table 3.3 Ground water monitoring satiation

S.No	Monitoring satiation	Distance & Direction	Lat & Long
1	Project site	00	29°11'38.34"N 80° 3'21.85"E
2	Suwala	6.20 km N	29°15'10.60"N 80° 4'14.57"E
3	Khatoli Talli	6.0 km NW	29°13'54.16"N 80° 0'21.60"E
4	Basanjoga	6.5 km W	29°11'26.21"N 79°57'20.32"E
5	Dhura	3.80 km S	29° 9'39.48"N 80° 3'30.98"E
6	Buram	4.0 km SE	29° 9'39.54"N 80° 3'29.85"E

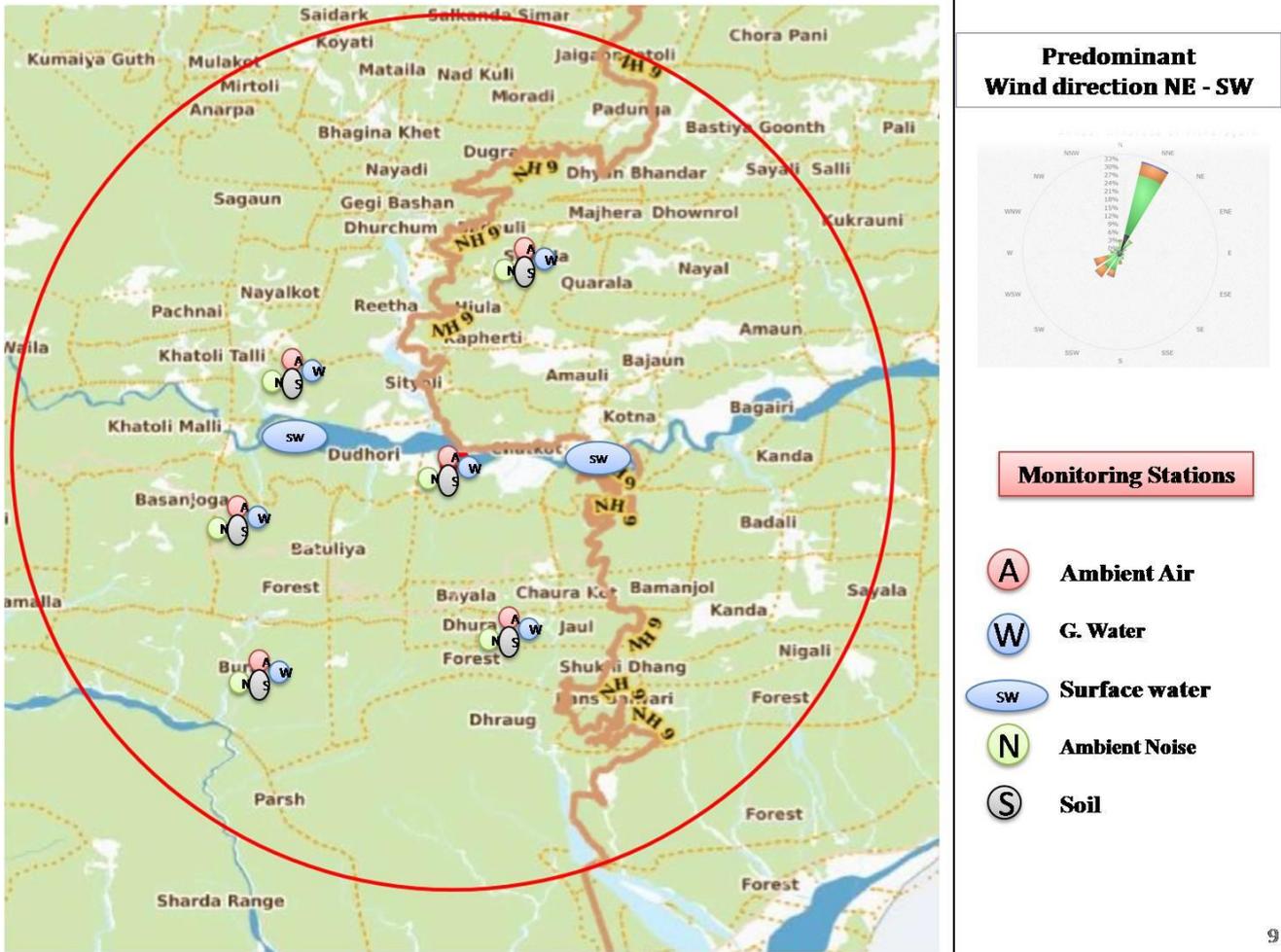


Figure – 3.3 Ground water quality monitoring location

Sampling Location : GW-1 GW-2 GW-3
 Project Site Suwala Khatoli Talli
 Sampling Procedure : IS 3025(Part-01)
 Sample Quantity : 2.0 Litre
 Analysis Duration : 16/10/2021 to 21/10/2021

RESULTS		as per IS 10500:2012						
S.No	Parameter	Test Method	Results			Units	Acceptable Limit	Permissible Limit in the Absence of Alternate Source
			Location					
			GW-1	GW-2	GW-3			
1	pH	IS:3025(Part-11)	7.41	7.13	7.21	-	6.5-8.5	-
2	Colour	IS:3025(Part-04)	<5.0	<5.0	<5.0	Hazen	5	15
3	Odour	IS-3025(Part-05)	Agreeable	Agreeable	Agreeable	-	Agreeable	Agreeable
4	Taste	IS:3025(Part-07)	Agreeable	Agreeable	Agreeable	-	Agreeable	Agreeable
5	Turbidity	IS-3025(Part-10)	<0.5	<0.5	<0.5	NTU	1	5
6	Total Hardness (as CaCO ₃)	IS:3025(Part-21)	160	168	152	mg/l	200	600
7	Calcium(as Ca)	IS:3025(Part-40)	32.00	33.60	30.40	mg/l	75	200
8	Magnesium(as Mg)	IS:3025(Part-46)	19.44	20.41	18.47	mg/l	30	100
9	Chloride(as Cl)	IS:3025(Part-32)	43.05	41.09	74.36	mg/l	250	1000
10	Iron(as Fe)	IS:3025(Part-53)	<0.05	0.057	0.061	mg/l	0.3	No Relaxation
11	Fluoride(as F)	IS:3025(Part-60)	0.39	0.28	0.25	mg/l	1	1.5
12	Free Residual chlorine	IS:3025(Part-26)	<0.1	<0.1	<0.1	mg/l	0.2	1
13	Total Dissolved Solid	IS:3025(Part-16)	368	327	416	mg/l	500	2000
14	Phenolic Compound (as C ₆ H ₅ OH)	IS: 3025 (Part-43)	<0.001	<0.001	<0.001	mg/l	0.001max	0.002 Max
15	Anionic Detergents (as MBAS)	Annex K of IS 13428	<0.1	<0.1	<0.1	mg/l	0.2	1.0
16	Sulphate (as SO ₄)	IS:3025(Part-24)	41.67	18.27	37.23	mg/l	200	400

17	Nitrate (as NO ₃)	IS: 3025 (Part-34)	2.06	2.31	2.15	mg/l	45	No Relaxation
18	Alkalinity(as CaCO ₃)	IS:3025(Part-23)	176	176	168	mg/l	200	600
19	Chloramines (as Cl ₂)	IS:3025(Part-26)	< 1.0	< 1.0	< 1.0	mg/l	4	No Relaxation
20	Cadmium (as Cd)	IS-3025(Part-41)	<0.001	<0.001	<0.001	mg/l	0.003	No Relaxation
21	Lead (as Pb)	IS:3025(Part-47)	<0.01	<0.01	<0.01	mg/l	0.01	No Relaxation
22	Total Chromium (as Cr)	IS:3025(Part-52)	<0.01	<0.01	<0.01	mg/l	0.05	No Relaxation
23	Copper (as Cu)	IS:3025(Part-42)	<0.01	<0.01	<0.01	mg/l	0.05	1.5
24	Total Ammonia	IS: 3025 (Part-34)	<0.5	<0.5	<0.5	mg/l	0.5	No Relaxation
25	Sulphide (as H ₂ S)	IS:3025(Part-29)	<0.05	<0.05	<0.05	mg/l	0.05	No Relaxation
26	Zinc (as Zn)	IS:3025(Part-49)	<0.1	<0.1	<0.1	mg/l	5	15
27	Manganese (as Mn)	IS:3025(Part-59)	<0.1	<0.1	<0.1	mg/l	0.1	0.3
28	Boron (as B)	IS:3025(Part-57)	<0.1	<0.1	<0.1	mg/l	0.5	1
29	Selenium (Se)	IS:3025(Part-56)	<0.01	<0.01	<0.01	mg/l	0.01	No Relaxation
30	Arsenic (as As)	IS:3025(Part-37)	<0.01	<0.01	<0.01	mg/l	0.01	0.05
1	E.coli	IS-1622	Not Detected (<2)	Not Detected (<2)	Not Detected (<2)	E.Coli/100ml	Shall not be detectable in100 ml sample	
2	Total Coliform	IS-1622	Absent	Absent	Absent	MPN/100ml	Shall not be detectable in100 ml sample	

Sampling Location : GW-4 GW-5 GW-6
 Basanjoga Dhura Buram
 Sampling Procedure : IS 3025(Part-01)
 Sample Quantity : 2.0 Litre
 Analysis Duration : 16/10/2021 to 21/10/2021

RESULTS			as per IS 10500:2012					
S.No	Parameter	Test Method	Results			Units	Acceptable Limit	Permissible Limit in the Absence of Alternate Source
			Location					
			GW-4	GW-5	GW-6			
1	pH	IS:3025(Part-11)	6.95	7.38	7.54	-	6.5-8.5	-
2	Colour	IS:3025(Part-04)	<5.0	<5.0	<5.0	Hazen	5	15
3	Odour	IS:3025(Part-05)	Agreeable	Agreeable	Agreeable	-	Agreeable	Agreeable
4	Taste	IS:3025(Part-07)	Agreeable	Agreeable	Agreeable	-	Agreeable	Agreeable
5	Turbidity	IS:3025(Part-10)	<0.5	<0.5	<0.5	NTU	1	5
6	Total Hardness (as CaCO ₃)	IS:3025(Part-21)	124	128	160	mg/l	200	600
7	Calcium(as Ca)	IS:3025(Part-40)	24.80	25.60	32.00	mg/l	75	200
8	Magnesium(as Mg)	IS:3025(Part-46)	15.07	15.55	19.44	mg/l	30	100
9	Chloride(as Cl)	IS:3025(Part-32)	37.18	39.14	74.36	mg/l	250	1000
10	Iron(as Fe)	IS:3025(Part-53)	<0.05	<0.05	0.057	mg/l	0.3	No Relaxation
11	Fluoride(as F)	IS:3025(Part-60)	0.18	0.39	0.66	mg/l	1	1.5
12	Free Residual chlorine	IS:3025(Part-26)	<0.1	<0.1	<0.1	mg/l	0.2	1
13	Total Dissolved Solid	IS:3025(Part-16)	289	291	451	mg/l	500	2000
14	Phenolic Compound (as C ₆ H ₅ OH)	IS: 3025 (Part-43)	<0.001	<0.001	<0.001	mg/l	0.001max	0.002 Max

15	Anionic Detergents (as MBAS)	Annex K of IS 13428	<0.1	<0.1	<0.1	mg/l	0.2	1.0
16	Sulphate (as SO ₄)	IS:3025(Part-24)	29.72	26.47	62.34	mg/l	200	400
17	Nitrate (as NO ₃)	IS: 3025 (Part-34)	0.84	0.51	3.76	mg/l	45	No Relaxation
18	Alkalinity(as CaCO ₃)	IS:3025(Part-23)	136	136	172	mg/l	200	600
19	Chloramines (as Cl ₂)	IS:3025(Part-26)	< 1.0	< 1.0	< 1.0	mg/l	4	No Relaxation
20	Cadmium (as Cd)	IS-3025(Part-41)	<0.001	<0.001	<0.001	mg/l	0.003	No Relaxation
21	Lead (as Pb)	IS:3025(Part-47)	<0.01	<0.01	<0.01	mg/l	0.01	No Relaxation
22	Total Chromium (as Cr)	IS:3025(Part-52)	<0.01	<0.01	<0.01	mg/l	0.05	No Relaxation
23	Copper (as Cu)	IS:3025(Part-42)	<0.01	<0.01	<0.01	mg/l	0.05	1.5
24	Total Ammonia	IS: 3025 (Part-34)	<0.5	<0.5	<0.5	mg/l	0.5	No Relaxation
25	Sulphide (as H ₂ S)	IS:3025(Part-29)	<0.05	<0.05	<0.05	mg/l	0.05	No Relaxation
26	Zinc (as Zn)	IS:3025(Part-49)	<0.1	<0.1	<0.1	mg/l	5	15
27	Manganese (as Mn)	IS:3025(Part-59)	<0.1	<0.1	<0.1	mg/l	0.1	0.3
28	Boron (as B)	IS:3025(Part-57)	<0.1	<0.1	<0.1	mg/l	0.5	1
29	Selenium (Se)	IS:3025(Part-56)	<0.01	<0.01	<0.01	mg/l	0.01	No Relaxation
30	Arsenic (as As)	IS:3025(Part-37)	<0.01	<0.01	<0.01	mg/l	0.01	0.05
1	E.coli	IS-1622	Not Detected (<2)	Not Detected (<2)	Not Detected (<2)	E.Coli/100ml	Shall not be detectable in100 ml sample	
2	Total Coliform	IS-1622	Absent	Absent	Absent	MPN/100ml	Shall not be detectable in100 ml sample	

Surface water monitoring satiation

S.No	Monitoring satiation	Distance Direction	& Lat & Long
1	Upstream	00	29°11'38.34"N 80° 3'21.85"E
2	Downstream	6.20 km N	29°15'10.60"N 80° 4'14.57"E

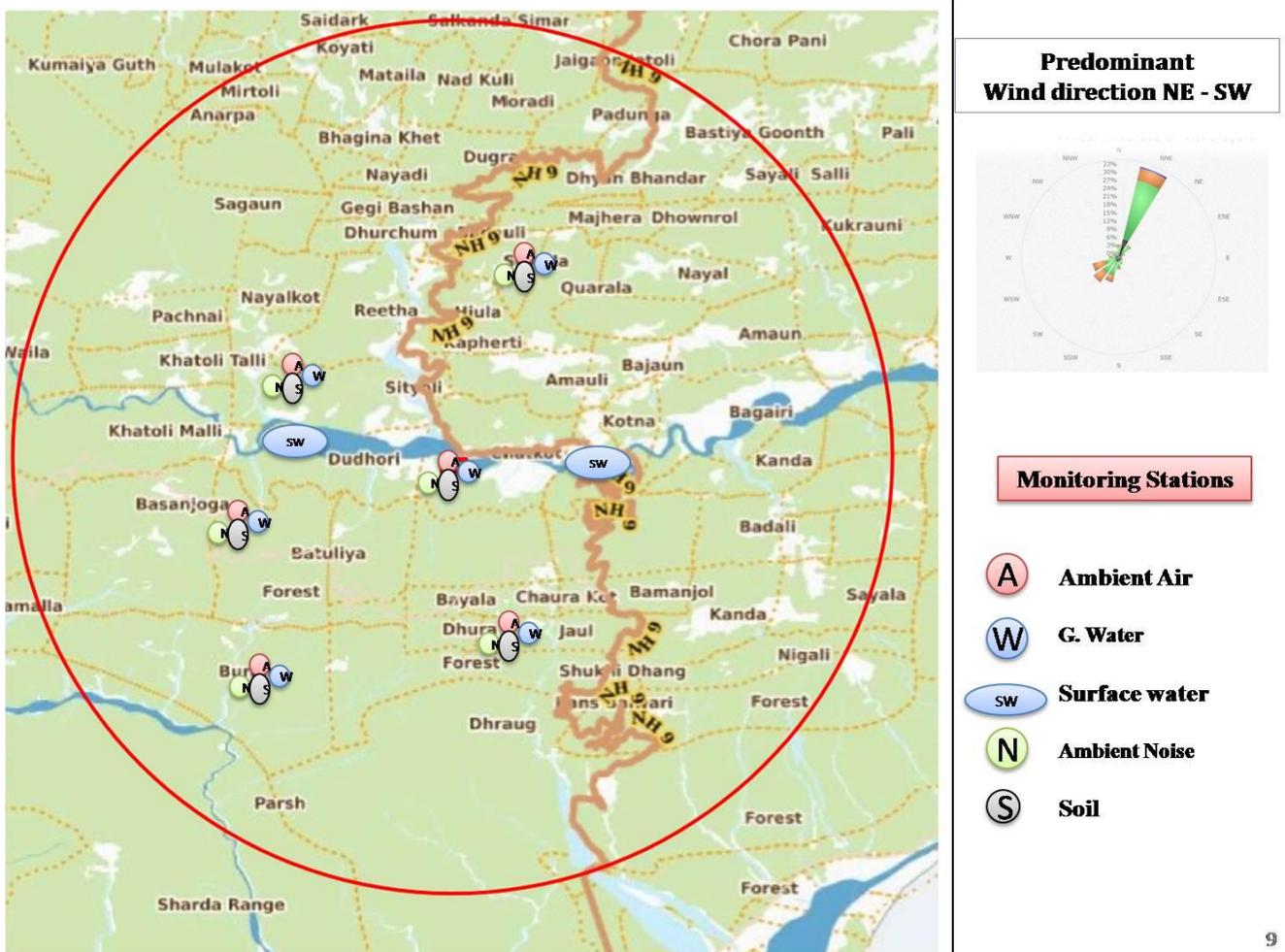


Figure: 3.4 - Surface water quality monitoring location

(b) Sampling Frequency and Sampling Techniques

Quality of ground water was compared with IS: 10500: 1991 (Reaffirmed 1993 with Amendment No.3 July 2010) for drinking purposes. Water samples were collected in a 5 liter plastic jerry can and 500ml sterilized clean glass bottles for physico-chemical and bacteriological tests respectively. GW sampling was done after flushing out the

source (minimum 10 minutes) to get the fresh ground water and grab sampling method was used. The samples were analyzed as per Indian standard /APHA latest edition.

The water quality in the impact zone was assessed through physico-chemical and bacteriological analysis of ground samples. CPCB's water quality criteria are presented below in Table 3.8:

Table 3.8: Water Quality Criteria as per Central Pollution Control Board

Designated-best-use	Class	Criteria
Drinking water source without conventional treatment but after disinfection	A	Total Coliform Organism MPN/100ml will be 50 or less pH between 6.5 and 8.5 Dissolved Oxygen 6mg/l or more Biochemical Oxygen Demand 5 days 20°C 2mg/l or less
Outdoor bathing (Organized)	B	Total Coliform Organism MPN/100ml will be 500 or less pH between 6.5 and 8.5; Dissolved Oxygen 5mg/l or more Biochemical Oxygen Demand 5 days 20°C 3mg/l or less
Drinking water source after conventional treatment and disinfection	C	Total Coliform Organism MPN/100ml will be 5000 or less pH between 6 to 9; Dissolved Oxygen 4mg/l or more Biochemical Oxygen Demand 5 days 20°C 3mg/l or less
Propagation of Wild life and Fisheries	D	pH between 6.5 to 8.5 Dissolved Oxygen 4mg/l or more Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled Waste disposal	E	pH between 6.0 to 8.5 Electrical Conductivity at 25°C micromhos/cm Max. 2250 Sodium absorption Ratio Max. 26 Boron Max. 2mg/l
	Below-E	Not Meeting A, B, C, D & E Criteria

Draft EIA Report of Sand Bajri Boulder Mining Project Khata No: 109: Khasra No: 1, 17 22ma, 23ma, 84ma, Area: 5.83 ha Village- Jhalakudi, Tehsil- Poornagiri District-Champawat (Uttarakhand)

RESULTS Sample Collected from Upstream									
S.No	Parameter	Test Method	Results	Units	Tolerance Limit as per IS:2296				
					Class A	Class B	Class C	Class D	Class E
1	pH	IS:3025(Part-11)	7.65	-	6.5-8.5	6.5-8.5	6.5-8.5	6.5-8.5	6.5-8.5
2	Temperature	IS:3025(Part-09)	22.8	°C	-	-	-	-	-
3	Turbidity	IS:3025(Part-10)	1.7	NTU	-	-	-	-	-
4	Conductivity @25°C	IS:3025(Part-14)	286.5	µs/cm.	-	-	-	1000	2250
5	Total Suspended Solid	IS:3025(Part-17)	9	mg/l	-	-	-	-	-
6	Total Alkalinity (as CaCO ₃)	IS:3025(Part-23)	104	mg/l	-	-	-	-	-
7	Biological Oxygen Demand (Max.) (at 27°C for 3 days)	IS:3025(Part-44)	2.00	mg/l	2	3	3	-	-
8	Dissolved Oxygen (as O ₂) Min.	IS:3025(Part-38)	8.2	mg/l	6	5	4	4	-
9	Calcium(as Ca)	IS:3025(Part-40)	24.00	mg/l	80	-	-	-	-
10	Magnesium(as Mg)	IS:3025(Part-46)	7.78	mg/l	24	-	-	-	-
11	Chloride(as Cl),Max	IS:3025(Part-32)	13.50	mg/l	250	-	-	-	600
12	Iron(as Fe),Max	IS:3025(Part-53)	0.075	mg/l	0.3	-	50	-	-
13	Fluoride(as F),Max	IS:3025(Part-60)	<0.1	mg/l	1.5	1.5	1.5	-	-
14	Total Dissolved Solid	IS:3025(Part-16)	177.627	mg/l	500	-	1500	-	2100
15	Total Hardness (as CaCO ₃)	IS:3025(Part-21)	92.00	mg/l	300	-	-	-	-
16	Sulphate (as	IS:3025(Part-24)	8.14	mg/l	400	-	400	-	1000

	SO ₄)Max								
17	Phosphate (as P)	IS:3025(Part-31)	<0.2	mg/l	-	-	-	-	-
18	Sodium (as Na)	IS:3025(Part-45)	10.80	mg/l	-	-	-	-	-
19	Manganese (as Mn)	IS:3025(Part-59)	<0.1	mg/l	0.5	-	-	-	-
20	Total Chromiun(as Cr)	IS:3025(Part-52)	<0.05	mg/l	0.05	0.05	0.05	-	-
21	Zinc (as Zn)	IS:3025(Part-49)	<0.1	mg/l	15	-	15	-	-
22	Potassium (as K)	IS:3025(Part-45)	2.16	mg/l	-	-	-	-	-
23	Nitrate (as NO ₃),Max	IS:3025 (Part-34)	2.40	mg/l	20	-	50	-	-
24	Cadmium (as Cd)	IS-3025(Part-41)	<0.01	mg/l	0.01	-	0.01	-	-
25	Lead (as Pb)	IS:3025(Part-47)	<0.01	mg/l	0.1	-	0.1	-	-
26	Copper (as Cu)	IS:3025(Part-42)	<0.01	mg/l	1.5	-	1.5	-	-
27	Chemical Oxygen Demand (asO ₂)	IS-3025(Part-58)	11.20	mg/l	-	-	-	-	-
28	Arsenic (as As)	IS:3025(Part-37)	<0.01	mg/l	0.05	0.2	0.2	-	-
					Class A	Class B	Class C	Class D	Class E
1	Total Coliform	IS:1622	90	MPN/100ml	50	500	5000	-	-

RESULTS Sample Collected from Downstream									
S.No	Parameter	Test Method	Results	Units	Tolerance Limit as per IS:2296				
					Class A	Class B	Class C	Class D	Class E
1	pH	IS:3025(Part-11)	7.61	-	6.5-8.5	6.5-8.5	6.5-8.5	6.5-8.5	6.5-8.5
2	Temperature	IS:3025(Part-09)	22.7	°C	-	-	-	-	-

3	Turbidity	IS:3025(Part-10)	2	NTU	-	-	-	-	-
4	Conductivity @25°C	IS:3025(Part-14)	320.3	µs/cm.	-	-	-	1000	2250
5	Total Suspended Solid	IS:3025(Part-17)	13	mg/l	-	-	-	-	-
6	Total Alkalinity (as CaCO ₃)	IS:3025(Part-23)	120	mg/l	-	-	-	-	-
7	Biological Oxygen Demand (Max.) (at 27°C for 3 days)	IS:3025(Part-44)	2.50	mg/l	2	3	3	-	-
8	Dissolved Oxygen (as O ₂) Min.	IS:3025(Part-38)	8.1	mg/l	6	5	4	4	-
9	Calcium(as Ca)	IS:3025(Part-40)	27.20	mg/l	80	-	-	-	-
10	Magnesium(as Mg)	IS:3025(Part-46)	9.72	mg/l	24	-	-	-	-
11	Chloride(as Cl),Max	IS:3025(Part-32)	17.36	mg/l	250	-	-	-	600
12	Iron(as Fe),Max	IS:3025(Part-53)	0.070	mg/l	0.3	-	50	-	-
13	Fluoride(as F),Max	IS:3025(Part-60)	<0.1	mg/l	1.5	1.5	1.5	-	-
14	Total Dissolved Solid	IS:3025(Part-16)	208	mg/l	500	-	1500	-	2100
15	Total Hardness (as CaCO ₃)	IS:3025(Part-21)	108.00	mg/l	300	-	-	-	-
16	Sulphate (as SO ₄)Max	IS:3025(Part-24)	9.03	mg/l	400	-	400	-	1000
17	Phosphate (as P)	IS:3025(Part-31)	<0.2	mg/l	-	-	-	-	-
18	Sodium (as Na)	IS:3025(Part-45)	13.89	mg/l	-	-	-	-	-
19	Manganese (as Mn)	IS:3025(Part-59)	<0.1	mg/l	0.5	-	-	-	-
20	Total Chromiun(as Cr)	IS:3025(Part-52)	<0.05	mg/l	0.05	0.05	0.05	-	-
21	Zinc (as Zn)	IS:3025(Part-49)	<0.1	mg/l	15	-	15	-	-
22	Potassium (as K)	IS:3025(Part-45)	2.78	mg/l	-	-	-	-	-

23	Nitrate (as NO ₃),Max	IS:3025 (Part-34)	2.42	mg/l	20	-	50	-	-
24	Cadmium (as Cd)	IS-3025(Part-41)	<0.01	mg/l	0.01	-	0.01	-	-
25	Lead (as Pb)	IS:3025(Part-47)	<0.01	mg/l	0.1	-	0.1	-	-
26	Copper (as Cu)	IS:3025(Part-42)	<0.01	mg/l	1.5	-	1.5	-	-
27	Chemical Oxygen Demand (asO ₂)	IS-3025(Part-58)	12.80	mg/l	-	-	-	-	-
28	Arsenic (as As)	IS:3025(Part-37)	<0.01	mg/l	0.05	0.2	0.2	-	-
S.No	Parameter	Test Method	Results	Units	Tolerance Limit as per IS:2296				
					Class A	Class B	Class C	Class D	Class E
1	Total Coliform	IS:1622	110	MPN/100ml	50	500	5000	-	-

(c) The water quality in the impact zone was assessed through physico-chemical and Microbiological analysis of ground water samples. The results have been compared with the drinking water quality standards specified in IS: 10500. It was observed that all the physico-chemical parameters and heavy metals from ground water samples are below stipulated limits for drinking water standards.

- The pH limit fixed for drinking water samples as per IS-10500 Standards is 6.5 to 8.5 beyond this range the water will affect the mucus membrane or water supply system. During the study period, the pH was varying for ground waters from 7.20 to 7.40 and the surface waters are 7.68 to 7.74. The pH values for all the samples collected in the study area during study period were found to be within the limits.
- The desirable limit for total dissolved solids as per IS-10500 Standards is 500 mg/l whereas the permissible limits in absence of alternate source is 2000 mg/l, beyond this palatability decreases and may cause gastro intestinal irritation. In ground water samples collected from the study area, the total dissolved solids are varying from 255 mg/l to 272 mg/l. The TDS of the samples were above the desirable limit but within the permissible limit of 2000 mg/l.
- The desirable limit for chlorides is 250 mg/l as per IS-10500 Standards whereas, permissible limit of the same is 1000 mg/l beyond this limit taste, and corrosion and palatability are affected. The chloride level in the surface water samples collected in the study area were ranging from 12 mg/l to a maximum of 18 mg/l, in ground water samples 14 mg/l to 22mg/l. The chloride samples are within the desirable limits.
- The desirable limit as per IS-10500 Standards for hardness is 200 mg/l whereas the permissible limit for the same is 600 mg/l beyond this limit encrustation in water supply structure and adverse effects on domestic use will be observed. In the ground water samples collected from the study area, the hardness is varying from 171.8 mg/l to 184 mg/l.
- Fluoride is the other important parameter, which has the desirable limit of 1 mg/l and permissible limit of 1.5 mg/l. however the optimum content of fluoride in the drinking water is 0.6 to 1.5 mg/l. If fluoride content is less than 0.6 mg/l it causes dental carries, above 1.5 mg/l causes flurosis. In the ground water samples of study area the fluoride value were in the range of 0.2 mg/l to 0.98 mg/l. In surface water 0.42 mg/l to 0.38 mg/l.

Overall all the samples collected from the study area were found to be fit for consumption, Most of ground water samples are well within the permissible limits, as per IS-10500. Most of the heavy metals in all samples are below detectable limits

SOIL

Majority of soil type in Tehri Garwal district is sandy loam which covers around 84% of total

geographical area. The alluvium in area comprises of silt, sand, gravel, clay and kankar.

The composite soil samples were collected from site and study area and analyzed for characterization. The locations of monitoring stations are depicted in Table 3.10 and results of monitoring are presented in the Table 3.11.

(a) **Type & characteristics:** To assess the soil quality, following stations were selected. Soil profile and quality was studied at 5 locations.

Table 3.11: Location of Soil Sampling Stations

S.No	Monitoring station	Distance & Direction	Lat & Long
1	Project site	00	29°11'38.34"N 80° 3'21.85"E
2	Suwala	6.20 km N	29°15'10.60"N 80° 4'14.57"E
3	Khatoli Talli	6.0 km NW	29°13'54.16"N 80° 0'21.60"E
4	Basanjoga	6.5 km W	29°11'26.21"N 79°57'20.32"E
5	Dhura	3.80 km S	29° 9'39.48"N 80° 3'30.98"E
6	Buram	4.0 km SE	29° 9'39.54"N 80° 3'29.85"E

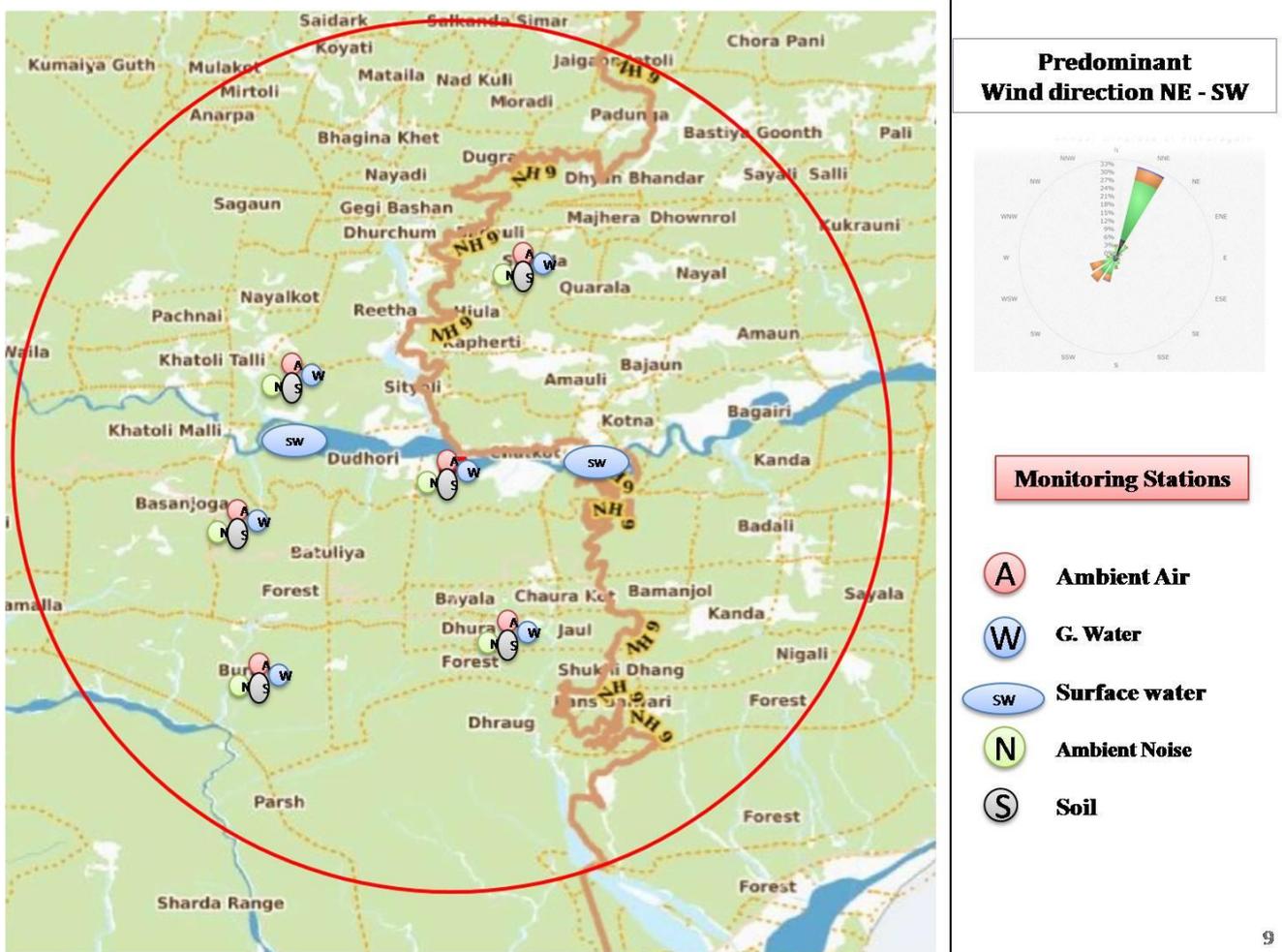


Figure : 3.5 - Soil quality monitoring location

(b) Methodology

The soil samples were collected in the Oct 2021 to Dec 2021 from 6 locations as stated above. At each of the location, 3 sub-locations were identified randomly from where soil was collected from up to 30 cm below the surface. The final samples represent homogeneously mixed soil from these 3 sub-locations for each location. The samples were filled in polythene bags, labeled in the field with number and site name and sent to laboratory for analysis. Table 3.12 gives information of frequency and methodology for selection of soil sampling locations and monitoring process.

Table 3.12: Frequency and Methodology for Soil Sampling

Particulars	Details
Frequency	One grab sample from each station– once during the Study Period
Methodology	Composite grab samples of the topsoil were collected from 3 depths, and mixed to provide a representative sample for analysis. They were stored in airtight Polythene Bags and analyzed at the laboratory

Draft EIA Report of Sand Bajri Boulder Mining Project Khata No: 109: Khasra No: 1, 17 22ma, 23ma, 84ma, Area: 5.83 ha Village- Jhalakudi, Tehsil- Poornagiri District-Champawat (Uttarakhand)

Sample Description	:	Soil		
Sample Location	:	SQ-1	SQ-2	SQ-3
		Project site	Suwala	Khatoli Talli
Sample Quantity	:	2.0 kg		
Analysis Duration	:	16/10/2021 To 21/10/2021		

RESULTS						
S.No	Parameter	Units	Result			Test Method
			Location			
			SQ-1	SQ-2	SQ-3	
1	Texture	-	Sandy Clay Loam	Sandy Clay	Sandy Clay	UTRL/LAB/SOIL/SOP/05
	Sand	%	47.97	47.52	46.52	UTRL/LAB/SOIL/SOP/05
	Clay	%	31.07	36.92	38.40	UTRL/LAB/SOIL/SOP/05
	Silt	%	20.96	15.56	15.08	UTRL/LAB/SOIL/SOP/05
2	pH(1:2.5 Suspension)	-	6.96	7.68	7.55	IS: 2720 (Part-26),1987
3	Electrical Conductivity	µmhos/cm	415.2	541.2	389.6	IS: 14767
4	Potassium (as K)	mg/kg	206.56	138.48	240.38	UTRL/LAB/SOIL/SOP/07
5	Sodium (as Na)	mg/kg	384.67	223.56	363.82	UTRL/LAB/SOIL/SOP/06
6	Calcium (as Ca)	mg/kg	4779.13	4234.13	4302.04	UTRL/LAB/SOIL/SOP/08
7	Magnesium (as Mg)	mg/kg	726.31	626.09	669.01	UTRL/LAB/SOIL/SOP/08
8	Sodium Absorption Ratio	-	1.37	0.85	1.36	UTRL/LAB/SOIL/SOP/14
9	Water Holding Capacity	%	28.71	32.73	31.11	UTRL/LAB/SOIL/SOP/11
10	Total Kjeldahl Nitrogen	%	0.065	0.119	0.100	UTRL/LAB/SOIL/SOP/15
11	Phosphorous	mg/kg	96.78	90.03	85.46	UTRL/LAB/SOIL/SOP/09
12	Bulk Density	gm/cc	1.30	1.28	1.28	UTRL/LAB/SOIL/SOP/10
13	Organic Matter	%	1.03	0.95	1.23	IS: 2720 (Part-22)
14	Porosity	%	42.81	42.02	42.68	UTRL/LAB/SOIL/SOP/17

Sample Description	:	Soil		
Sample Location	:	SQ-4	SQ-5	SQ-6
		Basanjoga	Dhura	Buram
Sample Quantity	:	2.0 kg		
Analysis Duration	:	16/10/2021 To 21/10/2021		

RESULTS						
S.No	Parameter	Units	Result			Test Method
			Location			
			SQ-4	SQ-5	SQ-6	
1	Texture	-	Silt Clay Loam	Sandy Clay	Clay Loam	UTRL/LAB/SOIL/SOP/05
	Sand	%	18.59	46.80	38.65	UTRL/LAB/SOIL/SOP/05
	Clay	%	30.69	39.46	30.60	UTRL/LAB/SOIL/SOP/05
	Silt	%	50.72	13.74	30.75	UTRL/LAB/SOIL/SOP/05
2	pH(1:2.5 Suspension)	-	6.88	7.92	7.36	IS: 2720 (Part-26),1987
3	Electrical Conductivity	µmhos/cm	447.2	425.3	447.1	IS: 14767
4	Potassium (as K)	mg/kg	227.64	115.95	193.33	UTRL/LAB/SOIL/SOP/07
5	Sodium (as Na)	mg/kg	305.68	193.07	232.16	UTRL/LAB/SOIL/SOP/06
6	Calcium (as Ca)	mg/kg	4500.08	4183.79	4248.10	UTRL/LAB/SOIL/SOP/08
7	Magnesium (as Mg)	mg/kg	1025.86	504.46	769.76	UTRL/LAB/SOIL/SOP/08
8	Sodium Absorption Ratio	-	1.07	0.75	0.86	UTRL/LAB/SOIL/SOP/14
9	Water Holding Capacity	%	45.63	31.12	45.65	UTRL/LAB/SOIL/SOP/11
10	Total Kjeldahl Nitrogen	%	0.11	0.084	0.11	UTRL/LAB/SOIL/SOP/15
11	Phosphorous	mg/kg	98.59	59.44	92.21	UTRL/LAB/SOIL/SOP/09
12	Bulk Density	gm/cc	1.28	1.32	1.28	UTRL/LAB/SOIL/SOP/10
13	Organic Matter	%	1.28	1.06	1.07	IS: 2720 (Part-22)

14	Porosity	%	39.51	41.72	39.80	UTRL/LAB/SOIL/SOP/17
----	----------	---	-------	-------	-------	----------------------

(c) Results:

Physical characteristics of soil were characterized through specific parameters viz bulk density, porosity, water holding capacity, pH, electrical conductivity and texture. Soil pH plays an important role in the availability of nutrients. Soil microbial activity as well as solubility of metal ions is also dependent on pH. In the study area, variations in the pH of the soil were found to be slightly basic (7.16 to 7.56). Electrical conductivity (EC) is a measure of the soluble salts and ionic activity in the soil. In the collected soil samples the conductivity ranged from 268-333 $\mu\text{mhos/cm}$.

The soils with low bulk density have favorable physical condition where as those with high bulk density exhibit poor physical conditions for agriculture crops.

BIOLOGICAL ENVIRONMENT

INTRODUCTION

The biodiversity we see today is the fruit of billions of years of evolution, shaped by natural processes. The vast array of interactions among the various components of biodiversity makes the planet habitable for all species, including humans. There is a growing recognition that, biological diversity is a global asset of tremendous value to present and future generations. At the same time, the threat to species and ecosystems has never been as great as it is today. Species extinction caused by human activities continues at an alarming rate. Protecting biodiversity is in our self-interest.

The biological study was under taken by Ecology & Biodiversity Expert, as a part of the EIA study report to understand the present status of ecosystem prevailing in the study area, to compare it with past condition with the help of available data, to predict changes in the biological environment as a result of present activities and to suggested measures for maintaining its health.

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

OBJECTIVES OF ECOLOGICAL AND BIODIVERSITY STUDIES

The local biota and fauna study of the area has been conducted in order to fully appreciate the ecological status of the existing flora and fauna to generate baseline information and correlation with secondary data of the 10 K.M radius. Conservation plan of schedule-I animals, its management plan and monitoring arrangement on the 10 Km radius along with evaluation of the probable impacts and its assessment was made.

Activities undertaken during the study

1. Flora survey-
2. Fauna survey
3. Habitat /microhabitat diversity in the Core site and Buffer areas.
4. Photo Documentation.

5. Methodology Adopted for Generic & Specific Flora Study

6. Assesment of potential damage to Ecology & biodiversity

Flora survey-

- ❖ To have an inventory /checklist & details of vegetation found in the 10 KM radius area
- ❖ Identification and enumeration of tree, shrub, herb, climber and grass species.
- ❖ Generation of primary data by undertaking systematic ecological studies in the area;
- ❖ Analysis of Rare-Endangered-Threatened flora.
- ❖ To conduct detail study of Terrestrial and Aquatic avifaunal species in the study area of theproposed project activity.
- ❖ To identify Impact of project during construction and operational phases on the biologicalenvironment.

Fauna survey

- ❖ Documentation of Avian, Reptilian, Insect, Amphibian, Mammal and other faunal diversity.
- ❖ Observations by direct and indirect evidence (Direct evidence- Sighting and hearing, indirectevidence- Pug marks, nests and other signs).
- ❖ Analysis of Scheduled species.
- ❖ To suggest management/mitigation/conservation plan for habitat improvement for differentfaunal Groups.

Photo Documentation.

Functional area expert has carried out flora & fauna survey by collecting the information of biological environment of Uttarakhand, their forests, type of forest and forest cover in Garwal

District & the floral species from the website . Further details of type of flora, botanical name, family use & fauna of the area have been studied by collecting the details by forest department. The secondary data so collected were also verified by the field survey.

List of Equipment/Material used in the survey

S. No	Equipment/Material used:
1	Digital camera
2	GPS

3	Brunton Compass
4	Magnifying Glass
5	Hammer
6	Sample bag
7	Binocular
8	Rope
9	Ballpoint pen
10	Field notebook

Study of flora & fauna in Core & Buffer zone: - The Ecological and biodiversity survey has been conducted during 15th to 23rd March 2021 (March 2021 to May 2021- Pre Monsoon) in the core & buffer zone.

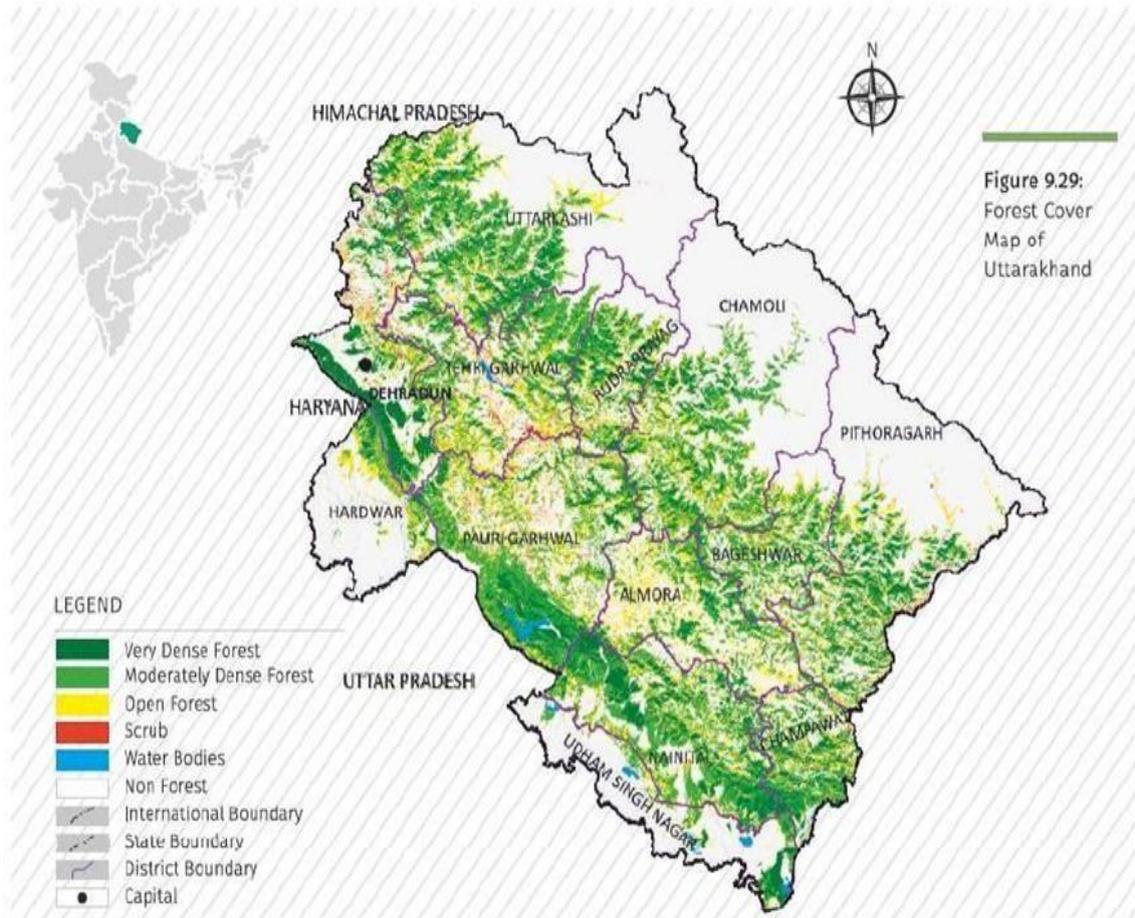
Methodology Adopted for Generic & Specific Flora Study

Flora: The present study on the floral assessment for the proposed project activity is based on extensive field survey of the area. The study has been conducted in post monsoon season. The local flora was identified by their morphological observation, such as its size and shape of the leaf, flowers, fruits and their bark features of stem and also documented their habitat viz. Trees, Shrubs, Herbs, Grasses and Climbers etc with the help of secondary sources like degree colleges and forest department. The plants which were not identified at field were collected, brought to the laboratory and identified using standard reference books and internet. Photo documentation of some of the key species present the study area was also done. Besides the collection of plant species, information was also collected with vernacular names of plant species made by local inhabitants. In this process the whole study area was divided into different sections to get the maximum diversity of plant species. The sampling sites were selected based on land use pattern, topography and floristic composition of the study area. Data on forest type, legal status and their extent in the study area has been collected from forest department. The other relevant data on biodiversity, economically important plant species and medicinal plant, rare and endangered species in the study area have been collected during site visit and from different secondary sources.

The major wealth of the district is dense Forests, Ecology and rich biodiversity. In the Land management, forest management is the core area. Any major changes in the Ecology and biodiversity will affect district water supply, soil erosion and consequent floods and impoverishment of agricultural land.

The human and livestock population is mainly dependent on forests and construction work and its results in heavy pressure on forests and consequent degradation of ecology and environment of the area. The state has a temperate climate except in plain areas where the climate is tropical. The average annual rainfall is 1550 mm.

Figure- forest cover map of Uttarakhand



Core and buffer zone (10 K.M radiuses) varying in vegetation types were studied along an altitudinal range. Maximum tree, shrub, and herb species were recorded 10 KM radius of core zone. The herb and climber species were greater on moist site. The distribution and species richness pattern in this elevational range largely depend on the altitude and climatic variables. The opening canopies increase the richness of tree, shrub, herb, and climbers.

TABLE 3.17: LIST OF FLORA SPECIES OBSERVED IN THE CORE ZONE

S. No	Local Name	Botanical Name	Family
TREE			
1	Tooun	Toona ciliata M. Roem.	Meliaceae
2	Chir	Pinus roxburghii,	Pinaceae
SHRUBS			
1.	Callicarpa macrophylla Ghaneri	Lantana camara L.	Verbenaceae
2	Agla	Mimosa himalayana Gamble	Mimosaceae
3	Tang	Rhus parviflora Roxb.	Anacardiaceae
HERBS			
1	Mayurshikha	Adiantum incisum Forsk	Adiantaceae
2	Anjiri-ka-patta	Anisochilus carnosus (L.f.) Wall. ex Benth	Lamiaceae
3	Bathua	Chenopodium album L.	Chenopodiaceae
4	Gandhabel	Cymbopogon martini (Roxb.) Wat.	Poaceae
5	Doob	Cynodon dactylon (L.) Pers.	Poaceae
6	Dudhi	Euphorbia hirta L.	Euphorbiaceae
7	Gajar ghas	Parthenium hysterophorus L.	Asteraceae
8	Blue grass	Poa annua L.	Poaceae
9	Ghamra	Tridax procumbens L.	Asteraceae

TABLE 3.18: LIST OF FLORA SPECIES OBSERVED IN THE BUFFER ZONE

S. No	Local Name	Botanical Name	Family
TREE			
1	Khair	Acacia catechu (L.f.) Willd.	Mimosaceae
2.	Kadam	Adina cordifolia (Roxb.) Hook.f. ex Brandis	Rubiaceae
3.	Bel	Aegle marmelos (L.) Corr.	Rutaceae
4.	Chhal	Anogeissus latifolia (Roxb. ex DC.)	Combretaceae
5.	Kurial	Bauhinia variegata L.	Caesalpiniaceae

6.	Semal	Bombax ceiba L.	Bombacaceae
7.	Maindul	Catunaregam spinosa (Thunb.) Tirvengadam	Rubiaceae
8.	Khareek	Celtis australis L.	Ulmaceae
9.	Lisora	Cordia dichotoma Forst.	Rutaceae
10.	Gulmohar	Delonix regia (Bojer ex Hook. F.) Rafin.	Caesalpiaceae
11.	Phagoora	Ficus auriculata Lour.	Moraceae
12.	Anzir	F. palmata Forsk.	Moraceae
13.	Khaina	F. semicordata Buch.- Ham. ex J.E. Smith	Moraceae
14.	Amaltas	Cassia fistula L.	Caesalpiaceae
15.	Amla	Emblica officinalis Gaert.	Euphorbiaceae
16.	Vad	Ficus benghalensis L.	Moraceae
17.	Pipal	Ficus religiosa L.	Moraceae
18	Bihul	Grewia opositifolia Buch.- Ham. ex D. Don	Tiliaceae
19.	kanju	Holoptelea integrifolia (Roxb.) Planch.	Ulmaceae
20.	Gurjon	Lannea coromandelica (Houtt.) Merr.	Anacardiaceae
21.	Subabul	Leucaena leucocephala(Lam.) De Wit.	Mimosaceae
22	Kamela	Mallotus philippensis (Lam.) Muell.-Arg.	Euphorbiaceae
23.	Aam	Mangifera indica L.	Anacardiaceae
24.	Sunara	Moringa oleifera Lam.	Moringaceae
25.	Sahtoot	Morus serrata Roxb.	Moraceae
26.	Sandar	Ougeinia oojeinensis (Roxb.) Hochreutiner	Fabaceae
27..	Aunmla	Phyllanthus emblica L.	Euphorbiaceae
28.	Melu	Pyrus pashia Buch.- Ham.ex D.Don	Rosaceae
29.	Amara	Spondias pinnata (L.f) Kurz	Anacardiaceae
30.	Tooun	Toona ciliata M. Roem.	Meliaceae
31	Chir	Pinus roxburghii,	Pinaceae
SHRUBS			
31.	Ratti	Abrus precatorius L.	Fabaceae
32.	Basutri	Adhatoda vasica Nees	Acanthaceae
33.	Nuriya	Aerva sanguinolenta (L.) Blume	Amaranthaceae
34.	Rambans	Agave americana L.	Agavaceae

35.	Kingore	<i>Berberis asiatica</i> Roxb. ex DC.	Berberidaceae
36.	Kingor	<i>B. lycium</i> Royle	Berberidaceae
37.	Daiya	<i>Callicarpa macrophylla</i> Vahl	Verbenaceae
38.	Karaunda	<i>Carissa opaca</i> Stapf ex Haines	Apocyanaceae
39.	Bindu	<i>Colebrookia oppositifolia</i> J.E. Smith	Lamiaceae
40.	Kharna	<i>Eupatorium adenophorum</i> Spreng.	Asteraceae
41.	Thor	<i>Euphorbia royleana</i> Boiss.	Euphorbiaceae
42.	Callicarpa macrophylla Ghaneri	<i>Lantana camara</i> L.	Verbenaceae
43.	Agla	<i>Mimosa himalayana</i> Gamble	Mimosaceae
44.	Kari Patta	<i>Murraya koenigii</i> (L.) Spreng.	Rutaceae
45.	Nagfani	<i>Opuntia elatior</i> Miller	Cactaceae
46.	Ghari	<i>Randia tetrasperma</i> (Roxb.) Poir.	Rubiaceae
47.	Tang	<i>Rhus parviflora</i> Roxb.	Anacardiaceae
48.	Arandi	<i>Ricinus communis</i> L.	Euphorbiaceae
49.	Hinsalu	<i>Rubus ellipticus</i> Smith	Rosaceae
50.	Kandali	<i>Urtica dioica</i> L.	Urticaceae
51.	Dhan	<i>Woodfordia fruticosa</i> (L.) Kurz	Lythraceae
52.	Ber	<i>Ziziphus mauritiana</i> Lam.	Rhamnaceae
HERBS			
53	Aghara	<i>Achyranthes aspera</i> L.	Amaranthaceae
54.	Mayurshikha	<i>Adiantum incisum</i> Forsk	Adiantaceae
55.	Ghandugli	<i>Alternanthera sessilis</i> (L.) DC.	Amaranthaceae
56.	Chaulai	<i>Amaranthus creuntus</i> L.	Amaranthaceae
57.	Beard grass	<i>Andropogon munroi</i> C.B Clarke	Poaceae
58.	Anjiri-ka- patta	<i>Anisochilus carnosus</i> (L.f.) Wall. ex Benth	Lamiaceae
59.	Satawari	<i>Asparagus racemosus</i> Willd.	Liliaceae
60.	Chaturi	<i>Barleria cristata</i> L.	Acanthaceae
61.	Kasmal	<i>Barleria strigosa</i> Willd.	Acanthaceae
62.	Kumra	<i>Bidens pilosa</i> L.	Asteraceae

63.	Bhang	<i>Cannabis sativa</i> L.	Cannabaceae
64.	Andhahuli	<i>Cynoglossum zeylanicum</i> Thunb. ex Lehm.	Boraginaceae
65.	Tuntkya	<i>Capsella bursa-pastoris</i> (L.) Medikus	Brassicaceae
66.	Gadria	<i>Celosia argentea</i> L.	Amaranthaceae
67.	Kandara	<i>Cirsium wallichii</i> DC.	Asteraceae
68.	Jakhya	<i>Cleome viscosa</i> L.	Cleomaceae
69.	Bhium Kaphal	<i>Duchesnea indica</i> (Andrews) Focke	Rosaceae
70.	Visnukranth a	<i>Evolvulus alsinoides</i> L.	Convolvulaceae
71	Jangi gobi	<i>Launaea acaulis</i> (Roxb.) Babcock ex Kerr.	Asteraceae
72	Akra	<i>Solanum verbascifolium</i> auct. Non. L.	Solanaceae
73.	Guthari	<i>Borreria articularis</i> (L.f.) F.N Williams	Rubiaceae
74.	Bathua	<i>Chenopodium album</i> L.	Chenopodiaceae
75.	Akanadi	<i>Cissampelos pareira</i> L.	Menispermaceae
76.	Kala bel	<i>Cryptolepis buchananii</i> Roem. and Schult.	Asclepiadaceae
77.	Gandhabel	<i>Cymbopogon martini</i> (Roxb.) Wat.	Poaceae
78.	Doob	<i>Cynodon dactylon</i> (L.) Pers.	Poaceae
80.	Tusara	<i>Debregeasia longifolia</i> (Burm.f.) Wedd.	Urticaceae
81.	Dudhi	<i>Euphorbia hirta</i> L.	Euphorbiaceae
82.	Bal Raksha	<i>Gnaphalium luteo-album</i> L.	Asteraceae
83.	Ban-pindalu	<i>Gonatanthus pumilus</i> (D.Don) Engler & Krause	Araceae
84.	Kaladana	<i>Ipomoea nil</i> (L.) Roth	Convolvulaceae
85.	Dori	<i>Leptadenia reticulata</i> (Retz.) Wight and Arn.	Asclepiadaceae
86.	Poudina	<i>Mentha arvensis</i> L.	Lamiaceae
87.	Poudina	<i>M. longifolia</i> (L.) Hudson	Lamiaceae
88.	Billilotan	<i>Nepeta hindostana</i> (Roth.) Haines	Lamiaceae
89.	Amrul	<i>Oxalis corniculata</i> L.	Oxalidaceae
90.	Kali tulasi	<i>Ocimum americanum</i> L.	Lamiaceae
91.	Gajar ghas	<i>Parthenium hysterophorus</i> L.	Asteraceae
92.	Atrilal	<i>Peristrophe bicalyculata</i> (Retz.) Nees	Acanthaceae
93.	Chitrak	<i>Plumbago zeylanica</i> L.	Plumbaginaceae
94.	Blue grass	<i>Poa annua</i> L.	Poaceae

95.	Perilla	Perilla frutescens (L.) Britton	Lamiaceae
96.	Basanti	Reinwardtia indica Dumort.	Linaceae
97.	Madder	Rubia manjith Roxb. ex Fleming	Rubiaceae
98.	Kareta	Sida acuta Burm.f.	Malvaceae
99.	Kharenti	Sida cordifolia L.	Malvaceae
100.	Makhoi	Solanum nigrum L.	Solanaceae
101.	Phool jhadu	Thysanolaena maxima (Roxb.) O. Kuntze	Poaceae
102.	Ghamra	Tridax procumbens L.	Asteraceae
CLIMBER			
103.	Bhinura	Ampelocissus latifolia (Roxb.) Planchon	Vitaceae
104.	Malkauni	Celastrus paniculatus Willd.	Celastraceae
105.	Kaduri	Coccinia grandis (L.) Voigt	Cucurbitaceae
106.	Genthi	Dioscorea bulbifera L.	Dioscoreaceae
107.	Siralu	Pueraria tuberosa (Roxb. ex Willd.) DC.	Fabaceae
108.	Machali	Vigna vexillata (L.) A. Richard	Fabaceae

TABLE: LIST OF FRUITS TREE

S. No	Fruits Tree	Botanical Name	Family
1	Orange	<i>Citrus reticulata</i>	Rutaceae
2	Malta	<i>Citrus sinensis</i>	Rutaceae
3	Naspati	<i>Pyrus communis</i>	Rosaceae
4	Guava	<i>Psidium guajava</i>	Myrtaceae
5	Neembu	<i>Citrus limon</i>	Rutaceae
6	Aroo	<i>Prunus persica</i>	Rosaceae
7	Amla	<i>Emblica officinalis</i>	Euphorbiaceae
8	Aam	<i>Mangifera indica</i>	Anacardiaceae

FAUNA (TERRESTRIAL & AQUATIC)

Faunal Assessment: - The study of fauna takes substantial amount of time to understand the specific faunal characteristics of the area. The assessment of fauna was done by extensive field survey of the area. During survey, Line Transect method was used for the study of mammals

and Transact & Patch sampling was used for Amphibians, visual encountered methods was used for reptiles, Aerial net was used for butterflies. The presence of wildlife was also confirmed from animal call, foot marks, excreta and from the local inhabitants depending on the animal sightings and the frequency of their visits in the project area which was later confirmed from different government offices like forest department, wildlife department etc.

Study of fauna in core & buffer zone

Identification of fauna (specifically amphibians, birds, mammals and reptiles) based on direct sightings, calls, pug marks, droppings, nests, etc.
Identification and classification of any species recognized as threatened (in accordance with International Union for the Conservation of Nature [IUCN] Red List or according to the schedules of the Wildlife (Preservation) Act 1972 and amendments).
Identification of areas which are important or sensitive for ecological reasons Including their breeding, nesting, foraging, resting, over wintering areas including wildlife migratory corridors /avian migratory routes.
Identification and assessment of aquatic ecological resources within the study area.

In addition the following sources were also used during survey-

- Sighting during ecological studies
- Animal call
- Foot mark and excreta
- Tree Scars & food leftover

Avifaunal Assessment: -

Avifauna is an important part of the ecosystem playing the various roles as scavengers, Pollinators, predators of insect pest, etc. They are also one of the bio-indicators of different status of environment and affected by urbanization, industrialization and human interference. The areas having good bird diversity signifies healthy ecosystem. They can be used as sensitive indicators of pollution and malfunction of ecosystem. The study area has different type of land cover like grassland, agriculture fields and human settlements.

Observations of birds were made during a walk through in the chosen transect for sighting birds. The number of birds observed in each sampling location was listed. Birds were noted, and identified with the help of 8X40 "Optima Zenith" binocular and standard field identification guides.

Assessment of Rare, Endangered and threatened Flora and Fauna

As per the Wildlife Protection Act, 1972 and their subsequent amendments, schedule category for wild plant and animals also consider for assessing the sensitive species. The scheduled species are given for the assessment of the any available sensitive species. This Act is enacted for protection of plants and animal species. It has six schedules which give varying degrees of protection. Schedule I and part II of Schedule II provide absolute protection - offences under these are prescribed the highest penalties. Species listed in Schedule III and Schedule IV are also protected, but the penalties are much lower. Schedule V includes the animals which may be hunted. The plants in Schedule VI are prohibited from cultivation and planting. The hunting to the enforcement authorities have the power to compound offences under this Schedule (i.e. they impose fines on the offenders).

Assessment of sensitive habitat

The riparian patches, protected areas (wildlife sanctuary & national park) and other specific habitat condition are some those places which are sensitive place for any small changes due to the developmental activity. During the baseline study such habitat fragmentation, ecological sensitivity, if any are taken in to consideration within the study area. Land use pattern of this region was dominated by agriculture land.

TABLE 3.21 LIST OF FAUNA SPECIES OBSERVED IN THE CORE ZONE

S. No	Common Name	Zoological Name	Status as per Wildlife Conservation Act, 1972 amendments
MAMMALS			
1	Jackal	<i>Canis aureus</i>	II
2	Jungle cat	<i>Felis chaus</i>	II
3	Common house Rat	<i>Rattus rattus</i>	V
4	Mouse	<i>Mus musculus</i>	V
5	Porcupine	<i>Hystrix indica</i>	IV
6	Five striped palm squirrel	<i>Felnambulos pennant</i>	-
BIRDS			
1	Common Mynas	<i>Acridotheres tristis</i>	IV
2	Black Drongos	<i>Dicrurus macrocercus</i>	IV
3	Hill crow	<i>Corvus brachyrhynchos</i>	IV
4	Green Pigeon	<i>Treron pompadora</i>	IV
5	Orange minivet	<i>Pericrocotus flammeus</i>	IV
6	Himalayan bulbul	<i>Pycnonotus leucogenys</i>	IV
7	Red vented Bulbul	<i>Pycononotus cafer</i>	V
8	Owl	<i>Bubo bubo</i>	IV

Observations: - The above mammals and birds are observed during the study period but amphibian and reptiles are not observed in the core zone during study period.

TABLE 3.22 LIST OF FAUNA SPECIES OBSERVED IN THE 10 K.M RADIUS

S. No	Common Name	Zoological Name	Status as per Wildlife Conservation Act, 1972 and amendments
MAMMALS			
1	Barking Deer	<i>Muntiacus muntjak</i>	III
2	Rhesus maeaque	<i>Macaca mulatta</i>	II
3	Langur	<i>Presptisen entellus</i>	II
4	Jackal	<i>Canis aureus</i>	II
5	Jungle cat	<i>Felis chaus</i>	II
6	Indian hare	<i>Lepus nigricollis</i>	IV
7	Wild boar	<i>Sus scrofa</i>	
8	Mongoose	<i>Herpest edwardii</i>	IV
9	Common house Rat	<i>Rattus rattus</i>	V
10	Mouse	<i>Mus muculus</i>	V
11	Porcupine	<i>Hystrix Indica</i>	IV
12	Hog deer	<i>Axis porcinus</i>	III
13	Striped hyena	<i>Hyaena hyaena</i>	III
14	Common red fox	<i>Vulpes vulpes</i>	II
15	Five striped palm squirrel	<i>Felnambulios pennant</i>	-
BIRDS			
1	Jungle Babbler	<i>Turdoides striata</i>	IV
2	Common Coots	<i>Fulica atra</i>	IV
3	Common Mynas	<i>Acridotheres tristis</i>	IV
4	Black Drongos	<i>Dicrurus macrocercus</i>	IV
5	Hill crow	<i>Corvus brachyrhynchos</i>	IV
6	Green Pigeon	<i>Treron pompadora</i>	IV
7	Orange minivet	<i>Pericrocotus flammeus</i>	IV

8	Himalayan bulbul	<i>Pycnonotus leucogenys</i>	IV
9	Red vented Bulbul	<i>Pycononotus cafer</i>	V
10	Purple sunbird	<i>Cinnyris asiaticus</i>	-
11	Oriental Turtle doves	<i>Streptopelia orientalis</i>	IV
12	Crested Kingfisher	<i>Megaceryl lugubris</i>	IV
13	Common Kingfisher	<i>Alcedo atthis</i>	IV
14	Oriental magpies robin	<i>Copsychus saularis</i>	IV
15	Yellow Billed blue magpie	<i>Urocissa flavirostris</i>	IV
16	Rose ringed parakeet	<i>Psittacula krameri</i>	IV
17	Night Jar	<i>Caprimulgus europaeus</i>	-
18	Red jungle fowl	<i>Gallus gallus</i>	III
19	Blue Whistling thrush	<i>Myophonus caeruleus</i>	-
20	Little egret	<i>Egretta garzetta</i>	IV
21	Owl	<i>Bubo bubo</i>	IV
22	Asian Koel	<i>Eudybnamys scolopaceus</i>	IV
23	Blue Rock Pigeon	<i>Columba livia</i>	IV
24	Baya Weaver	<i>Ploceus philippinus</i>	-
25	Grey Quail	<i>Coturnix coturnix L</i>	-
26	Black quail	<i>Coturnix corm Andelica Gmelin</i>	-
27	House crow	<i>Corvus spendens</i>	IV
28	Parrot	<i>Psittacula himalayana</i>	IV
29	Pahari bulbul	<i>Pycnonotus jocosus</i>	IV
30	Chakor	<i>Alectoris graeca</i>	IV
31	Laughing Dove	<i>Streptopelia senegalensis</i>	IV
32	Great Cormorant	<i>Phalacrocorax carbo</i>	IV
33	Little Cormorant	<i>Microcarbo niger</i>	IV

34	Eastern Great Egret	<i>Ardea modesta</i>	IV
35	Black Kite	<i>Milvus migrans</i>	IV
36	House Sparrow	<i>Passer domesticus</i>	IV
37	Black Bulbul	<i>Hypsipetes leucocephalus</i>	IV
38	Himalayan Bulbul	<i>Pyconotus leucogenys</i>	IV
39	Titar	<i>Francolinus pondicerlanus</i>	IV
40	Syam kukut / wood cock	<i>Scolopax rusticola</i>	IV
41	Brown-fronted Woodpecker	<i>Dendrocopos auriceps</i>	IV
42	Great barbet	<i>Megalaima virens</i>	IV
43	Rock bunting	<i>Emberiza cia</i>	IV
44	Wild owlet	<i>Glaucidium radiatum Tickell</i>	IV
45	Brown wood owl	<i>Strix leptogrammica Hodgson</i>	IV
46	Grey hornbill	<i>Tockus birostris Scopoli</i>	IV
47	Indian roller	<i>Coracias benghalensis L</i>	IV
48	Large yellow naked woodpecker	<i>P. chlorolophus</i>	IV
49	Black naked wood pecker	<i>Picus canus Baker</i>	IV
AMPHIBIAN			
1	Marbled toad	<i>Bufo andersoni</i>	Not covered
2	Indian bull frog	<i>Rana tigrina</i>	IV
REPTILES			
1	Oriental garden lizard	<i>Calotes versicolor</i>	II
2	Indian Cobra	<i>Naja naja</i>	II
3	Russell's Viper	<i>Vipera russelii</i>	II
4	rat-snake	<i>Zamenis longissimus</i>	II
5	Himalayan Rock Agama	<i>Laudakia himalayana</i>	II

There is no existence of any National Park, Sanctuary, Biosphere reserve, Wildlife corridor, Tiger /Elephant reserve in the 10 km periphery of the project area.

Source: Survey team in consultation with concern state forest officials, secondary sources and consultation with local people.

AQUATIC ECOLOGY

The sampling was carried out post monsoon 2021. Biological characteristics that were assessed include zooplankton, phytoplankton, and benthos & fish diversity.

Several methods have been used to analyze the effects of human activities on aquatic environment. They include the use of selected chemical and physical parameters, as well as a variety of biological measurements that range from bacteriological analyses to bioassay studies of fish and other aquatic organisms. Biological species viz. phytoplankton and zooplankton specific for a particular environmental condition are the best indicators of environmental quality. Studies on biological aspects of ecosystem are important in view of the conservation of environmental quality and of natural flora and fauna including human-beings.

Phytoplankton: - For the study of phytoplankton, samples were collected from 10 cm depth below the water surface. Fresh Polythene bottles of 250 ml capacity (Polylab) were used for collection of water samples. After the sampling, the sample was preserved by adding Lugol's solution.

Zooplankton: - For the quantification of zooplankton samples, water was filtered at each site by using standard plankton net made up of fine silk cloth (mesh size 25 μ m). After the sampling, the preservation of samples was carried out without delay to avoid damage to animal tissue by bacterial action. The collected filtrate was preserved in the 4% formalin solution (Analytical grade). The density of zooplankton was estimated with the help of APHA (2012). After preservation the zooplankton samples were kept in well-ventilated room at temperature less than 25°C. The samples were kept in the wide mouth bottle. A good quality pre-printed label were used, on which date and time of sampling, fixative and preservative used and other field information were written for ready reference at the time of analysis.

Benthos: - To study the diversity of benthic organisms, samples were collected from different habitats such as Rivers and Village ponds. In most of the sampling location water level was very low (1-2 ft). The sampling sites were selected randomly and distributed in and around the project area for a radius of 10 km from the project boundary. Standard D-frame dip net,

500 F opening mesh was used for sample collection. After collection, Samples were sieved with the help of Sieve frame which is consist of wire mesh supported by a wooden frame in order to remove sand / fine sediments and any other unrelated material. Water is sprinkled directly onto the sample with low-pressure to prevent any damage to animals. All material retained on the sieve including organisms, shell fragments and other aquatic fauna are transferred to appropriate containers. Containers were labeled with record like station code, sample code and sampling date. For preservation 10% formalin solution is used.

Fish: - Fish samples were collected from different habitats such as Rivers, Dams and Village ponds. For fish collection Cast Net, Mosquito net and locally available fishing pole were used. After sample collection, fish were examined, and released back into the system. For unidentified species, some fish samples were preserved in formalin solution (30%) and transported for species confirmation. Species identification and confirmation were carried out using available literature, books and pictorial guides.

At each sampling site, a set of the following environmental variables were recorded: Water source, stream order, altitude, stream width (m) approx. and water depth (cm)

TABLE PHYTO PLANKTONS ARE OBSERVED IN THE LADHIYA RIVER SIDE.

S.No	Botanical Name	Family
1	<i>Scenedesmus</i>	Scenedesmaceae
2	<i>Microcystis</i>	Chroococcaceae
3	<i>Anabaena</i>	Nostocaceae
4	<i>Spirogyra</i>	Zygnemataceae
5	<i>Chlorella</i>	Oocystaceae
6	<i>Chlamydomonas</i>	Chlamydomonadaceae
7	<i>Volvox</i>	Volvacaceae
8	<i>Chlorella</i>	Oocystaceae
9	<i>Ankistrodesmus</i>	Oocystaceae
10	<i>Coelastrum</i>	Scenedesmaceae
11	<i>Oedogonium</i>	Oedogoniaceae
12	<i>Ulothrix</i>	Ulotrichaceae
13	<i>Cladophora</i>	Cladophoraceae

14	<i>Chlamydomonas</i>	Chlamydomonadaceae
15	<i>Chara</i>	Characeae
16	<i>Microspora</i>	Microsporaceae
17	<i>Chromulina</i>	Ochromonadaceae
18	<i>Desmidium</i>	Desmidiaceae
19	<i>Sphaerosozma</i>	
20	<i>Chlorobotrys</i>	Eustigmatophyceae
21	<i>Botrydiopsis</i>	Pleurochloridaceae
22	<i>Oscillatoria</i>	Oscillatoriaceae

Zooplanktons are observed in the Ladhiya river side.

It is situated in downstream from the project and project is committed to zero liquid discharge hence it cannot disturb the aquatic ecology.

S.No.	Species Name	Family
1	<i>Euglena</i>	Euglenaceae
2	<i>Phacus</i>	
3	<i>Daphnia</i>	Daphniidae
4	<i>Pteromonas</i>	Phacotaceae
5	<i>Amoeba</i>	Amoebidae
6	<i>Diffflugia</i>	Difflugiidae
7	<i>Paramecium</i>	Parameciidae
8	<i>Entamoeba histolytica</i>	Entamoebidae
9	<i>Cyclops</i>	Cyclopidae
10	<i>Rotaria</i>	Philodinidae

Benthos is the community of organisms that live on, in, or near the river, lake, or stream bottom, also known as the benthic zone. This community lives in or near marine or freshwater sedimentary environments, from tidal pools along the foreshore, out to the continental shelf, and then down to the abyssal depths. The pressure difference can be very significant (approximately one atmosphere for each 10 metres of water depth). Because light is absorbed before it can reach deep ocean-water, the energy source for deep benthic ecosystems is often organic matter from higher up in the water column that drifts down to the

depths. This dead and decaying matter sustains the benthic food chain; most organisms in the benthic zone are scavengers or detritivores.

Macrobenthos comprises the larger, visible to the naked eye, benthic organisms greater than about 1 mm in size.

Meiobenthos comprises tiny benthic organisms that are less than about 1 mm but greater than about 0.1 mm in size. Observed nematodes, gastrotriches and smaller crustaceans such as copepods and ostracodes.

Microbenthos comprises microscopic benthic organisms that are less than about 0.1 mm in size. Observed diatoms, ciliates, amoeba, flagellates

Fish is found in almost all the rivers, streams and lakes. Ladhiya River abounds in the larger fish. The riparian villages find in it an important supplement to their food. The common species found in the river are given below:

S.No	Scientific Name	Common Name
1	<i>Tor putitora</i>	Golden Mahseer
2	<i>Tor tor</i>	Silver Mahseer
3	<i>Schizothorax richardsonii</i>	Alwan Snow trout
4	<i>Schizothoraichthys progastus</i>	Snow trout
5	<i>Brachidanio rerio</i>	Zebra Fish
6	<i>Puntius conchoniis</i>	Rosy barb
7	<i>Puntius sophore</i>	Pool Barb
8	<i>Tor chilinoides</i>	Black mahseer
9	<i>Banillius bendilisis</i>	Baril
10	<i>Glythorax pecinopterus</i>	River cat
11	<i>Danio devario</i>	Devario danio

Life Form Spectrum: - Life forms, as suggested by Raunkaier, reflect the quality of environment in which plants belonging to a particular community live. It is based on the nature of protection afforded to perennating organs of plants, to overcome stresses in the environment.

The following groupings are commonly recognized for life forms.

Phanerophytes - shrubs and trees

Therophytes - Annuals

Hydrophytes - Floating and submerged plants runners or suckers

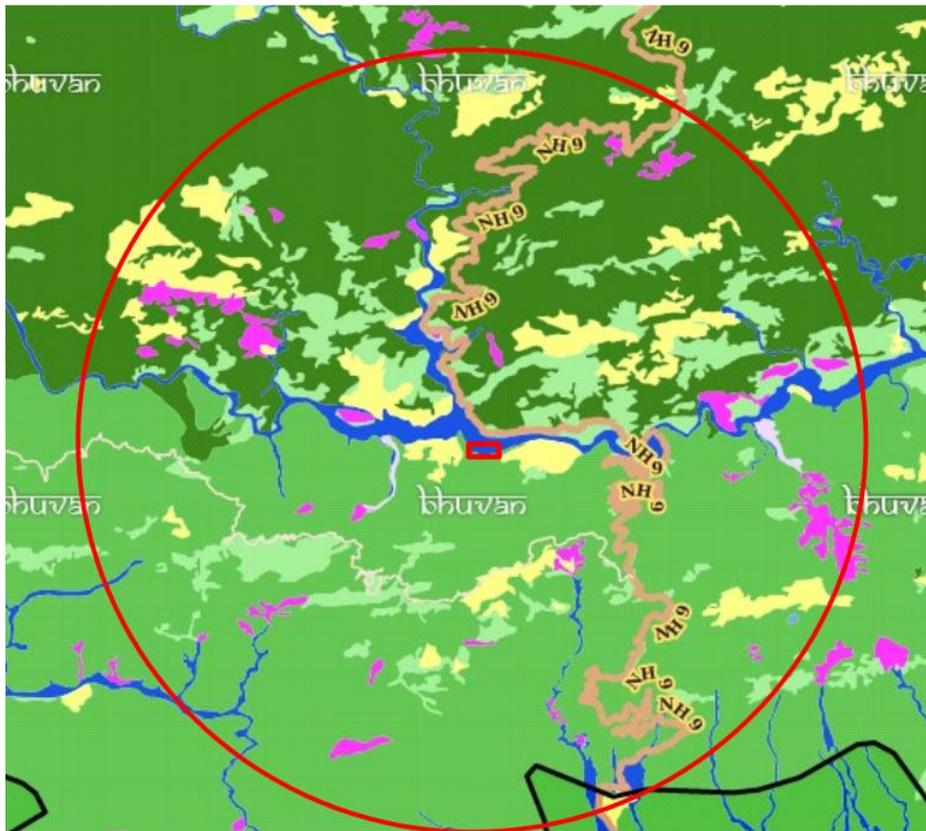
Geophytes - Plants with corms, tubers or rhizomes in deep ground

Climbers - Lianas, stragglers and climbing plants and

Epiphytes - Plants without contact with ground

LAND USE LAND COVER

The satellite based remote sensing is a sustainable global information system because it has the potential to meet the needs and demands of the present and future. The synoptic Average, which provides capability for integration of real time information on regional and global scales, is a unique characteristic of this information system. Its versatility lies in its inherent capability to conceptualize situation to give clear perceptions for defining short term and long term objectives.



An activity could bring about changes in the Land use and Land cover in the vicinity. A data based on Land use and land cover indicates ecosystems existing in and around the centre of an economic activity, to safeguard to allow comparison at a future date to draw conclusions on the nature. The study reported here is with the honest intention of building such a database on land use and land cover in an area within about 10 km radius of the proposed project. The details of the land use present in the 10 km study area are given below in Table

3.25; Land use Land cover Map and satellite imagery shown in figure is shown in Figure 3.9 and 3.10.

Table 3.24 Details of the land use present in the 10 km study area

Classes	Area (in Ha.)	Area (in %)
Scrub land	193.69	0.60
Plantation	20566.35	63.99
Crop land	7588.80	23.61
Fallow land	1579.18	4.91
Habitation	798.18	2.48
Water bodies	829.56	2.58
Reserve Forest	582.06	1.81
Total	32137.82	100.00

SOCIOECONOMIC SURVEY

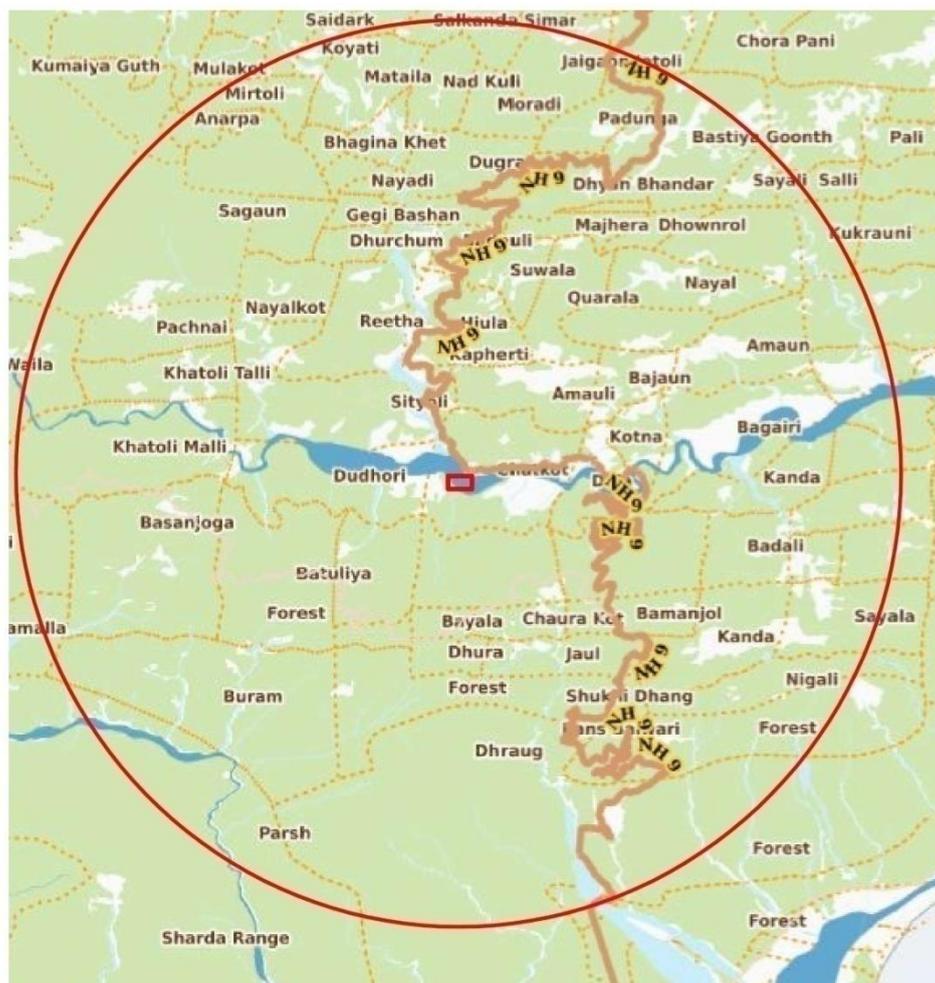
Introduction

The study of socio-economic component of environment incorporates various facets, viz. demographic structure, availability of basic amenities such as housing, education, health and medical services, occupation, water supply, sanitation, communication and power supply, prevailing diseases in the region as well as features such as places of tourist attraction and monuments of archaeological importance. The study of these parameters helps in identifying predicting and evaluating the likely impacts due to project activity in the surrounding region.

Sr.No.	Village Name	Direction	Population
1.	Dudhori	W	360
2.	Khatoli Malli	W	388
3.	Siyali	NW	305
4.	Khatoli Talli	NW	891
5.	Reetha	NW	113
6.	Nayalkot	NW	63
7.	Pachnai	NW	649
8.	Ghurchum	NW	131

Sr.No.	Village Name	Direction	Population
9.	Gegi Bashan	N	50
10.	Nayadi	N	24
11.	Sagaun	NW	95
12.	Bhagina Khet	NW	22
13.	Anarpa	NW	295
14.	Mirtoli	NW	303
15.	Mataila	N	100
16.	Nand Kuli	N	116
17.	Moradi	N	443
18.	Dugra	N	30
19.	Kapherti	N	72
20.	Hiula	N	197
21.	Sawala	NE	554
22.	Qurali	N	0
23.	Jhala Kudi	E	593
24.	Amauli	NE	608
25.	Kotna	SE	277
26.	Bajaun	SE	512
27.	Quarala	NE	0
28.	Majhera	NE	61
29.	Dhyan Bhandar	NE	0
30.	Padunga	NE	135
31.	Jaigaon Jatoli	NE	343
32.	Bastiya Goonth	NE	320
33.	Dhownrol	NE	110
34.	Nayal	NE	0

Sr.No.	Village Name	Direction	Population
35.	Sayali	NE	305
36.	Amaun	NE	147
37.	Bagairi	NE	448
38.	Kanda	E	723
39.	Badali	SE	562
40.	Sayala	SE	352
41.	Kanda	SE	163
42.	Baman jaol	SE	147
43.	Chaura Kot	SE	221
44.	Jaul	SE	545
45.	Bayala	S	119
46.	Dhura	S	534
47.	Dhraug	S	445
48.	Shukhi Dhang	SE	21
49.	Nigali	SE	63
50.	Dhansbawari	SE	56
51.	Batuliya	SW	155
52.	Basanjoga	W	156
53.	Buram	SW	351
54.	Parsh	SW	134



The project is for Proposed of Sand Bajri Boulder Mining Project Khata No: 109: Khasra No: 1, 17 22ma, 23ma, 84 ma, Area: 5.83 ha Village-Jhalakudi, Tehsil- Poornagiri District-Champawat (Uttarakhand). On the basis of available census data, 2011 different aspects of socio economic condition of total 54 villages in the study area have been analysed and surveyed.

Methodology used for the Field survey

In order to access and evaluate likely impacts arising out of any development projects on socio economic environment, it is necessary to gauge the apprehensions of the people in the study areas.

Methodology Adopted for the Study Collection of data

The information analyzed for the project has been collected from various secondary sources, which has been supported by the extensive site visits and field observations.

- ☐ **Secondary:** Review of secondary data, such as District Primary Census of Champawat District, Uttarakhand 2011 within the study area around the existing project

- ☐ **Primary:** A social survey for examination of the respective site and specific region reference to its general character. A questionnaire developed to make it suitable to fulfill the objectives of the study. Primary data collected by Focus Group discussions in sample villages. Extensive site visits and observations of the socio economic environment.

Sampling method

The studies are conducted and inferences are drawn on the basis of observation and field survey on the basis of non-probability random sampling and convenience sampling with access to the nearest habitation of the project to the extent possible.

Review of Demographic and Socio-Economic Profile – 2011

The sociological aspects of this study include human settlements, demography, social strata such as Scheduled Castes and Scheduled Tribes and literacy levels besides infrastructure facilities available in the study area. The economic aspects include occupational structure of workers. The information on socio-economic aspects of the study area has been collected from secondary sources, which mainly include District Primary Census 2011 of Champawat District, Uttarakhand.

1. Data Collection and Quality Assurance

The available data have been compiled to generate the existing socio-economic scenario of the study area. Information on socio-economic profile was collected from the Primary Census Abstract 2011, including the population details of the region and Village Directory 2011, having the details of basic amenities available in the region. In the 10 km radius study area constitute 54 villages from Champawat District, Uttarakhand 2011. As per 2011 census the study area consisted of 10801 persons. The distribution of population in the study area is given below.

Human Settlement

The study area comprises 54 villages with population of about 10801 (Male-5940 & female – 4860) and number of households are 2160. (According to the Census 2011).

Population

The total number of house hold is 2160 with an average house hold size of 4-5 people. Hence, it is interpreted there are no joint family systems in the study area. There are 10801 people in the study area as per the census survey of India, 2011.

Employment Pattern

Economic resource base of any region mainly depends upon its economically active group i.e. the working population involved in productive work. Work may be defined as participation in any economically productive activity. Such participation may be physical or mental in nature. Work not only involves actual work but also effective supervision and direction of work. It also includes unpaid work on farm or in family enterprise.

There are different types of workers that may be classified as - those persons who had worked for at least six months or 183 days are treated to be Main Workers, on the other hand if person categorized as worker has participated in any economic or productive activity for less than six months or 183 days during the last one year is treated as Marginal Worker. Non-workers are those who have not worked any time at all in the year preceding the enumeration.

The workers coming under the main and marginal workers category are those involved in activities such as cultivation, agriculture, livestock, forestry, fishing, hunting, plantations, orchards and allied activities, mining and quarrying, manufacturing, processing, servicing and repairs in household industry, construction, trade and commerce, transport, storage and communication and other services.

As per 2011 census records altogether the main workers works out to be 34.00% of the total population. The marginal workers and non-workers constitute to 17.91% and 48.09% of the total population respectively. The distribution of workers by occupation indicates that the non-workers are the predominant population.

MAIN WORKERS EMPLOYMENT PATTERN

Main workers are classified in four categories as cultivators, agricultural workers, household industry workers and other workers. As per 2011 Census, Out of total 4695 main workers in the study area, there were total 2967 cultivators (63.19%), 107 agricultural workers (02.28%), 36 household industry workers (0.77%) and 1585 other workers (33.76%). Mostly in main workers population cultivator a were highly found in study area.

Infrastructure Facilities

The infrastructure and amenities available in the area denotes the economic wellbeing of the region. The study area as a whole possesses poor to moderate level of infrastructure facilities.

However, in comparison with the facilities available in other parts of the districts, this area has good level of amenities like education, health, drinking water, electrification, transport and communication network. A review of infrastructure facilities available in the area has been done based on the information given in District Census of Champawat District, Uttarakhand.

Educational Facilities

Educational status is positively correlated to the economic development of a person and the society as a whole. This is very much reflected in the study area. In order to make the education profile more informative the Local people have been grouped into eight educational categories i.e., illiterate, literate, primary, HS, Intermediate, Graduate/PG, others (includes technical education such as Hotel Management, Polytechnique, ITI etc.) and those below the age of 5 years. The general trend in the Buffer zone shows that the younger population is almost 90-95 % literate, whereas the majority of illiterates are in the 50+ age group. Education in the study area is average. The facilities are available in every village and is promoted and accepted.

The educational facilities are evenly distributed in the area. In all, there are 62 primary schools, 26 Middle Schools, 11 secondary schools, and 5 Sr. Secondary Schools in the study area.

Health Status: - Health facilities, which include different types of hospitals and dispensaries, are available in the area. The level of health facilities is found to be below average. Altogether there are 02 Community Health Centers, 03 Primary Health Centers, 7 Primary Health Sub Centers, 2 Maternity and Child welfare Center, 1 TB Clinic, 1 Allopathic Hospital, 3 Dispensary, 6 Mobile Health Clinic, and 3 Family Welfare Centers in the study area. The available health facilities are given below.

Health Facilities

All the medical facilities are available at Srinagar which is 4 km away from the project site.

- **Drinking water facilities:** - Water is finite but all life is infinite from mankind's view point. Hence water has to support and sustain all life – human, animal and plant. Some of villages are connected with tap water facility and rest of villages has open wells, tube wells and Hand pumps for source of drinking water.
- **Electricity:** - There is no source of electricity generation. All the power consumed is received from Uttarakhand power corporation Limited. (U.P.C.L.). Almost all the villages are connected with electricity in the study area.

Rail head: -Nearest railway station is Tanakpur Railway Station (16.0 km)

Airport: - Pant Nagar Airport (50 km) West direction from project site.

Post: - Post Office is within in nearby villages and few villages have Post office or Sub Post Office & most of all Villages are connected with mobile phone facilities in the study area

Bus: - Naulapani Village is connected with Black Topped (Pucca) Road facility (connected with nationalhighway no. 9) but Pvt. Bus & Jeeps are not available for transportation.

The Primary data of socio economic status are collected in the study area. During study period FAE & his team has discussed to the Villagers, School Teachers, Aaganbadi Employees, Van Sahayak, Gram Sevak, Patwari, Sarpunch and Filled the socio economic survey formats by randomly in core & buffer zone. The details are given below:

1. Field Survey and Observations

Field survey and observations is made at each sampling village and the socio-economic status of that region is studied. Visits are made at hospitals, primary health centres and sub-centres to know the health status of the region. Various Governmental organizations such as Statistical Department visited to collect the requisite details of that region.

Salient Observation of the Survey/ Study Area

Economy: The main occupation of the population is agriculture. Some small industrial units have been established around Champawat. Besides, army / para-military forces and teaching are a major source of employment for young people. Due to the lack of required infrastructure and the geography of the area, there are no major industries in the hilly part of the district.

House pattern: It is notable that Almost 50% of houses are kutcha house/dilapidated house, 30% of houses are Pucca (brick) rest are Semi- pucca houses in study area. People are using Garhwali and Hindi language.

Employment: People here are nice, honest, hardworking and shy! More often they are short and stout. Toughness and difficult life of mountains make them special. A reasonable percentage of Uttaranchal enjoys their share in Armed Forces and many works outside the state/country for better job prospects, for a better earning. Horticulture, Agriculture and Tourism are three major activities after Government Service Sector, which is also a prime engagement. However, Agriculture, Tourism and Horticulture are not fully utilised in the Hills.

Fuel: Most of the villagers use fire woods and LPG for cooking purpose.

Agriculture: Agriculture is not a profitable means of employment in this hilly district due to its uneven geographical conditions, small terraced fields and non-availability of proper irrigation facilities. The Ladhiya (the main river system of the district) catchments are richly endowed with various natural resources viz. Soil, Water, Minerals, Rocks, Forests and a Scenic Landscape. It is still economically under developed. The present form and level of agro economy of the area is considerably poor

Main Crops: crop grown by the farmer of study area are rice, wheat, barley, maize, mandua, and pulses such as urd, moong, masoor, chana, matar, arhar etc. oil containing seeds like sarson, alsin, til, sunflower, soyabean etc.

Migration: During survey it was found that local populations were migrating for employment purpose. Male from families are migrated to other cities in search of work leaving females behind at home.

Sanitation: Sanitation facility coverage as found in primary survey may be comparatively better in the urban areas, but in rural areas. Sanitation programme is going on in study area under "Swachh Bharat Mission" and people are well aware about sanitation and its sustainability. Most of households are creating toilets in study area and rest of household's work is going on.

Drinking Water Facilities: Spring water is the main source of water providing life to people in the mountain region especially in the study area. Spring is a natural source of groundwater. Unlike wells, which may be owned and controlled privately; springs are generally community-owned and community-managed. Thus, they give a sense of a "common" resource i.e. groundwater shared through a common mechanism, i.e. the spring. Some of respondents have individual taps in their houses for water, whereas most of respondent depends on the natural source of water for their daily requirement.

Education Facilities: Most of the villages had education facilities in the form of Anganwadi and Primary Schools. Higher education facilities were available in the range of 5-10 km. Colleges and other diploma courses were available at Srinagar.

Transportation Facility: For transportation purpose Auto, Public and Private Bus services were available in study areas. Transportation facilities were frequently available in the study area and connecting major cities. Private vehicles like Bicycles & Motor Cycles were mostly used by villagers for transportation purpose.

Road Connectivity: Most of the roads were pucca and connecting to villages. Dambar and cement roads were commonly seen inside the villages.

Communication Facilities: For communication purpose mainly mobile phones, newspaper & post offices were seen in the villages.

Medical Facilities: The availability of medical facilities in the study area is good, there are average numbers of dispensaries, maternity and family welfare centres are available.

Electricity: The power supply connections in Villages are majorly used for domestic purposes, Source/ Provider of Electricity is Uttarakhand power corporation, Dehradun.

Market Facility: Study area is predominantly rural. In villages, small shops were available for daily needs. Wholesale markets were available at Srinagar town place.

Animal's husbandry: Normally local villagers are based upon cattle, buffaloes, sheep, goats, pigs and poultry. etc. Villagers are generating daily income from these animals. They are sailing Milk to dairy point and get appropriate rates during the year and also supply the milk in their village and nearby Hotels/ road side Dhaba.

Savings: - At study area earnings of families are depend on agriculture crops, daily labour work and some of their small type of business. 55% families has source of income is agriculture. Their yearly income and expenditure is equal so they enable to do saving.

Family assets:-For assessing the family condition as per movable (material) assets information has been taken from the study area. Its show that People have own Television sets, tape, radio, mobile, LPG connections and refrigerator respectively in their houses. Few populations have two wheeler, 4 wheeler, and goods vehicle & own some other assets such as washing machine, telephone, sewingmachine, etc.

Awareness and Opinion about the project

- ❖ The respondents from almost of all the villages are not aware about this MSW project.
- ❖ The respondents have mixed view about the project. Most of the respondents have fear about the increased solid waste, air, water & soil contamination and emission odour.
- ❖ Some respondents from the nearby villages have in the region show favorable opinion about Project and associated activity as it may lead to increase in infrastructural facilities and job opportunities.
- ❖ This will improve the living standard of society & will provide safe & hygienic surroundings. It will also eliminate the passage of solid waste/garbage problems in sewer lines.
- ❖ This will reduce the chances of spreading of diseases. This project will improve the health condition of the area and society.

Expectation from the project

- Local employment
- Plantation at nearby areas and ensure their survival rate.
 - Efficient waste collection & disposal of waste will improve the living & health condition of inhabitants in the area.
 - Free Medical facilities for villagers and organize medical camps in nearby villages for seasonable diseases.
 - Integrated Solid waste management project will ensure timely collection of waste, efficient treatment & disposal in scientific & environment friendly manner.
- Collection of waste from their villages also.

Impact on Human Settlement

The impact on socio economic of surrounding area will be positive, as Project will directly employ the local workers. Preference to local people residing nearby will be given direct employment for this project. There is no displacement of any habitation or personnel and hence the rehabilitation and resettlement action plan is not required.

- **Impact on Social Status:** The study area is predominantly inhabited by rural population. The proposed project is likely to provide more opportunities in employment to this area. The preference in employment will be provided to the local residents in this area. Thus, population of the study area will be benefited due to the project in terms of direct and indirect employment opportunities.
- **Impact on Civic Amenities:** Cattles & other stray animals are used to roam around the existing open dump site, which creates disturbance to society. Open dumping of waste also creates an unpleasant view and leads to emission of mal odour. It will control the diseases menace which gets spread due to the unattended waste lying at dumping site which attracts flies, rats, and other creatures that in turn spread diseases in society. This leads to unhygienic conditions and thereby causes rise in the health problem. Open dumping of waste also creates an unpleasant view and leads to emission of mal odour. Through this project a scientific technology of waste management shall be developed. Proper Disposal and processing of MSW, processing rejects /inert will create better hygienic conditions within municipal limits of city and nearby villages.

- **Impact on Public Health:** Efficient waste collection & disposal of waste will improve the living & health condition of inhabitants in the area. Littering of waste creates nuisance due to unpleasant view and emission of foul odour. It will eliminate the ground for breeding of mosquitoes & disease causing pathogens. Integrated Solid waste management project will ensure timely collection of waste, efficient treatment & disposal in scientific & environment friendly manner. This will reduce the chances of spreading of diseases. This project will improve the health condition of the area and society.
- **Impact on Health Care Facilities:** While MSW activities, sufficient care will be taken in providing health facilities to their employees besides organizing various medical camps for the surrounding villages. The improved health care facilities improve the quality of life in the area.

- **Impact on Economic Aspects:** Project will generate both direct & indirect employment. Local people will be preferred for giving employment. This will improve economic status of the area. Emigration of local people to other parts of state/country due to unavailability of employment will be reduced.

Impact on Archeological and Historical and Places of Religious worship & Tourist Places: The MSW project is unlikely to cause any impact on these places or structures or devotees.

Socio-Economic Development

- Based on the requirement of the people in the area, various development activities will be taken by Srinagar Nagar Palika Parishad regularly. The basic requirement of the community are strengthened by extending health care, educational facilities developed in the township to the community, providing drinking water to the villages affected, building/strengthening of existing roads in the area etc.; In order to obtain felt needs of the surrounding villagers for effective implantation of desired needs. The proposed project may create opportunities for indirect employment in the field of vehicle hiring, labors, trading of construction material, service sector etc. This will help in improving the socio economic status of the region.

Steps to be taken to Improve Socio-Economic Conditions

The socio-economic conditions in the study area indicate the quality of life of the people. The important indicators which decide the quality of life and required to be improved for better living conditions are literacy levels, occupational structure, infrastructural facilities, transportation, communication linkages, land development and cropping pattern. The project proponents are envisaging undertaking the following socio-economic measures.

- **Health Care:** The adequate funds will be allocated for mobile dispensary, family planning, medical camps and aid to the Govt. hospitals.
- **Educational Facilities:** These include adult education facilities, financial assistance for

higher studies, sponsorship to vocational / professional training institution, computer education camps, vocational training for students and aid to existing/proposed Govt. schools and colleges.

- **Civic Amenities:** These include support to community toilets, drinking water facilities like public stand posts, elevated service reservoirs, playgrounds for children and recreation facilities for all age groups. In addition to this participation and support to government efforts.
- **Employment:** Development of project will provide employment opportunity to local skilled, unskilled & semiskilled people during both construction & operation phase. Indirect employment may also generate during construction phase of project. Tea stalls, and food shop may come up around project site for workers. Almost local labour will be engaged for the allied activity like marketing and sale of products like compost may further require more man power engagement

CHAPTER-4

ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Details of the Investigated Environmental Impacts

This Chapter provides a brief overview of the potential impacts on various environmental components due to the proposed opencast mining activities. The opencast mining operations in general cause environmental degradation and if adequate control measures are not taken to prevent/mitigate the adverse environmental impacts, these operations may cause irreversible damage to the eco- system. The environmental parameters most commonly affected by mining activities are:

- Topography and drainage;
- Air quality including Climate
- Noise levels
- Water resources and quality;
- Land use Pattern
- Soil quality
- Flora and Fauna
- Socio-Economic conditions
- Occupational Health

Various environmental impacts, which have been identified due to the mining activities, are discussed in the following sections and mitigation measures are suggested.

Impact on Drainage

The surrounding area characterized by steep slopes, narrow ridges & forms the mountainous topography. The rainy water flows through the slopes & meet the seasonal drainages. All the seasonal drainages meet & ultimately influence in to river Ladhiya which is the main catchment zone within the buffer area. Garland drains will be all along the proposed pits will be made for proper drainage. Thus, there will be no impact on drainage pattern of the area

AIR ENVIRONMENT

Anticipated Impacts

RBM mining will be carried out by opencast semi-mechanized method. The air borne particulate matter generated by ore and handling operations, and transportation of ore is the main source of air pollutant. The dumpers and HEMM will emit smoke and noxious gases and un-burnt

Hydrocarbons. The emissions of Sulphur dioxide (SO₂), Oxides of Nitrogen (NO₂) contributed by diesel operated excavation/loading equipment and vehicles plying on haul roads are marginal. Prediction of impacts on air environment has been carried out taking into consideration proposed production and net increase in emissions.

Air pollution sources in the proposed mine have been classified into two categories:

- i. Loading and unloading of OB and ore
- ii. Transportation of ore on the haul road

Water tankers with spraying arrangement will be used for regular water sprinkling on the haul roads to ensure effective dust suppression. The tippers will be well maintained so that exhaust smoke does not contribute abnormal values of noxious gases and un-burnt hydrocarbons. In order to assess the impact due to RBM production of 71 TPD on air environment, prediction has been carried out.

The prediction of Ground level concentrations (GLC) of pollutants emitted from the mining activities will be carried out using ISCST-3 Air Quality simulation model released by USEPA. This model is basically a Gaussian dispersion model, which considers multiple sources. The model accepts hourly meteorological data records, to define the conditions of plume rise for each source and receptor combination for each hour of input meteorological data sequentially calculates short term averages up to 24 hours.

The impact has been predicted over a 10 km radius area with mining area as the centre. To obtain greater resolution, the receptors are defined with respect to 500 x 500 m grid point to have better results. GLC have been calculated at every 500 m grid point to have better results.

Air Pollution Impact Prediction through Dispersion Modeling

Prediction of impacts on air environment has been carried out by employing **Industrial Source Complex Short Term (ISCST3)** dispersion model.

The ISC area source model is used to simulate the effects of fugitive emissions from sources such as storage piles and dumps. The ISC models use a numerical integration approach for modeling impacts from area sources. The ISC models accept rectangular areas that may also have a rotation angle specified relative to a north-south orientation.

The dust dispersion modeling requires the following data:

- Micro – meteorological data
- Mining data
- Dust concentration data
- Micro - meteorological data

Meteorological parameters

The hourly meteorological data recorded at site for the period from March’19 to May’19 covering Pre-monsoon season 2019 is converted to the mean meteorological hourly data as specified by CPCB and the same has been used in the model. The mean meteorological data recorded at the site has been used for the modeling. In absence of site specific mixing heights, mixing heights published in IMD Publication “Atlas of Hourly Mixing Height and Assimilative Capacity of Atmosphere in India” by S.D. Attri, Siddhartha Singh, B. Mukhopadhyay, and A.K. Bhatnagar (2008) has been used. The open pit mining involves the following general processes:

- ❖ Removal of the vegetable layer (top soil)
- ❖ Removal of overburden
- ❖ Removal of the useful geological material

Each one of these mining operations is, in turn, divided into various different activities, that depend on the technologies used. Each activity is an emission source. The Table - 4.1 shows the emission factors considered for modeling exercise.

Table-4.1 Emissions

Activity type	Emission
Mineral loading	1.8 x 10 ⁻⁷ kg PM ₁₀ /t
Mineral unloading	0.34 x 10 ⁻⁷ kg PM ₁₀ /t
Mineral Transportation	1.74x 10 ⁻⁷ kg PM ₁₀ VKT

Emission was calculated with the help of emission factor calculated by formula given below $E=TP \times EF$

Where E= Emissions (tons/year) TP= Annual Throughput EF= Emission Factor

After processing of area source data in ISCST3, isopleths for fugitive dusts (Line Source + Area Source) is generated. The above table shows that, the resultant PM₁₀ levels will remain within the NAAQS norms. The 24-h maximum incremental GLC of PM₁₀ was 4.4µg/m³ occurred at the center of the mine site. The value of PM₁₀at the project site was 82.6 µg/m³observed after superposition of base-line value of 78.2 µg/m³ on the incremental GLC of 4.4 µg/m³occurred under the influence of south westerly winds as evident from wind rose (**Fig 4.1**) under combined impact of loading, unloading, and transportation of ore by trucks over haul road of the mining area.

WATER ENVIRONMENT

(a) Impact on Water Resources & Surface Water Resources:

The topography of the area will not be largely changed in view of the proposed concurrent reclamation. No surface water body exists and passes through the lease area. During the mining activity period, there is a possibility of mixing of freshly disturbed material with the rain water. To take care of such events, retaining walls have been provided along the backfilled pits and along the soil and inter- burden dumps. Before the commencement of rain all the mining pits shall be backfilled so that rain water does not accumulate in the mining pits. Rain water will be channelized along the slopes it shall not carry suspension to natural streams.

Groundwater Resources: The water table in hills is usually very deep and does not have any relevance with mining activities. However, concurrent restoration to original topography will not disturb the percolating water.

Table-4.1 Site Elevation and Working Depth Details

Particulars	Details
Elevation	608.16 -618.25 m AMSL
Ground Water Table	9.06 to 10.0 m bgl
Ultimate working depth	3m

(b) Impact on Water Quality

Mining activities cause adverse impacts due to mine drainage, siltation due to storm water and contaminated water from workshops and domestic sewage water. Various components have been identified for study of impact of the mine operations.

(c) Impact on Surface Water Quality

As there no perennial and seasonal *nalla* or water body within the leasehold area, therefore no

change will be observed due to mining operation.

Due to mining activities it is anticipated that over burden and mineral fines flowing with water may cause siltation and affect the flow of drainage courses. Mining activity and degradation of land and subsequent flow of water is likely to disturb the drainage course. The quality of water flowing in these drainages will also be polluted. Therefore to safeguard the existing drainages in the area following precautions are proposed:-

- The mining pits will be properly benched; and waste dumps will be properly terraced with retaining walls at the toe so that there is no land slide during the rains.
- Premature backfilling shall be carried out before the commencement of monsoon & all the quantities of interburden & soil shall be filled back in the mining pit, leveled & it shall be used for agricultural purpose
- The benches of mining pits, terraces of waste dumps will have grass plantation during the rains and if possible local cultivators will be allowed to grow vegetables and other seasonal crops so that it will also reduce the land degradation and will provide additional income to the local people. Cultivated land reduces the soil erosion and this aspect will be utilized for reducing the soil erosion and also the effect of siltation on drainages.
- The over burden and mineral is non toxic and not going to have any effect on quality of water flowing in these drainages.
- Check dams will also be constructed so that speed of water flowing during rains does not increase abruptly to cause land slide and degradation of land and these check dams will also works for settlement of the silts before the clean water flows out of the lease area.
- Regular monitoring of quality of water and surface water flow in these drainages are proposed to take care of adverse impact due to mining.

Analysis results of surface water samples collected from rivers and *nallas* in the buffer zone indicate that the pH, total dissolved solids (TDS) are well below the prescribed limits.

No adverse impact was noticed. Backfilling will be done before the onset of monsoon.

(d) Impact on Ground Water Quality

The proposed bottom level of working pit will not affect the water table. Extraction of water for mining operation is not anticipated. Therefore project will not affect the ground hydrogeology and water depth. The source of water will be under the govt. scheme Swajal Dhara Yojna.

(e) Wastewater Generation, Treatment & Disposal

The total water consumption in the proposed RBM Mine is about 5.0 KLD. The water is used in the following purposes.

- For dust suppression
- For domestic consumption
- For greenbelt development

It is proposed to obtain water for drinking and plantation from spring under the scheme of Swajal Dhara (Govt. of India).

There will be no waste water generation from Mining activities. However, a small amount of domestic wastewater generation will happen as a result of water used by humans. The domestic and service building effluents will be disposed through eco-friendly mobile toilet.

There will no settlement near the site as the workers will be hired from nearby villages so no significant liquid effluent will be generated.

(f) Surface Water

There is a possibility of mixing of freshly disturbed material with the rain water. To take care of such happenings, retaining walls have been provided along the backfilled pits and along the soil and interburden dumps.

Monitoring of water will be carried out periodically. Water analysis will be carried out seasonally.

(g) Ground Water Pollution

Regular monitoring of water levels and quality in the existing open wells and bore wells in the vicinity will be carried out. If found necessary, additional observation wells will be sunk for monitoring the water levels and quality around the mine representing both upstream and downstream conditions. No springs are reported within the site, therefore chances of surface runoff mixing with ground water is negligible.

Mostly local labors are employed for mining operation, thus small value of waste water from domestic source are anticipated. The waste water generated from toilets at site will be routed to septic tanks.

IMPACT ON LAND USE

Land use Pattern in Core Zone

The proposed opencast mine will result in change of land use pattern of the ML area. The land degradation is expected during mining activities like excavation, overburden dumping, soil extraction etc. Land requirement for the project has been assessed considering functional needs.

The potential adverse impact of opencast mining is the change in land use pattern. So reclamation of mined out land will be given due importance as a step for land resource management.

IMPACT ON SOIL

The quantum of soil removed during the mining will be very less. Soil will lose its compactness. Present, End of the fifth years & Conceptual land use pattern land use pattern is given in mine plan attached as annexure1.

IMPACT ON AIR QUALITY

Proposed RBM mine where PM 10 will be the main pollutants generated in mining activities. The emissions of Sulphur dioxide (SO₂), Oxides of Nitrogen (NO_x) contributed by diesel operated equipment and vehicles movement were considered marginal as branded make and vehicles with PUC certificate will

be operated only. Fugitive dust and particulates are major pollutants which will occur in the mining activities. Fugitive emissions will be settled by 70- 80% by use of multiple water sprinklers. Prediction of impacts on air environment will be made with proposed production and net increase in PM 10 emissions at the proposed site and at the 10 km radius of study area due to mining activities.

Air pollution sources in the operating mine was classified into two categories

- Impact due to wind erosion & road maintenance
- Loading and unloading of mineral and OB, IB
- Transportation on the mule and haul road

Water tankers with spraying arrangement of sprinklers with high efficiency will be used for regular water sprinkling on the mule and haul roads to ensure effective dust suppression. The trucks and tippers are well maintained so that exhaust smoke does not contribute abnormal values of noxious gases and un-burnt hydrocarbons.

(a) Emissions Details

Road maintenance due to mining activities, loading - unloading and transportation of ores and overburden, interburden will be the main polluting sources in the proposed mining activities releasing Particulate Matter (PM₁₀) affecting Ambient Air Quality of the area. Transportation of the ore by tucks on the haul road was calculated by the area source which was combination of line sources with each truck loaded with ore transported over the haul road of the mining area.

PROPOSED MITIGATION MEASURES FOR DUST SUPPRESSION

The Sand, Bajri and Boulder are available everywhere and is being used from the time immemorial for wide applications in our daily life like infrastructure, building construction, highways, roads, townships, multiplexes, foundations of buildings and industrial units etc. and is an integral part of development. The same are as follows:

Control of Fugitive Emissions

- Use of Personal Protection Equipments (PPE) like dust masks, ear plugs etc. by the mineworkers.
- No Blasting will be done.
- Regular water sprinkling on haul roads & loading points will be carried out.
- Development of green belt/plantation around the lease boundary, roads, dumps etc.
- Ambient Air Quality Monitoring will be conducted on regularly basis to assessthe quality of ambient air.

Prevention and control of Gaseous Pollution

- In mining activities, the sources of gaseous emissions would be through truck movements
- Proper maintenance of vehicles improves combustion process & makes reduction in the pollution. Good maintenance and monitoring of fuel and oil will not allow significant addition in the gaseous emission.
- All the vehicles used will have PUC certificate.
- Taxi mode of vehicles carrying mined out material while loading and unloading will not be allowed.

- Vehicles carrying mineral will be covered with tarpaulin sheet. This will prevent dust emission. The sources of pollutants from mining activities are given in **Table-4.3**

Table-4.3 Sources of Pollutants

Sr. No.	Source	Type of Pollutant
1	Transport of Overburden or soil for dumping/ backfill	SPM
2	Dumping of	SPM
3	Loading of ore	SPM
4	Transportation of ore	SPM, NOx

IMPACT ON NOISE ENVIRONMENT

Noise Environment

As mining will be done by machine, noise will only be generated due evacuation, transportation activities. The noise generated by the mining activity dissipates within the mine. There is no major impact of the mining activity on the nearby villages. However, pronounced effect of above noise levels is felt only near the active working area.

The impact of noise on the villages is negligible as the villages are far located from the mine workings. Since there is no involvement of machinery, the impact of noise levels will be minimal.

(a) Noise Abatement and Control

In this mine the noise level will be up to tolerable limit (70 dbA°) and the noise level can be reduced by:

- Proper maintenance, oiling and greasing of transport vehicles at regular intervals will be done to reduce the generation of noise.
- Adequate silencers will be provided in all the diesel engines.
- Plantation along the sides of approach roads, around office building and mine area will be done to minimize the propagation of noise.
- Personal Protective Equipments (PPE) like earmuffs/earplugs will be provided to all operators and employees working near mining machineries or at higher noise zone.
- Periodical noise level monitoring will be done.

Frequency levels and associated mental and physical response of humans are given in Table- 4.4.

Table-4.4: Noise Exposure Levels & Its Effects

Noise Levels	Exposure Time	Effects
85	Continuous	Safe
85-90	Continuous	Annoyance and irritation

90-100	Short term	Temporary shift in hearing threshold, generally with complete recovery
Above 100	Continuous	Permanent loss of hearing
	Short term	Permanent hearing loss can be avoided
100-110	Several years	Permanent deafness
110-120	Few months	Permanent deafness
120	Short term	Extreme discomfort
140	Short term	Discomfort with actual pain
150 and above	Single exposure	Mechanical damage to the ear

GREENBELT AND PLANTATION

Proposed Plantation at the Mine Site

The main aim of plantation in the mined out areas is to stabilize the land to protect it from rain wash off and wind erosion. The plantation scheme broadly covers the following areas:

Greenbelt and Plantation will be raised in and near Village Panchayat land with the permission of Village Panchayat in consultation with the local DFO/Agriculture department. Around 2453 plants will be planted in the plan period.

Greenbelt Development in ML area

The entire plantation will be done in and near Village Panchayat land with the permission of Village Panchayat. Precautionary measures will be taken for care of the forestation made by regular watering in the plantation area, to protect from grazing animals and proper manuring.

Trees Planted: Peach (Khumani), Pears (Nashpati), Apricot (Aaru), Faliyat, Surai etc.

Shrubs: Ghingarau with a few Jhitalu, Kilmora and Hisalu etc. occurs in the depressions.

Further trees will be also selected from the plants recommended for afforestation is as per Guidelines for Developing Greenbelts, CPCB, and March 2000.

Table-4.6: Species Suggested for Plantation

Sl.N o.	Species	Family	Habit
1.	<i>Alternanthera paronychioides</i>	Amaranthaceae	Herb
2.	<i>Alternanthera pungens</i>	Amaranthaceae	Herb
3.	<i>Amaranthus spinosus</i>	Amaranthaceae	Herb
4.	<i>Colocasia esculenta</i>	Araceae	Herb

5.	<i>Ageratum conyzoides</i>	Asteraceae	Herb
6.	<i>Grangea maderaspatana</i>	Asteraceae	Herb
7.	<i>Parthenium hysterophorus</i>	Asteraceae	Herb
8.	<i>Cassia tora</i>	Fabaceae	Herb
9.	<i>Cannabis sativa</i>	Cannabaceae	Herb
10.	<i>Chenopodium album</i>	Chenopodiaceae	Herb
11.	<i>Argemone Mexicana</i>	Papaveraceae	Herb
12.	<i>Brachiaria ramosa</i>	Poaceae	Herb
13.	<i>Cynodon dactylon</i>	Poaceae	Herb
14.	<i>Eleusine indica</i>	Poaceae	Herb
15.	<i>Eragrostis tenella</i>	Poaceae	Herb
16.	<i>Saccharum spontaneum</i>	Poaceae	Herb
17.	<i>Physalis minima</i>	Solanaceae	Herb
18.	<i>Calotropis procera</i>	Asclepiadaceae	Shrub
19.	<i>Cassia occidentalis</i>	Fabaceae	Shrub
20.	<i>Croton bonplandianum</i>	Euphorbiaceae	Shrub
21.	<i>Abutilon indicum</i>	Malvaceae	Shrub
22.	<i>Bougainvillea spectabilis</i>	Nyctaginaceae	Shrub
23.	<i>Ziziphus mauritiana</i>	Rhamnaceae	Shrub
24.	<i>Datura innoxia</i>	Solanaceae	Shrub
25.	<i>Solanum virginianum</i>	Solanaceae	Shrub
26.	<i>Lantana camara</i>	Verbenaceae	Shrub
27.	<i>Berberis vulgaris</i>	Berberidaceae	Shrub
28.	<i>Mangifera indica</i>	Anacardiaceae	Tree
29.	<i>Ficus racemosa</i>	Moraceae	Tree
30.	<i>Cassia fistula</i>	Fabaceae	Tree
31.	<i>Ricinus communis</i>	Euphorbiaceae	Tree
32.	<i>Albizia lebbek</i>	Fabaceae	Tree
33.	<i>Bauhinia acuminata</i>	Fabaceae	Tree
34.	<i>Butea monosperma</i>	Fabaceae	Tree
35.	<i>Bombax ceiba</i>	Malvaceae	Tree
36.	<i>Azadirachta indica</i>	Meliaceae	Tree
37.	<i>Quercus leucotricophora</i>	Lauraceae	Tree
38.	<i>Melia azedarach</i>	Meliaceae	Tree
39.	<i>Luecena leucocephala</i>	Fabaceae	Tree
40.	<i>Bauhinia variegata</i>	Fabaceae	Tree
41.	<i>Terminalia bellerica</i>	Combretaceae	Tree
42.	<i>Terminalia chebula</i>	Combretaceae	Tree

43.	<i>Morus alba</i>	Moraceae	Tree
44.	<i>Delonix regia</i>	Fabaceae	Tree
45.	<i>Pinus roxburgii</i>	Pinaceae	Tree
46.	<i>Celtis australis</i>	Cannabaceae	Tree
47.	<i>Grewia optiva</i>	Tiliaceae	Tree
48.	<i>Holoptelea integrifolia</i>	Ulmaceae	Tree

BIOLOGICAL ENVIRONMENT

The baseline flora and fauna has been depicted in Chapter-3. There is no National Parks, Sanctuary, Breeding, roosting places or ecologically sensitive areas within the 10 km periphery of the mine lease area. However, most of the area surrounding to project site are covered with forest land.

No loss of forest resource is envisaged due to the project. No medicinal plants exist in the area.

Impact on Biodiversity

Present data have been collected through direct inventory as well as various Government Departments such as forests, agriculture, fisheries, animal husbandry and various offices to establish the pre-project biological environmental conditions. There are no endangered species, wildlife sanctuary, wildlife corridors, faunal migratory routes or eco-sensitive area near the whole study area. Save the flora/fauna around the project area, is one of the basic objective of present project. For this, mine owner agency will plant a good roadside plantation along both side of the mine road.

SOCIO - ECONOMIC ENVIRONMENT

The mine area does not cover any habitation. Hence the mining activity does not involve any displacement of human settlement. The mining operation will not disturb/ relocate any village or need resettlement. Thus no adverse impact is anticipated.

The impact of mining activity in the area is positive on the socio-economic environment of the region. Proposed project will provide employment to local population and preference will be given to the local people whenever there is requirement of man power.

PROBABLE IMPACT ASSESSMENT

Impact on population composition

The impact of the proposed mining project on population composition will be marginal as there will be no major immigration of people from distant areas. Only few skilled and managerial staff will be recruited from outside and the rest will be recruited locally. The PP will ensure that all the unskilled workers deployed for mining activities are local recruits. Further, no mining operation will be carried till it is assured that local people has been recruited and deployed for mining operation.

Impact on employment generation

The proposed mining project is expected to provide Direct and Indirect employment opportunities to local people of different skills and trades. It is a positive impact that needs to be encouraged. It has been estimated that 24 workers of various categories will be employed directly.

The employment potentiality of the project is expected to ameliorate the economic condition of the families of those persons who will get employed in the proposed mining project. Further, the project will provide indirect employment to people who will be involved in segregation of extracted mining materials, petty business and service oriented industries.

Impact on consumption pattern

The field survey has revealed that people in the study generally poverty ridden. Increased household income may slightly change and enhance the consumption pattern of few who are burdened with poverty.

Impact on road development

Movement of trucks and other vehicles to and fro the quarry is expected to increase, when mining will start. There is mule road connectivity from the quarry to existing road. The existing roads connecting the quarry with the state highways are mostly narrow mud roads. There will be mud slide and traffic bottle neck if these roads are not widened and their conditions are not improved by making them paved roads. Hence, there is ample scope for road development in and around the mining areas. It is suggested that concerned department in the Government of the state to undertake widening and strengthening of existing roads connecting the mining sites on priority basis. There should also be budgetary support for road development in and around the mining areas.

Impact on law & Order

As local people will be employed to run the quarry, no law & order problem is envisaged. It is expected that the workers will attend to their duties from their residence and return to their homes after the day's work is over. There would have been law & order problem if the workers were migrants and lived in shanties closed to the mining area.

OCCUPATIONAL HAZARDS AND SAFETY

Occupational safety and health is very closely related to productivity and good employer-employee relationship. The factors of occupational health in RBM Mining project are mainly dust and land degradation. Safety of employees during operation and maintenance etc. shall be as per Mines rules and regulations.

To avoid any adverse effect on the health of workers due to various pollutants, sufficient measures relating to safety and health will also be practiced:

- Provision of rest shelters for mine workers with amenities like drinking water etc.
- All safety measures like use of safety appliances, such as dust masks, helmets, shoes, safety awareness programs, awards, posters, slogans related to safety etc.
- Safety belts will be provided to workers on working on top benches.

- Training of employees for use of safety appliances and first aid in vocational training center.
- Regular maintenance and testing of all equipment as per manufacturers' guidelines.
- Periodical Medical Examination (PME) of all workers by a medical Officer
- First Aid facility is provided at the mine site.
- The mine area will be properly fenced to avoid any inadvertent entry in the mining pit.
- Warning boards and working hours will be displayed at conspicuous places.

PUBLIC HEALTH IMPLICATIONS

With the mitigation measures in relation to air pollution, water pollution, soil contamination and noise pollution proposed to be adopted at the mine along with green belt plantation along the periphery of Mining Lease boundary, it is expected that there will be no impact of mining on the population in the impact zone. However, the following measures shall be adopted:

Health check of all villagers in the immediate vicinity of the mine shall be carried out periodically. Surface water management shall be adopted to ensure that run-off from the mining area does not adversely affect natural water streams or other water bodies.

All water bodies e.g. wells and surface water sources in the vicinity of the mine, shall be periodically tested for any pollution related to mining operations and remedial action taken, if warranted.

Operators of all transport vehicles shall be instructed not to honk unnecessarily and not over speed while passing through villages or near schools.

CORPORATE SOCIAL RESPONSIBILITY

Corporate Social Responsibility (CSR) refers to responsibility of a company to ensure positive impact on environment, consumers, employees, communities, stakeholders and all other members of public sphere. The CSR activities are increasingly being taken up by the project proponents not only as fulfilling of mandatory provisions but also for the formation and or enhancement of brand image. Besides the above, CSR is seen more as a responsibility towards society rather than a business promotion activity. It is the need of the day for expansion of occupational welfare. The activities to be undertaken for the local people under CSR have already been identified. It is expected that this will improve the socio-economic status of the local people and at the same time the popularity of the mining project will enhance. It is proposed to spend five percent of the total cost of the project for the benefits of the local community under CSR activities. The amount earmarked for CSR activities has been worked out to Rs. 3.50 Lacs. It is proposed to spend the above amount during the first five years of the commissioning of the mining project. Based on 'Community Needs Survey' conducted in the study area by the Consultant appointed by the company the following activities are proposed to be taken up for the benefits of the local community.

The list of activities proposed to be taken up is indicated below:

- Health Camps
- Construction of Bus stop shelters
- Distribution of Books and Notebooks among meritorious girl child belonging to Scheduled Caste and Scheduled Tribe population
- Cleaning of Tanks in selected villages

- Repair and Painting of School Building in the project village

Table 4.7: funds allocation of for the various activities proposed to be taken up under CSR programme

S. No.	Activity	Cost per Unit (Rs)	Quantity	Total (Rs.)
1.	Installation of Hand pump for nearby Villagers	80,000	01	80,000
2.	Installation of Solar street light in nearby Villages	20,000	05	100,000
3.	Construction of Toilets for Women in nearby villages	69,000	01	69,000
4.	Distribute Stationary nearby School	26,000		26,000
	Total Proposed CER Cost			149,000

For each activity the funds to be earmarked by the proponent will be decided after discussion with the local authority and the beneficiaries. It has been planned to undertake a concurrent evaluation of the activities to be taken up under the CSR programme.

CHAPTER-5

ANALYSIS OF ALTERNATIVE TECHNOLOGY AND SITE

Site Alternatives under Consideration

Over the millennia, the weathering effect, the flow of water at high velocities in rivers and the pressure of water from the high mountainous reservoirs converted and pushed the hard ground underneath into sand, gravel etc. which travelled as sediments with the flow. This sand gets deposited along the river course wherever conditions were favorable. In deep past this settled sand was not extracted in a quantity in which it is deposited, since due to less population the requirement was not enough. As a result of continuous deposit of sand, bajri etc, the river course continued changing by widening itself, eroding the fields and expanding. This started resulting in floods, inundation and breaking their banks, causing devastation of property and loss of life. The mining projects are site specific as such alternate sites were not considered.

Analysis of Alternative Technology Choice of Method of Mining

Factors in the choice of an actual mining method for a given deposit are deposit characteristics, percentage recovery, requirement of health and safety and environmental concerns, production, scheduling scope of mechanization and automation, workforce requirements wage rates, and land reclamation, operating and capital cost estimates. The selection of the mining method (development and extraction) is a key decision to be made in the opening up of a mine.

Surface or open pit mining is used for large, near-surface mineral deposits. Mineral is excavated, loaded into trucks, and hauled to a facility where it is crushed and ground to a uniform size for further processing. Surface mining requires the removal and disposal of layers of top soil and underlying rock commonly called the overburden. Mining must be planned so that the combine of mining processing and reclaiming the land is taken up concurrently.

The open cast mining method will be adopted because of the following reasons: The opencast mining operations ensure higher mineral conservation.

Taking into consideration the matrix of deposit in the river bed and the targeted production, the mine will be worked by fully manual opencast method for collection of Minor Minerals Draft EIA Report of Sand Bajri

Boulder Mining Project Khata No: 109: Khasra No: 1, 17 22ma, 23ma, 84ma, Area: 5.83 ha Village-Jhalakudi, Tehsil- Poornagiri District-Champawat (Uttarakhand). The project does not involve any processes such as overburden removal, drilling, blasting and beneficiation. The proposed mining method is conventional opencast river bed mining primarily involves scooping the mineral through use of implements like spade, pick axe and shovel etc. and requires no drilling & blasting. Proposed mining will be started from higher levels to lower levels through phase wiser block wise, going to the maximum depth of 30m below ground levels then or observe ground water level whichever is less Length of the block may be decided on the spot convenience. The loading of mineral shall be done manually and transported by truck to the storage points located outside the mine.

CHAPTER-6 ENVIRONMENTAL MONITORING PROGRAMME

Introduction

The industrial development of any area needs to be intertwined with judicious utilization of non-renewable resources of the study area and within the limits of permissible assimilative capacity. The assimilative capacity of the study area is the maximum amount of pollution load that can be discharged into the environment without affecting the designated use and is governed by dilution, dispersion and removal due to physico-chemical and biological processes.

The Environment Monitoring Programme is required to ensure sustainable development in the study area (10 km) of the project site, hence it needs to be an all encompassing plan for which the plant authorities, Government, Regulating agencies like Pollution Control Board etc. working in the region and more importantly the affected population of the study area need to extend their co-operation and contribution.

Implementation Schedule of Mitigation Measures

The mitigation measures suggested in Chapter-4 will be implemented so as to reduce the impact on the environment due to the operations of the proposed project. Implementation schedule of mitigation measures is given in **Table-6.1**.

Table-6.1 Implementation Schedule

Sr. No.	Recommendations	Time Requirement	Schedule
1	Air pollution control measures	Before commissioning of respective units	Immediate
2	Water pollution control measures	Before commissioning of the mine	Immediate
3	Noise control measures	Along with the commissioning of the mine	Immediate
4	Ecological preservation and up gradation	Stage-wise implementation	Immediate & Progressive

Administrative Aspects & Environmental Monitoring Program

Regular monitoring of environmental parameters is of immense importance to assess the status of environment during project operation. With the knowledge of baseline conditions, the monitoring programme will serve as an indicator for any deterioration in environmental conditions due to operation of the project, to enable taking up suitable mitigatory steps in time to safeguard the environment. Monitoring is as important as that of control of pollution since the efficiency of control measures can only be determined by monitoring.

Usually, as in the case of the study, an Impact Assessment study is carried over short period of time and the data cannot bring out all variations induced by the natural or human activities. Therefore, regular monitoring programme of the environmental parameters is essential to take into account the changes in the environmental quality.

Institutional Arrangements for Environment Protection and Conservation

The mine will be supervised and controlled by an independent Mines Manager supported by adequate team of technically and statutorily qualified personnel apart from the operating staff of skilled, semi-skilled, unskilled and other categories.

This Environment Cell is responsible for the management and implementation of the environmental control measures. Basically, this department will supervise the reclamation planning & management, air & water pollution control management, dealing with State & Central Statutory agency & Committee.

In case the monitored results of environmental pollution are found to exceed the allowable limits, the Environment Management Cell will suggest remedial action and get these suggestions implemented through the concerned authorities.

The Environment Management Cell will also co-ordinate all the related activities such as collection of statistics of health of workers and population of the region, afforestation and greenbelt development. The Environment Management Cell will review Corporate Environmental performance along with the reporting of non-compliances.

Environment Monitoring Programme

Monitoring shall confirm that commitments are being met. This may take the form of direct measurement and recording of quantitative information, such as amounts and concentrations of discharges, emissions and wastes, for measurement against corporate or statutory standards, consent limits or targets. It may also require measurement of ambient environmental quality in the vicinity of a site using ecological/biological, physical and chemical indicators. Monitoring may include socio-economic interaction, through local liaison activities or even assessment of complaints. The environmental monitoring will be conducted in the mine operations as follows:

- Air quality;
- Water and wastewater quality;
- Noise levels;
- Soil Quality; and
- Greenbelt Development

The details of post project monitoring is presented in **Table 6.1**

Reporting Schedules

Project monitoring will be carried during operation phase as per conditions stipulated in environmental clearance letter issued by MoEF, consent issued by SPCB as well as according to CPCB guidelines. The project site is considered as core zone and the area lying within 10 km radius from the mine site is considered as buffer zone, where some impacts may be observed on physical and biological environment.

Table-6.2 Post Project Monitoring Programme.

Attributes	Sampling		Measurement Method	Test Procedure
	Network	Frequency		
A. Air Environment				
Pollutants PM _{2.5} , PM ₁₀ SO ₂ NO ₂	6 locations in the project impact area (Minimum 3 Locations in upwind side, 3 sites in Downwind side / impact zone and 1 in core zone)	Once in a season.	Gravimetric method	-
			Gravimetric method	-
			EPA Modified West & Geake method	Absorption in Potassium Tetra Chloromercurate followed by Colorimetric estimation using P-Rosaniline hydrochloride and Formaldehyde (IS: 5182 Part - II).
			Arsenite modified Jacob Hochheiser	Absorption in dil. NaOH and then estimated colorimetrically with sulphanilamide and N (I-Nephthyle) Ethylene diamine Dihydrochloride and Hydrogen Peroxide (CPCB Method).
B. Water Environment				

pH, Turbidity,	Set of grab	Diurnal and	As per IS	Samples for water
Colour, Odour, Taste, TDS, Total Hardness, Calcium hardness, Magnesium hardness, Chloride, Fluoride, Sulphate, Nitrates, Alkalinity, Iron, Copper, Manganese, Mercury, Cadmium, Selenium, Arsenic, Cyanide, Lead, Zinc, Chromium, Aluminum, Boron, Phenolic Compounds	Samples during pre and post-monsoon for ground and surface Water in the vicinity.	Season wise	10500	quality should be collected and analyzed as per : IS : 2488 (Part 1-5) methods for sampling and testing of Industrial effluents Standard methods for examination of water and wastewater analysis published by American Public Health Association.
C. Noise				
Noise levels at Day & night time - Leq dB (A)	Mine Boundary , High noise generating areas within the lease	Quarterly / Half yearly	As per CPCB norms	As per CPCB norms
D. Soil				
pH, Bulk Density, Soil texture,	3 locations in the project impact area	Yearly/half yearly	As per USDA Method	As per USDA Method

Nitrogen, Available Phosphorus,				
Potassium, Calcium, Magnesium, Sodium, Electrical Conductivity, Organic Matter, Chloride				
E. Socioeconomic				
Demographic structure Infrastructure resource base Economic resource base Health status: Morbidity pattern Cultural and Aesthetic attributes Education	Socioeconomic survey is based on proportionate, stratified and random sampling method	Minimum for two phases of the project	Primary	Secondary data from census records, statistical hard books, topo sheets, health Records and relevant official records available with Govt. Agencies

CHAPTER – 7 ADDITIONAL STUDIES

PUBLIC CONSULTATION

As this is Draft EIA to conduct public hearing. The minutes of public hearing will be added on in Final EIA

Risk Assessment

The complete mining operation will be carried out under the management control and direction of a qualified mine manager. Moreover, mining staff will be sent to refresher courses from time to time to keep them alert.

In order to take care of above hazard/disasters, the following control measures will be adopted:

- All safety precautions and provisions of Mine Act 1951, Metalliferous Mines Regulations 1961 and Mines Rules, 1955 will be strictly followed during all mining operations;
- Entry of unauthorized persons will be prohibited;
- Fire fighting and first-aid provisions in the mines office complex and mining area;
- Provisions of all the safety appliances such as safety boot, helmets, goggles etc. will be made available to the employees and regular check for their use;
- Training programmes for all the employees working in hazardous premises; Under Mines rules all employees of mines shall have to undergo the training at a regular interval;
- Working of mine, as per approved plans and regularly updating the mine plans;
- Regular maintenance and testing of all mining equipment as per manufacturer's guidelines;
- Suppression of dust on the haulage roads and loading & unloading points ;
- Increasing the awareness of safety and disaster through competitions, posters and othersimilar drives.

Blasting

No drilling & blasting is proposed as mineral is very soft in nature.

Overburden & Interburden

The overburden and interburden dumps may cause landslides. High overburden dumps created at the quarry edge may cause sliding of the overburden and interburden dump or may cause failure of the pit slope due to excessive loading, thereby causing loss of life and Property. Siltation of surface water may also cause run-off from overburden and interburden dumps.

Machinery

Machinery is involved, entire operation will be semi mechanized, accident during transport by trucks is often attributable to mechanical failures and human errors.

Water Logging

Water logging in the mine site can be avoided by adopting following measures:

- Due care will be taken to provide retaining/toe wall around the pits.
- Proper drainage will be maintained to eliminate inundation of working pits during rains from run-off water.
- There is no danger of flood or inundation as the ground level.
- Mining operations are not carried below the ground water table; therefore, there will be no disturbance to ground water quality due to mining activity.

Natural resource conservation

- A green belt will be developed so that minimum soil erosion takes place.
- The excavated soil will be refilled in order to minimize the impact on environment.
- In any case the natural habitats of the existing flora and fauna will not be disturbed.
- Use of traditional knowledge in all aspects of conservation.
- Water conservation techniques will be employed.
- Time to time analysis of the soil, water resources etc will be done in order to analyze the negative impacts of mining activities on the environment.
- To prepare management plans for village landscapes. Villages to be seen as landscapes of diverse elements such as forests, scrub, grassland, streams/river, ponds etc.

Earthquake Management Plan

Following measures will be undertaken:

- The project site is a hilly area. There will be no drilling and blasting during mining.
- The overall slope angle of the upper pit wall will be kept to 45° & bench height would be 6m.

Flood Management Plan

- This is a RBM mining project and the site is not close by to a water body so water bodies in the area will not be disturbed.

Natural resource conservation

- A green belt will be developed so that minimum soil erosion takes place.
- The excavated soil will be spread over the backfilled mined out area in order to minimize the impact on environment.
- In any case the natural habitats of the existing flora and fauna will not be disturbed.
- Use of traditional knowledge in all aspects of conservation shall be utilized.
- Water conservation techniques will be employed.
- Time to time analysis of the soil, water resources etc will be done in order to analyze the negative impacts of mining activities on the environment.

- To prepare management plans for village landscapes, villages to be seen as landscapes of diverse elements such as forests, scrub, grassland, streams/river, ponds etc. The dynamics of the village as an ecosystem to be assessed, corridors to be devised between major natural landscape elements, so as to facilitate movement of species.

Safety Measures

➤ **Safety Measures at the proposed Open Cast Mining Project**

- The opencast mines have been planned for working with shovel tipper system which requires proper benching not only for slope stability but also for movement of tippers and other machinery. The inclination of the quarry sides at the final stage i.e. at the dip most point will not exceed 45° to the horizontal. (This angle is measured between the line joining the toe of the bottom most bench to the crest of the top most bench and the horizontal line);
- The quarries will be protected by garland drains around the periphery for storm water drainage;
- A minimum safe distance of 100-m will be kept between the surface edge of the quarry and the nearest public building, roads etc.

➤ **Measures Suggested to Avoid Accidents due to Blasting**

- No drilling & blasting is proposed as mineral is very soft in nature.

➤ **Measures to Prevent the Danger of Overburden**

- To prevent the failure of overburden slopes, especially during the rainy season, proper garland drain & bund are constructed around the dump.

➤ **Measures to Prevent Accidents due to Trucks and Tippers**

- All transportation within the main working area should be carried out under the direct supervision and control of the management.
- The vehicles must be maintained in good repairs and checked thoroughly at least once a week by a competent person authorized for this purpose by the management;
- Broad signs should be provided at each and every turning point specially for the guidance of the drivers at night;
- To avoid dangers while reversing the trackless vehicles, especially at the embankment and tripping points, all areas for reversing of lorries should, as far as possible, be made man free, and there should be a light and sound device to indicate reversing of trucks;
- A statutory provision of the fence, constant education, training etc. Will go a long way in reducing the incidence of such accidents.

Disaster Management Plan Objectives of Disaster Management Plan

The Disaster Management Plan is aimed to ensure safety of life, protection of environment,

protection of installation and restoration of production. For effective implementation of the Disaster Management Plan, it should be widely circulated and personnel training should be given.

The objective of the Disaster Management Plan is to make use of the combined resources of themine and the outside services to achieve the following:

- Effect the rescue and medical treatment of casualties;
- Safeguard other people;
- Minimize damage to property and the environment;
- Initially contain and ultimately bring the incident under control;
- Secure the safe rehabilitation of affected area;

In effect, it is to optimize operational efficiency to rescue rehabilitation and render medical help and to restore normalcy.

Fire Fighting Facilities

Sufficient fire extinguishers will be installed at selected locations such as mine office, garage, stores etc.

Emergency Medical Facilities

An ambulance with driver availability in all the shifts, emergency shift vehicle would be ensured and maintained to transport injured or affected persons. Number of persons would be trained in first aid so that, in every shift first aid personnel would be available.

CHAPTER 8

ENVIRONMENT MANAGEMENT PLAN

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

The aims of EMP are:

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

Air Quality Management

Over the millennia, the weathering effect, the flow of water at high velocities in rivers and the pressure of water from the high mountainous reservoirs converted and pushed the hard ground underneath into sand, gravel etc. which travelled as sediments with the flow. This sand gets deposited along the river course wherever conditions were favorable. In deep past this settled sand was not extracted in a quantity in which it is deposited, since due to less population the requirement was not enough. Use of Personal Protection Equipments (PPE) like dust masks, ear plugs etc. by the mine workers.

- Regular water sprinkling on haul roads & loading points will be carried out.
- Development of green belt/plantation around the lease boundary, roads, dumps etc.
- Ambient Air Quality Monitoring will be conducted on regularly basis to assess the quality of ambient air.

Prevention and control of Gaseous Pollution

Proper maintenance of machines improves combustion process & makes reduction in the pollution. Good maintenance and monitoring of fuel and oil will not allow significant addition in the gaseous emission.

Noise Pollution Control Noise Abatement and Control

- Proper maintenance, oiling and greasing of machines at regular intervals will be done to reduce the generation of noise.
- Adequate silencers will be provided in all the diesel engines.
- Plantation along the sides of approach roads and mine area will be done to minimize the propagation of noise.
- Personal Protective Equipments (PPE) like earmuffs/earplugs will be provided to all operators and employees working near mining machineries or at higher noise zone.
- Periodical noise level monitoring will be done.

Water Quality Management

Water for drinking and operations is required to be 8.5 KLD. It is proposed to obtain water for drinking and plantation from spring under the scheme of Swajal Dhara (Govt. of India).

Waste Management

Nature of waste: The quantum of wastes removed is given in mine plan attached as annexure.

Selection of Dumping Site:

All the quantities of soil & interburden material to be generated will be used in the purpose of reclamation. The soil and interburden is stacked separately. The interburden and interburden will be filled back on the pit and later on soil will be spread over the interburden material to restore the maximum original topography of the area. Therefore soil stack and interburden material have not been proposed to be dumped separately.

Biological Management Measures

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 plantation are as follows:-

- Improvement of Soil quality
- Quick vegetative cover to check soil erosion
- Improvement in mining site stability
- Conservation of biological diversity
- As dust receptor which likely to produce during mining

Greenbelt Development Plan

Green belt is plantation of trees for reducing the pollution as they absorb both gaseous and particulate pollutant, thus removing them from atmosphere. Green plants form a surface capable of absorbing air pollutants and forming sinks for pollutants. It improves the aesthetic value of local environment. Under present project, green belts have been planned with emphasis on creating biodiversity; enhance natural surroundings and mitigating pollution. The greenbelt development plan aims to overall improvement in the environmental conditions of the region. The plan with a five-fold objective addresses issues such as providing sink for air pollutants likely to emit from the project enhancing the forest cover for increasing the biodiversity of the region; providing aesthetic value to the project area enhancing the ecological equilibrium of the area; and to a large proportion in combating soil erosion.

- Afforestation on degraded forest area, forest protection / conservation will be carried out every year by the mine owner.
- This helps in regeneration & establishment of pioneer plant species saving expose land & land cutting
- It will improve the aesthetic beauty of the area.

Plantation will be raised at a spacing of 7.5m along the boundaries of the mining lease by planting the native species around ML area, backfilled and reclaimed area, around water body, roads etc. in consultation with the local DFO/Agriculture department.

The following characteristics should be taken into consideration while selecting plant species for green belt development and tree plantation.

- They should be fast growing and tall trees.
- They should be perennial and evergreen.
- They should have thick canopy cover.
- Plantation should be done in appropriate alternate rows around the proposed site to prevent

Lateral pollution dispersion.

- The trees should maintain regional ecological balance and conform to soil and hydrological conditions. Indigenous species should be preferred

The suggestive measures under EMP are given in Table below

Table 8.1: Key suggestive measures under EMP

Impact Predicted	Suggestive measure
Disturbance of forest movement/living of wildlife fauna	<ul style="list-style-type: none"> • Awareness camps will be conducted for labours to make them aware about sensitivity/importance of forest life • No tract or new road for movement of labours or vehicles be laid in reserve forest area, this will prevent forest fragmentation, encroachment and human – animal encounter • Care will be taken that noise produced during vehicle movement for carrying materials are within the permissible noise level. Higher noise level in the forest area will lead to restless and failure in detection of calls of mates and young ones • Care will be taken that no hunting of animals carried out by labours • If wild animals are noticed crossing the core zone, it will not be disturbed at all • Labours will not be allowed to discard food, plastic etc which can attract animals near the core site • Only low polluting vehicle will be allowed for carrying of materials. All vehicles allowed in the project site area will have to provide pollution under control certificate at the end of three months • No honk will be allowed in the forest area, noise level will be within permissible limit (silent zone-50dB during day time) as per noise pollution (regulation and control), rules, 2000, CPCB norms
Harvesting of forest flora	<ul style="list-style-type: none"> • No tree cutting, chopping, lumbering, uprooting of shrubs and herbs should be allowed • No piling of ore material should in the reserve forest area • Collections of economically important plants will be fully

	restricted
--	------------

Occupational Hazards and Safety

Occupational safety and health is very closely related to productivity and good employer- employee relationship. The factors of occupational health in the proposed RBM Mine are mainly dust and land degradation. Safety of employees during operation and maintenance etc. shall be as per Mines rules and regulations.

To avoid any adverse effect on the health of workers due to various pollutants, sufficient measures relating to safety and health will also be practiced:

- Provision of rest shelters for mine workers with amenities like drinking water etc.
- All safety measures like use of safety appliances, such as dust masks, helmets, shoes, safety awareness programs, awards, posters, slogans related to safety etc.
- Training of employees for use of safety appliances and first aid in vocational training center.
- Regular maintenance and testing of all equipment as per manufacturers' guidelines.
- Periodical Medical Examination (PME) of all workers by a medical Officer
- First Aid facility is provided at the mine site.
- Close surveillance of the factors in working environment and work practices which may affect environment and worker's health.
- Working of mine as per approved mining plan and environmental plans.

Environmental Policy

The Owner believes that responsible environmental stewardship comprises diligent application of well-established natural resource management, controls and practices for the protection, reclamation of the mined out land, preservation of biodiversity and proper disposal of waste following the best environmental practices during the process of mining of RBM.

Environmental policy prescribed for standard operating process to bring into focus any violation/deviation of the environment and forest norms/conditions that the company operations will implement operational and risk management practices that provide for maximum protection of people and the environment. To this end, the owner resolves that company will follow the below mentioned practices:

Operate in accordance with prescribed industry standards while complying with all applicable environmental, health and safety laws and regulations.

- Establish and maintain a well-defined environmental, health and safety management

System to guide its operations.

- Ensure that all employees, officers and directors understand and adhere to its environmental, health and safety management program.
- Provide operations with the necessary resources, expertise and training to effectively carry out its EHS management programs.
- Engage employees at all levels in programs directed towards minimizing adverse effects on the environment resulting from mining activity.
- Work proactively with governments and the public in the development of cost effective and realistic regulations that promote enhanced environmental, health and safety protection.
- Promote environmental awareness among its employees, their families and the communities in which it operates.
- Require those who provide services and products to practice good environmental stewardship.
- Mitigate its environmental impacts through efficient use of resources, and the reduction of input materials and waste.
- Maintain a high degree of emergency preparedness

Budget

It is necessary to include the environmental cost as a part of the budgetary cost component. The project authorities propose to undertake the following environmental works to achieve the environmental quality as desired. The total project cost & budget for environmental protection has been formulated approx 20 lakh.

CER Project Details

It is proposed to provide financial assistance of Rs 0.4 lakh(i.e. Rs 40 Thousand) for the development of social infrastructure of the area. Following measure will be taken to improve the Social infrastructure of the study area:

- Health Camps & medical care facilities for rural population shall be promoted.
- Distribution of Books and Notebooks among meritorious girl child belonging to Scheduled Caste and Scheduled Tribe population.
- Up gradation of toilets of government school in nearby villages.
- Repair and Painting of School Building in the project village assisting social forestry programme.

Conclusion

As discussed, it is safe to say that the project is not likely to cause any significant impact on the ecology of the area, as adequate preventive measures will be adopted to contain the various pollutants within permissible limits. Green belt development around the area will also be taken up as an effective pollution mitigative technique, as well as to control the pollutants released from the premises of Draft EIA Report of Sand Bajri Boulder Mining Project Khata No: 109: Khasra No: 1, 17 22ma, 23ma, 84ma, Area: 5.83 ha Village-Jhalakudi, Tehsil- Poornagiri District-Champawat (Uttarakhand).

CHAPTER – 9 PROJECT BENEFITS

Improvement in the Physical Infrastructure

The impact on the civic amenities will be substantial after the commencement of mining activities. The basic requirement of the community needs will be strengthened by extending health care, educational facilities developed in the township to the community, providing drinking water to the villages, building/strengthening of existing roads in the area. The proponent will initiate the above amenities either by providing or by improving the facilities in the area, which will help in uplifting the living standards of local communities.

Medical facilities will be provided in the form of first-aid facility at the mine. These medical facilities will also be available to local people in the surrounding in case of emergencies.

Improvement in the Social Infrastructure

- Generation of employment and improved standard of living;
- Increased revenue to the State by way of royalty, taxes and duties; and
- Superior communication and transport facilities etc.
- There will be significant change in the socio-economic scenario of the area.
- The proposed project will enhance the prospects of employment. Recruitment for the unskilled and semiskilled workers for the proposed project will be from the nearby villages.
- The development of the basic amenities viz. roads, transportation, electricity, drinking water, proper sanitation, educational institutions, medical facilities, entertainment, etc. will be developed as far as possible.
- Overall the proposed project will change living standards of the people and improve the socio-economic conditions of the area.

Employment Potential

- Future production planning does not indicate some change from present, in the employment. The number of unskilled labour may increase depending on the quantum of overburden removal and mineral excavation. The lessee has employed miners for raising ores & removal of overburden, quarry cleaning & road repairing. The details of employment are given in mine plan.

The employment of local people in primary and secondary sectors of project will upgrade the prosperity of the region. These will in-turn improves the socio-economic conditions of

The area. The total manpower required for the proposed mining project under various categories is 41 persons and persons will be mainly sourced from local community in and around mining project and few technical persons will be employed during operational phase from local and also from outside area. In addition to the above, contractual labour and indirect employment opportunities will also be getting benefited after installation of mining project.

Policy and Action Plan on Social Responsibility

A detailed Community Social Responsibility plan has been prepared and the details of the report are given below.

CSR Project Details

RBM mine has proposed to provide financial assistance of Rs. 4.23 lakh for the development of social infrastructure of the area.

Following measure will be taken to improve the Social infrastructure of the study area:

- Health Camps & medical care facilities for rural population shall be promoted.
- Distribution of Books and Notebooks among meritorious girl child belonging to Scheduled Caste and Scheduled Tribe population.
- Up gradation of toilets of government school in nearby villages.
- Repair and Painting of School Building in the project village assisting social forestry programme.

Conclusion

As discussed, it is safe to say that the project is not likely to cause any significant adverse impact on the ecology of the area, as adequate preventive measures will be adopted to contain the various pollutants within permissible limits. Green belt development around the area will also be taken up as an effective pollution mitigative technique, as well as to control the pollutants released from the premises of the RBM mine

Chapter -10

Environment Cost Benefit Analysis

INTRODUCTION

The Sand, Bajri and Boulder are available everywhere and is being used from the time immemorial for wide applications in our daily life like infrastructure, building construction, highways, roads, townships, multiplexes, foundations of buildings and industrial units etc. and is an integral part of development. Over the millennia, the weathering effect, the flow of water at high velocities in rivers and the pressure of water from the high mountainous reservoirs converted and pushed the hard ground underneath into sand, gravel etc. which travelled as sediments with the flow. This sand gets deposited along the river course wherever conditions were favorable. In deep past this settled sand was not extracted in a quantity in which it is deposited, since due to less population the requirement was not enough. As a result of continuous deposit of sand, bajri etc, the river course continued changing by widening itself, eroding the fields and expanding. This started resulting in floods, inundation and breaking their banks, causing devastation of property and loss of life. There has been a severe impact on every aspect of the environment. Thus there was a need for channelization of rivers for which extraction of sand through mining was expedient. The haphazard mining of river bed material being practiced for now long through unregulated, uncontrolled and illegal manner added almost an irreversible damage to the environment, which became a cause of serious concern. Though sand is very important mineral source for development, its mining through scientific methods have also become equally imperative. It is for this purpose that 'mining plan' is being drawn so that all its aspects are taken care of justifiably, according to law, protecting the environment, removing all adverse impacts and creating a direct and indirect employment opportunities, improving socio-economic conditions of the local inhabitants and all round status of life, achieving thereby a sustainable development. Besides above, the process of mining of minor minerals is a constant source of revenue generation to the State Government to Royalty..

ECONOMIC AND FINANCIAL ANALYSIS

An Economic analysis is conducted from the perspective of the community as a whole. It focuses on "real" resource costs and benefits, including any "external" environmental costs and benefits that affect the broader community.

In Financial analysis, from a private perspective, similar concepts apply as in the economic analysis, but the benefits and costs are estimated in terms of the financial benefits received and costs borne by private producers. Because the financial analysis focused only on the Soap stone dredge owners'

private financial prospects and did not take into account externalities or external environmental costs, it is inadequate in determining the efficiency of resource allocation.

Quantitative Analysis

Financial analysis

The total profit per year that a dredge owner can receive from mining is calculated as follows:

Total Profit = Unit Profit x Extract Volume

Unit Profit = Market Value of 100 m³ of Extracted – Total Costs of Extraction of 100 m³

The market value of was calculated based on the market price of Soap stone; the cost of Soap stone extraction includes cost of labor, fuels, equipment depreciation, and other costs.

Economic analysis

The net benefit that a society receives from mining was calculated as follows:

$$NPV = \sum_{i=0}^n \frac{Bi - Ci}{(1+r)^i}$$

Where NPV is net social benefit from Soap stone mining;

Bi- is the financial benefits of RBM mining for society through the years;

Ci- is the cost of Soap stone mining through the years, including the financial cost (cost of labor, fuel, and equipment that the dredgers have to pay), external costs of riverbank erosion, dike breakage and degradation, agricultural loss, and aqua-resource degradation;

and **r-** is the discount rate.

Qualitative Analysis

The analysis is expected to show if the external cost of current RBM mining does outweigh the combined gains/profits of all the individuals involved in RBM mining. It is out of the scope of the report to quantify the Environmental Cost Benefits resulting from the proposed mining activity, thus a general quantitative description is discussed as under:

Environmental Costs

Expenditures incurred to prevent, contain, mitigate or remove environmental contamination throughout the life cycle of a product or an activity. These costs include remediation or restoration costs, waste management costs or other compliance and environmental management costs. The various environmental costs identified, qualitatively for the Sand Bajri Boulder Mining Project Khata No: 109: Khasra No: 1, 17 22ma, 23ma, 84ma, Area: 5.83 ha Village-Jhalakudi, Tehsil-Poornagiri District-Champawat (Uttarakhand) are:

- ✓ On-site effects such as the erosion
- ✓ Dust and air pollution due to fugitive air emissions
- ✓ Noise pollution due to movement of heavy machinery and transporting vehicles
- ✓ Erosion, soil quality deterioration due to movement of heavy vehicles
- ✓ Spillage of diesel oil from machines and vehicles, which may pollute the soil and may leach to pollute the ground water.
- ✓ Presence of water puddles in lease vicinity and haulage road, thus increase in mosquito-related health problems
- ✓ Breakout of epidemics leading to loss of life. Expenditure on control of these breakouts, vaccines, medicines, scientific research and quarantining the area.
- ✓ Off-site effects include the impairment of rural roads, causing damage to the road infrastructure due to heavy loads carried on weak rural roads.

Environmental Benefits

Expenditures saved on safeguard, management or upkeep of environment, through direct or indirect practices, implemented during the course of life cycle of a product or an activity. In the case of Soap stone mining the environmental benefits are:

1. The proposition is to mine RBM mining from area to cater to the increasing demands of the construction industry. This in turns has a number of benefits:
 - ❖ Prevention of Loss of life
 - ❖ Prevention of Loss of homes or other items of utility
 - ❖ Prevention of Agricultural losses
 - ❖ Prevention of loss of cattle and aquatic resources.

Social Benefits and Associated Environmental Benefits

The proposed mining will generate revenue for the government and for the lease holder. It will generate employment for people, who will work as manual labours on site.

Employment will also be generated for machine operators and truck drivers. The benefits of these are as:

- Generation of employment, thus improvement in life style and increase in standard of living.
- Paradigm shift from environment polluting activities such as burning of woods or coal to cleaner or less polluting fuels such as LPG or electricity, resulting in reduced dust, smoke and GHG emissions.

- Education of masses instills the importance and need of preservation of environment, which in long run, will improve the environmental conditions.
- Revenue generation to Government gives them the opportunity to carry out researches on new improved scientific methods for environmental preservation and sustainable development.

INFERENCE

The Analysis done for Draft EIA Report of Sand Bajri Boulder Mining Project Khata No: 109: Khasra No: 1, 17 22ma, 23ma, 84ma, Area: 5.83 ha Village-Jhalakudi, Tehsil- Poornagiri District-Champawat (Uttarakhand) indicates the balance in favour of Environmental Benefits. That is to say, the financial expenditures incurred in preventing, containing, mitigating or removing environmental contaminations occurring as a result of the proposed mining activity are superseded by the expenditures saved (on environment, both short and long term) as a result of project activity.

EXECUTIVE SUMMARY

PURPOSE OF THE REPORT

Environmental Impact Assessment (EIA) is a decision making tool, in the hands of the Authorities which brings forth the factual position about a project that enables them in arriving at an appropriate conclusion for the proposed projects, to retain them if environmentally sound, and reject if found having deleterious overall impact. EIA identifies the extent of the environmental, social and economic impacts of a project prior to decision-making. EIA systematically examines both beneficial and adverse impacts of the proposed project over and above the prevailing conditions of environmental parameters and ensure that these impacts are taken into account during the project designing stage itself and the values of the combined impacts are never allowed to exceed and remain within the statutory norms. This process has been envisioned and set in motion by the Ministry of Environment and Forests for sustainable development and the final decision is arrived at only, when those to whom it matters are made known of the salient features of the project being envisaged close to them and their opinion has been sought in a widely advertised Public Hearing Event under the chairmanship of the district authorities so that public could also express their opinion free, without favor and fear. Environmental Impact Assessment report is prepared to comply with the Terms of Reference (TOR) received from SEIAA, Uttarakhand, under EIA Notification of the MoEF dated 19-8-2006, and its subsequent amendments and EIA Guidance Manual for Mining of Minerals of MoEF, Govt. of India, for seeking environmental clearance for mining of soapstone in the applied mining lease area measuring 5.83 ha. The proposed project falls under Category "B1" as per EIA Notification 2006 its amendment of the Ministry of Environment and Forests, New Delhi but due to NGT recent order it falls under B1 Category.

INTRODUCTION OF PROJECT & PROPONENT

Mining lease was initially granted to Kumaon Mandal Vikas Nigam Limited (KMVN) Thandi Sadak, Tallital Nainital, , Uttarakhand 263002 for extraction of Sand Bajri and Boulders from a part of Khata No: 109: Khasra No: 1, 17 22ma, 23ma, 84ma, Area: 5.83 ha Village-Jhalakudi, Tehsil- Poornagiri District-Champawat (Uttarakhand) for a period of 10 years, Mining deed was executed on 16 May 1987 between State Government (Uttar Pradesh) & Kumaon Mandal Vikas Nigam Limited (KMVN) Thandi Sadak, Tallital Nainital, , Uttarakhand 263002,

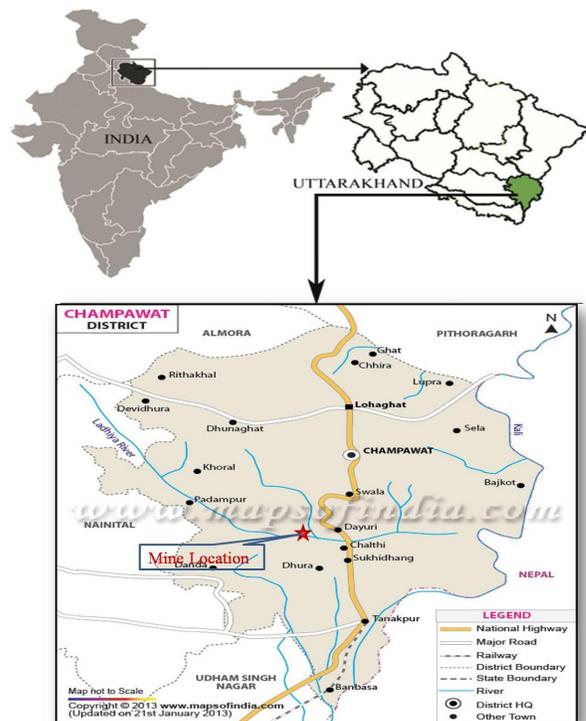
LOCATION

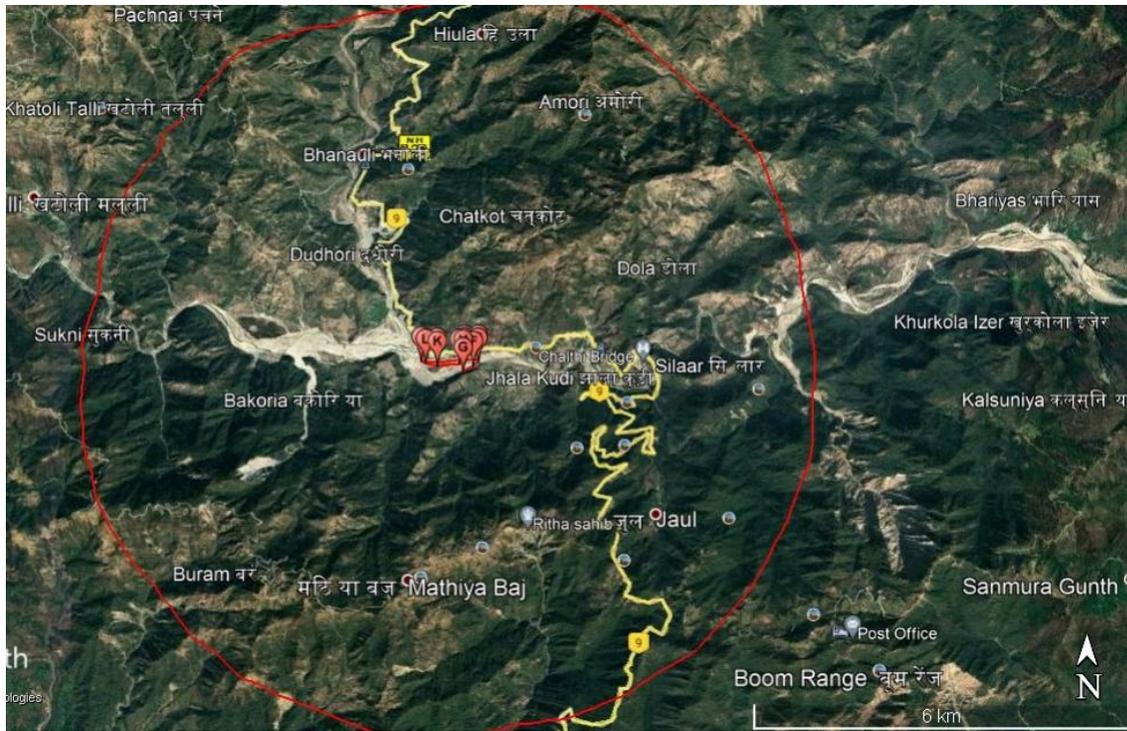
The mining area is located in Khata No: 109: Khasra No: 1, 17 22ma, 23ma, 84ma, Area: 5.83 ha Village-Jhalakudi, Tehsil- Poornagiri District-Champawat (Uttarakhand). The mining lease / proposed project area falls in Survey of India Toposheet.

Details of the Project Location & Surroundings

Sr. No.	Particular	Details		
A.	Nature of the Project	Sand Bajri Boulder Mining Project		
1.	MLArea	5.83 ha		
2.	Proposed Production Capacity	3,32,310 tonnes per annum Total Lease Area -5.83 ha		
3.	Lease Period of Mine	Lease. Period 5.0 yr		
C.	Method of Mining			
1.	Method	Open-Cast semi-mechanized Mining		
2.	Blasting/Drilling	Not proposed		
D.	Project Location			
1.	Village	Village-Jhalakudi		
2.	Tehsil	Poornagiri		
3.	District	Champawat		
4.	State	Uttarakhand		
5.	TopoSheetNo.	-		
6.	Lease Area Coordinates	The area lies		
		Point	latitude	longitude
		A	29°11'47.70"N	80° 3'27.21"E
		B	29°11'47.03"N	80° 3'36.90"E
		C	29°11'48.40"N	80° 3'52.90"E
		D	29°11'48.70"N	80° 4'0.96"E
		E	29°11'47.03"N	80° 4'0.85"E
		F	29°11'45.40"N	80° 3'58.02"E
		G	29°11'42.09"N	80° 3'52.10"E
		H	29°11'46.10"N	80° 3'52.00"E
		I	29°11'46.90"N	80° 3'52.80"E
		J	29°11'46.30"N	80° 3'49.80"E
		K	29°11'45.30"N	80° 3'36.90"E
	L	29°11'46.40"N	80° 3'29.90"E	
E.	Cost Details			
1.	Project Cost	Rs.20.0 Lakh		
F.	Water Demand			
1.	Requirement	8.5 KLD		
2.	Source of water	Nearby villages & natural springs.		
G.	Man Power Requirement	50		

H.	Environmental Setting	
1.	Nearest Village	Naulapani 0.50 km S Jhalakundi 2.50 E
2.	Nearest Town	Tanakpur – 14.50 km (SE) Champawat 16.0 km N
3.	Nearest National/ State Highway	NH-125 about 0.5 * km (W)
4.	Nearest Railway Station	Tanakpur Railway Station- 15.0 km (S)
5.	Nearest Airport	Airport: Pantnagar Airport – 50.0* km (W)
6.	Ecological Sensitive Areas (National Park, Wild Life Sanctuaries ,Biosphere Reserve etc.) within 10 km radius	Danda range 9.0 km SE Boom rang 12.50. SE
7.	Water bodies within 10 km radius of the mine site.	River bank of Ladhiya river Sharad River 13.0 S
8.	Archaeologically important Place	None
9.	Seismic Zone	IV





5.00 km Google Map



1.3 LEASEHOLD AREA

The proposed mine lease area is located at Khata No: 109: Khasra No: 1, 17 22ma, 23ma, 84ma, Area: 5.83 ha Village-Jhalakudi, Tehsil- Poornagiri District-Champawat (Uttarakhand). It has been proposed to collect approximately 3,32,310 tonnes per annum sand/morrum will be extracted by mechanized (OTFM) using EMM and Loaders. There is no National Park, Sanctuary, Elephant/Tiger Reserve, eco-sensitive area, Interstate boundary, migratory routes within 10 km of the project site.

Table 10 Yearly Production of RBM

YEAR	Minable Reserves (Tonnes)
First	3,32,310
Second	3,32,310
Third	3,32,310
Fourth	3,32,310
Fifth	3,32,310
Total	16,61,550

1.4

ESTIMATION OF THE RESERVE

Main aspects of the lease area are as discussed below Total demarcated Area- 5.83 ha (as per Joint Demarcation Report Attached as ann.08) As per Uttarakhand Minor Mineral Policy,

Quantity of ultimate reserve (tonnes) = mining area (5.83 ha) x 3.0 m depth x 2.2 bulk density- 3,32,310 tonnes/year

Deposit/material (in cum) at maximum allowable depth i.e. 3.0m Depth= 3,32,310 • As per the data collected & slice wise mineral assessment/ survey, about 90% of ultimate reserve been considered/planned as annual production quantity i.e. 3,32,310 tonnes: rest about 10% of material available is planned as residue/waste material including Mining loss. (Accordingly planned & backfilled used for river bank protection work & Plantation work).

1.5 PROJECT DESCRIPTION (Technology & Process)

The proposed project is to mine sand from river bed sustainably and scientifically. Mining will be opencast and mechanized (OTFM) using EMM and Loaders, along the river bed keeping both the shores unaffected.

Following geo-scientific methods are proposed to carry out the activity:

- ✓ Mining will be confined to extraction of Sand from the river bed only.
- ✓ Mining of gravelly sand from the river bed will be restricted to a maximum depth of 3mt. from the surface.
- ✓ No drilling, blasting and beneficiation is proposed.
- ✓ Approximately 3,32,310 tonnes per annum minor mineral will be extracted.

- ✓ No mining activity will be undertaken during the monsoon season. So the river bed material will be replenished during the monsoon season every year.
- ✓ The mining activity will be restricted to daytime only in order to avoid environmental pollution or any accidental hazards.
- ✓ The operation will be done by mechanized (OTFM) using EMM and Loaders During the lease period, the deposit will be worked from the top surface of the river bed to 3.0m bgl or above water level whichever is less.

1.6 WATER SUPPLY

Water requirement in this project site is 8.5 KLD. Water will be taken from existing water sources from nearby villages or tanker supplier. The details are incorporated in the EIA/EMP report.

Total Water Requirement= 8.5 KLD

Dust Suppression and Plantation= 7.5 KLD

Domestic Purpose= 1.00 KLD

1.7 BASE LINE DATA

This section contains the description of baseline studies of the 10 km radius of the area surrounding "Sand/Morrum Mine", at Khata No: 109: Khasra No: 1, 17 22ma, 23ma, 84ma, Area: 5.83 ha Village-Jhalakudi, Tehsil- Poornagiri District-Champawat (Uttarakhand) The data collected has been used to understand the existing environment scenario around the proposed mining project against which the potential impacts of the project can be assessed.

Environmental data has been collected in relation to proposed mining for:-

- (a) Air
- (b) Noise
- (c) Water
- (d) Soil
- (e) Ecology and Biodiversity
- (f) Socio-economy

Table 1: BASELINE ENVIRONMENTAL STATUS

Attribute	Baseline status
Ambient Air Quality	Ambient Air Quality Monitoring reveals that the minimum & maximum

	<p>concentrations of PM10 for all the 6 AQ monitoring stations were found to be</p> <table border="1" data-bbox="560 294 1437 632"> <thead> <tr> <th></th> <th>Particulate Matter PM10 ($\mu\text{g}/\text{m}^3$)</th> <th>Particulate Matter PM2.5 ($\mu\text{g}/\text{m}^3$)</th> <th>Sulphur Dioxide SO_2 ($\mu\text{g}/\text{m}^3$)</th> <th>Nitrogen Dioxide NO_2 ($\mu\text{g}/\text{m}^3$)</th> <th>Carbon monoxide CO (mg $/\text{m}^3$)</th> </tr> </thead> <tbody> <tr> <td>Minimum</td> <td>62.37</td> <td>30.64</td> <td>7.35</td> <td>17.03</td> <td>0.51</td> </tr> <tr> <td>Maximum</td> <td>69.84</td> <td>34.89</td> <td>10.92</td> <td>21.86</td> <td>0.59</td> </tr> <tr> <td>Average</td> <td>66.33</td> <td>32.79</td> <td>8.98</td> <td>19.24</td> <td>0.55</td> </tr> <tr> <td>98th Percentile</td> <td>69.81</td> <td>34.81</td> <td>10.68</td> <td>21.74</td> <td>0.59</td> </tr> </tbody> </table>		Particulate Matter PM10 ($\mu\text{g}/\text{m}^3$)	Particulate Matter PM2.5 ($\mu\text{g}/\text{m}^3$)	Sulphur Dioxide SO_2 ($\mu\text{g}/\text{m}^3$)	Nitrogen Dioxide NO_2 ($\mu\text{g}/\text{m}^3$)	Carbon monoxide CO (mg $/\text{m}^3$)	Minimum	62.37	30.64	7.35	17.03	0.51	Maximum	69.84	34.89	10.92	21.86	0.59	Average	66.33	32.79	8.98	19.24	0.55	98 th Percentile	69.81	34.81	10.68	21.74	0.59
	Particulate Matter PM10 ($\mu\text{g}/\text{m}^3$)	Particulate Matter PM2.5 ($\mu\text{g}/\text{m}^3$)	Sulphur Dioxide SO_2 ($\mu\text{g}/\text{m}^3$)	Nitrogen Dioxide NO_2 ($\mu\text{g}/\text{m}^3$)	Carbon monoxide CO (mg $/\text{m}^3$)																										
Minimum	62.37	30.64	7.35	17.03	0.51																										
Maximum	69.84	34.89	10.92	21.86	0.59																										
Average	66.33	32.79	8.98	19.24	0.55																										
98 th Percentile	69.81	34.81	10.68	21.74	0.59																										
<p>Noise Levels</p>	<p>Noise monitoring reveals that the maximum & minimum noise levels at day time were recorded.</p> <p>There are several other sources in the 10 km radius of study area, which contributes to the local noise level of the area. Traffic activities as well as activities in nearby villages and agricultural fields add to the ambient noise level of the area.</p> <table border="1" data-bbox="560 940 1347 1052"> <tbody> <tr> <td>Minimum</td> <td>61.2</td> <td>51.4</td> </tr> <tr> <td>Maximum</td> <td>67.4</td> <td>58.7</td> </tr> <tr> <td>Average</td> <td>64.9</td> <td>55.2</td> </tr> </tbody> </table>	Minimum	61.2	51.4	Maximum	67.4	58.7	Average	64.9	55.2																					
Minimum	61.2	51.4																													
Maximum	67.4	58.7																													
Average	64.9	55.2																													
<p>Water Quality</p>	<p>Analysis of results of ground water reveals the following: -</p> <ul style="list-style-type: none"> • pH varies from 6.95 at GW-4 and 7.54 at GW-6 of study area. • Total hardness varies from 124 mg/l at GW-4 and 168 mg/l at GW-2 of study area. • Total dissolved solids vary from 289 mg/l at GW-4 and 451 mg/l at GW-6 of study area. <p>The ground water from all sources remains suitable for drinking purposes as all the constituents are within the limits prescribed by drinking water standards promulgated by Indian Standards IS: 10500.</p> <p>Analysis of results of Surface water reveals the following: -</p> <p>The analysis results indicate that the pH ranges between 7.61 and 7.65.</p> <p>BOD values were observed to be in the range of 2.0-2.50 mg/l.</p> <p>The Sulphates were found to be in the range of 8.14 – 9.03 mg/l.</p> <p>Based on the results it is evident that most of the parameters of the samples comply with 'Category 'B' standards of CPCB indicating their suitability for Outdoor Bathing.</p>																														

Soil Quality	Monitoring data shows that the texture of soil at all locations is Sandy Loam. The data shows that value of <ul style="list-style-type: none"> • pH ranges from 6.88- 7.92 indicating that all soil samples are neutral. • Magnesium values ranges from 504.46-1025.12 mg/kg
Ecology and Bio-diversity	There are no Ecologically Sensitive Areas present in the study area, but many reserved forests regions surround the project area.
Socio-economy	The implementation of the Khata No: 109: Khasra No: 1, 17 22ma, 23ma, 84ma, Area: 5.83 ha Village-Jhalakudi, Tehsil- Poornagiri District-Champawat (Uttarakhand) Sand bajari boulder mining project on river Alkhanda River will throw opportunities to local people for both direct and indirect employment. The study area is still lacking in education, health, housing, water, electricity etc. It is expected that same will improve to a great extent due to proposed mining project and associated industrial and business activities.

1.8 OVERALL JUSTIFICATION FOR THE IMPLEMENTATION OF THE PROJECT

1.8.1 Sustainable Mining

- ❖ Proposed mining project is an open cast mining where no drilling or blasting is required.
- ❖ Mining sites & points will be selected in the riverbed where the concentration of minor mineral is higher & preferably at places or points where the minor mineral is well exposed & present in dunes of higher elevation.
- ❖ The mining will be carried out by using mechanized (OTFM) using EMM and Loaders etc. In order to reduce or minimize hazards of erosion, mining will be done in the river bed.
- ❖ To reduce the further chances of erosion & landslides at the bank of the river, mining will not be done in the concave areas of the rivers.
- ❖ To safe guard the river banks as per mining rules, mining will be done at least 7.5 m inside of the either banks inside the river bed in the lateral form. Mining will be done as per norms of mining rule and the depth of excavation shall not exceed 3 m BGL as suggested by MoEF.
- ❖ Mining at any case will not be carried out below the water table.
- ❖ Mining will be done in the dry season only at places where the replenishment of sediments is high.
- ❖ Mining operation will be carried out in the day time only.

- ❖ Mining will be carried out in the dry season only & will be stopped completely during monsoon.
- ❖ Thus the mining area leftover will get replenished with the sediments of minor mineral in the monsoon itself.
- ❖ The mine owner will carry out mining work as per UPMPCR, 1963 and under all the rules and regulations, term and condition laid down therein.
- ❖ Mine area once dug will not be mined until they are replenished in the monsoon till next year.
- ❖ Mining in any case will not be done below the water table. During the lease period, the deposit will be worked from the top surface of the river bed to 2.22m BGL or above groundwater level whichever is less.
- ❖ No mining operation shall be carried out on at or to any point within a distance of 50m from any of railway line, reservoir, canal or other public works, such as roads and buildings or inhabited site.
- ❖ In order to reduce the noise pollution in the vicinity only PUC certified vehicles will be allowed for the transportation of minor mineral.

1.8.2 ENVIRONMENTAL BENEFITS

- ✓ This activity promotes the emergence of the primary succession species; hence it is silvicultural operation extremely important for maintaining ecology and environment of the area.
- ✓ It controls river bank erosion by deepening of river channel, thus prevents flooding and other natural hazards.
- ✓ It helps in Regeneration & Establishment of Pioneer Species like Shisham & Khair on the banks of rivers besides saving agricultural land & land cutting.
- ✓ It regulates & maintains the existing course of the river, and improves the water holding capacity of channels.

1.8.3 SOCIAL BENEFITS

- ✓ Generates employment to the locals engaged directly in extraction of sand as well as indirectly transportation and sale of mineral.
- ✓ Leads to improvement in lifestyle and standard of living.

- ✓ Earns huge sum of revenue in the form of mineral royalty or dead rent for the State Exchequer.

1.9 SOCIO-ECONOMIC PROFILE

The implementation of the Devlan, sand/Morrurum mining project will generate both direct and indirect employment. Besides, it will provide a check on existing system of mining operation. Since the quarries will be allotted on lease basis, mining operation will be legally valid and it will bring income to the state exchequer. It will also reduce flooding of river banks, destruction of standing crops, land and property to a great extent. The project will also provide impetus to industrialization of the area. At present agriculture is the main occupation of the people as more than half of the population depends on it. With the implementation of the proposed mining project the occupational pattern of the people in the area will change making more people engaged in industrial and business activities rather in agriculture. Thus there will be a gradual shifting of population from agriculture to mining and industry. Further, the mining and industrial activities in the area may lead to rapid increase in population and thereby urbanization. Due to urbanization of the area, employment opportunities will further increase.

1.10 ENVIRONMENTAL MANAGEMENT PLAN (EMP)

Proper environmental management plan is proposed for “Sand/Morrurum” mining project to mitigate the impact during the mining operation.

- i.** Care will be taken that no labour camps are allowed on river bed.
- ii.** Care will be taken that no cooking, or burning of woods will be allowed in the adjoining area.
- iii.** No lighting will be allowed in the area.
- iv.** Prior to mining, short awareness program will be conducted for labours to make them aware to way of working.
- v.** If some causality or injury to animal occurs, it will be informed to forest department and proper treatment will be given.
- vi.** No tree cutting, chopping, lumbering, uprooting of shrubs and herbs will be allowed.
- vii.** Maintenance of roads will be done from time to time.
- viii.** Corridor movement of wild mammals (If exists) will not be disturbed.
- ix.** Care will be taken that noise produced during vehicles movement for carrying sand is within the permissible noise level.
- x.** No pilling of RBM material will be allowed in adjoining area.

- xi. If wild animals are noticed crossing the river bed, they will not be disturbed or chased away, instead the labours will move away from their path.

1.11 ENVIRONMENTAL MANAGEMENT PLAN IMPLEMENTATION

Environmental Management Plan serves no purpose if it is not implemented with true spirit. Some loopholes in the EMP can also be detected afterwards when it is implanted and monitored. Thus, an implementation and monitoring programme has to be prepared.

The major attributes of environment are not confined to the mining site alone. Implementation of proposed control measures and monitoring programme has an implication on the surrounding area as well as for the region. Therefore, mine management will strengthen the existing control measures as elaborated earlier in this report and monitor the efficacy of the control measures implemented within the mining area relating to the following specific areas for eco-friendly mining:

- a. Collection of air and water samples at strategic locations with frequency suggested and by analyzing thereof. If the parameters exceed the permissible tolerance limits, corrective regulation measure will be taken.
- b. Collection of soil samples at strategic locations once in every two years and analysis thereof with regard to deleterious constituents, if any.
- c. Measurement of water level fluctuations in the nearby ponds, dug wells and bore wells.
- d. Regular visual examination will be carried out to look for erosion of river banks. Any abnormal condition, if observed will be taken care of.
- e. Measurement of noise levels at mine site, stationary and mobile sources, and adjacent villages will be done in every six months for first two years, thereafter once a year.
- f. Plantation/afforestation as will be done as per program i.e. along the road sides and near civic amenities, which will be allotted by Government bodies as it is not feasible to plant trees near the mine lease area. Post plantation, the area will be regularly monitored in every two years for evaluation of success rate. For selection of plant species local people will also be involved.

11.13 BUDGET ALLOCATION FOR EMP IMPLEMENTATION

The EMP Cost is Rs. 3.5 lacs

11.14 MONITORING SCHEDULE AND PARAMETERS:

Table 11.3 Monitoring Schedule and Parameters

S No	Description of Parameters	Schedule and Duration of
-------------	----------------------------------	---------------------------------

		Monitoring/Execution
1	Air Quality: a) In the vicinity of the mine b) In the vicinity of the transportation Network c) Dust suppression on roads d) Scraping/ bulldozing of road to shift accumulated dust to the sides	24 hourly samples twice a week for one month in each season except monsoon season Regularly in non- monsoon months and whenever occurrence of fugitive dust takes place Fortnightly
2	Water Quality near or around the site: a) Surface water quality b) Ground water quality	Once in a season for 4 seasons in a year
3	Ambient Noise Level	Twice a year for two years & then once a year
4	Soil Quality	Once in two years on project monitoring area
5	Inventory of Flora(tree plantation, survival etc) & Fauna	Once in two years on project monitoring area
6	Socio-economic condition of local, population, physical survey	Once in 3 years

1.12 BENEFITS OF MINING

- i.** Controlling river channel.
- ii.** Protecting river banks.
- iii.** Reducing submergence of adjoining agricultural lands.
- iv.** Reducing aggradations of river level.
- v.** Generating useful economic resource for construction.
- vi.** Generating employment.
- vii.** Improvement in socio economic conditions of the people of the study area.

1.13 CONCLUSION

This Project will provide several benefits to the near Khata No: 109: Khasra No: 1, 17 22ma, 23ma, 84ma, Area: 5.83 ha Village-Jhalakudi, Tehsil- Poornagiri District-Champawat () by a proper planning and management. This project will employ most of the worker from nearby villages. Only supervisor Staff will be hired from outside. There will not be any increase in population due to the project. However, few people from other area may migrate in this area for business opportunities. During the operation of this project no adverse impact on the surrounding environment. So project is beneficiary for the surrounding village.

Chapter -XII

Disclosure of Consultants Engaged

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

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

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

PARAMARSH (Servicing Environment and Development) has got accreditation of EIA consultant with Quality Council of India (QCI) /National Accreditation Board of Education and Training (NABET) (Certificate No.- NABET/EIA/2124/RA 0224, Valid till 01/05/2024. For details kindly refer QCI website <http://www.qcin.org/nabet/about.php>

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

Draft EIA Report of Sand Bajri Boulder Mining Project Khata No: 109: Khasra No: 1, 17 22ma, 23ma, 84ma, Area: 5.83 ha
Village-Jhalakudi, Tehsil- Poornagiri District-Champawat (Uttarakhand)

development and exploration of traditional technologies and unconventional energy resources. The benefit of these activities is propagated to the end users.

DECLARATION BY EXPERTS CONTRIBUTING TO EIA REPORT

I, hereby certify that I was a part of the EIA team in the following capacity that developed the EIA for Environment Clearance for Sand Bajri Boulder Mining Project Khata No: 109: Khasra No: 1, 17 22ma, 23ma, 84ma, Area: 5.83 ha Village-Jhalakudi, Tehsil- Poornagiri District-Champawat (Uttarakhand) of Kumaon Mandal Vikas Nigam Limited (KMVN) Thandi Sadak, Tallital Nainital, , Uttarakhand

EIA coordinator:

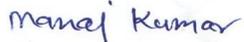
Name : Dr. S V Ghavari

ACO : Paramarsh Servicing Environment and Development

Period of involvement : Oct 2021 to till date

Contact Information : paramarsh.env@gmail.com

S. No.	Functional Area	Name of the experts	Involvement		Signature and date
			Period	Task	
1	RH	Mr. Akash Kumar	Oct 2021 to till date	Identification of hazards materials, Fire accidents from Diesel storage and lethality damages, DMP and EPP for onsite & offsite were provided.	
2	WP			Estimating water requirements based on population, suggesting wastewater treatment/disposal schemes and developed the plan for rain water harvesting.	
3	EB			Generating the ground truthing ecological assessment with secondary data from different departments, earmarking rare and endangered species	
4	SHW	Dr. Manjul Gupta	Oct 2021 to till date	Inventory of Municipal Solid Waste, suggesting treatment options viz; organic waste convertor technology.	
5	SC			Proposing the soil management practices during construction and operation phase of project.	
6	AP			Collected the meteorological data and AAQ data through secondary sources and suggested air pollution control	

				measures during both phase of project.	
7	SE	Mr. Pankaj Kumar Srivastava	Oct 2021 to till date	Collected the primary data, livestock inventory/ impacts, identified village-wise amenities/ needs.	
8	AQ & NV	Mr. Vinod Kumar Dwivedi	Oct 2021 to till date	Collected the ambient noise data through secondary sources and suggested Noise pollution control measures during both phases of project.	
9	SC	Dr. S.V. Ghavri	Oct 2021 to till date	Proposing the soil management practices during construction and operation phase of project.	
10	Geo	Dr Abdul Rahman	Oct 2021 to till date	Input in EIA/EMP report regarding geology of the area.	
11	LU & HG	Mr. S.P. Tiwari	Oct 2021 to till date	Input in EIA/EMP report regarding Land use and Hygro-geology of the area.	
12	MSW and Noise	Dr. Vivek Kr. Tewari	Oct 2021 to till date	Quantification of Solid & Hazardous Waste and Assessment of Impacts and Probable impacts of noise on communities,	
13	SHW	Mr. Pramod Kumar Vishwakarma	Oct 2021 to till date	Assisted in drafting and compilation of report with respective FAE	
14	Team Member	Mr. Raj Kumar Gautam	Oct 2021 to till date	Assisted in drafting and compilation of report with respective FAE	
15	Team Member	Mr. Manoj Kumar	Oct 2021 to till date	Assisted in drafting and compilation of report with respective FAE	
16	FAA (AP)	Mr. Ravi Shankar	Oct 2021 to till date	Input in EIA/EMP report regarding Air pollution related section	

Draft EIA Report of Sand Bajri Boulder Mining Project Khata No: 109: Khasra No: 1, 17 22ma, 23ma, 84ma, Area: 5.83 ha
Village-Jhalakudi, Tehsil- Poornagiri District-Champawat (Uttarakhand)



National Accreditation Board for Education and Training



Certificate of Accreditation

Paramarsh Servicing Environment and Development, Lucknow

M.S.-1/10 Sector A, Sitapur Road Yojna, Ram Ram Bank Chauraha, Aliganj, Lucknow-226024

The organization is accredited as **Category-A** under the QCI-NABET Scheme for Accreditation of EIA Consultant Organization, Version 3: for preparing EIA-EMP reports in the following Sectors –

S. No	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1	Mining of minerals including opencast / underground mining	1	1 (a) (i)	A
2	Thermal power plants	4	1 (d)	A
3	Metallurgical industries (ferrous & non-ferrous)	8	3 (a)	A
4	Cement plants	9	3 (b)	B
5	Asbestos milling and asbestos based products	12	4 (c)	A
6	Pesticides industry and pesticide specific intermediates	17	5 (b)	A
7	Synthetic organic chemicals industry	21	5 (f)	A
8	Distilleries	22	5 (g)	A
9	Pulp & paper industry excluding manufacturing of paper from wastepaper and manufacture of paper from ready pulp without bleaching	24	5 (i)	A
10	Sugar Industry	25	5 (j)	B
11	Industrial estates/ parks/ complexes/areas, export processing Zones (EPZs), Special Economic Zones (SEZs), Biotech Parks, Leather Complexes	31	7 (c)	B
12	Highways	34	7 (f)	B
13	Building and construction projects	38	8 (a)	B
14	Townships and Area development projects	39	8 (b)	B

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in RAAC minutes dated Nov 09 2021 posted on QCI-NABET website.

The Accreditation shall remain in force subject to continued compliance to the terms and conditions mentioned in QCI-NABET's letter of accreditation bearing no. QCI/NABET/ENV/ACO/21/2197 dated Dec 30, 2021. The accreditation needs to be renewed before the expiry date by Paramarsh Servicing Environment and Development, Lucknow following due process of assessment.

Sr. Director, NABET
Dated: Dec 30, 2021

Certificate No.
NABET/EIA/2124/RA 0224

Valid up to
May 01, 2024

Executive Summary (English)

Sand Bajri & Boulder (Minor-Mineral) mining

at

Khata No: 109: Khasra No: 1, 17 22ma, 23ma, 84ma

at Village-Jhalakudi, Tehsil- Poornagiri District-Champawat (Uttarakhand).

Lease area: Area- Area -5.83 ha

Production: Capacity- 3,32,310 TPA



PROJECT PROPONENT:
Kumaon Mandal Vikas Nigam Limited (KMVN)

Thandi Sadak, Tallital Nainital, , Uttarakhand 263002

EXECUTIVE SUMMARY

1.0 INTRODUCTION OF PROJECT & PROPONENT

Mining lease was initially granted to Kumaon Mandal Vikas Nigam Limited (KMVN) Thandi Sadak, Tallital Nainital, , Uttarakhand 263002 for extraction of Sand Bajri and Boulders from a part of Khata No: 109: Khasra No: 1, 17 22ma, 23ma, 84ma, Area: 5.83 ha Village-Jhalakudi, Tehsil- Poornagiri District-Champawat (Uttarakhand) for a period of 10 years, Mining deed was executed on 16 May 1987 between State Government (Uttar Pradesh) & Kumaon Mandal Vikas Nigam Limited (KMVN) Thandi Sadak, Tallital Nainital, , Uttarakhand 263002,

1.2 LOCATION

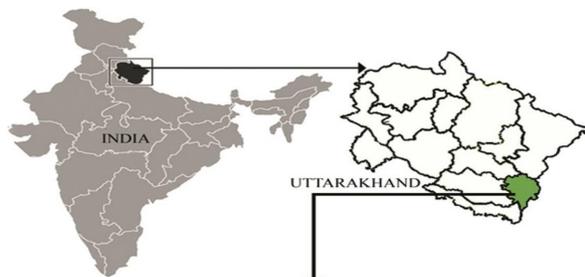
The mining area is located in Khata No: 109: Khasra No: 1, 17 22ma, 23ma, 84ma, Area: 5.83 ha Village-Jhalakudi, Tehsil- Poornagiri District-Champawat (Uttarakhand). The mining lease / proposed project area falls in Survey of India Toposheet.

Table No.2.1:- Details of the Project Location & Surroundings

Sr. No.	Particular	Details
A.	Nature of the Project	Sand Bajri Boulder Mining Project
1.	MLArea	5.83 ha
2.	Proposed Production Capacity	3,32,310 tonnes per annum Total Lease Area -5.83 ha
3.	Lease Period of Mine	Lease. Period 5.0 yr
C.	Method of Mining	
1.	Method	Open-Cast semi-mechanized Mining
2.	Blasting/Drilling	Not proposed
D.	Project Location	
1.	Village	Village-Jhalakudi
2.	Tehsil	Poornagiri
3.	District	Champawat

4.	State	Uttarakhand		
5.	TopoSheetNo.	-		
6.	Lease Area Coordinates	The area lies		
		Point	latitude	longitude
		A	29°11'47.70"N	80° 3'27.21"E
		B	29°11'47.03"N	80° 3'36.90"E
		C	29°11'48.40"N	80° 3'52.90"E
		D	29°11'48.70"N	80° 4'0.96"E
		E	29°11'47.03"N	80° 4'0.85"E
		F	29°11'45.40"N	80° 3'58.02"E
		G	29°11'42.09"N	80° 3'52.10"E
		H	29°11'46.10"N	80° 3'52.00"E
		I	29°11'46.90"N	80° 3'52.80"E
		J	29°11'46.30"N	80° 3'49.80"E
		K	29°11'45.30"N	80° 3'36.90"E
L	29°11'46.40"N	80° 3'29.90"E		
E.	Cost Details			
1.	Project Cost	Rs.20.0 Lakh		
F.	Water Demand			
1.	Requirement	8.5 KLD		
2.	Source of water	Nearby villages & natural springs.		
G.	Man Power Requirement	50		
H.	Environmental Setting			
1.	Nearest Village	Naulapani 0.50 km S Jhalakundi 2.50 E		
2.	Nearest Town	Tanakpur – 14.50 km (SE) Champawat 16.0 km N		
3.	Nearest National/ StateHighway	NH-125 about 0.5 * km (W)		
4.	Nearest Railway Station	Tanakpur Railway Station- 15.0 km (S)		
5.	Nearest Airport	Airport: Pantnagar Airport – 50.0* km (W)		
6.	Ecological Sensitive Areas (National Park, Wild Life Sanctuaries ,Biosphere Reserve etc.) within 10 kmradius	Danda range 9.0 km SE Boom rang 12.50. SE		
7.	Water bodies within 10 km radius of the mine site.	River bank of Ladhiya river Sharad River 13.0 S		
8.	Archaeologically important Place	None		
9.	Seismic Zone	IV		

परियोजना



क्षेत्र का विवरण:



5.00 km Google Map



1.3 LEASEHOLD AREA

The proposed mine lease area is located at Khata No: 109: Khasra No: 1, 17 22ma, 23ma, 84ma, Area: 5.83 ha Village-Jhalakudi, Tehsil- Poornagiri District-Champawat (Uttarakhand). It has been proposed to collect approximately 3,32,310 tonnes per annum sand/morrum will be extracted by mechanized (OTFM) using EMM and Loaders. There is no National Park, Sanctuary, Elephant/Tiger Reserve, eco-sensitive area, Interstate boundary, migratory routes within 10 km of the project site.

Table 10 Yearly Production of RBM

YEAR	Minable Reserves (Tonnes)
First	3,32,310
Second	3,32,310
Third	3,32,310
Fourth	3,32,310
Fifth	3,32,310
Total	16,61,550

1.4

ESTIMATION OF THE RESERVE

Main aspects of the lease area are as discussed below Total demarcated Area- 5.83 ha (as per Joint Demarcation Report Attached as ann.08) As per Uttarakhand Minor Mineral Policy,

Quantity of ultimate reserve (tonnes) = mining area (5.83 ha) x 3.0 m depth x 2.2 bulk density-
3,32,310 tonnes/year

Deposit/material (in cum) at maximum allowable depth i.e. 3.0m Depth= 3,32,310 • As per the data collected & slice wise mineral assessment/ survey, about 90% of ultimate reserve been considered/planned as annual production quantity i.e. 6, 3,32,310 tonnes: rest about 10% of material available is planned as residue/waste material including Mining loss. (accordingly planned & backfilled used for river bank protection work & Plantation work).

1.5 PROJECT DESCRIPTION (Technology & Process)

The proposed project is to mine sand from river bed sustainably and scientifically. Mining will be opencast and mechanized (OTFM) using EMM and Loaders, along the river bed keeping both the shores unaffected.

Following geo-scientific methods are proposed to carry out the activity:

- ✓ Mining will be confined to extraction of Sand from the river bed only.
- ✓ Mining of gravelly sand from the river bed will be restricted to a maximum depth of 3mt. from the surface.
- ✓ No drilling, blasting and beneficiation is proposed.
- ✓ Approximately 6, 32,610 tonnes per annum minor mineral will be extracted.
- ✓ No mining activity will be undertaken during the monsoon season. So the river bed material will be replenished during the monsoon season every year.
- ✓ The mining activity will be restricted to daytime only in order to avoid environmental pollution or any accidental hazards.
- ✓ The operation will be done by mechanized (OTFM) using EMM and Loaders During the lease period, the deposit will be worked from the top surface of the river bed to 3.0m bgl or above water level whichever is less.

1.6 WATER SUPPLY

Water requirement in this project site is 5.0 KLD. Water will be taken from existing water sources from nearby villages or tanker supplier. The details are incorporated in the EIA/EMP report.

Total Water Requirement= 5.0 KLD

Dust Suppression = 3.0 KLD

Plantation= 1.5 KLD

Domestic Purpose= 0.50 KLD

1.7 BASE LINE DATA

This section contains the description of baseline studies of the 10 km radius of the area surrounding “Sand/Morrum Mine”, at Khata No: 109: Khasra No: 1, 17 22ma, 23ma, 84ma, Area: 5.83 ha Village-Jhalakudi, Tehsil- Poornagiri District-Champawat (Uttarakhand) The data collected has been used to understand the existing environment scenario around the proposed mining project against which the potential impacts of the project can be assessed.

Environmental data has been collected in relation to proposed mining for:-

- (a) Air
- (b) Noise
- (c) Water
- (d) Soil
- (e) Ecology and Biodiversity
- (f) Socio-economy

Table 1: BASELINE ENVIRONMENTAL STATUS

Attribute	Baseline status					
Ambient Air Quality	Ambient Air Quality Monitoring reveals that the minimum & maximum concentrations of PM10 for all the 6 AQ monitoring stations were found to be					
		Particulate Matter PM10 (µg /m ³)	Particulate Matter PM2.5 (µg /m ³)	Sulphur Dioxide SO ₂ (µg /m ³)	Nitrogen Dioxide NO ₂ (µg /m ³)	Carbon monoxide CO (mg /m ³)
	Minimum	62.37	30.64	7.35	17.03	0.51
	Maximum	69.84	34.89	10.92	21.86	0.59
	Average	66.33	32.79	8.98	19.24	0.55
98 th	69.81	34.81	10.68	21.74	0.59	

	Percentile														
Noise Levels	<p>Noise monitoring reveals that the maximum & minimum noise levels at day time were recorded .</p> <p>There are several other sources in the 10 km radius of study area, which contributes to the local noise level of the area. Traffic activities as well as activities in nearby villages and agricultural fields add to the ambient noise level of the area.</p> <table border="1" data-bbox="558 548 1349 657"> <tr> <td>Minimum</td> <td>61.2</td> <td>51.4</td> </tr> <tr> <td>Maximum</td> <td>67.4</td> <td>58.7</td> </tr> <tr> <td>Average</td> <td>64.9</td> <td>55.2</td> </tr> </table>						Minimum	61.2	51.4	Maximum	67.4	58.7	Average	64.9	55.2
Minimum	61.2	51.4													
Maximum	67.4	58.7													
Average	64.9	55.2													
Water Quality	<p>Analysis of results of ground water reveals the following: -</p> <ul style="list-style-type: none"> • pH varies from 6.95 at GW-4 and 7.54 at GW-6 of study area. • Total hardness varies from 124 mg/l at GW-4 and 168 mg/l at GW-2 of study area. • Total dissolved solids vary from 289 mg/l at GW-4 and 451 mg/l at GW-6 of study area. <p>The ground water from all sources remains suitable for drinking purposes as all the constituents are within the limits prescribed by drinking water standards promulgated by Indian Standards IS: 10500.</p> <p>Analysis of results of Surface water reveals the following: -</p> <p>The analysis results indicate that the pH ranges between 7.61 and 7.65. BOD values were observed to be in the range of 2.0-2.50 mg/l. The Sulphates were found to be in the range of 8.14 – 9.03 mg/l. Based on the results it is evident that most of the parameters of the samples comply with 'Category 'B' standards of CPCB indicating their suitability for Outdoor Bathing.</p>														
Soil Quality	<p>Monitoring data shows that the texture of soil at all locations is Sandy Loam. The data shows that value of</p> <ul style="list-style-type: none"> • pH ranges from 6.88- 7.92 indicating that all soil samples are neutral. • Magnesium values ranges from 504.46-1025.12 mg/kg 														
Ecology and Bio-diversity	<p>There are no Ecologically Sensitive Areas present in the study area, but many reserved forests regions surround the project area.</p>														
Socio-economy	<p>The implementation of the Khata No: 109: Khasra No: 1, 17 22ma,</p>														

	<p>23ma, 84ma, Area: 5.83 ha Village-Jhalakudi, Tehsil- Poornagiri District-Champawat (Uttarakhand) Sand bajari boulder mining project on river Alkhanda River will throw opportunities to local people for both direct and indirect employment.</p> <p>The study area is still lacking in education, health, housing, water, electricity etc. It is expected that same will improve to a great extent due to proposed mining project and associated industrial and business activities.</p>
--	--

1.8 OVERALL JUSTIFICATION FOR THE IMPLEMENTATION OF THE PROJECT

1.8.1 Sustainable Mining

- ❖ Proposed mining project is an open cast mining where no drilling or blasting is required.
- ❖ Mining sites & points will be selected in the riverbed where the concentration of minor mineral is higher & preferably at places or points where the minor mineral is well exposed & present in dunes of higher elevation.
- ❖ The mining will be carried out by using mechanized (OTFM) using EMM and Loaders etc. In order to reduce or minimize hazards of erosion, mining will be done in the river bed.
- ❖ To reduce the further chances of erosion & landslides at the bank of the river, mining will not be done in the concave areas of the rivers.
- ❖ To safe guard the river banks as per mining rules, mining will be done at least 7.5 m inside of the either banks inside the river bed in the lateral form. Mining will be done as per norms of mining rule and the depth of excavation shall not exceed 3 m BGL as suggested by MoEF.
- ❖ Mining at any case will not be carried out below the water table.
- ❖ Mining will be done in the dry season only at places where the replenishment of sediments is high.
- ❖ Mining operation will be carried out in the day time only.
- ❖ Mining will be carried out in the dry season only & will be stopped completely during monsoon.
- ❖ Thus the mining area leftover will get replenished with the sediments of minor mineral in the monsoon itself.
- ❖ The mine owner will carry out mining work as per UPMCR, 1963 and under all the rules and regulations, term and condition laid down therein.
- ❖ Mine area once dug will not be mined until they are replenished in the monsoon till next year.

- ❖ Mining in any case will not be done below the water table. During the lease period, the deposit will be worked from the top surface of the river bed to 2.22m BGL or above groundwater level whichever is less.
- ❖ No mining operation shall be carried out on at or to any point within a distance of 50m from any of railway line, reservoir, canal or other public works, such as roads and buildings or inhabited site.
- ❖ In order to reduce the noise pollution in the vicinity only PUC certified vehicles will be allowed for the transportation of minor mineral.

1.8.2 ENVIRONMENTAL BENEFITS

- ✓ This activity promotes the emergence of the primary succession species; hence it is silvicultural operation extremely important for maintaining ecology and environment of the area.
- ✓ It controls river bank erosion by deepening of river channel, thus prevents flooding and other natural hazards.
- ✓ It helps in Regeneration & Establishment of Pioneer Species like Shisham & Khair on the banks of rivers besides saving agricultural land & land cutting.
- ✓ It regulates & maintains the existing course of the river, and improves the water holding capacity of channels.

1.8.3 SOCIAL BENEFITS

- ✓ Generates employment to the locals engaged directly in extraction of sand as well as indirectly transportation and sale of mineral.
- ✓ Leads to improvement in lifestyle and standard of living.
- ✓ Earns huge sum of revenue in the form of mineral royalty or dead rent for the State Exchequer.

1.9 SOCIO-ECONOMIC PROFILE

The implementation of the Devlan, sand/Morrum mining project will generate both direct and indirect employment. Besides, it will provide a check on existing system of mining operation. Since the quarries will be allotted on lease basis, mining operation will be legally valid and it will bring income to the state exchequer. It will also reduce flooding of river banks, destruction of standing crops, land and property to a great extent. The project will also provide impetus to industrialization

of the area. At present agriculture is the main occupation of the people as more than half of the population depends on it. With the implementation of the proposed mining project the occupational pattern of the people in the area will change making more people engaged in industrial and business activities rather in agriculture. Thus there will be a gradual shifting of population from agriculture to mining and industry. Further, the mining and industrial activities in the area may lead to rapid increase in population and thereby urbanization. Due to urbanization of the area, employment opportunities will further increase.

1.10 ENVIRONMENTAL MANAGEMENT PLAN (EMP)

Proper environmental management plan is proposed for “Sand/Morrum” mining project to mitigate the impact during the mining operation.

- xii.** Care will be taken that no labour camps are allowed on river bed.
- xiii.** Care will be taken that no cooking, or burning of woods will be allowed in the adjoining area.
- xiv.** No lighting will be allowed in the area.
- xv.** Prior to mining, short awareness program will be conducted for labours to make them aware to way of working.
- xvi.** If some causality or injury to animal occurs, it will be informed to forest department and proper treatment will be given.
- xvii.** No tree cutting, chopping, lumbering, uprooting of shrubs and herbs will be allowed.
- xviii.** Maintenance of roads will be done from time to time.
- xix.** Corridor movement of wild mammals (If exists) will not be disturbed.
- xx.** Care will be taken that noise produced during vehicles movement for carrying sand is within the permissible noise level.
- xxi.** No pilling of RBM material will be allowed in adjoining area.
- xxii.** If wild animals are noticed crossing the river bed, they will not be disturbed or chased away, instead the labours will move away from their path.

1.11 ENVIRONMENTAL MANAGEMENT PLAN IMPLEMENTATION

Environmental Management Plan serves no purpose if it is not implemented with true spirit. Some loopholes in the EMP can also be detected afterwards when it is implanted and monitored. Thus, an implementation and monitoring programme has to be prepared.

The major attributes of environment are not confined to the mining site alone. Implementation of proposed control measures and monitoring programme has an implication on the surrounding area

as well as for the region. Therefore, mine management will strengthen the existing control measures as elaborated earlier in this report and monitor the efficacy of the control measures implemented within the mining area relating to the following specific areas for eco-friendly mining:

- g.** Collection of air and water samples at strategic locations with frequency suggested and by analyzing thereof. If the parameters exceed the permissible tolerance limits, corrective regulation measure will be taken.
- h.** Collection of soil samples at strategic locations once in every two years and analysis thereof with regard to deleterious constituents, if any.
- i.** Measurement of water level fluctuations in the nearby ponds, dug wells and bore wells.
- j.** Regular visual examination will be carried out to look for erosion of river banks. Any abnormal condition, if observed will be taken care of.
- k.** Measurement of noise levels at mine site, stationary and mobile sources, and adjacent villages will be done in every six months for first two years, thereafter once a year.
- l.** Plantation/afforestation as will be done as per program i.e. along the road sides and near civic amenities, which will be allotted by Government bodies as it is not feasible to plant trees near the mine lease area. Post plantation, the area will be regularly monitored in every two years for evaluation of success rate. For selection of plant species local people will also be involved.

11.13 BUDGET ALLOCATION FOR EMP IMPLEMENTATION

The EMP Cost is Rs. 3.5 lacs

11.14 MONITORING SCHEDULE AND PARAMETERS:

Table 11.3 Monitoring Schedule and Parameters

S No	Description of Parameters	Schedule and Duration of Monitoring/Execution
1	Air Quality: e) In the vicinity of the mine f) In the vicinity of the transportation Network g) Dust suppression on roads h) Scraping/ bulldozing of road to shift accumulated dust to the sides	24 hourly samples twice a week for one month in each season except monsoon season Regularly in non- monsoon months and whenever occurrence of fugitive dust takes place Fortnightly
2	Water Quality near or around the site: c) Surface water quality d) Ground water quality	Once in a season for 4 seasons in a year

3	Ambient Noise Level	Twice a year for two years & then once a year
4	Soil Quality	Once in two years on project monitoring area
5	Inventory of Flora(tree plantation, survival etc) & Fauna	Once in two years on project monitoring area
6	Socio-economic condition of local, population, physical survey	Once in 3 years

1.12 BENEFITS OF MINING

- viii. Controlling river channel.
- ix. Protecting river banks.
- x. Reducing submergence of adjoining agricultural lands.
- xi. Reducing aggradations of river level.
- xii. Generating useful economic resource for construction.
- xiii. Generating employment.
- xiv. Improvement in socio economic conditions of the people of the study area.

1.13 CONCLUSION

This Project will provide several benefits to the near Khata No: 109: Khasra No: 1, 17 22ma, 23ma, 84ma, Area: 5.83 ha Village-Jhalakudi, Tehsil- Poornagiri District-Champawat (Uttarakhand) by a proper planning and management. This project will employ most of the worker from nearby villages. Only supervisor Staff will be hired from outside. There will not be any increase in population due to the project. However, few people from other area may migrate in this area for business opportunities. During the operation of this project no adverse impact on the surrounding environment. So project is beneficiary for the surrounding village.

Draft EIA Report of Sand Bajri Boulder Mining Project Khata No: 109: Khasra No: 1, 17 22ma, 23ma, 84ma, Area: 5.83 ha
Village-Jhalakudi, Tehsil- Poornagiri District-Champawat (Uttarakhand)