

**DRAFT**  
**ENVIRONMENTAL IMPACT ASSESSMENT REPORT**  
**AND**  
**ENVIRONMENTAL MANAGEMENT PLAN**

**For**

**SAND BAJRI & BOULDER**  
**(MINOR MINERAL) MINING ON THE BED OF ALAKNANDA RIVER,**  
**KHASRA No: 2152 to 2154, 2196, 2896, 2898, 2899 to 2914,**  
**3003 to 3005, 3316, 3445**  
**VILLAGE - NAITHANA, PATTI - CHAURUS TEHSIL- KIRTINAGAR**  
**DISTRICT - TEHRL GARHWAL UTTARAKHAND**

**Lease area: Area- 9.72 ha**

**Production: Capacity- 519156 TPA**



**Submitted to**

**Uttarakhand Pollution Control Board (UKPCB)**

**PROJECT PROPONENT:**

**Shri Sateye Singh Rana**

**M/s Kilkileshwar Mining Company,**

**R/o - Kailash Gate Muni-Ki-Reti, District-Tehri Garhwal**

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5.	ANNEXURE - V	Copy of Approved Mining Plan

## **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 Alaknanda River, Khasra No 2152 to 2154, 2896, 2898, 2899 to 2914, 3003 to 3005, 3316, 3445, at Village: Naithana, Patti- Chauras , Tehsil & District: Tehri Garhwal, Uttarakhand Tehsil- Kirtinagar District - Tehri Garhwal Uttarakhand in the applied mining lease area measuring 9.72 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**

Mining lease was initially granted vide DM Tehri letter No. 764 /tees-116 (86-87), /2018/02(82)/18, dated 28 February 1987, to M/s Rajendra Rawat & Co., 1/7 East Rest Camp. Dehradun, Prop. Ramesh Singh Rawat, S/o Sh. Kalam Singh Rawat, R/o Kailash Gate, Muni ki reti, Dist. Tehri Garhwal (Letter Attached as Ann.1) for extraction of Sand Bajri and Boulder, at a part of Village Naithana, Patti- Chauras, Tehsil- Devprayag Now Kirtinagar, District- Tehri Garhwal, Khasra No. 2152 to 2154, 2896, 2898, 2899 to 2914, 3003 to 3005, 3316, 3445; Area- 9.72 Hectare for a period of 10 years; Mining deed was executed on 08 May 1987 between State Government (Uttar Pradesh) & M/s Rajendra Rawat & Co Prop. Ramesh Singh Rawat, S/o Sh.

Draft EIA Report for Public Hearing of Sand Bajri & Boulder (Minor-Mineral) mining on the bed of Alaknanda River, Khasra No: 2152 to 2154, 2896, 2898, 2899 to 2914, 3003 to 3005, 3316, 3445, Area - 9.72 ha Village- Naithana, Patti- Chauras, Tehsil - Kirtinagar District: Tehri Garhwal, Uttarakhand

Kalam Singh Rawat, R/o Kailash Gate, Muni ki reti, Dist. Tehri Garhwal (ML Deed Attached as Ann.2); Supplementary deed for the same lease was granted on 27 June 1994 in favor of M/s Kilkileshwar Mining Company, Partner Shri Sateye Singh Rana Village- Kailash Gate Muni-Ki-Reti, District- Tehri Garhwal (Attached as Ann. 3). Further 5 year extension for the lease was granted via letter no Memo/30-116 dated 27 June 1994 of DM Tehri (Attached as Ann. 4). Renewal for the same lease was granted for further 10 years, vide DM Tehri letter no. Memo /30-33, dated 28 February 1987, to M/s Kilkileshwar Mining Company, Partner Shri Sateye Singh Rana, Village- Kailash Gate, Muni-Ki-Reti, District- Tehri Garhwal (Attached as Ann. 5), Renewal deed was executed on 21/07/2000 between State Government (Uttar Pradesh) & M/s Kilkileshwar Mining Company, Partner Shri Sateye Singh Rana Village- Kailash Gate Muni-Ki-Reti, District- Tehri Garhwal (Attached as Ann. 6). On 12/01/2001 (after creation of new state Uttaranchal, later on Uttarakhand) the State Government (Uttarakhand) issued a GO circular (No.-178/4-1/Sa.U./2000-2001, dated 12 January 2001) directing to all District Magistrates that, in the state of Uttarakhand not to renew any contract/agreement/lease deed including the mining lease deeds after the expiry of such deeds and not to grant any new lease till further orders (Attached as Ann. 07). Lessee approached Honorable High Court for regarding the same order to save his lease. In the compliance of Honorable Rebur Writ Petition no.-1894 of 2013 (M/S) Nainital State Government de letter no.485/VII-1/2015/234-kha/2001, Dated 25 July 2015 & District strata order No. 10/30-32, dated, Nai Tehri, 01 October

.As per DM Tehri order No. 150/30-85 (2018-2019), Dated, Nai Tehri 16 January 2021, in compliance State Government G.O. letter No. 1775/VII-A-1/2020/234Kha/01 dated 06 November 2020, up to 31 May 2024 (From January 2020 to 31 May 2024) Mining is proposed for four (4) years i.e. 2020-21, 2021-22, 2022-23 & 2023-24

**TABLE NO. 6. - YEARWISE PRODUCTION**

YEAR	MINEABLE AREA (M <sup>2</sup> )	DEPTH (M)	ULTIMATE MINABLE RESERVE (tonnes/year)	PRODUCTION (Saleable Quantity of RBM) (tonnes/year)
YEAR-2020-21	87400	3.0	5,76,840	5, 19,156
YEAR- 2021-22	87400	3.0	5,76,840	5, 19,156
YEAR- 2022-23	87400	3.0	5,76,840	5, 19,156
YEAR- 2023-24	87400	3.0	5,76,840	5, 19,156
<b>TOTAL</b>	-	-	<b>23,07,360</b>	<b>20,76,624</b>

## **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 9.72 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

The report has been prepared using the following references:

- Guidance Manual of Environmental Impact Assessment For Mining of Minerals, Ministry of Environment and Forests, 2010
- Form-1 as per EIA Notification, 14<sup>th</sup> 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 9.72 ha was granted to Shri Sataye Singh Rana, Village- Kailash Gate, Muni-Ki-Reti, District- Tehri Garhwal Environmental Impact Assessment report is prepared to comply with the Terms of Reference (ToR) received from SEAC SIA/UK/MIN/64437/2021 on dated 4th July. 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:

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.	Sateye Singh Rana, Village- Kailash Gate, Muni-Ki-Reti, District- Tehri Garhwal
3	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, Carrying Capacity and Mitigation	Lease grant to Smt. Sateye Singh Rana, Village - Kailash Gate, Muni-Ki-Reti, District- Tehri Garhwal Lease Area: 9.72ha Production: 519156 TPA
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	<p>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.</p>	<p>Lease grant to Sateye Singh Muni Ki Reti, District- Tehri Garhwal Lease Area: 9.72ha  Production: 519156 TPA  As per DM Tehri order No. 150/30-85 (2018-2019), Dated, Nai Tehri 16 January 2021, in compliance State Government G.O. letter No. 1775/VII-A-1/2020/234Kha/01 dated 06 November 2020, up to 31 May 2024 (From January 2020 to 31 May 2024) Mining is proposed for four (4) years i.e. 2020-21, 2021-22, 2022-23 &amp; 2023-24</p>
6	<p>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.</p>	<p>.As per DM Tehri order No. 150/30-85 (2018-2019), Dated, Nai Tehri 16 January 2021, in compliance State Government G.O. letter No. 1775/VII-A-1/2020/234Kha/01 dated 06 November 2020, up to 31 May 2024 (From January 2020 to 31 May 2024) Mining is proposed for four (4) years i.e. 2020-21, 2021-22, 2022-23 &amp; 2023-24 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 detailed in the EIA Report</p>	<p>Environment Policy and Management cell has been laid down as per IS: 14001:2014.</p> <p>Continual improvement by consumer feedback, periodic monitoring and review.</p> <p>Minimization of waste management by adopting best practices. Optimum utilization of natural resources. By adopting approved /Govt. norms for mining purposes and environment conservation.</p> <p>EMC shall comprise of Environmental officer, who shall report to management and govt. authorities as and when required.</p>
8	<p>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</p>	<p>It is open-cast sand mining project, PPEs (Mask, Gloves, gum boots, helmet, etc. ) will be provided to mining workers during mining activity.</p> <p>It is a sand mining project hence there is no need of blasting.</p>
9	<p>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</p>	<p>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</p>

		dustbin will be available at the project 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 land. use should be given.	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.
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	Not applicable

	afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.	
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. Toposheet 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	A detailed biological study (of 10 Km radius study area) was conducted by Ecology and Biodiversity Expert and the

	<p>authenticated, separately for core and buffer zone should be furnished based on such 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>details are incorporated in the EIA/EMP Report.</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 district Tehri Garhwal. Area are not come in any Proximity to Areas declared as Critically Polluted'</p>
20	<p>R&amp;R Plan/compensation details for the Project Affected People (PAP) should be furnished While preparing the R&amp;R Plan, the relevant State/National Rehabilitation &amp; 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 programs prepared and submitted accordingly, integrating the sectorial programs 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 village(s) including their R&amp;R and socio-economic aspects should be discussed in the Report.</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&amp;R Plan is envisaged; as there is no displacement of people from their respective areas.</p>

21	<p>One season (non-monsoon) [.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</p>	<p>Environmental baseline monitoring data and results are given in Chapter 3. Base line monitoring done pre monsoon of year 2012 (March 2021 to May 2021)</p>
22	<p>Air quality modeling should be carried out for prediction of impact of the project on the air quality of the area. It should also take into account the impact of movement of 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</p>	<p>Air quality modeling was carried out and impact of Air quality has been incorporated in the EIA/EMP report. Max. Predicted cumulative ground level concentration (GLC) of PM<sub>10</sub>, SO<sub>x</sub>, and NO<sub>x</sub>. The predominant over all wind patterns for the study period</p>
23	<p>The water requirement for the Project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the Project should be indicated</p>	<p>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.</p>

		<p><b>Total Water Requirement= 5.0 KLD</b></p> <p>Dust Suppression = 3.0 KLD</p> <p>Plantation= 1.5 KLD</p> <p>Domestic Purpose= 0.50 KLD</p>
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.	<p><b>Surface Water:</b></p> <p>No permanent infrastructure will be developed which may obstruct the surface water, <b>Ground Water:</b></p> <p>The ground water quality will not be changed because mining activity will not intersect the ground water table</p>
27	Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect groundwater table, a detailed Hydro Geological Study should be undertaken and Report furnished. The Report inter-alia shall include details of the aquifers present and impact of mining	The maximum working depth of 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.

	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	
28	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.	No any seasonal stream, passing through the lease area and nor any modification /diversion proposed
29	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.	Site Elevation: 1238.10mRL The highest level of lease hold is 1430.20mRL towards western side & while lowest level is 1238.10mRL
30	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. 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	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
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)	Excavated sand will be carried Sand Bajri & Boulder (Minor-Mineral) will be carried out through NH 7 The area is about

	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	7 Km from Srinagar & 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 mining area may be detailed.	<p>Laborers will be provided with onsite basic first aid (first aid box) facility and personal protective equipment's (PPE), including boots, helmets and gloves</p> <p>Regular medical check will be 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 include emergency response including location and proper use of emergency equipment's procedure for raising alarm and notifying</p>

		<p>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	<p>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.</p>	<p>The proposed site is away from the nearest habitat yet periodically health check-up camp will be organized under the CER activity.</p>
36	<p>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 may be given with time frames for implementation</p>	<p>Job Opportunity to local community for betterment of livelihood, amenities etc.</p> <p>Direct and in-direct employment.</p> <p>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</p>	<p>Noted</p>

	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.	
39	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	NA
40	The cost of the Project (capital cost.and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.	Detail cost of Project is as follows: Project Cost- 90.0 Lakhs/annum CER 2% Capital Cost-6.60 Lakh Recurring Cost- 4.0 Lakh Total EMP Cost- 10.60 Lakh
41	A Disaster management Plan shall be prepared and included in the EIA/EMP Report.	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.  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

		<p>system etc. shall be checked regularly.</p> <p>During May no mining pit excavation shall be carried out adjacent to the bank offset line.</p> <p>Standing orders for withdrawal of persons and mining equipment from mine in case of apprehend danger shall be framed and enforce</p>
42	<p>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</p>	<p>Job Opportunity to local community for betterment of livelihood, amenities etc.</p> <p>Direct and in-direct employment.</p> <p>Skill development and training Programme (Carpentry, Welding, Masonry works, plumbing, Tailoring etc.) for the local community will be conducted.</p>
43	<p>Besides the above, the below mentioned general points are also to be followed:</p>	
a	<p>Executive Summary of the EIA/EMP Report</p>	<p>Noted</p>
b	<p>All documents to be properly referenced with index and continuous page numbering</p>	<p>All documents to be properly referenced with index and continuous page numbering.</p>
c	<p>Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources should be indicated.</p>	<p>Noted</p>
d	<p>Project Proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the MoEF&amp;CC/NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the Project</p>	<p>Analysis/testing reports are enclosed the report</p>

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-1 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
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#### **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,

Draft EIA Report for Public Hearing of Sand Bajri & Boulder (Minor-Mineral) mining on the bed of Alaknanda River, Khasra No: 2152 to 2154, 2896, 2898, 2899 to 2914, 3003 to 3005, 3316, 3445, Area - 9.72 ha Village- Naithana, Patti- Chauras, Tehsil - Kirtinagar District: Tehri Garhwal, Uttarakhand

- 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**

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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 analysed 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 include the names of the consultants engaged in preparation of EIA and nature of consultancy rendered.

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## **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 andfore

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
<b>A.</b>	Nature of the Project	Sand Bajri & Boulder (Minor-Mineral)
<b>1.</b>	ML Area	9.72 ha
<b>2.</b>	Proposed Production Capacity	519156 TPA
<b>3.</b>	Lease Period of Mine	Lease was granted for a period of 10Years.
<b>C.</b>	<b>Method of Mining</b>	
<b>1.</b>	Method	Open-Cast semi-mechanized Mining
<b>2.</b>	Blasting/Drilling	Not proposed
<b>D.</b>	<b>Project Location</b>	
<b>1.</b>	Village	Naithana, Patti- Chauras
<b>2.</b>	Tehsil	Kirtinagar
<b>3.</b>	District	Tehri Garhwal
<b>4.</b>	State	Uttarakhand
<b>5.</b>	Topo Sheet No.	Toposheet No. 53 J/16
<b>6.</b>	Lease Area Coordinates	The area lies between Latitude : 30°13'41.86" N Longitude: 78°46'21.14" E To Latitude : 30°13'43.247" N Longitude: 78°46'21.767" E
<b>E.</b>	<b>Cost Details</b>	
<b>1.</b>	Project Cost	Rs.90 Lakh
<b>F.</b>	<b>Water Demand</b>	
<b>1.</b>	Requirement	5.0 KLD
<b>2.</b>	Source of water	Nearby villages & natural springs.
<b>G.</b>	Man Power Requirement	24

H.	Environmental Setting	
1.	Nearest Village	Ranihat, Patti- Chauras,1.0 km
2.	Nearest Town	Sri Nagar 2.0 km
3.	Nearest National /State Highway	NH7
4.	Nearest Railway Station	Dehradun ,70 km
5.	Nearest Airport	Jolly Grant 60 km
6.	Ecological Sensitive Areas (National Park, Wildlife Sanctuaries, Biosphere Reserve etc.) within 10km radius	None
7.	Water bodies within 10 km radius of the mine site.	Alaknanda River –River Bed
8.	Archaeological Important Place	None
9.	Seismic Zone	V

## Location Plan

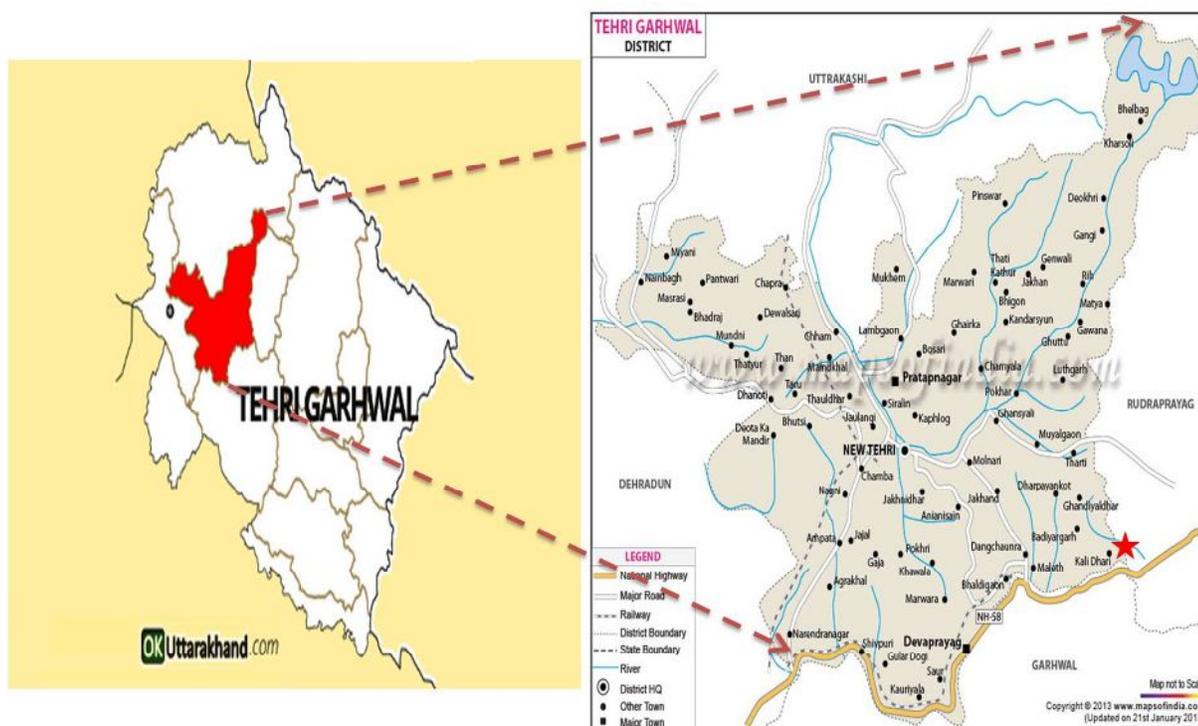


Figure: 1.1 - Project Location

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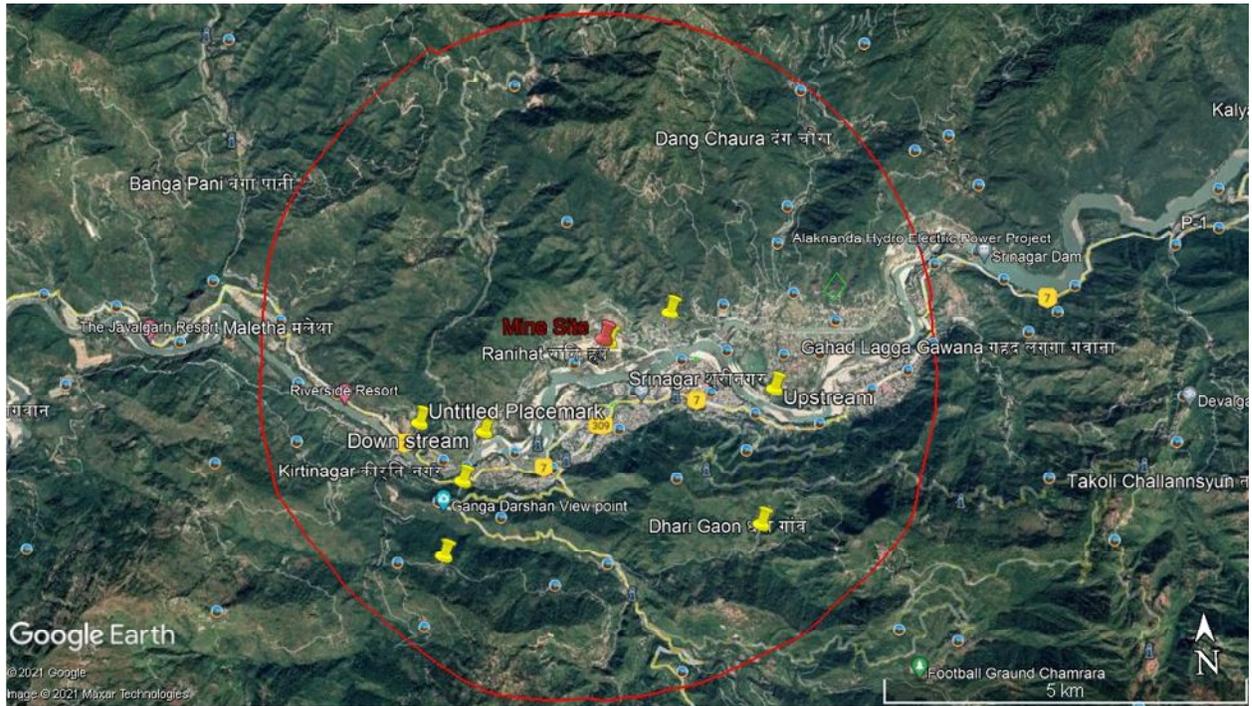


Figure: 5.0 KM Study area

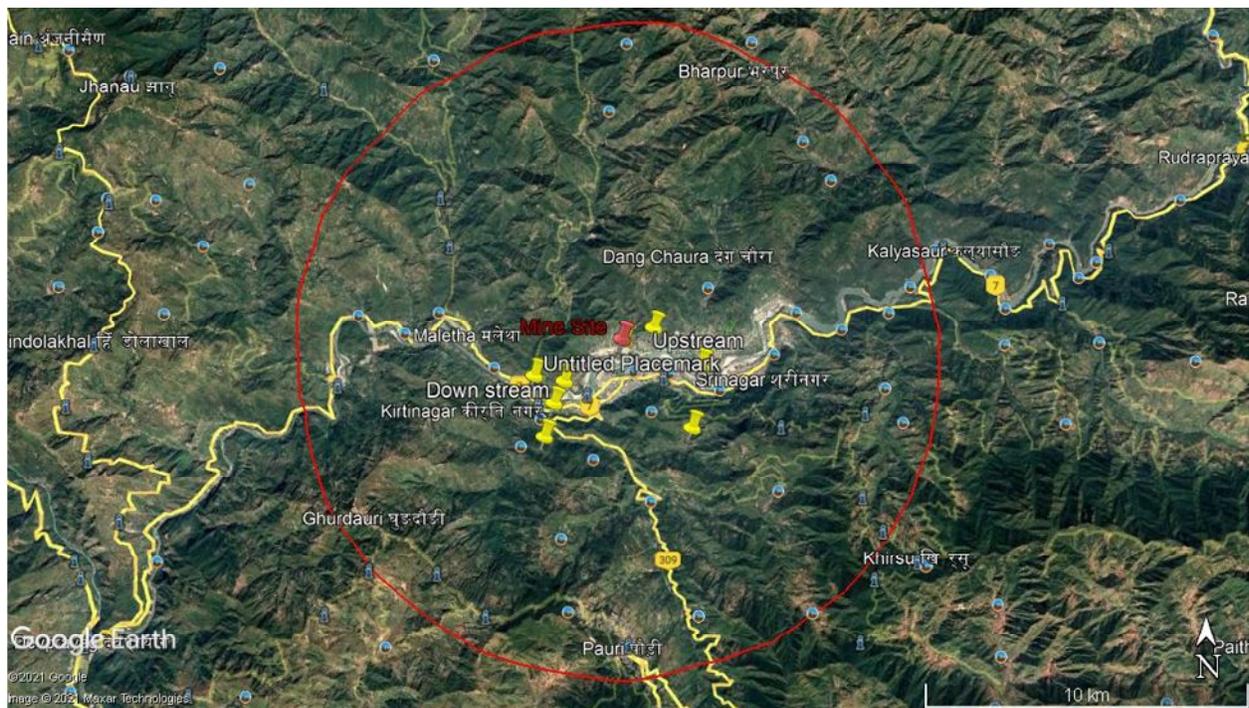


Figure: 1.2 10 KM Study area

## **TOPOGRAPHY & GEOLOGY**

### **Topography**

Tehri Garhwal district comprises two broad physiographic divisions viz. Central Himalayan Zone (north of the Main Central Thrust) exposed in the north eastern part and Lesser Himalayan Zone (south of the Main Central Thrust) in rest of the area. The physiography of the district is characterized by high mountain peaks, deep gorges and valleys. Major part of the area is inaccessible due to extremely rugged topography and dense forest cover. The altitude varies from 369 to 6672 m. The regional trend of major ridges is NNW-SSE, which is usually parallel to the strike of the country rocks. However, E-W, NW-SE and N-S trending ridges are also observed which are mainly structurally controlled. The soils of Tehri Garhwal district can be broadly classified into two types, viz. soils of Central/Higher Himalaya and soils of Lesser Himalaya. The soils of Central Himalaya have been broadly classified under a) Soils of Summits, Ridge Tops and Mountain Glaciers, b) Soils of Side Slopes, c) Soils of Upper Glacio-Fluvial Valleys and d) Soils of Cliffs. Major part of the district is covered by soils of Lesser Himalaya, which may be broadly subdivided into three soil types. Soils of the first type are moderately shallow, excessively drained, thermic, fine loamy, moderately eroded and slightly stony and are known as Dystric Eutrudepts. The second type, Lithic Udorthents, is characterized by very shallow, excessively drained, severely eroded and strongly stony, thermic loamy soils exposed on steep slopes with loamy and sandy surface. Typic Udorthents, the third major soil type, is moderately shallow, excessively drained, moderately eroded and slightly stony, loamy soils on moderate slopes with loamy surface.

### **Geology**

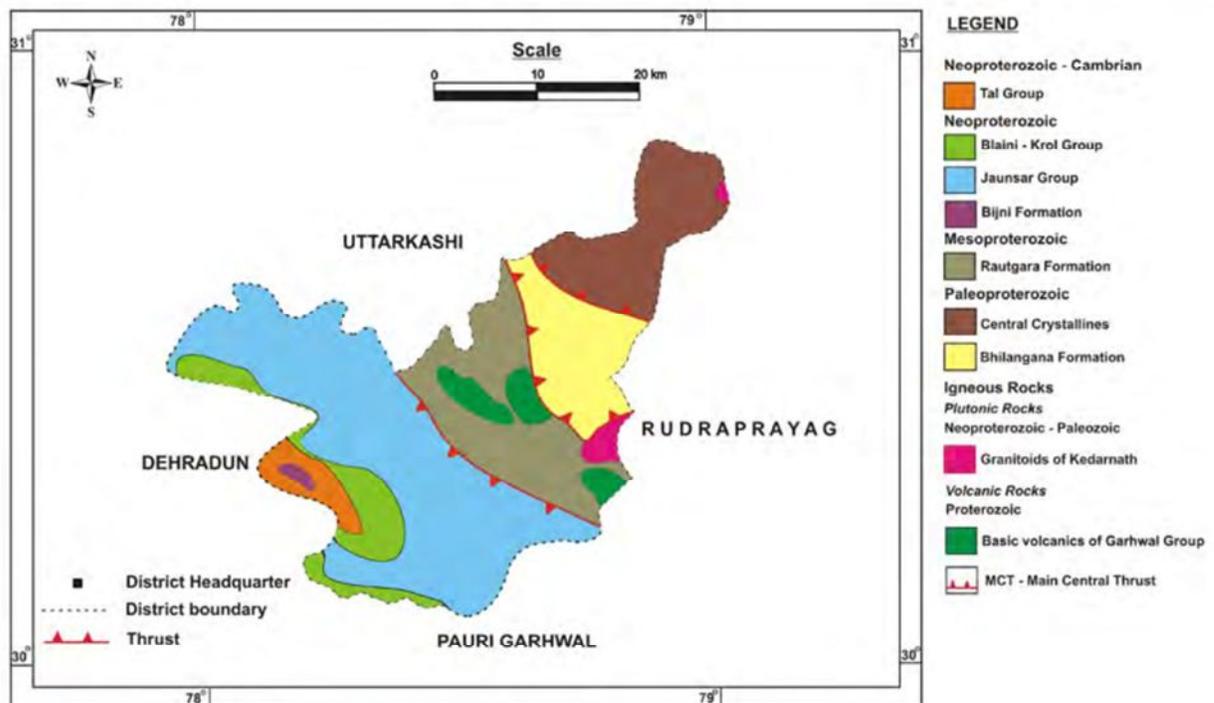
District Tehri Garhwal is represented by the rocks of Lesser Himalaya and Central Himalaya. The geological set up is very complex due to the repeated tectonic disturbances caused by different orogenic cycles. The rock units exposed in various parts of Tehri Garhwal district are exposed in two broad geotectonic zones viz. Central or Higher Himalaya and Lesser Himalaya.

Central Himalaya-It lies to the north of Main Central Thrust (MCT) whereas the Lesser

Himalaya occurs to the south of it. A group of regionally metamorphosed rocks known as Central Crystallines are exposed in the Central Himalaya. The Central Crystallines occur as thrust sheets over the metasedimentary and sedimentary rocks of Lesser Himalaya in varied tectonic settings. Major rock types of Central Crystallines are migmatites, psammitic and mica gneiss, calc gneiss. Quartzite, marble, mica schist and amphibolite. Granites of different ages ranging from Paleoproterozoic to Mesozoic-Tertiary intrude the Central Crystallines.

Lesser Himalaya- It occupies major part of the district and comprises of different groups like Jaunsar Group, Blaini-Krol Group and Tal Group. The groups are subdivided into various formations like Bhilangana Formation, Rautgara Formation, Bijni Formation. A suite of granitic intrusives known as Granitoids of Kedarnath and basic volcanics of Garhwal Group are also exposed in parts of the district. Generally, the rocks of the Lesser Himalayan Zone show signs of multiple phases of deformation and metamorphism. (Central ground water board)

The proposed mining area deposit is a product of fluvial activity deposit i.e. Sand. Bajari and Boulders.





## CLIMATE

### Temperature, Relative Humidity and Wind

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.

## Rainfall

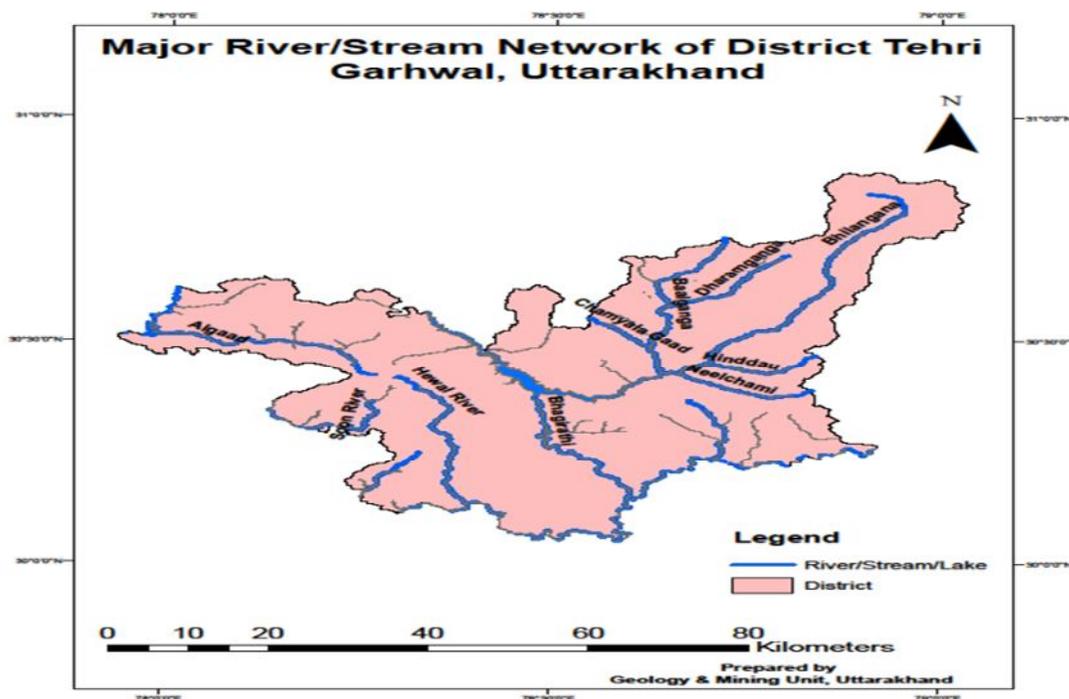
Rainfall, in the study area, occurs almost throughout the year. Maximum rainfall is recorded during the monsoon period i.e. from July to September. There is slight decrease in rainfall from December till March. Rest of the year rainfall is quiet low. Average rainfall (Month-wise), for five years (2007-2011), is tabulated below.

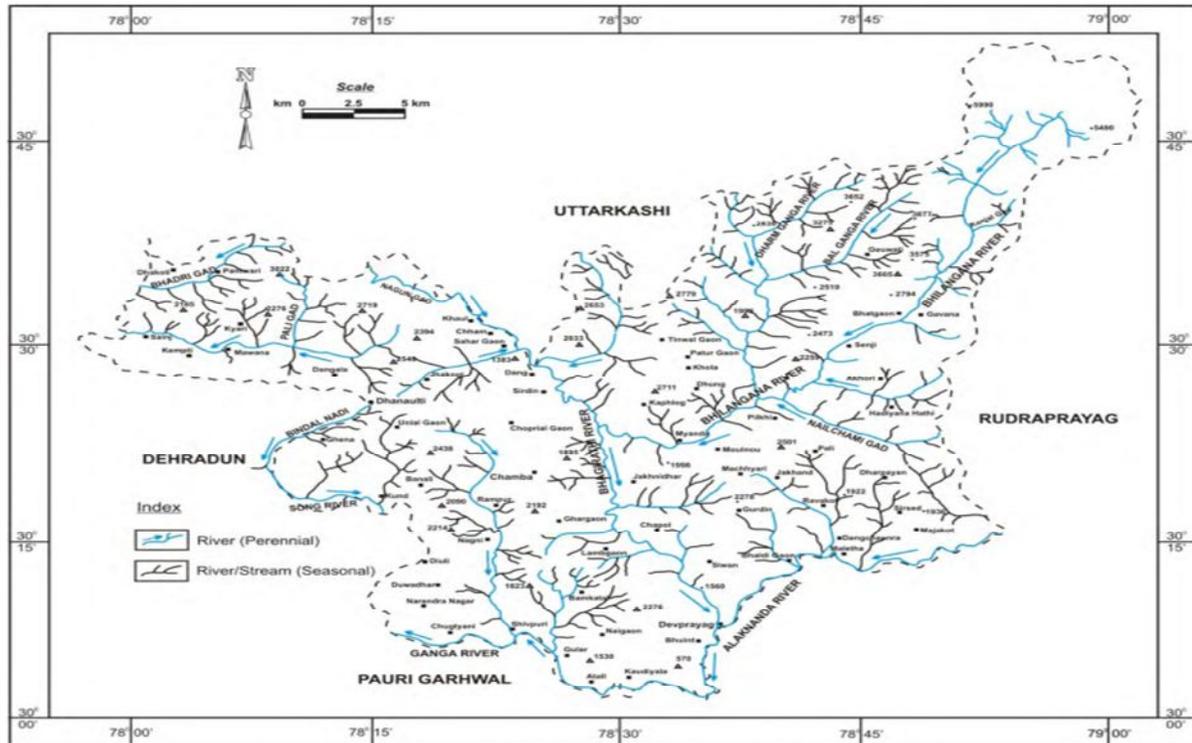
Month		2014	2015	2016	2017	2018
January	R/F	31.7	-	0.9	58.2	15.8
	%DEP	-42	-	-98	7	-71
February	R/F	143	-	51.9	22.6	9
	%DEP	174	-	-1	-57	-83
March	R/F	64.8	-	32.2	43.9	23.4
	%DEP	15	-	-43	-22	-58
April	R/F	35	-	14.9	44	32
	%DEP	10	-	-53	39	1
May	R/F	74.6	-	38.8	74	39.1
	%DEP	33	-	-31	32	-30
June	R/F	26.4	-	80.6	135.8	144.1
	%DEP	-81	-	-41	0	6
July	R/F	249.4	-	415	294.8	216.8
	%DEP	-6	-	12	-21	-42
August	R/F	200.5	-	225.5	164.4	247
	%DEP	-45	-	-39	-55	-33
September	R/F	93.7	-	31.4	192.9	141
	%DEP	-46	-	-82	12	-18
October	R/F	10.2	-	0.2	0	6.5
	%DEP	-79	-	-99	-100	-87
	R/F	0	-	0	0.4	23.1
November	%DEP	-100	-	-100	-96	124
December	R/F	15.8	-	4.5	26.8	0.9
	%DEP	-45	-	-84	-6	-97

Source: Indian Meteorological Department

## SURFACE DRAINAGE PATTERN

Drainage of the area is mainly controlled by the major perennial rivers like Bhagirathi, Bhilangana, Alaknanda and their tributaries like Bal Ganga and Dharma Ganga. Bhagirathi River flows from north to south and meets Alaknanda River at Devprayag. Bhilangana River flows from north east to south west and meets Bhagirathi River near Old Tehri. Bhagirathi and Bhilangana Rivers drain the central part of the district while Alaknanda River flows in the southernmost part close to the district boundary. Apart from the major rivers, many seasonal streams and rivulets (locally called gad and gadhera) drain the area. Important among them are Nailchami Gad, Lastar Gad, Nagun Gad, Bhadri Gad, Chandrabhaga Gad, Bandal Nadi etc Sub-trellis and sub-dendritic are the most common drainage patterns in the area. 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 & inter burden 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**

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 (Sand, Bajri & Boulders) from River - Alaknanda (ML Area 9.72Hectare) at a part of Village- Naithana Patti- Chauras, Khasra No. 2152 to 2154, 2896, 2898, 2899 to 2914, 3003 to 3005, 3316, 3445, at Village: Naithana, Patti- Chauras , Tehsil & District: Tehri Garhwal, Uttarakhand Tehsil- Kirtinagar District - Tehri Garhwal 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.

### **About the Reserve:**

Main aspects of the lease area are as discussed below Total demarcated Area- 10.65 ha Area found suitable for mining- 9.72 ha(as per Joint Demarcation Report Attached as ann.08) As per Uttarakhand Minor Mineral Policy,

Quantity of ultimate reserve (tonnes) = mining area (9.72 ha) x 3.0 m depth x 2.2 bulk density- 576840 tonnes/year

Deposit/material (in cum) at maximum allowable depth i.e. 3.0m Depth= 262200 M<sup>3</sup> • As per the data collected & slice wise mineral assessment/ survey, about 90% of ultimate reserve been considered/planned as annual production quantity i.e. 519156 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).

**Based on above facts and figure, the saleable mineral i.e. 519156 tonnes/years sustainable extractable quantity for this project (final saleable quantity from the proposed lease).**

### **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 small insects, 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

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- 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 discusses 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 **March 2021 to 22nd May 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.

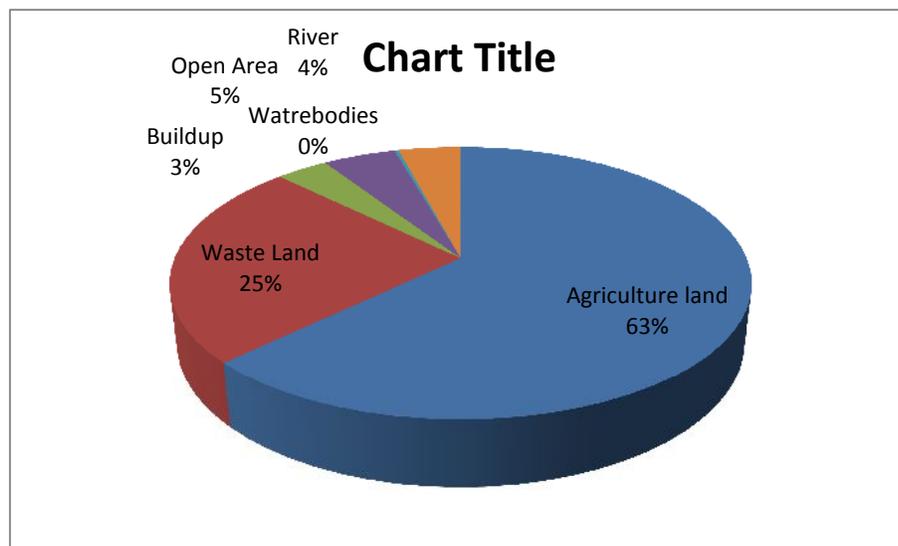
### 3.1.3 Observation of Land Use Study

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
<b>Total</b>	<b>31429.53</b>	<b>100 %</b>

(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 are covering 3.46 % of the study area. Waste land constitutes about 24.47 % of the study area.

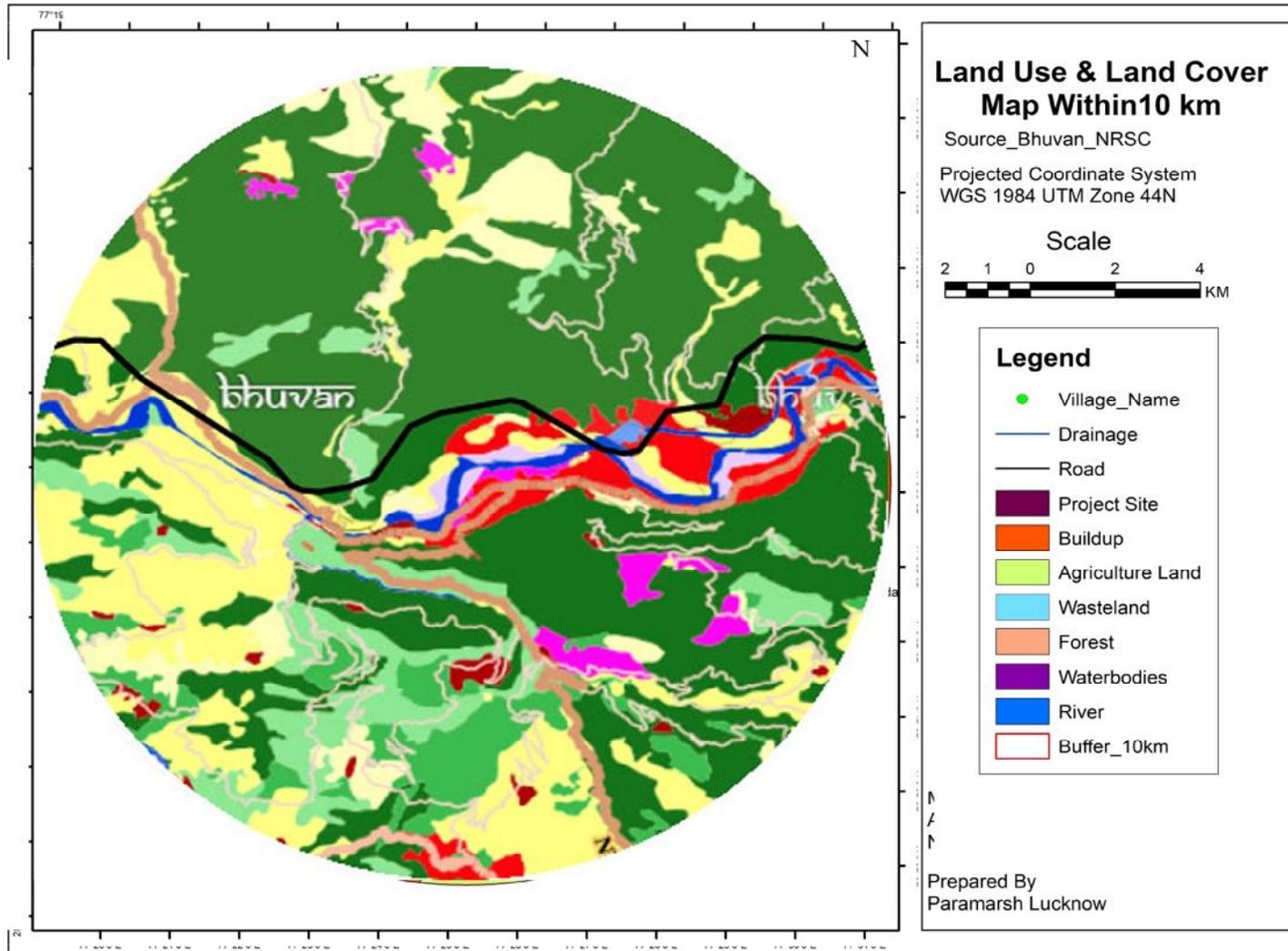
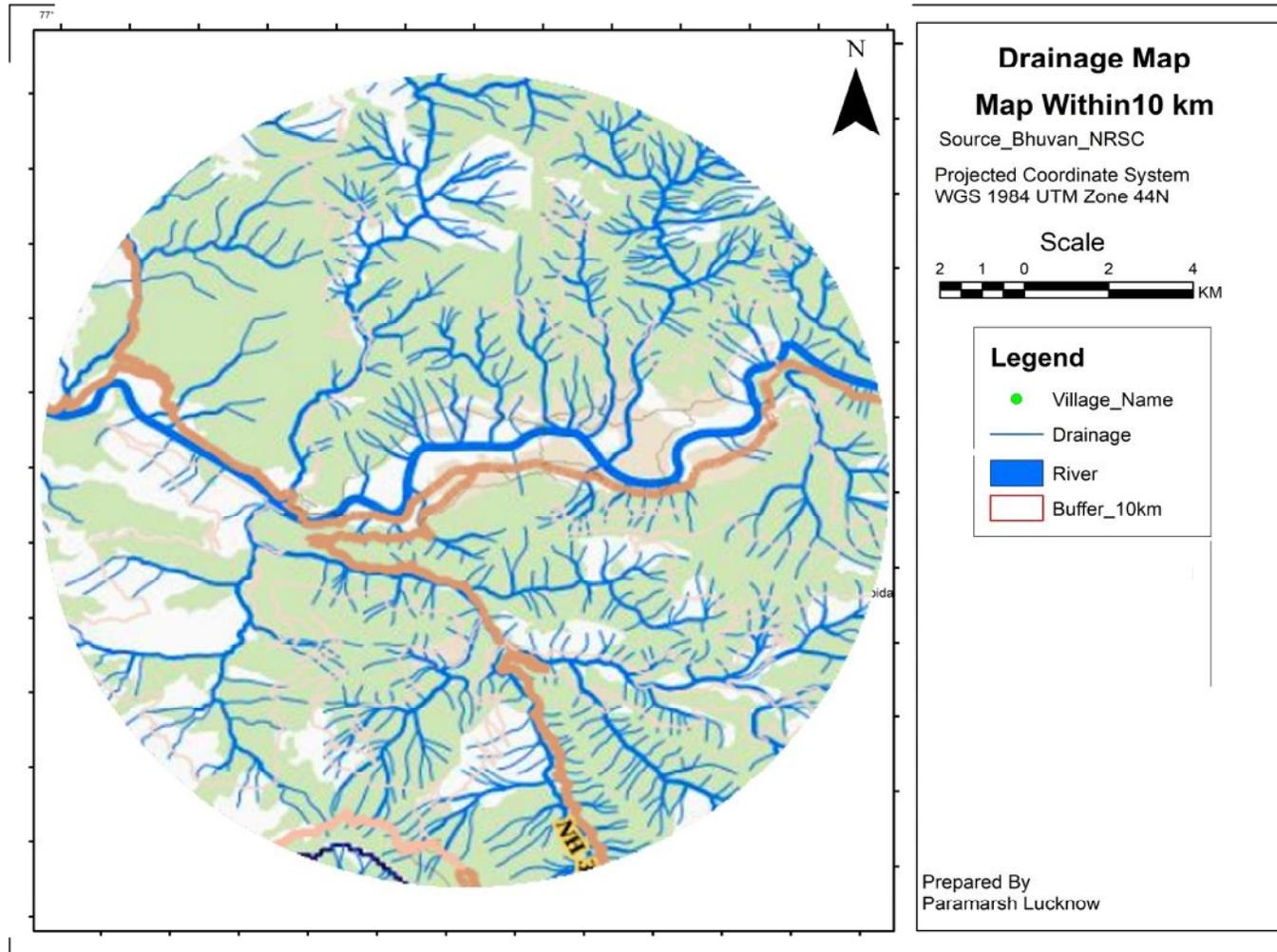


Figure 3.2: Land Use Pattern of the Study Area (10 Km Radius from the Mine Site)

Draft EIA Report for Public Hearing of Sand Bajri & Boulder (Minor-Mineral) mining on the bed of Alaknanda River, Khasra No: 2152 to 2154, 2896, 2898, 2899 to 2914, 3003 to 3005, 3316, 3445 Area - 9.72 ha Village- Naithana, Patti- Chauras, Tehsil -Kirtinagar District: TehriGarhwal, Uttarakhand



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

### **3.1.5 CROPPING PATTERN**

The economy of Banda 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, mustard 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 slopy 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 vulgoris</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

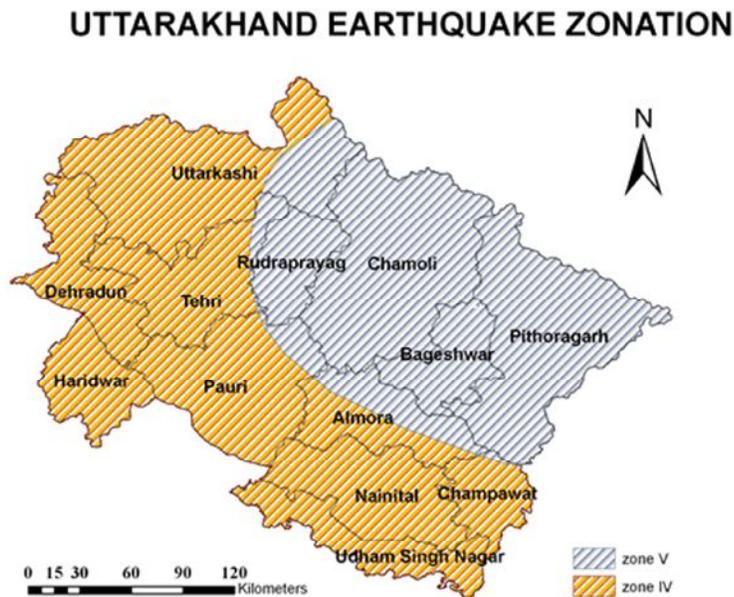
### 3.1.6 PHYSIOGRAPHY OF THE MINE AREA

The applied area along River Ken has mild slope towards north & north-east. The highest level of area is 99.20mRL near boundary pillar “D” in North while The lowest level is 86.7 mRL near boundary pillar “A”.. The area lies on right bank of Yamuna River **which** surround the area along west north & east direction and flows from west to north & east direction in the area. The area lies right bank of river Yamuna which flows from west to east direction in the area. In past no mining activities was carried out with in the area.

### 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.



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 March 2021 to May 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

### **Meteorology Climate**

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**

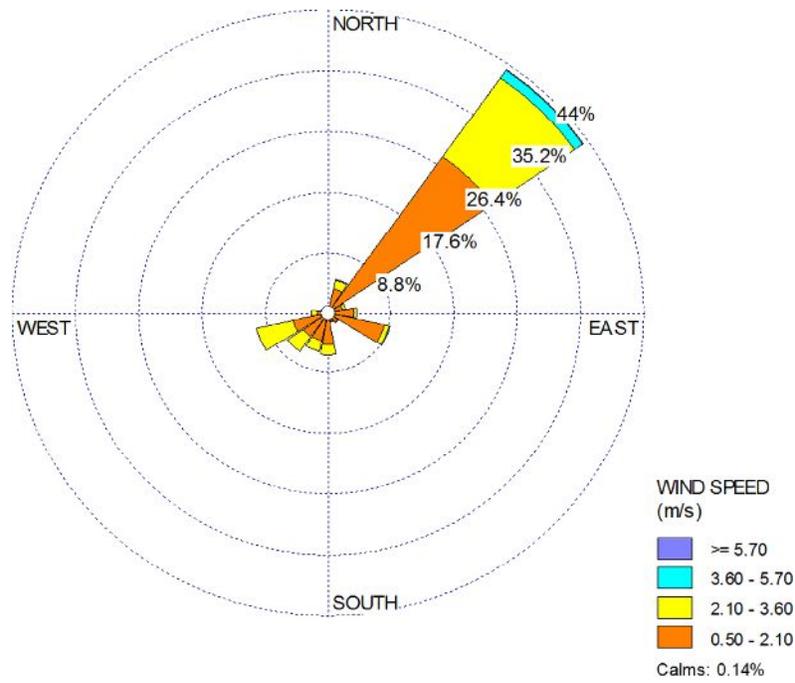
The prime objective of the baseline study with respect to ambient air quality is to establish the present air quality and its conformity to National Ambient Air Quality Standards. This data has been further used during impact assessment to predict the final air quality. This section describes the sampling 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 (PM<sub>10</sub>), Particulate Matter- 2.5 (PM<sub>2.5</sub>), Sulphur-dioxide (SO<sub>2</sub>) and Oxides of Nitrogen (NO<sub>2</sub>), 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.

- The predominant wind direction in the Season (March 2021 to May 2021) NE with average wind speed of 1.80 m/s.

### **FIGURE 3.1 WIND ROSE March 2021 to May 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	30°13'42.70"N 78°46'25.32"E
2	Naithana	1.0 km NE	30°13'55.55"N 78°47'0.17"E
3	Mahar gaoun	3.02 km SW	30°12'38.28"N 78°45'2.23"E
4	Giri gaoun	4.20 km SW	30°12'4.31"N 78°44'51.70"E
5	Dhari Gaoun	4.0 km SE	30°12'13.47"N 78°47'45.24"E
6	Badgaoun	3.0 km W	30°13'6.80"N 78°44'38.64"E



**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 (PM<sub>2.5</sub>) fine particles in ambient air was calculated as the total mass of collected particles divided by the volume of air sampled.

- II. Particulate Matter (PM<sub>10</sub>): Particulate Matter (PM<sub>10</sub>) 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<sub>10</sub> dust is accumulated on the filter paper (8 ×10 size) while coarse dust is collected in a cup placed under the cyclone. PM<sub>10</sub> 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<sub>10</sub> in the designated size range was calculated by dividing the weight gain of the filter by the volume of air sampled.
- III. Sulphur dioxide (SO<sub>2</sub>): SO<sub>2</sub> 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: NO<sub>2</sub> 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:**

<b>Ambient Air Quality Analysis</b>	
Report Code: AAQ-31052021-01	Issue Date: 31/05/2021
ISSUED TO :	PARAMARSH SERVICING ENVIRONMENT & DEVELOPMENT M.S.-1/10, SECTOR A, SITAPUR ROAD YOJNA (NEAR ST. ANTHONY SCHOOL, RAM RAM BANK CHAURAHA) ALIGANJ, LUCKNOW-226024
Project Name :	Sand bajri & boulder (minor mineral) mining on the bed of alkhnanda river, Village - Naithana, Ranihat Patti – Chaurus, Tehsil- Keertinagar District - Tehrl Garhwal Uttarakhand
Sampling Protocol :	UTRL/STP/AIR/01
Location :	AQ-1 Project site
Analysis Duration :	05/03/2021 To 31/05/2021
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 <sub>2</sub> ( $\mu\text{g}/\text{m}^3$ )	Nitrogen Dioxide NO <sub>2</sub> ( $\mu\text{g}/\text{m}^3$ )	Carbon monoxide CO ( $\text{mg}/\text{m}^3$ )
		IS:5182(Part-23)	IS:5182(Part-24)	IS:5182(Part-2)	IS:5182(Part-6)	IS:5182( Part-X)
1	01-03-2021	68.63	32.69	7.01	14.37	<0.5
2	04-03-2021	65.24	36.30	8.21	16.30	<0.5
3	08-02-2021	71.40	34.77	6.63	15.63	<0.5
4	11-03-2021	67.49	32.57	7.54	16.73	<0.5
5	15-03-2021	68.22	35.83	6.33	17.79	<0.5
6	18-03-2021	69.32	33.80	7.85	18.15	<0.5
7	22-03-2021	65.37	34.89	6.93	18.64	<0.5
8	25-03-2021	70.37	36.04	8.01	15.63	<0.5
9	29-03-2021	67.68	37.18	7.57	14.30	<0.5
10	01-04-2021	69.14	32.37	7.03	15.73	<0.5
11	05-04-2021	66.19	34.47	8.73	16.24	<0.5
12	08-04-2021	68.88	35.02	6.40	16.67	<0.5
13	12-04-2021	65.54	36.17	7.90	18.46	<0.5
14	15-04-2021	70.69	35.37	8.51	17.90	<0.5
15	19-04-2021	69.39	34.89	7.63	18.64	<0.5
16	22-04-2021	66.87	36.43	6.98	16.36	<0.5
17	26-04-2021	68.88	37.02	8.46	14.40	<0.5
18	01-05-2021	66.21	34.53	7.03	15.92	<0.5
19	05-05-2021	70.21	37.71	8.38	16.73	<0.5
20	08-05-2021	67.18	35.19	6.08	17.47	<0.5
21	12-05-2021	68.70	34.59	8.35	18.34	<0.5
22	15-05-2021	71.64	34.65	7.30	15.58	<0.5
23	19-05-2021	70.27	37.99	8.02	14.98	<0.5
24	22-05-2021	65.65	36.30	8.35	16.67	<0.5
Minimum		65.24	32.37	6.08	14.30	<0.5

Maximum	71.64	37.99	8.73	18.64	<0.5
Average	68.30	35.28	7.55	16.57	<0.5
98 <sup>th</sup> Percentile	71.53	37.86	8.63	18.64	<0.5
NAAQS,For 24 Hourly Monitoring	100.0	60.0	80.0	80.0	4.0

### Ambient Air Quality Analysis

Report Code: AAQ-31052021-02

Issue Date: 31/05/2021

ISSUED TO : PARAMARSH SERVICING ENVIRONMENT & DEVELOPMENT  
M.S.-1/10, SECTOR A, SITAPUR ROAD YOJNA (NEAR ST. ANTHONY SCHOOL, RAM RAM BANK CHAURAHA) ALIGANJ, LUCKNOW-226024

Project Name : Sand bajri & boulder (minor mineral) mining on the bed of alkhnanda river, Village - Naithana, Ranihat Patti – Chaurus, Tehsil- Keertinagar District - Tehri Garhwal Uttarakhand

Sampling Protocol : UTRL/STP/AIR/01

Location : AQ-2 Naithana

Analysis Duration : 05/03/2021 To 31/05/2021

Sample Drawn By : UTRL

R

### 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 <sub>2</sub> ( $\mu\text{g}/\text{m}^3$ )	Nitrogen Dioxide NO <sub>2</sub> ( $\mu\text{g}/\text{m}^3$ )	Carbon monoxide CO ( $\text{mg}/\text{m}^3$ )
		IS:5182(Part-23)	IS:5182(Part-24)	IS:5182(Part-2)	IS:5182(Part-6)	IS:5182( Part-X)
1	01-03-2021	69.01	33.86	7.26	15.80	<0.5
2	04-03-2021	65.32	38.30	6.93	16.98	<0.5
3	08-02-2021	70.91	35.07	8.26	14.66	<0.5
4	11-03-2021	68.26	33.78	6.97	17.62	<0.5
5	15-03-2021	67.98	37.85	8.27	18.66	<0.5
6	18-03-2021	68.77	34.95	7.54	16.44	<0.5
7	22-03-2021	66.37	38.16	7.18	18.39	<0.5
8	25-03-2021	71.44	33.00	6.89	14.68	<0.5
9	29-03-2021	68.05	35.79	8.23	15.52	<0.5
10	01-04-2021	70.13	32.69	7.29	16.79	<0.5
11	05-04-2021	65.96	35.62	6.63	14.71	<0.5
12	08-04-2021	69.13	37.29	7.40	17.66	<0.5
13	12-04-2021	66.39	35.44	8.35	18.71	<0.5
14	15-04-2021	71.94	32.54	8.26	16.50	<0.5
15	19-04-2021	65.47	33.50	6.91	17.84	<0.5
16	22-04-2021	67.24	38.01	7.23	15.75	<0.5
17	26-04-2021	69.12	34.16	8.35	13.89	<0.5
18	01-05-2021	65.97	33.55	6.73	14.93	<0.5
19	05-05-2021	70.71	35.83	7.73	17.23	<0.5
20	08-05-2021	68.04	34.04	6.79	16.61	<0.5
21	12-05-2021	69.25	36.43	8.52	18.22	<0.5

22	15-05-2021	66.83	37.47	6.86	16.26	<0.5
23	19-05-2021	67.54	34.41	7.71	15.86	<0.5
24	22-05-2021	65.89	37.71	6.98	17.66	<0.5
<b>Minimum</b>		<b>65.32</b>	<b>32.54</b>	<b>6.63</b>	<b>13.89</b>	<b>&lt;0.5</b>
<b>Maximum</b>		<b>71.94</b>	<b>38.30</b>	<b>8.52</b>	<b>18.71</b>	<b>&lt;0.5</b>
<b>Average</b>		<b>68.16</b>	<b>35.39</b>	<b>7.47</b>	<b>16.56</b>	<b>&lt;0.5</b>
<b>98<sup>th</sup> Percentile</b>		<b>71.71</b>	<b>38.24</b>	<b>8.44</b>	<b>18.69</b>	<b>&lt;0.5</b>
<b>NAAQS,For 24 Hourly Monitoring</b>		<b>100.0</b>	<b>60.0</b>	<b>80.0</b>	<b>80.0</b>	<b>4.0</b>

Report Code: AAQ-31052021-03

Issue Date: 31/05/2021

ISSUED TO : PARAMARSH SERVICING ENVIRONMENT & DEVELOPMENT  
M.S.-1/10, SECTOR A, SITAPUR ROAD YOJNA (NEAR ST. ANTHONY SCHOOL, RAM RAM BANK CHAURAHA) ALIGANJ, LUCKNOW-226024

Project Name : Sand bajri & boulder (minor mineral) mining on the bed of alkhnanda river, Village - Naithana, Ranihat Patti – Chauras, Tehsil- Keertinagar District - Tehri Garhwal Uttarakhand

Sampling Protocol : UTRL/STP/AIR/01 Location :AQ-3 Mahar Gaoun

Analysis Duration : 05/03/2021 To 31/05/2021 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 <sub>2</sub> ( $\mu\text{g}/\text{m}^3$ )	Nitrogen Dioxide NO <sub>2</sub> ( $\mu\text{g}/\text{m}^3$ )	Carbon monoxide CO ( $\text{mg}/\text{m}^3$ )
		IS:5182(Part-23)	IS:5182(Part-24)	IS:5182(Part-2)	IS:5182(Part-6)	IS:5182( Part-X)
1	01-03-2021	66.43	35.95	6.97	16.71	<0.5
2	04-03-2021	65.23	36.12	8.31	14.75	<0.5
3	08-02-2021	69.72	32.91	7.56	15.56	<0.5
4	11-03-2021	65.14	34.16	6.68	17.41	<0.5
5	15-03-2021	68.50	36.51	7.70	18.82	<0.5
6	18-03-2021	66.24	33.64	6.85	16.78	<0.5
7	22-03-2021	67.50	35.99	7.59	17.45	<0.5
8	25-03-2021	70.12	33.80	7.98	16.50	<0.5
9	29-03-2021	68.56	37.84	8.36	15.14	<0.5
10	01-04-2021	69.36	34.76	7.69	17.69	<0.5
11	05-04-2021	67.87	36.54	6.78	15.67	<0.5
12	08-04-2021	70.14	38.03	8.21	16.68	<0.5
13	12-04-2021	65.59	34.92	7.91	18.47	<0.5
14	15-04-2021	70.82	32.84	7.54	15.52	<0.5
15	19-04-2021	66.32	35.74	6.65	16.61	<0.5
16	22-04-2021	68.09	34.29	7.68	14.87	<0.5
17	26-04-2021	71.13	35.40	8.16	16.29	<0.5
18	01-05-2021	67.15	37.55	7.03	17.79	<0.5

19	05-05-2021	69.85	34.84	8.41	16.79	<0.5
20	08-05-2021	68.10	33.07	7.18	15.08	<0.5
21	12-05-2021	70.30	37.18	8.35	17.61	<0.5
22	15-05-2021	69.61	36.39	7.17	15.60	<0.5
23	19-05-2021	65.55	35.19	6.99	14.89	<0.5
24	22-05-2021	68.28	33.95	7.60	16.57	<0.5
<b>Minimum</b>		<b>65.14</b>	<b>32.84</b>	<b>6.65</b>	<b>14.75</b>	<b>&lt;0.5</b>
<b>Maximum</b>		<b>71.13</b>	<b>38.03</b>	<b>8.41</b>	<b>18.82</b>	<b>&lt;0.5</b>
<b>Average</b>		<b>68.15</b>	<b>35.32</b>	<b>7.56</b>	<b>16.47</b>	<b>&lt;0.5</b>
<b>98<sup>th</sup> Percentile</b>		<b>70.98</b>	<b>37.95</b>	<b>8.38</b>	<b>18.66</b>	<b>&lt;0.5</b>
<b>NAAQS,For 24 Hourly Monitoring</b>		<b>100.0</b>	<b>60.0</b>	<b>80.0</b>	<b>80.0</b>	<b>4.0</b>

### Ambient Air Quality Analysis

Report Code: AAQ-31052021-04

Issue Date: 31/05/2021

ISSUED TO : PARAMARSH SERVICING ENVIRONMENT & DEVELOPMENT  
M.S.-1/10, SECTOR A, SITAPUR ROAD YOJNA (NEAR ST. ANTHONY SCHOOL, RAM RAM BANK CHAURAHA) ALIGANJ, LUCKNOW-226024

Project Name : Sand bajri & boulder (minor mineral) mining on the bed of alkhnanda river, Village - Naithana, Ranihat Patti – Chaurus, Tehsil- Keertinagar District - Tehri Garhwal Uttarakhand

Sampling Protocol : UTRL/STP/AIR/01      Location :AQ-4 Giri Gaoun

Analysis Duration : 05/03/2021 To 31/05/2021      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 <sub>2</sub> ( $\mu\text{g}/\text{m}^3$ )	Nitrogen Dioxide NO <sub>2</sub> ( $\mu\text{g}/\text{m}^3$ )	Carbon monoxide CO ( $\text{mg}/\text{m}^3$ )
		IS:5182(Part-23)	IS:5182(Part-24)	IS:5182(Part-2)	IS:5182(Part-6)	IS:5182( Part-X)
1	02-03-2021	67.52	32.46	8.07	18.34	<0.5
2	05-03-2021	68.19	34.77	7.60	16.19	<0.5
3	09-02-2021	70.18	38.32	6.86	14.61	<0.5
4	12-03-2021	66.09	33.24	7.22	15.71	<0.5
5	16-03-2021	69.58	35.57	6.98	17.66	<0.5
6	19-03-2021	67.32	37.34	8.61	16.38	<0.5
7	23-03-2021	69.20	38.03	7.16	18.15	<0.5
8	26-03-2021	65.10	34.15	6.87	14.63	<0.5
9	30-03-2021	70.84	36.50	8.20	15.29	<0.5
10	02-04-2021	71.07	35.55	6.98	16.72	<0.5
11	06-04-2021	69.20	38.59	7.60	18.21	<0.5
12	09-04-2021	68.78	37.10	7.64	17.57	<0.5
13	13-04-2021	66.18	33.14	6.92	14.75	<0.5

14	16-04-2021	65.69	32.35	8.21	16.04	<0.5
15	20-04-2021	67.40	36.52	6.92	17.50	<0.5
16	23-04-2021	69.76	38.49	8.08	15.21	<0.5
17	27-04-2021	66.58	34.46	7.72	14.95	<0.5
18	02-05-2021	68.77	36.56	7.29	18.28	<0.5
19	06-05-2021	70.92	32.62	6.99	15.82	<0.5
20	09-05-2021	66.43	34.70	7.31	14.68	<0.5
21	13-05-2021	69.84	38.38	8.47	16.65	<0.5
22	16-05-2021	67.02	36.73	6.88	16.30	<0.5
23	20-05-2021	65.76	34.29	8.24	17.66	<0.5
24	23-05-2021	70.57	33.87	7.31	15.61	<0.5
<b>Minimum</b>		<b>65.10</b>	<b>32.35</b>	<b>6.86</b>	<b>14.61</b>	<0.5
<b>Maximum</b>		<b>71.07</b>	<b>38.59</b>	<b>8.61</b>	<b>18.34</b>	<0.5
<b>Average</b>		<b>68.25</b>	<b>35.57</b>	<b>7.51</b>	<b>16.37</b>	<0.5
<b>98<sup>th</sup> Percentile</b>		<b>71.00</b>	<b>38.54</b>	<b>8.55</b>	<b>18.31</b>	<0.5
<b>NAAQS,For 24 Hourly Monitoring</b>		<b>100.0</b>	<b>60.0</b>	<b>80.0</b>	<b>80.0</b>	<b>4.0</b>

### Ambient Air Quality Analysis

Report Code: AAQ-31052021-05

Issue Date: 31/05/2021

ISSUED TO : PARAMARSH SERVICING ENVIRONMENT & DEVELOPMENT  
M.S.-1/10, SECTOR A, SITAPUR ROAD YOJNA (NEAR ST. ANTHONY SCHOOL, RAM RAM BANK CHAURAHA) ALIGANJ, LUCKNOW-226024

Project Name : Sand bajri & boulder (minor mineral) mining on the bed of alkhanda river, Village - Naithana, Ranihat Patti – Chaurus, Tehsil- Keertinagar District - Tehri Garhwal Uttarakhand

Sampling Protocol : UTRL/STP/AIR/01

Location :AQ-5 Dhari Gaoun

Analysis Duration : 05/03/2021 To 31/05/2021

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 <sub>2</sub> ( $\mu\text{g}/\text{m}^3$ )	Nitrogen Dioxide NO <sub>2</sub> ( $\mu\text{g}/\text{m}^3$ )	Carbon monoxide CO ( $\text{mg}/\text{m}^3$ )
		IS:5182(Part-23)	IS:5182(Part-24)	IS:5182(Part-2)	IS:5182(Part-6)	IS:5182( Part-X)
1	02-03-2021	68.57	37.90	6.94	16.62	<0.5
2	05-03-2021	64.95	36.81	7.17	14.68	<0.5
3	09-02-2021	71.59	35.05	8.12	15.02	<0.5
4	12-03-2021	67.60	32.48	6.68	17.61	<0.5
5	16-03-2021	70.56	36.30	7.65	16.67	<0.5
6	19-03-2021	68.68	34.06	6.16	18.06	<0.5
7	23-03-2021	65.39	35.84	6.87	14.63	<0.5
8	26-03-2021	67.16	33.00	7.58	15.23	<0.5

9	30-03-2021	68.05	37.89	6.17	14.61	<0.5
10	02-04-2021	69.63	32.46	7.37	17.41	<0.5
11	06-04-2021	69.15	36.60	6.93	17.90	<0.5
12	09-04-2021	67.12	34.62	6.54	16.68	<0.5
13	13-04-2021	66.46	35.32	7.21	14.80	<0.5
14	16-04-2021	68.81	37.55	7.97	15.56	<0.5
15	20-04-2021	66.51	33.83	6.20	16.51	<0.5
16	23-04-2021	71.23	32.19	7.41	15.64	<0.5
17	27-04-2021	69.24	33.24	8.02	14.60	<0.5
18	02-05-2021	67.74	35.22	7.00	17.70	<0.5
19	06-05-2021	70.46	34.84	6.03	14.93	<0.5
20	09-05-2021	67.42	37.45	8.04	16.43	<0.5
21	13-05-2021	68.70	36.30	7.93	17.60	<0.5
22	16-05-2021	70.12	34.65	6.47	15.03	<0.5
23	20-05-2021	66.86	32.81	7.64	16.64	<0.5
24	23-05-2021	68.23	36.04	8.15	14.71	<0.5
<b>Minimum</b>		<b>64.95</b>	<b>32.19</b>	<b>6.03</b>	<b>14.60</b>	<b>&lt;0.5</b>
<b>Maximum</b>		<b>71.59</b>	<b>37.90</b>	<b>8.15</b>	<b>18.06</b>	<b>&lt;0.5</b>
<b>Average</b>		<b>68.34</b>	<b>35.10</b>	<b>7.18</b>	<b>16.05</b>	<b>&lt;0.5</b>
<b>98<sup>th</sup> Percentile</b>		<b>71.42</b>	<b>37.90</b>	<b>8.13</b>	<b>17.99</b>	<b>&lt;0.5</b>
<b>NAAQS,For 24 Hourly Monitoring</b>		<b>100.0</b>	<b>60.0</b>	<b>80.0</b>	<b>80.0</b>	<b>4.0</b>

### Ambient Air Quality Analysis

Report Code: AAQ-31052021-06

Issue Date: 31/05/2021

ISSUED TO : PARAMARSH SERVICING ENVIRONMENT & DEVELOPMENT  
M.S.-1/10, SECTOR A, SITAPUR ROAD YOJNA (NEAR ST. ANTHONY SCHOOL, RAM RAM BANK CHAURAHA) ALIGANJ, LUCKNOW-226024

Project Name : Sand bajri & boulder (minor mineral) mining on the bed of alkhanda river, Village - Naithana, Ranihat Patti – Chaurus, Tehsil- Keertinagar District - Tehri Garhwal Uttarakhand

Sampling Protocol : UTRL/STP/AIR/01 Location :AQ-6 Bad Gaoun

Analysis Duration : 05/03/2021 To 31/05/2021 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 <sub>2</sub> ( $\mu\text{g}/\text{m}^3$ )	Nitrogen Dioxide NO <sub>2</sub> ( $\mu\text{g}/\text{m}^3$ )	Carbon monoxide CO (mg/m <sup>3</sup> )
		IS:5182(Part-23)	IS:5182(Part-24)	IS:5182(Part-2)	IS:5182(Part-6)	IS:5182( Part-X)
1	02-03-2021	67.74	35.69	7.61	17.51	<0.5
2	05-03-2021	66.05	38.00	6.88	15.57	<0.5
3	09-02-2021	70.22	36.66	7.96	14.62	<0.5
4	12-03-2021	65.05	33.26	8.20	18.31	<0.5
5	16-03-2021	66.12	37.07	7.22	17.56	<0.5

6	19-03-2021	68.65	34.83	6.29	18.20	<0.5
7	23-03-2021	67.12	36.63	7.54	15.52	<0.5
8	26-03-2021	69.51	35.07	6.88	14.66	<0.5
9	30-03-2021	66.74	36.58	8.08	16.41	<0.5
10	02-04-2021	68.92	33.26	7.22	18.31	<0.5
11	06-04-2021	70.77	37.37	6.64	16.58	<0.5
12	09-04-2021	67.53	36.65	8.19	14.79	<0.5
13	13-04-2021	66.53	34.35	7.60	15.63	<0.5
14	16-04-2021	71.32	35.79	6.86	16.26	<0.5
15	20-04-2021	67.58	32.49	6.72	18.12	<0.5
16	23-04-2021	69.30	37.29	7.96	14.87	<0.5
17	27-04-2021	65.91	32.71	8.27	15.87	<0.5
18	02-05-2021	66.83	36.69	7.73	18.54	<0.5
19	06-05-2021	69.70	33.91	6.29	15.27	<0.5
20	09-05-2021	67.84	36.07	7.88	17.49	<0.5
21	13-05-2021	70.81	37.71	6.98	16.73	<0.5
22	16-05-2021	71.59	35.62	7.46	14.71	<0.5
23	20-05-2021	67.43	33.31	6.96	17.60	<0.5
24	23-05-2021	65.05	35.54	7.58	15.60	<0.5
<b>Minimum</b>		<b>65.05</b>	<b>32.49</b>	<b>6.29</b>	<b>14.62</b>	<b>&lt;0.5</b>
<b>Maximum</b>		<b>71.59</b>	<b>38.00</b>	<b>8.27</b>	<b>18.54</b>	<b>&lt;0.5</b>
<b>Average</b>		<b>68.10</b>	<b>35.52</b>	<b>7.38</b>	<b>16.45</b>	<b>&lt;0.5</b>
<b>98<sup>th</sup> Percentile</b>		<b>71.46</b>	<b>37.87</b>	<b>8.24</b>	<b>18.43</b>	<b>&lt;0.5</b>
<b>NAAQS,For 24 Hourly Monitoring</b>		<b>100.0</b>	<b>60.0</b>	<b>80.0</b>	<b>80.0</b>	<b>4.0</b>

The values of PM2.5, PM10, SO2 & NOx 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.

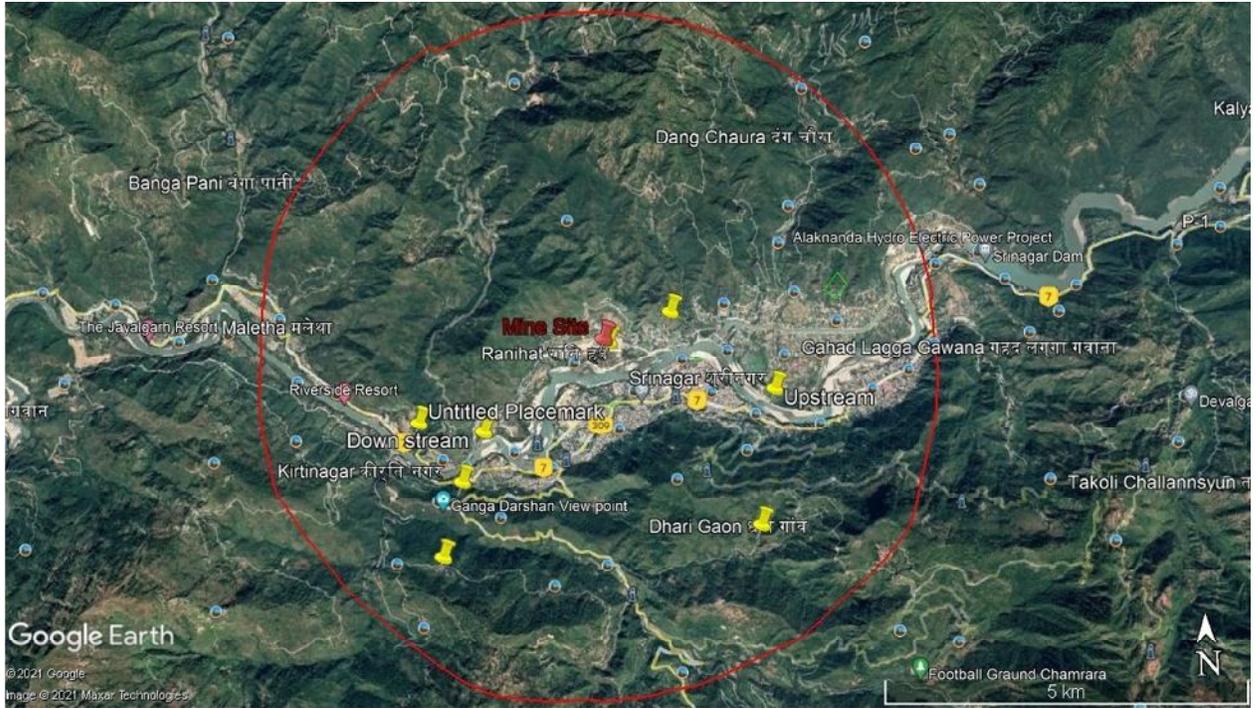
The day noise levels have been monitored during 6.00 am to 10.00 pm and night noise levels, during 10.00 pm to 6.00 am at all the 4 locations, which covers residential areas, commercial, industrial areas, silence area within 10 km radius of the study area.

**(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 station	Distance & Direction	Lat & Long
1	Project site	00	30°13'42.70"N 78°46'25.32"E
2	Naithana	1.0 km NE	30°13'55.55"N 78°47'0.17"E
3	Mahar gaoun	3.02 km SW	30°12'38.28"N 78°45'2.23"E
4	Giri gaoun	4.20 km SW	30°12'4.31"N 78°44'51.70"E
5	Dhari Gaoun	4.0 km SE	30°12'13.47"N 78°47'45.24"E
6	Badgaoun	3.0 km W	30°13'6.80"N 78°44'38.64"E



**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 March 2021 to May 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 (March 2021 May 2021)**

<b>Noise Report</b>	
Report Code: N-31052021-01	Issue Date: 31/05/2021
ISSUED TO :	PARAMARSH SERVICING ENVIRONMENT & DEVELOPMENT M.S.-1/10, SECTOR A, SITAPUR ROAD YOJNA (NEAR ST. ANTHONY SCHOOL, RAM RAM BANK CHAURAHA) ALIGANJ, LUCKNOW-226024,
Project Name :	Sand bajri & boulder (minor mineral) mining on the bed of alkhnanda river, Village - Naithana, Ranihat Patti – Chaurus, Tehsil- Keertinagar District - Tehri Garhwal Uttarakhand
Sampling Protocol :	UTRL/STP/Noise
Analysis Duration :	05/03/2021 To 31/05/2021
	Location : NQ1 (Project Site)
	Sample Drawn By : UTRL

**TEST RESULT**

S.No	Date	Observed Value Leq, dB(A)		LIMIT as per CPCB Guidelines Leq, dB(A)	
		DAY	NIGHT	Zone - Commercial	
				DAY*	NIGHT*
1	01-03-2021	57.6	48.1	65.0	55.0
2	04-03-2021	58.2	45.2		
3	08-02-2021	59.1	46.2		
4	11-03-2021	55.4	48.1		
5	15-03-2021	58.1	45.8		
6	18-03-2021	55.2	46.5		
7	22-03-2021	53.6	47.2		
8	25-03-2021	57.1	43.6		
9	29-03-2021	52.8	48.7		
10	01-04-2021	55.8	46.5		
11	05-04-2021	58.1	48.9		
12	08-04-2021	56.5	47.5		
13	12-04-2021	55.4	48.2		
14	15-04-2021	57.1	45.2		
15	19-04-2021	59.1	48.2		
16	22-04-2021	58.7	46.5		
17	26-04-2021	56.8	47.5		
18	01-05-2021	58.3	48.2		
19	05-05-2021	57.7	45.4		
20	08-05-2021	58.2	46.1		
21	12-05-2021	60.4	46.8		
22	15-05-2021	58.2	44.5		
23	19-05-2021	57.4	46.7		
24	22-05-2021	58.2	45.2		
<b>Minimum</b>		<b>52.8</b>	<b>43.6</b>		
<b>Maximum</b>		<b>60.4</b>	<b>48.9</b>		
<b>Average</b>		<b>57.2</b>	<b>46.7</b>		
<b>Day time</b>		<b>(6.00AM TO 10.00PM)</b>			

<b>Night time</b>	<b>(10.00PM TO 6.00AM)</b>
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**Noise Report**

Report Code: N-31052021-02		Issue Date: 31/05/2021
ISSUED TO :	PARAMARSH SERVICING ENVIRONMENT & DEVELOPMENT M.S.-1/10, SECTOR A, SITAPUR ROAD YOJNA (NEAR ST. ANTHONY SCHOOL, RAM RAM BANK CHAURAHA) ALIGANJ, LUCKNOW-226024,	
Project Name :	Sand bajri & boulder (minor mineral) mining on the bed of alkhanda river, Village - Naithana, Ranihat Patti – Chaurus, Tehsil- Keertinagar District - Tehri Garhwal Uttarakhand	
Sampling Protocol :	UTRL/STP/Noise	Location : NQ2 Naithana
Analysis Duration :	05/03/2021 To 31/05/2021	Sample Drawn By : UTRL

**TEST RESULT**

S.No	Date	Observed Value Leq, dB(A)		LIMIT as per CPCB Guidelines Leq, dB(A)	
		DAY	NIGHT	Zone - Residential	
				DAY*	NIGHT*
1	01-03-2021	48.5	39.5	55.0	45.0
2	04-03-2021	51.6	38.7		
3	08-02-2021	50.6	36.8		
4	11-03-2021	53.7	39.5		
5	15-03-2021	49.5	39.5		
6	18-03-2021	50.4	40.5		
7	22-03-2021	49.7	39.5		
8	25-03-2021	48.2	41.5		
9	29-03-2021	50.5	39.5		
10	01-04-2021	52.4	38.6		
11	05-04-2021	53.6	40.5		
12	08-04-2021	50.7	39.7		
13	12-04-2021	51.5	38.2		
14	15-04-2021	50.8	38.4		
15	19-04-2021	53.4	39.5		
16	22-04-2021	50.8	39.1		
17	26-04-2021	52.7	36.2		
18	01-05-2021	53.4	38.7		
19	05-05-2021	50.8	42.1		
20	08-05-2021	50.9	40.1		
21	12-05-2021	53.5	38.5		
22	15-05-2021	50.8	39.7		
23	19-05-2021	51.7	40.5		
24	22-05-2021	51.8	40.8		
<b>Minimum</b>		<b>48.2</b>	<b>36.2</b>		
<b>Maximum</b>		<b>53.7</b>	<b>42.1</b>		

<b>Average</b>	<b>51.3</b>	<b>39.4</b>		
<b>Day time</b>	<b>(6.00AM TO 10.00PM)</b>			
<b>Night time</b>	<b>(10.00PM TO 6.00AM)</b>			

### Noise Report

<b>Report Code: N-31052021-03</b>		<b>Issue Date:</b> 31/05/2021
<b>ISSUED TO :</b>	PARAMARSH SERVICING ENVIRONMENT & DEVELOPMENT M.S.-1/10, SECTOR A, SITAPUR ROAD YOJNA (NEAR ST. ANTHONY SCHOOL, RAM RAM BANK CHAURAHA) ALIGANJ, LUCKNOW-226024,	
<b>Project Name :</b>	Sand bajri & boulder (minor mineral) mining on the bed of alkhnanda river, Village - Naithana, Ranihat Patti – Chaurus, Tehsil- Keertinagar District - Tehri Garhwal Uttarakhand	
<b>Sampling Protocol :</b>	UTRL/STP/Noise	<b>Location :</b> NQ3 Mahar gaoun
<b>Analysis Duration :</b>	05/03/2021 To 31/05/2021	<b>Sample Drawn By :</b> UTRL

### TEST RESULT

S.No	Date	Observed Value Leq, dB(A)		LIMIT as per CPCB Guidelines Leq, dB(A)	
		DAY	NIGHT	Zone - Residential	
				DAY*	NIGHT*
1	01-03-2021	51.7	39.1	55.0	45.0
2	04-03-2021	52.7	39.8		
3	08-02-2021	50.8	40.2		
4	11-03-2021	48.9	38.2		
5	15-03-2021	54.5	39.8		
6	18-03-2021	50.6	41.2		
7	22-03-2021	50.9	42.6		
8	25-03-2021	51.8	40.8		
9	29-03-2021	50.7	38.1		
10	01-04-2021	50.8	37.5		
11	05-04-2021	51.6	40.5		
12	08-04-2021	53.4	42.8		
13	12-04-2021	49.7	40.2		
14	15-04-2021	50.4	42.5		
15	19-04-2021	51.6	38.4		
16	22-04-2021	51.6	39.2		
17	26-04-2021	52.7	39.5		
18	01-05-2021	50.6	41.8		
19	05-05-2021	50.2	40.7		
20	08-05-2021	53.6	41.5		
21	12-05-2021	49.7	39.2		
22	15-05-2021	49.2	41.5		
23	19-05-2021	50.4	40.5		

24	22-05-2021	52.7	41.8		
<b>Minimum</b>		<b>48.9</b>	<b>37.5</b>		
<b>Maximum</b>		<b>54.5</b>	<b>42.8</b>		
<b>Average</b>		<b>51.3</b>	<b>40.3</b>		
<b>Day time</b>		<b>(6.00AM TO 10.00PM)</b>			
<b>Night time</b>		<b>(10.00PM TO 6.00AM)</b>			

### Noise Report

Report Code: N-31052021-04		Issue Date: 31/05/2021
ISSUED TO :	PARAMARSH SERVICING ENVIRONMENT & DEVELOPMENT M.S.-1/10, SECTOR A, SITAPUR ROAD YOJNA (NEAR ST. ANTHONY SCHOOL, RAM RAM BANK CHAURAHA) ALIGANJ, LUCKNOW-226024,	
Project Name :	Sand bajri & boulder (minor mineral) mining on the bed of alkhnanda river, Village - Naithana, Ranihat Patti – Chaurus, Tehsil-Keertinagar District - Tehri Garhwal Uttarakhand	
Sampling Protocol :	UTRL/STP/Noise	Location : NQ4 Giri gaoun
Analysis Duration :	05/03/2021 To 31/05/2021	Sample Drawn By : UTRL

### TEST RESULT

S.No	Date	Observed Value Leq, dB(A)		LIMIT as per CPCB Guidelines Leq, dB(A)	
		DAY	NIGHT	Zone - Residential	
				DAY*	NIGHT*
1	02-03-2021	51.2	41.2	55.0	45.0
2	05-03-2021	53.2	42.5		
3	09-02-2021	50.4	39.7		
4	12-03-2021	50.8	38.7		
5	16-03-2021	49.8	38.7		
6	19-03-2021	52.7	41.5		
7	23-03-2021	50.6	40.6		
8	26-03-2021	49.8	40.1		
9	30-03-2021	50.6	39.7		
10	02-04-2021	51.4	38.2		
11	06-04-2021	50.8	40.5		
12	09-04-2021	53.2	39.8		
13	13-04-2021	50.4	40.7		
14	16-04-2021	49.7	38.4		
15	20-04-2021	48.2	39.2		
16	23-04-2021	50.6	39.1		
17	27-04-2021	51.4	39.7		
18	02-05-2021	50.8	39.1		
19	06-05-2021	53.4	40.7		
20	09-05-2021	51.6	39.7		

21	13-05-2021	52.7	40.8
22	16-05-2021	48.7	39.5
23	20-05-2021	53.5	40.5
24	23-05-2021	51.4	39.8
<b>Minimum</b>		<b>48.2</b>	<b>38.2</b>
<b>Maximum</b>		<b>53.5</b>	<b>42.5</b>
<b>Average</b>		<b>51.1</b>	<b>39.9</b>
<b>Day time</b>		<b>(6.00AM TO 10.00PM)</b>	
<b>Night time</b>		<b>(10.00PM TO 6.00AM)</b>	

### Noise Report

Report Code: N-31052021-05		Issue Date: 31/052021
ISSUED TO :	PARAMARSH SERVICING ENVIRONMENT & DEVELOPMENT M.S.-1/10, SECTOR A, SITAPUR ROAD YOJNA (NEAR ST. ANTHONY SCHOOL, RAM RAM BANK CHAURAHA) ALIGANJ, LUCKNOW-226024,	
Project Name :	Sand bajri & boulder (minor mineral) mining on the bed of alkhanda river, Village - Naithana, Ranihat Patti – Chauras, Tehsil- Keertinagar District - Tehri Garhwal Uttarakhand	
Sampling Protocol :	UTRL/STP/Noise	Location : NQ5 Dhari Gaoun
Analysis Duration :	05/03/2021 To 31/05/2021	Sample Drawn By : UTRL

### TEST RESULT

S.No	Date	Observed Value Leq, dB(A)		LIMIT as per CPCB Guidelines Leq, dB(A)	
		DAY	NIGHT	Zone - Residential	
				DAY*	NIGHT*
1	02-03-2021	50.4	40.6	55.0	45.0
2	05-03-2021	52.1	41.5		
3	09-02-2021	52.9	40.8		
4	12-03-2021	49.6	42.5		
5	16-03-2021	50.2	40.6		
6	19-03-2021	52.4	42.5		
7	23-03-2021	50.1	41.6		
8	26-03-2021	52.4	40.5		
9	30-03-2021	50.7	38.0		
10	02-04-2021	49.6	39.5		
11	06-04-2021	51.7	40.2		
12	09-04-2021	52.6	41.7		
13	13-04-2021	50.8	42.1		
14	16-04-2021	49.8	39.5		
15	20-04-2021	49.2	38.4		
16	23-04-2021	51.5	40.5		
17	27-04-2021	50.6	41.2		

18	02-05-2021	52.8	41.6
19	06-05-2021	50.5	40.8
20	09-05-2021	53.6	39.6
21	13-05-2021	49.2	40.6
22	16-05-2021	52.7	38.7
23	20-05-2021	49.7	40.2
24	23-05-2021	50.4	39.5
<b>Minimum</b>		<b>49.2</b>	<b>38.0</b>
<b>Maximum</b>		<b>53.6</b>	<b>42.5</b>
<b>Average</b>		<b>51.1</b>	<b>40.5</b>
<b>Day time</b>		<b>(6.00AM TO 10.00PM)</b>	
<b>Night time</b>		<b>(10.00PM TO 6.00AM)</b>	

**Noise Report**

Report Code: N-31052021-06		Issue Date: 31/052021
ISSUED TO :	PARAMARSH SERVICING ENVIRONMENT & DEVELOPMENT M.S.-1/10, SECTOR A, SITAPUR ROAD YOJNA (NEAR ST. ANTHONY SCHOOL, RAM RAM BANK CHAURAHA) ALIGANJ, LUCKNOW-226024,	
Project Name :	Sand bajri & boulder (minor mineral) mining on the bed of alkhnanda river, Village - Naithana, Ranihat Patti – Chaurus, Tehsil- Keertinagar District - Tehrl Garhwal Uttarakhand	
Sampling Protocol :	UTRL/STP/Noise	Location : NQ6 Badgaoun
Analysis Duration :	05/03/2021 To 31/05/2021	Sample Drawn By : UTRL

**TEST RESULT**

S.No	Date	Observed Value Leq, dB(A)		LIMIT as per CPCB Guidelines Leq, dB(A)	
		DAY	NIGHT	Zone - Residential	
				DAY*	NIGHT*
1	02-03-2021	51.7	41.2	55.0	45.0
2	05-03-2021	50.6	42.7		
3	09-02-2021	51.5	40.5		
4	12-03-2021	53.2	39.6		
5	16-03-2021	51.4	41.5		
6	19-03-2021	50.5	41.2		

7	23-03-2021	52.4	42.5
8	26-03-2021	50.6	41.7
9	30-03-2021	53.5	42.5
10	02-04-2021	50.1	41.5
11	06-04-2021	51.5	42.1
12	09-04-2021	53.6	41.7
13	13-04-2021	52.1	41.2
14	16-04-2021	50.4	39.4
15	20-04-2021	51.2	39.1
16	23-04-2021	51.5	40.5
17	27-04-2021	50.2	42.5
18	02-05-2021	50.8	41.4
19	06-05-2021	51.4	43.2
20	09-05-2021	53.2	40.2
21	13-05-2021	52.4	39.7
22	16-05-2021	50.2	41.5
23	20-05-2021	53.1	41.8
24	23-05-2021	52.5	40.5
<b>Minimum</b>		<b>50.1</b>	<b>39.1</b>
<b>Maximum</b>		<b>53.6</b>	<b>43.2</b>
<b>Average</b>		<b>51.7</b>	<b>41.2</b>
<b>Day time</b>		<b>(6.00AM TO 10.00PM)</b>	
<b>Night time</b>		<b>(10.00PM TO 6.00AM)</b>	

## **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 March 2021 to May 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:

### **Ground water monitoring satiation**

S.No	Monitoring satiation	Distance & Direction	Lat & Long
1	Project site	00	30°13'42.70"N 78°46'25.32"E
2	Naithana	1.0 km NE	30°13'55.55"N 78°47'0.17"E
3	Mahar gaoun	3.02 km SW	30°12'38.28"N 78°45'2.23"E
4	Giri gaoun	4.20 km SW	30°12'4.31"N 78°44'51.70"E
5	Dhari Gaoun	4.0 km SE	30°12'13.47"N 78°47'45.24"E
6	Badgaoun	3.0 km W	30°13'6.80"N 78°44'38.64"E

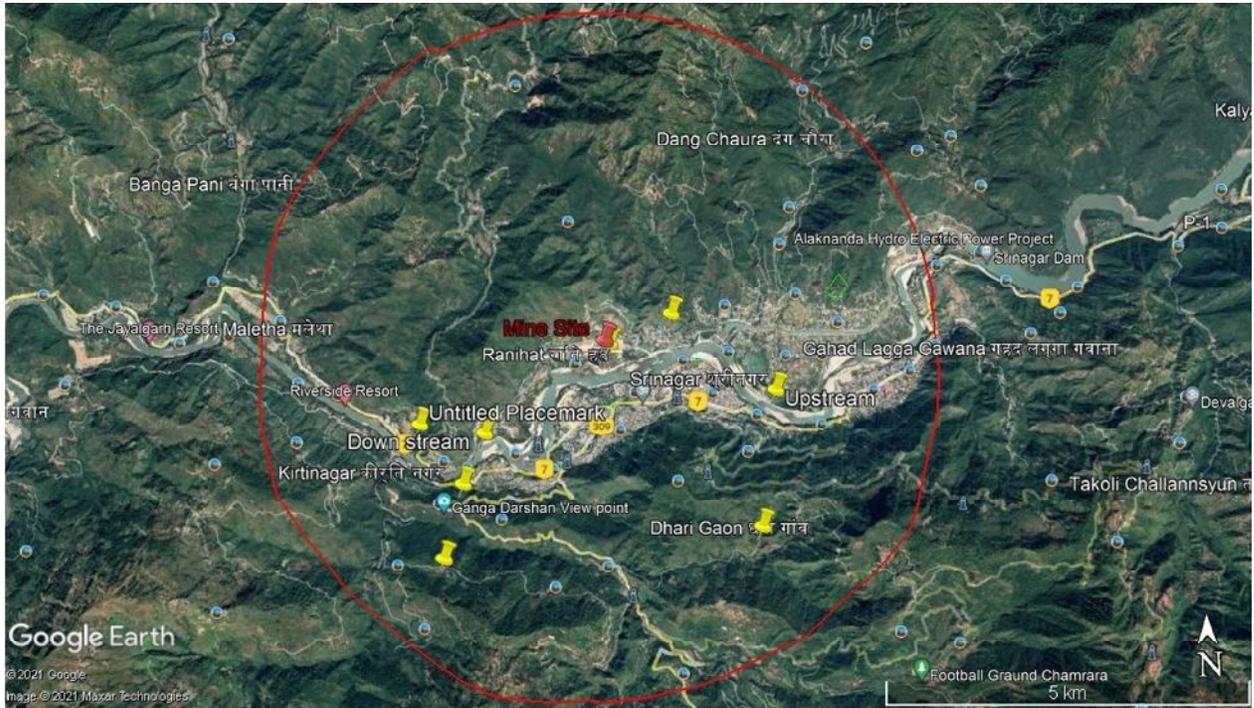


Figure – 3.3 Ground water quality monitoring location

**Water Sample Analysis  
Discipline/Group-Chemical/Water**

<b>Report Code:</b>	<b>W-12042021-01</b>	<b>Issue Date: 18/04/2021</b>
<b>ISSUED TO</b>	: <b>PARAMARSH SERVICING ENVIRONMENT &amp; DEVELOPMENTS 1/10, SECTOR A, SITAPUR ROAD YOJNA (NEAR ST. ANTHONY SCHOOL RAM RAM BANK CHAURAHA) ALIGANJ, LUCKNOW-226024</b>	
<b>Project Name</b>	: Sand Bajri & Boulder (Minor Mineral) Mining on the bed of Alkhnanda River, Village - Naithana, Ranihat Patti – Chauras, Tehsil- Keertinagar District - Tehri Garhwal (Uttarakhand)	
<b>Sample Drawn On</b>	: 10-04-2021	
<b>Sample Drawn By</b>	: UTRL	
<b>Sample Description</b>	: Ground Water	

Sampling Location : GW-1 GW-2 GW-3  
 Project Site Naithana Mahar gaoun  
 Distance & Direction : 0.0 1.0 km NE 3.02 km SW  
 Sampling Procedure : IS 3025(Part-01)  
 Sample Quantity : 2.0 Litre  
 Analysis Duration : 12/04/2021 to 18/04/2021

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)	7.48	7.18	7.23	-	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	0.8	NTU	1	5
6	Total Hardness (as CaCO <sub>3</sub> )	IS:3025(Part-21)	164	172	152	mg/l	200	600
7	Calcium(as Ca)	IS:3025(Part-40)	32.80	34.40	30.40	mg/l	75	200
8	Magnesium(as Mg)	IS:3025(Part-46)	19.93	20.90	18.47	mg/l	30	100
9	Chloride(as Cl)	IS:3025(Part-32)	45.01	82.19	78.27	mg/l	250	1000
10	Iron(as Fe)	IS:3025(Part-53)	<0.05	0.075	0.061	mg/l	0.3	No Relaxation
11	Fluoride(as F)	IS:3025(Part-60)	0.39	0.31	0.27	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)	379	354	405	mg/l	500	2000
14	Phenolic Compound (as C <sub>6</sub> H <sub>5</sub> 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 <sub>4</sub> )	IS:3025(Part-24)	47.14	31.94	38.43	mg/l	200	400
17	Nitrate (as NO <sub>3</sub> )	IS: 3025 (Part-34)	2.32	2.91	2.23	mg/l	45	No Relaxation
18	Alkalinity(as CaCO <sub>3</sub> )	IS:3025(Part-23)	176	120	148	mg/l	200	600
19	Chloramines (as Cl <sub>2</sub> )	IS:3025(Part-26)	< 1.0	< 1.0	< 1.0	mg/l	4	No Relaxation





	Mg)	46)						
9	Chloride(as Cl)	IS:3025(Part-32)	35.22	35.22	72.40	mg/l	250	1000
10	Iron(as Fe)	IS:3025(Part-53)	<0.05	<0.05	0.053	mg/l	0.3	No Relaxation
11	Fluoride(as F)	IS:3025(Part-60)	0.25	0.38	0.60	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)	285	263	472	mg/l	500	2000
14	Phenolic Compound (as C <sub>6</sub> H <sub>5</sub> 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 <sub>4</sub> )	IS:3025(Part-24)	32.96	36.21	73.78	mg/l	200	400
17	Nitrate (as NO <sub>3</sub> )	IS: 3025 (Part-34)	0.94	0.60	4.78	mg/l	45	No Relaxation
18	Alkalinity(as CaCO <sub>3</sub> )	IS:3025(Part-23)	128	112	172	mg/l	200	600
19	Chloramines (as Cl <sub>2</sub> )	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 <sub>2</sub> 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

### Bacteriological Quality of Drinking Water

Report W-12042021-02

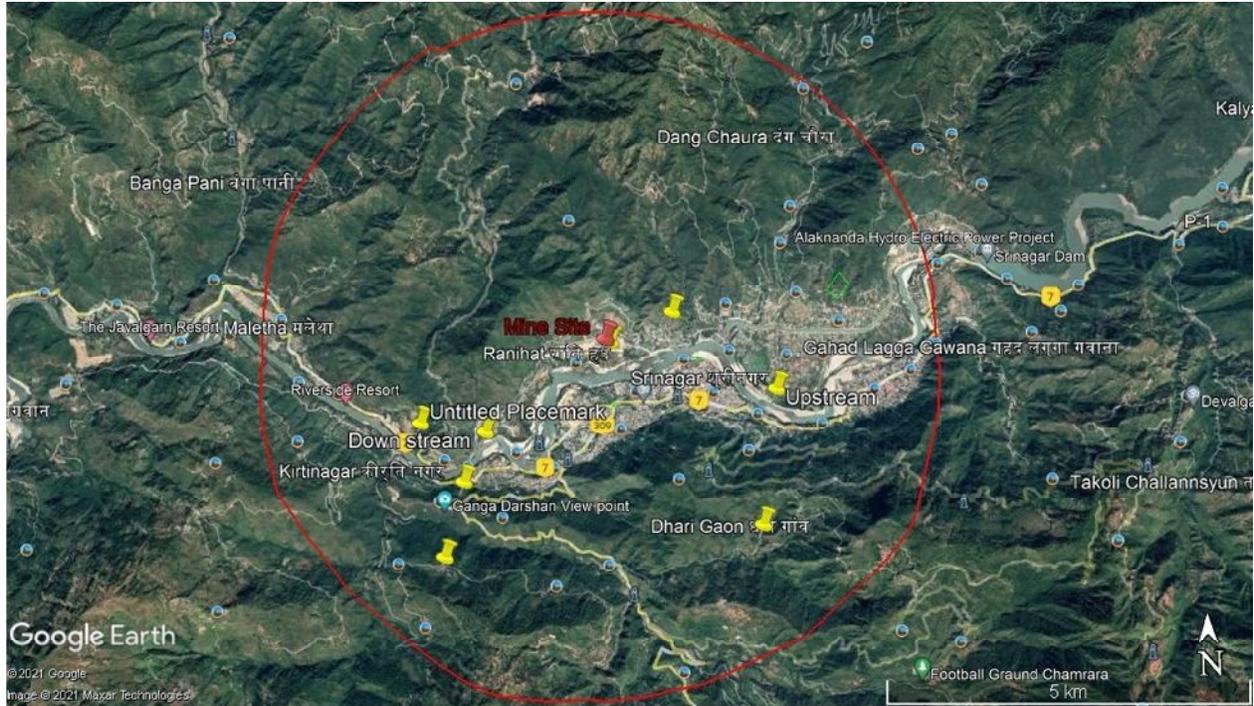
Issue Date: 18/04/2021

Code :

Issued To

: PARAMARSH SERVICING ENVIRONMENT & DEVELOPMENTS  
1/10, SECTOR A, SITAPUR ROAD YOJNA (NEAR ST. ANTHONY)





**Figure : 3.4 - Surface water quality monitoring location**

**Surface Water Sample Analysis  
Discipline/Group-Chemical/Water**

Sample Description	: Surface Water
Sampling Location	: Alkhnanda River Upstream
Sampling Procedure	: IS 3025(Part-01)
Sample Quantity	: 2.0 Litre
Analysis Duration	: 12/04/2021 To 18/04/2021

RESULTS									
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)	7.69	-	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)	20.8	°C	-	-	-	-	-
3	Turbidity	IS:3025(Part-10)	1.8	NTU	-	-	-	-	-
4	Conductivity @25°C	IS:3025(Part-14)	254.8	µs/cm.	-	-	-	1000	2250
5	Total Suspended	IS:3025(Part-	10	mg/l	-	-	-	-	-

	Solid	17)							
6	Total Alkalinity (as CaCO <sub>3</sub> )	IS:3025(Part-23)	92	mg/l	-	-	-	-	-
7	Biological Oxygen Demand (Max.) (at 270C for 3 days)	IS:3025(Part-44)	2.00	mg/l	2	3	3	-	-
8	Dissolved Oxygen (as O <sub>2</sub> ) Min.	IS:3025(Part-38)	8.8	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)	6.80	mg/l	24	-	-	-	-
11	Chloride(as Cl),Max	IS:3025(Part-32)	11.57	mg/l	250	-	-	-	600
12	Iron(as Fe),Max	IS:3025(Part-53)	0.065	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)	158	mg/l	500	-	1500	-	2100
15	Total Hardness (as CaCO <sub>3</sub> )	IS:3025(Part-21)	96.00	mg/l	300	-	-	-	-
16	Sulphate (as SO <sub>4</sub> )Max	IS:3025(Part-24)	7.61	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)	5.79	mg/l	-	-	-	-	-
19	Manganese (as Mn)	IS:3025(Part-59)	<0.1	mg/l	0.5	-	-	-	-
20	Total Chromium (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)	1.16	mg/l	-	-	-	-	-
23	Nitrate (as NO <sub>3</sub> ),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 <sub>2</sub> )	IS-3025(Part-58)	9.60	mg/l	-	-	-	-	-
28	Arsenic (as As )	IS:3025(Part-	<0.01	mg/l	0.05	0.2	0.2	-	-

		37)						
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**Surface Water Sample Analysis  
Discipline/Group-Chemical/Water**

**Report Code:** WW-12042021-01 **Issue Date:** 18/04/2021

**ISSUED TO** : PARAMARSH SERVICING ENVIRONMENT & DEVELOPMENTS 1/10, SECTOR A, SITAPUR ROAD YOJNA (NEAR ST. ANTHONY SCHOOL RAM RAM BANK CHAURAHA) ALIGANJ, LUCKNOW-226024

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**Project Name** : Sand Bajri & Boulder (Minor Mineral) Mining on the bed of Alkhnanda River, Village - Naithana, Ranihat Patti – Chauras, Tehsil- Keertinagar District - Tehri Garhwal (Uttarakhand)

**Sample Drawn On** : 10-04-2021

**Sample Drawn By** : UTRL

**Sample Description** : Surface Water

**Sampling Location** : Alkhnanda River Upstream

**Analysis Duration** : 12/04/2021 To 18/04/2021

RESULTS									
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 Coli Form	IS:1622	8	MPN/100ml	50	500	5000	-	-

**(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 micro mhos/cm Max.2250 Sodium absorption Ratio Max. 26 Boron Max. 2mg/l
	Below-E	Not Meeting A, B, C, D & E Criteria

(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.

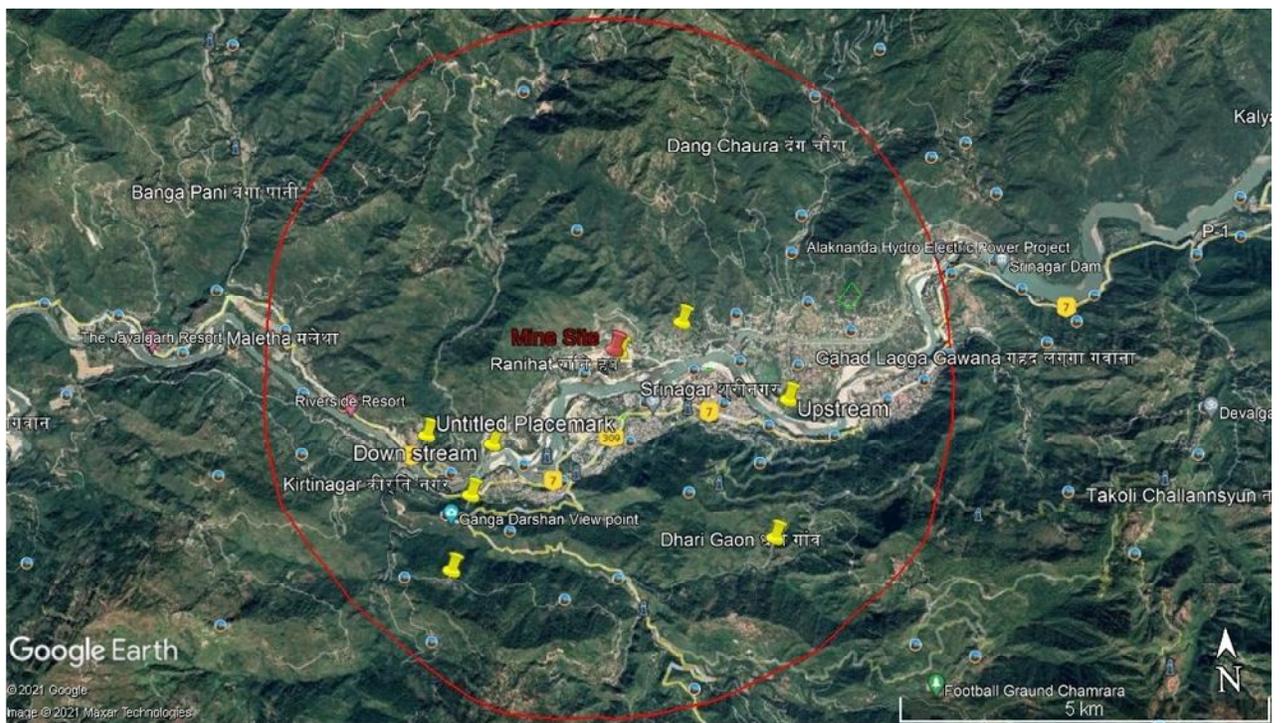
## SOIL

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**



**Figure : 3.5 - Soil quality monitoring location**

**(b) Methodology**

The soil samples were collected in the March 2021 to May 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

**Soil Sample Analysis  
Discipline/Group-Chemical/ Pollution & Environment**

Analysis Duration : 12/04/2021 To 18/04/2021

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	%	48.80	47.54	46.81	UTRL/LAB/SOIL/SOP/05
	Clay	%	30.57	36.90	38.19	UTRL/LAB/SOIL/SOP/05
	Silt	%	20.63	15.56	15.00	UTRL/LAB/SOIL/SOP/05
2	pH(1:2.5 Suspension)	-	6.94	7.67	6.89	IS: 2720 (Part-26),1987
3	Electrical Conductivity	µmhos/cm	421.3	671.3	412.8	IS: 14767
4	Potassium ( as K)	mg/kg	207.03	138.83	240.64	UTRL/LAB/SOIL/SOP/07
5	Sodium (as Na)	mg/kg	385.54	224.13	364.21	UTRL/LAB/SOIL/SOP/06
6	Calcium (as Ca)	mg/kg	4789.96	4244.87	4306.61	UTRL/LAB/SOIL/SOP/08
7	Magnesium (as Mg)	mg/kg	727.96	627.68	669.72	UTRL/LAB/SOIL/SOP/08
8	Sodium Absorption Ratio	-	1.37	0.85	1.36	UTRL/LAB/SOIL/SOP/14
9	Water Holding Capacity	%	29.03	32.52	31.03	UTRL/LAB/SOIL/SOP/11
10	Total Kjeldahl Nitrogen	%	0.068	0.120	0.102	UTRL/LAB/SOIL/SOP/15

Draft EIA Report for Public Hearing of Sand Bajri & Boulder (Minor-Mineral) mining on the bed of Alkhnanda River, Khasra No: 2152 to 2154, 2196, 2899 to 2914, 3003 to 3005, 3316, 3435 Area - 9.72 ha Village- Naithana, Patti- Chauras, Tehsil -Keertinagar District: TehriGarhwal, Uttarakhand

11	Phosphorous	mg/kg	96.53	90.91	86.19	UTRL/LAB/SOIL/SOP/09
12	Bulk Density	gm/cc	1.30	1.28	1.28	UTRL/LAB/SOIL/SOP/10
13	Organic Matter	%	1.02	0.97	1.26	IS: 2720 (Part-22)
14	Porosity	%	43.04	41.79	42.39	UTRL/LAB/SOIL/SOP/17

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	%	18.57	46.88	38.66	UTRL/LAB/SOIL/SOP/05
	Clay	%	30.70	39.41	30.59	UTRL/LAB/SOIL/SOP/05
	Silt	%	50.73	13.71	30.75	UTRL/LAB/SOIL/SOP/05
2	pH(1:2.5 Suspension)	-	6.85	7.89	6.89	IS: 2720 (Part-26),1987
3	Electrical Conductivity	µmhos/cm	474.5	628.2	594.5	IS: 14767
4	Potassium ( as K)	mg/kg	228.18	116.14	193.41	UTRL/LAB/SOIL/SOP/07
5	Sodium (as Na)	mg/kg	306.40	193.39	232.25	UTRL/LAB/SOIL/SOP/06
6	Calcium (as Ca)	mg/kg	4510.78	4190.66	4249.79	UTRL/LAB/SOIL/SOP/08
7	Magnesium (as Mg)	mg/kg	1028.29	505.29	770.07	UTRL/LAB/SOIL/SOP/08
8	Sodium Absorption Ratio	-	1.07	0.75	0.86	UTRL/LAB/SOIL/SOP/14
9	Water Holding Capacity	%	45.58	31.36	45.58	UTRL/LAB/SOIL/SOP/11
10	Total Kjeldahl Nitrogen	%	0.12	0.085	0.11	UTRL/LAB/SOIL/SOP/15
11	Phosphorous	mg/kg	99.33	59.28	93.98	UTRL/LAB/SOIL/SOP/09
12	Bulk Density	gm/cc	1.27	1.32	1.28	UTRL/LAB/SOIL/SOP/10
13	Organic Matter	%	1.35	1.06	1.09	IS: 2720 (Part-22)
14	Porosity	%	39.61	41.84	39.59	UTRL/LAB/SOIL/SOP/17

Draft EIA Report for Public Hearing of Sand Bajri & Boulder (Minor-Mineral) mining on the bed of Alkhnanda River, Khasra No: 2152 to 2154, 2196, 2899 to 2914, 3003 to 3005, 3316, 3435 Area - 9.72 ha Village- Naithana, Patti- Chauras, Tehsil -Keertinagar District: TehriGarhwal, Uttarakhand

**(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. Assessment 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 the proposed project activity.
- To identify Impact of project during construction and operational phases on the biological environment.

**Fauna survey**

- Documentation of Avian, Reptilian, Insect, Amphibian, Mammal and other faunal diversity.
- Observations by direct and indirect evidence (Direct evidence- Sighting and hearing, indirect evidence- 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 15<sup>th</sup> to 23<sup>rd</sup> 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 plant life of Tehri Garhwal can be divided into six main categories of tropical dry deciduous forests, Sal forests, Chir forests, oak deodar, fir and spruce forests, and finally the Alpine pastures. The variety of forests is perhaps enough to make anyone realize the sheer multiplicity of the flora species. These forests do not provide a safe haven for animals but also help the villagers to maintain the ecological balance and give them firewood and food. The scent of damp earth leaves and the noise of grasshopper are the essence of Garhwali forests.

There are many trees like chir, Oaks, Conifers, Sal, Deodar, Haldu, Yew, Cypress, Rhododendron, Birch, Horse-Chestnut, Cycamore, Willow and Alder are found here. A large variety of medicinal herbs, shrubs and bushes like Brahmi and Ashwagandha are found in abundance here. One can also savor fruits like Cornel, Figs, Kaiphal, Mulberry, Kingora, Raspberry, Blackberry, Currants, Medlars, Gooseberries, Hazelnuts, Apples, Pears, Cherries, Apricots, Plums, Peaches, Oranges, Limes, Bananas, Pomegranates and Walnuts.

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 effect 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.

***Type of forest in Garwal district-***

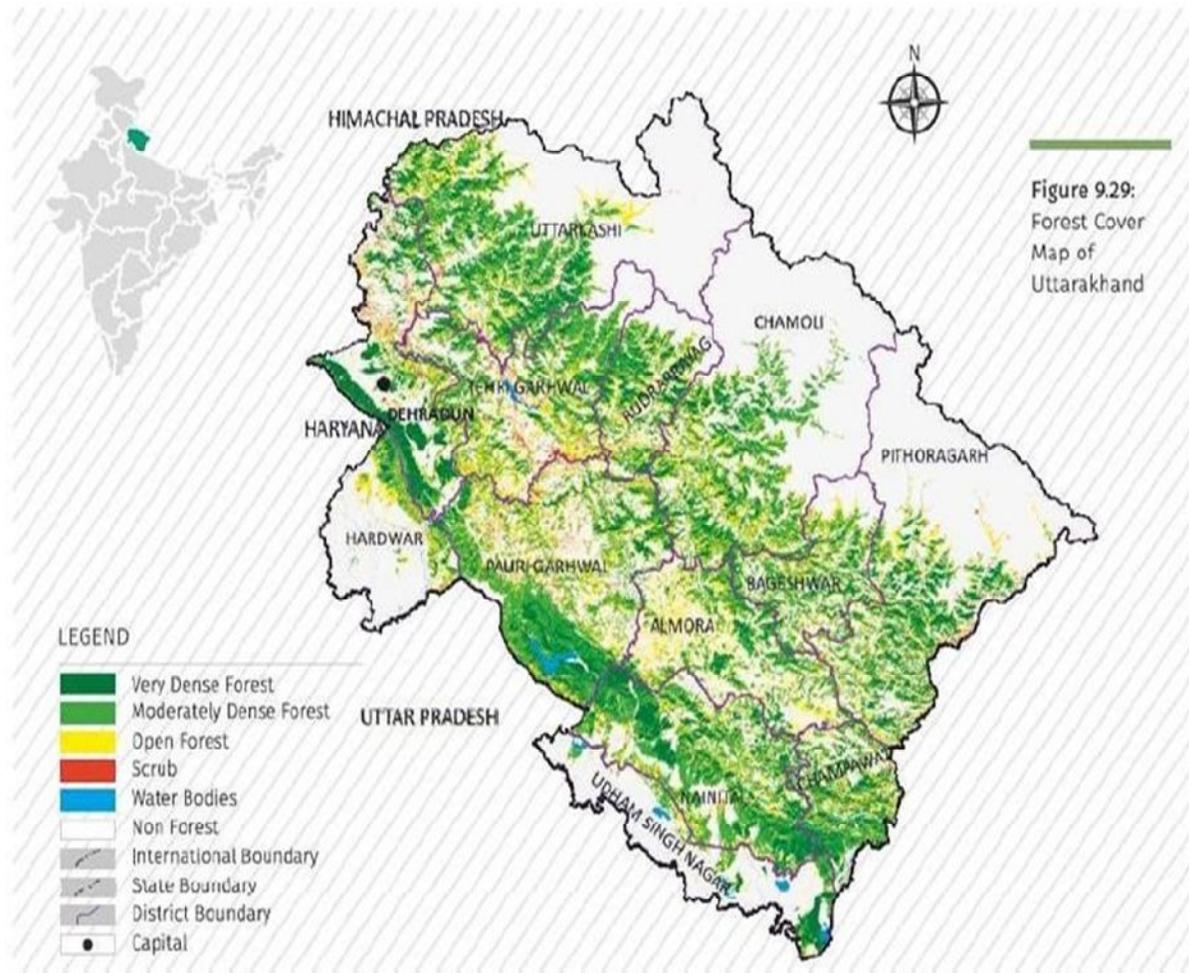
The flora of the district may be divided into six main botanical divisions : (1) The tropical dry deciduous forests, (2) The sal forests (3) The chir forests, (4) The deodar, fir and spruce forests, (5) The oak forests and (6) The Alpine pastures.

The list of PF & RF exists within the study area which is below mention-

S.No	Location	Distance from the project Site (In Km)	Direction
1.	Adwani R.F	12.8	SSW
2.	Sigad R.F	9.5	SSE

District-wise Forest Cover of Uttarakhand								
District-wise Forest Cover							(Area in km2)	
District	Geo-graphical Area	2017 Assessment			Total	Percent of GA	Change	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest				
Pauri Garhwal	5329	552	1925	917	3394	63.69	76	96

Figure- forest cover map of Uttarakhand



Core and buffer zone (10 K.M radius) 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.

**FIGURE 3.6: SITE PHOTOGRAPHS OF THE PROJECT AREA**





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

S. No	Local Name	Botanical Name	Family
<b>TREE</b>			
1	Tooun	Toona ciliata M. Roem.	Meliaceae
2	Chir	Pinus roxburghii,	Pinaceae
<b>SHRUBS</b>			
1.	Callicarpa macrophylla Ghaneri	Lantana camara L.	Verbenaceae
2	Agla	Mimosa himalayana Gamble	Mimosaceae
3	Tang	Rhus parviflora Roxb.	Anacardiaceae
<b>HERBS</b>			
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
<b>TREE</b>			
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.	Caesalpiniaceae
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.	Caesalpiniaceae
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	Lanea 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
<b>SHRUBS</b>			
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	Berberis asiatica 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	Mimosa himalayana Gamble	Mimosaceae
44.	Kari Patta	Murraya koenigii (L.) Spreng.	Rutaceae
45.	Nagfani	Opuntia elatior Miller	Cactaceae
46.	Ghari	Randia tetrasperma (Roxb.) Poir.	Rubiaceae
47.	Tang	Rhus parviflora Roxb.	Anacardiaceae
48.	Arandi	Ricinus communis L.	Euphorbiaceae
49.	Hinsalu	Rubus ellipticus Smith	Rosaceae
50.	Kandali	Urtica dioica L.	Urticaceae
51.	Dhan	Woodfordia fruticosa (L.) Kurz	Lythraceae
52.	Ber	Ziziphus mauritiana Lam.	Rhamnaceae
<b>HERBS</b>			
53	Aghara	Achyranthes aspera L.	Amaranthaceae
54.	Mayurshikha	Adiantum incisum Forsk	Adiantaceae
55.	Ghandugli	Alternanthera sessilis (L.) DC.	Amaranthaceae
56.	Chaulai	Amaranthus creuntus L.	Amaranthaceae
57.	Beard grass	Andropogon munroi C.B Clarke	Poaceae
58.	Anjiri-ka-patta	Anisochilus carnosus (L.f.) Wall. ex Benth	Lamiaceae
59.	Satawari	Asparagus racemosus Willd.	Liliaceae
60.	Chaturi	Barleria cristata L.	Acanthaceae
61.	Kasmal	Barleria strigosa Willd.	Acanthaceae
62.	Kumra	Bidens pilosa L.	Asteraceae
63.	Bhang	Cannabis sativa L.	Cannabaceae
64.	Andhahuli	Cynoglossum zeylanicum Thunb. ex Lehm.	Boraginaceae
65.	Tuntkya	Capsella bursa-pastoris (L.) Medikus	Brassicaceae
66.	Gadria	Celosia argentea L.	Amaranthaceae
67.	Kandara	Cirsium wallichii DC.	Asteraceae
68.	Jakhya	Cleome viscosa L.	Cleomaceae
69.	Bhium Kaphal	Duchesnea indica (Andrews) Focke	Rosaceae
70.	Visnukrantha	Evolvulus alsinoides L.	Convolvulaceae
71	Jangi gobi	Launaea acaulis (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	<i>Perilla frutescens</i> (L.) Britton	Lamiaceae
96.	Basanti	<i>Reinwardtia indica</i> Dumort.	Linaceae
97.	Madder	<i>Rubia manjith</i> Roxb. ex Fleming	Rubiaceae
98.	Kareta	<i>Sida acuta</i> Burm.f.	Malvaceae
99.	Kharenti	<i>Sida cordifolia</i> L.	Malvaceae
100.	Makhoi	<i>Solanum nigrum</i> L.	Solanaceae
101.	Phool jhadu	<i>Thysanolaena maxima</i> (Roxb.) O. Kuntze	Poaceae
102.	Ghamra	<i>Tridax procumbens</i> L.	Asteraceae
<b>CLIMBER</b>			
103.	Bhinura	<i>Ampelocissus latifolia</i> (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: 2.20 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
<b>MAMMALS</b>			
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>	-
<b>BIRDS</b>			
1	Common Mynas	<i>Acridotheres tristis</i>	IV
2	Black Drongos	<i>Dicrurus macrocercus</i>	IV
3	Hill crow	<i>Corvus brachyrhynchus</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
<b>MAMMALS</b>			
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>Felnambulos pennant</i>	-
<b>BIRDS</b>			
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
<b>AMPHIBIAN</b>			
1	Marbled toad	<i>Bufo andersoni</i>	Not covered
2	Indian bull frog	<i>Rana tigrina</i>	IV
<b>REPTILES</b>			
1	Oriental garden	<i>Calotes versicolor</i>	II

	lizard		
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 Winter 2019. 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 µm). 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 NO. 3. 23 PHYTO PLANKTONS ARE OBSERVED IN THE ALAKNANDA RIVER SIDE.**

<b>S.No</b>	<b>Botanical Name</b>	<b>Family</b>
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>Sphaeroszma</i>	
20	<i>Chlorobotrys</i>	Eustigmatophyceae
21	<i>Botrydiopsis</i>	Pleurochloridaceae

22	<i>Oscillatoria</i>	Oscillatoriaceae
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**Zooplanktons are observed in the Alakhnanda 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>Diffugia</i>	Diffugiidae
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. Alakhnanda abound 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 conchoniuis</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

groundClimbers - 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**

<b>Classes</b>	<b>Area (in Ha.)</b>	<b>Area (in %)</b>
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
<b>Total</b>	<b>32137.82</b>	<b>100.00</b>

## **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.

The project is for Proposed Municipal Solid Waste Management Project for Srinagar Nagar Palika Parishad at Village-Girgaon, Tehsil - Srinagar Distric – Pauri Garhwal, Utrakhand. On the basis of available census data, 2011 different aspects of socio economic condition of total 64 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 StudyCollection 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 Pauri Garhwal and Tehri Garhwal 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 Pauri Garhwal and Tehri Garhwal 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 64 villages from Pauri Garhwal and Tehri Garhwal District, Uttarakhand 2011

**ABLE 3.23: DISTRIBUTION OF POPULATION**

<b>Particulars</b>	<b>0-10 Km</b>
No. of Households	3766
Male Population	7344
Female Population	8594
Total Population	15938
Male Population(0-6 Years)	1086
Female Population (0-6 Years)	1042
Total Population (0-6 Years)	2128
Average Household Size	4
% Of 0-6 Years to the total Population	13.35%
% Of males to the total Population	46.08%
% of females to the total Population	53.92%
Sex Ratio (no of females per 1000 males)	1170
<b>Source:</b> Primary census abstract 2011, Pauri Garhwal and Tehri Garhwal District, Uttarakhand,	

As per 2011 census the study area consisted of 15938 persons. The distribution of population in the study area is given below.

### Human Settlement

The study area comprises 64 villages with population of about 15938 (Male-7344 & female – 8594) and number of households are 3766. (According to the Census 2011).

**Population**

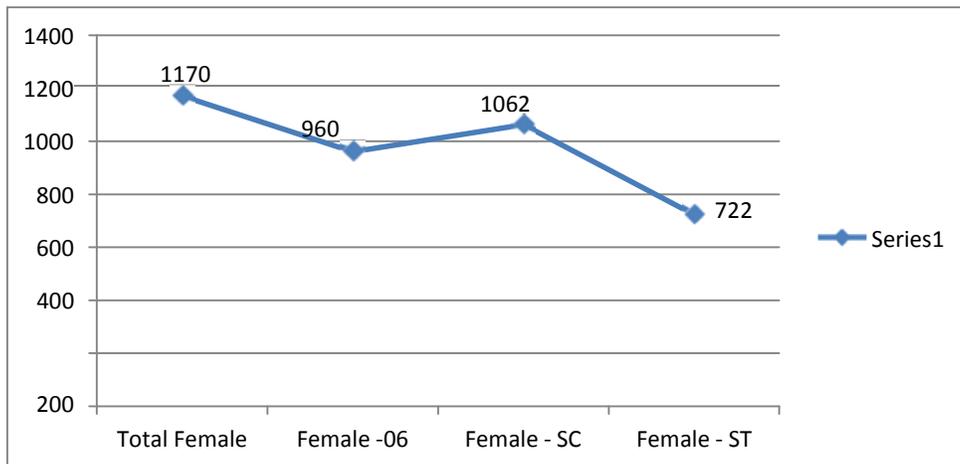
The total number of house hold is 3766 with an average house hold size of 4-5 people. Hence, it is interpreted there are no joint family systems in the study area. There are 15938 people in the study area as per the census survey of India, 2011.

**Gender Ratio**

The data reveals that male and female percentage in this area is 46.08% and 53.92% respectively. The study areas on an average 1170 females are per 1000 males which are not good indicators inspect of gender equality. Accordingly census record the number of females per 1000 males indirectly reveals certain sociological aspects in relation with female births, infant mortality among female children. The complete demography of the area is given above in table no.1. Child 0-6 sex ratio is 960 female to1000 male. In SC category 1062 female to 1000 male and in ST category females are very low than the male which are 722 females to 1000 male, details are presented in

**Figure 3.10.**

**FIGURE 3.10: SEX RATIO IN THE STUDY AREA**



Caste Categories:-

As per the classification under our constitution castes are divided into 4 major groups i.e., General, SC, ST and OBC as per their social status.

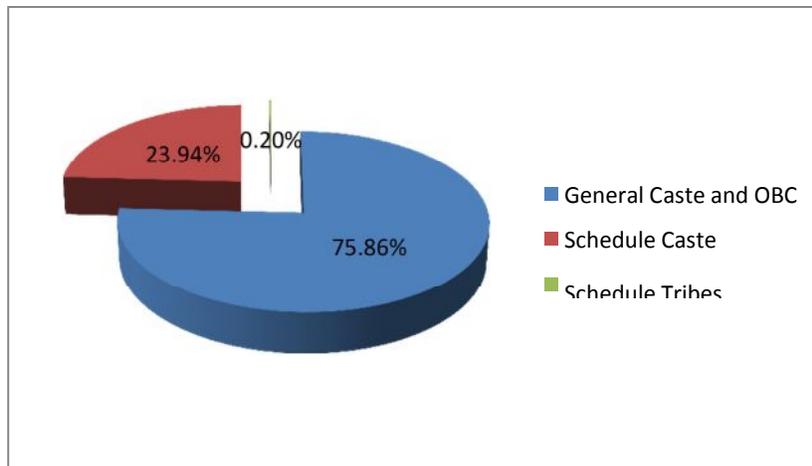
**TABLE 3.24: DISTRIBUTION OF POPULATION BY SOCIAL STRUCTURE**

Particulars	0-10 km
Total Population	15938

SC Male Population	1851
SC Female Population	1966
Schedule Caste Total Population	3817
% to the total population	23.94%
ST Male Population	18
ST Female Population	13
Schedule Tribes Total Population	31
% to the total population	0.20%
Total SC and ST population	3848
% to total population	24.14%
<b>Source:</b> Primary census abstract 2011, Pauri Garhwal and Tehri Garhwal District, Uttarakhand	

Social stratification on the basis of caste is very much prevalent in our society from the date back to the history. The population from general/upper castes is richer than SCs and STs in terms of land and livestock. Various religion castes consisting of Hindus inhabit the study area. As per 2011 census, the percentage of Schedule caste population is very low i.e. 23.94 % and Schedule tribe population is only 0.20%, total population of SC and ST is 24.14% in study areas. Details are presented in Figure 3.11.

**FIGURE 3.11: CASTE CATEGORIES IN THE STUDY AREA**



#### Literacy Levels

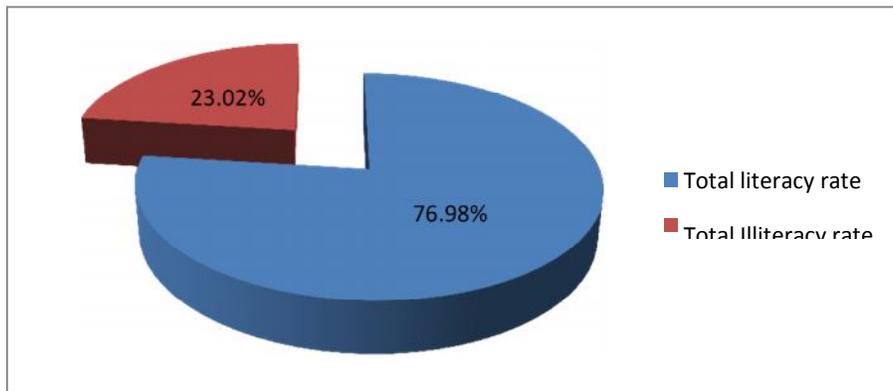
The study area experiences a considerably average literacy rate of 76.98% (2011). The distribution of literate and literacy rate of study area is in tabulated below -

**TABLE 3.25: DISTRIBUTION OF LITERATE AND LITERACY RATES**

Particulars	0-10 km
Male population	7344
Female population	8594
Total population	15938(-2128)
Male population (0-6years)	1086
Female population (0-6 years)	1042
Total population (0-6 years )	2128
Male literates	5674
Female literates	4957
Total literates	10631
Male literacy rate (%)	90.67%
Female literacy rate (%)	65.64%
Total literacy rate (%)	76.98%
Total Illiterates	5307(-2128)
Total Illiteracy rate (%)	23.02%
<b>Source:</b> Primary census abstract 2011, Pauri Garhwal and Tehri Garhwal District, Uttarakhand	

The male literacy i.e. the percentage of literate males to the total males works out to be 90.67%. The female literacy rate, which is an important indicator for social change, is observed to be 65.64 % as per 2011 census records. From the above given data, it is revealed that illiterate rate is lower in the study area. 23.02% Population is illiterate in the study area. Literacy rate is given in Table 3.26 and Figure 3.12

**Figure 3.12: Literacy Rate in the Study Area**



## 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.

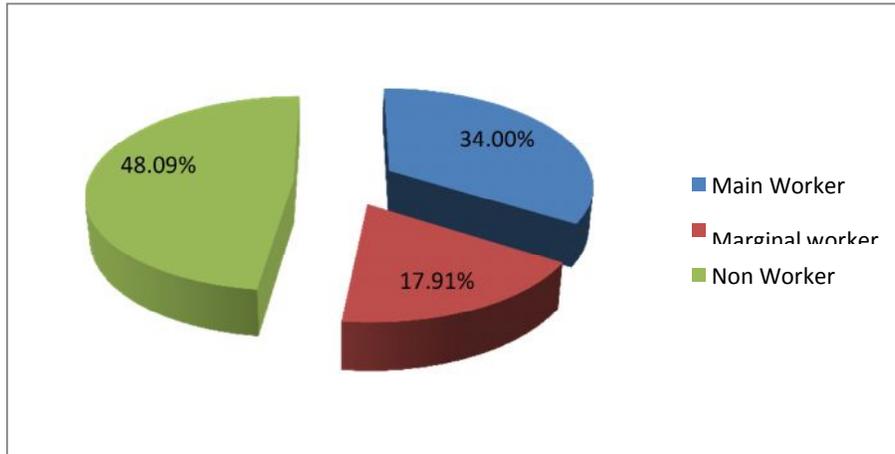
The workers coming under the main and marginal workers category are those involved in activities such as cultivation, agriculture, livestock, forestry, fishing, hunting, plantations, orchards and allied activities, mining and quarrying, manufacturing, processing, servicing and repairs in household industry,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

**Table 3.26 : Employment Pattern**

<b>Particulars</b>	<b>0-10 km</b>
Total population	15938 (-2128)
Total population (0-6 years )	2128
Total workers	7169
Work participation rate (%)	51.91%
Total main workers	4695
% of main workers to total population	34.00%
Marginal workers	2474
% of marginal workers to total population	17.91%
Non-workers	8769 (-2128)
% of non- workers to total population	48.09%
<b>Source:</b> Primary census abstract 2011, Pauri Garhwal and Tehri Garhwal District, Uttarakhand	

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.

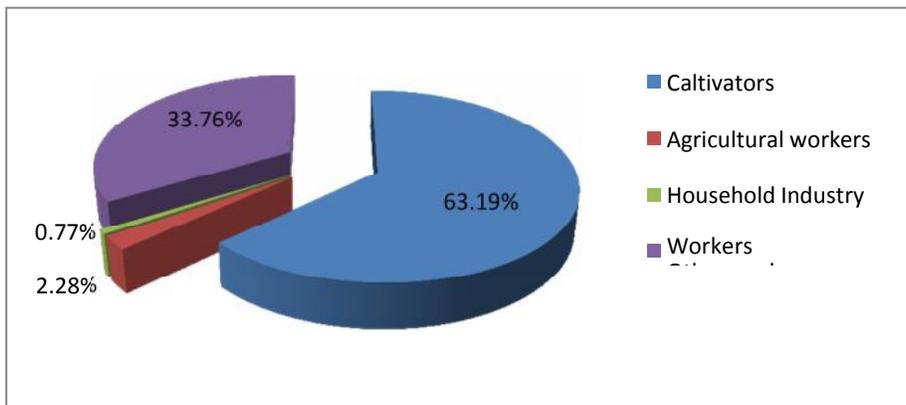
**FIGURE 3.13: EMPLOYMENT PATTERN IN THE STUDY AREA**



**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.

**FIGURE 3.14: MAIN WORKERS EMPLOYMENT PATTERN IN THE 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 Pauri Garhwal and Tehri Garhwal 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. The available educational facilities in the area as per 2011 district census are given below.

**Educational Facilities in the Study Ares**

Govt Primary School	Private Primary School	Govt Middle School	Private Middle School	Govt Secondary School	Private Secondary School	Govt Senior Secondary School
60	02	25	01	8	3	05

Comm unity Health Centre	Primary Health Centre	Primary Health Sub Centre	Maternity and Child Welfare Centre	TB Clinic	Hospital Allopathic	Dispensary	Veterinar y Hospital	Mobile Health Clinic	Family Welfare Centre
2	3	7	2	1	1	3	1	6	3

- **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 Rishikesh Railway Station (48.96 km)
- **Airport:** - Jolly Grant Airport (150 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:** - Girgaon Village is connected with Black Topped (Pucca) Road facility (connected with national highway no. 58) but Pvt. Bus & Jeeps are not available for transportation. There is no good network of road and most of the villages are connected with POVED & MUD Road. The Bus facilities are available in few villages in the Buffer zone and UTC (Uttarakhand Transport Corporation) Buses facility is very poor in the areas.

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 large and small industrial units have been established around Kotdwara e.g. SIDCUL. 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 kutchha 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 Nayar (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 population 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, VCD, 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 Projectand 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 ofthe 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 punjar 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 (SO<sub>2</sub>), Oxides of Nitrogen (NO<sub>2</sub>) 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 modelling. 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	$1.8 \times 10^{-7}$ kg PM <sub>10</sub> /t
Mineral unloading	$0.34 \times 10^{-7}$ kg PM <sub>10</sub> /t
Mineral Transportation	$1.74 \times 10^{-7}$ kg PM <sub>10</sub> 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 PM<sub>10</sub> levels will remain within the NAAQS norms. The 24-h maximum incremental GLC of PM<sub>10</sub> was 4.4µg/m<sup>3</sup> occurred at the center of the mine site. The value of PM<sub>10</sub> at the project site was 82.6 µg/m<sup>3</sup> observed after superposition of base-line value of 78.2 µg/m<sup>3</sup> on the incremental GLC of 4.4 µg/m<sup>3</sup> occurred 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 interburden 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.

The Pre-monsoon Depth to Water (DTW) ranges from 9.06 to 60.75 mBGL whereas the Post- monsoon DTW ranges from 1.02 to 55.90 mBGL.

**Table-4.1 Site Elevation and Working Depth Details**

Particulars	Details
Elevation	1670.10 -1830.10 m AMSL
Ground Water Table	9.06 to 60.75m bgl
Ultimate working depth	12m

### **(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 mineoperations.

### **(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 annexure 1.

### **IMPACT ON AIR QUALITY**

Proposed RBM mine where PM 10 will be the main pollutants generated in mining activities. The emissions of Sulphur dioxide (SO<sub>2</sub>), Oxides of Nitrogen (NO<sub>x</sub>) 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 (PM<sub>10</sub>) affecting Ambient Air Quality of the area. Transportation of the ore by trucks 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 mine workers.
- 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 assess the 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, NO <sub>x</sub>

## **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<sup>o</sup>) 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 around peripheral portions of the ML and Plantation will be raised along the boundaries of the mining lease by planting the native species around ML area, backfilled and reclaimed area, around water body, etc. 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 on the periphery of the reclaimed area. 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:** Ghingarua with a few Jhitalu, Kilmora and Hisalu etc. occurs in the depressions.

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

**Table-4.6: Species Suggested for Plantation**

Sl.No.	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 ramose</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 leucotricophera</i>	Lauraceae	Tree
38.	<i>Melia azedarach</i>	Meliaceae	Tree
39.	<i>Lucena 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. 3.50Lacs. 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	40,000	01	40,000
2.	Installation of Solar street light in nearby Villages	14,000	01	14,000
3.	Construction of Toilets for Women in nearby villages	69,000	01	69,000
4.	Distribute Stationary nearby School	26,000		26,000

	<b>Total Proposed CER Cost</b>			<b>149,000</b>
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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 (Sand, Bajri & Boulders) from Alaknanda River, Khasra No 2152 to 2154, 2896, 2898, 2899 to 2914, 3003 to 3005, 3316, 3445, at Village: Naithana, Patti- Chauras, Tehsil & District: Tehri Garhwal, Uttarakhand Tehsil- Kirtinagar District - Tehri Garhwal 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		
<b>A. Air Environment</b>				
<b>Pollutants</b>	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	-
PM <sub>2.5</sub> , PM <sub>10</sub>			Gravimetric method	-
SO <sub>2</sub>			EPA Modified West & Geake method	Absorption in Potassium Tetra Chloromercurate followed by Colorimetric estimation using P-Rosaniline hydrochloride and Formaldehyde (IS: 5182 Part - II).
NO <sub>2</sub>			Arsenite modified Jacob Hochheiser	Absorption in dil. NaOH and then estimated colorimetrically with sulphanilamide and N (I-Nepthyle) Ethylene diamine Dihydrochloride and Hydrogen Peroxide (CPCB Method).
<b>B. Water Environment</b>				

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.
<b>C. Noise</b>				
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
<b>D. Soil</b>				
pH, Bulk Density, Soil texture,	3 locations in the project impact area	Yearly/half yearly	As per USDA A	As per USDA Method

			Method	
Nitrogen , Availabl e Phosphorus,				
Potassium, Calcium, Magnesium, Sodium, Electrical Conductivity, Organic Matter, Chloride				
<b>E. Socioeconomic</b>				
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 waterbodies 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  $45^{\circ}$  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 inreducing 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 helpand 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 5.0 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 exposed 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 wild fauna	<ul style="list-style-type: none"> <li>• Awareness camps will be conducted for labours to make them aware about sensitivity/importance of forest life</li> <li>• 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</li> <li>• 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</li> <li>• Care will be taken that no hunting of animals carried out by labours</li> <li>• If wild animals are noticed crossing the core zone, it will not be disturbed at all</li> <li>• Labours will not be allowed to discard food, plastic etc which can attract animals near the core site</li> <li>• 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</li> <li>• 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</li> </ul>
Harvesting of forest flora	<ul style="list-style-type: none"> <li>• No tree cutting, chopping, lumbering, uprooting of shrubs and herbs should be allowed</li> <li>• No pilling of ore material should in the reserve forest area</li> <li>• Collections of economically important plants will be fully</li> </ul>

	restricted
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### **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 90 lakh.

### **CER Project Details**

It is proposed to provide financial assistance of Rs 3.5 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.

**Table 8.3: CER Budget Allocation**

S. No.	Activity	Cost per Unit (Rs)	Quantity	Total (Rs.)
1.	Installation of Hand pump for nearby Villagers	40,000	01	40,000
2.	Installation of Solar streetlight in nearby Villages	14,000	01	14,000
3.	Construction of Toilets for Women in nearby villages	69,000	01	69,000
4.	Distribute Stationary nearby School	26,000	-	26,000
	<b>Total Proposed CER Cost</b>			149,000

### **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 Sand Bajri & Boulder (Minor-Mineral) mining on the bed of Alaknanda River, Area 10.65 ha Khasra No: 1195,1196, 1197 to 1199, 1203, 1204, 1206, at Village: Ranihat, Patti-Chauras, Tehsil- Keertinagar District - Tehri Garhwal 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 m<sup>3</sup> of Extracted – Total Costs of Extraction of 100 m<sup>3</sup>

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 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 (Minor-Mineral) mining on the bed of Alaknanda River, Khasra No: 2152 to 2154, 2896, 2898, 2899 to 2914, 3003 to 3005, 3316, 3445,, at Village: Naithana, Patti- Chauras , Tehsil & District: Tehri Garhwal, Uttarakhand Tehsil- Kirtinagar District - Tehri Garhwal

Uttarakhand of Smt Sushila Devi, Sateye Singh C/o Shri Sateye Singh Rana, Village- Kailash Gate Muni-Ki-Reti, District- Tehri Garhwal. 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 Sand Bajri & Boulder (Minor-Mineral) mining on the bed of Alaknanda River, Khasra No 2152 to 2154, 2896, 2898, 2899 to 2914, 3003 to 3005, 3316, 3445, at Village: Naithana, Patti- Chauras , Tehsil & District: Tehri Garhwal, Uttarakhand Tehsil- Kirtinagar District - Tehri Garhwal 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.

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## 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 socio-economic information collation and analysis always plays an indispensable role. PARAMARSH (Servicing Environment and Development) have always stood in the front lines in this important area.

PARAMARSH (Servicing Environment and Development) has got accreditation of EIA consultant with Quality Council of India (QCI) /National Accreditation Board of Education and Training (NABET) (Certificate No.- NABET/EIA/1821/RA 0120, Valid till 01/01/2022. For details kindly refer QCI website <http://www.qcin.org/nabet/about.php>

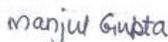
To summarize PARAMARSH (Servicing Environment and Development) is a group which is inspired and guided by the nature and finds immense pleasure in working on scientific lines with a role of activator between the decision makers and the locals. The active participation of locals through the development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

### 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 (Minor-Mineral) mining on the bed of Alaknanda River, Khasra No: 2152 to 2154, 2196, 2896, 2898, 2899 to 2914, 3003 to 3005, 3316, 3435 , at Village: Naithana, Patti- Chauras , Tehsil & District: Tehri Garhwal, Uttarakhand Tehsil-Kirtinagar District - Tehri Garhwal Uttarakhand of M/s Kilkileshwar mining Company C/o Shri Sateye Singh Rana R/o Village - Kailash Gate Muni-Ki-Reti, District - Tehri Garhwal, Uttarakhand

**EIA coordinator:**

Name : Dr. S V Ghavari  
 ACO : Paramarsh Servicing Environment and Development  
 Period of involvement : March 2021 to till date  
 Contact Information : [paramarsh.env@gmail.com](mailto:paramarsh.env@gmail.com)

S. No.	Functional Area	Name of the experts	Involvement		Signature and date
			Period	Task	
1	RH	Mr. Akash Kumar	March 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	March 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	March 2021 to till date	Collected the primary data, livestock inventory/ impacts, identified village-wise amenities/ needs.	
8	AQ & NV	Mr. Vinod Kumar Dwivedi	March 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	March 2021 to till date	Proposing the soil management practices during construction and operation phase of project.	
10	Geo	Dr Abdul Rahman	March 2021 to till date	Input in EIA/EMP report regarding geology of the area.	
11	LU & HG	Mr. S.P. Tiwari	March 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	March 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	March 2021 to till date	Assisted in drafting and compilation of report with respective FAE	
14	Team Member	Mr. Raj Kumar Gautam	March 2021 to till date	Assisted in drafting and compilation of report with respective FAE	
15	Team Member	Mr. Manoj Kumar	March 2021 to till date	Assisted in drafting and compilation of report with respective FAE	
16	FAA (AP)	Mr. Ravi Shankar	March 2021 to till date	Input in EIA/EMP report regarding Air pollution related section	



## Quality Council of India

### National Accreditation Board for Education & Training



## CERTIFICATE OF ACCREDITATION

### Paramarsh (Servicing Environment & Development)

B 1/67, Sector - G, Jankipuram, Lucknow-226021, UP

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

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

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

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

  
 Sr. Director, NABET  
 Dated: February 15, 2019

Certificate No.  
 NABET/ EIA/1821/ RA 0120

Valid till  
 01.05.2021

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