COMPLIANCE OF TERMS OF REFERENCE

(Vide letter No. 256/SEAC dated 11.11.2021)

Soapstone mining near Village- Udiyar, Tehsil-Dugnakuri, District-Bageshwar, Uttarakhand. M/s Udiayr Soapstone Mining Project

1 (a). Standard Terms of Reference for conducting EIA study for non-coal mining projects

S. No.	Points	Reply
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.	The proposed project is a new soapstone mining project. EC proposed for Highest Production i.e. 13137 tonnes (in FifthYear); Approved Mining Plan is Attached as **Annexure-3**.
2	A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.	The State Govt. willing to grant Mining Lease over an area of 2.480 Ha. to **Shri Rajendra Singh S/o Shri Madho Singh**, Village- Udiyar, Tehsil-Dugnakuri, District- Bageshwar, Uttarakhand, vide G.O./letter of intent **No. 1147/VII-1/2018soapstone/18,** dated **26.12.2018,** for a period of 25 years. Copy of LOI attached as **Annexure 2**.
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	Complied.

	latest District Survey Report (DSR) notification no.-2827 dated 25th July, 2018. Data obtained from this DSR should be incorporated in the EIA Report for impact identification, interpretation, prediction, carrying capacity and mitigation.	
4	All corners coordinate of the mine lease area, superimposed on 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).	Satellite Imagery map and Land use map of the proposed area attached as **Drawing 4 & 5** of the report.
5	Information should be provided in Survey of India Toposheet in 1:50000 scale indicating geological map of the area, geomorphology of the land forms of the area, existing mineral and mining history of the area, important water bodies, streams and rivers and soil characteristics.	Toposheet map scale 1:50000 indicating information attached as **Drawing 1**.
6	Details about the land proposed for mining activities should be given with information as to whether mining conforms to the land use policy of the state; land diversion for mining should have approval from state land use board or the concerned authority.	The State Govt. willing to grant Mining Lease over an area of 2.480 Ha. to Shri **Rajendra Singh**, Village- Udiyar, Tehsil- dugnakuri, District- Bageshwar, Uttarakhand, vide G.O./letter of intent **No. 1147/VII-1/2018soapstone/86, dated 26.12.2018,** for a period of 25 years. The Mining Plan has been approved by Directorate of Geology and Mining, Dehradun, Uttarakhand and copy is attached as **Annexure 3.**
7	It should be clearly stated whether the proponent	Yes, the detail has been shown within Chapter No. 6. &10

	company has a well laid down environment.	
8	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/procedure 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 condition 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.	The institutional arrangements for Environmental protection & Conservation have been described in Chapter No. 6. & 10.
9	Issues relating to Mine Safety, including subsidence study in case of underground mining and slop study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided.	Complied.
10	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 mine/ lease period.	Complied.
11	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 the other ecological	The Land use map of the proposed area has been attached as **Drawing -5** of the report. Details about the Land use is shown & given in Chapter -3

	features should be indicated. Land use plan of the mine lease area should be prepared to encompass pre operational, operational and post operational phases and submitted. Impact, if any of change of land use should be given.	
12	Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from terms of the mine lease, its Land use, R&R issues, if any, should be given.	Provided in EIA/EMP Report.
13	A certificate from Competent Authority in 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.	There is no forest land involved in proposed mining area so forest clearance is not required. Certificate is attached.
14	Status of forest clearance for the broken up area and virgin forestland involved in the Project including deposition of Net Present Value (NPV) and compensatory afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.	There is no forest land involved in proposed Soapstone mining area so forest clearance is not required.

15	Implementation status of recognition of Forest rights under Schedule Tribes and other Traditional Forest Dweller (Recognition of Forest Rights) Act, 2006 should be indicated. The vegetation in the RF/PF areas in the study area, with necessary details, should be given.	Not applicable
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 wildlife in the surrounding and any other protected area and accordingly, detailed mitigative measures required, should be worked out with cost implications and submitted.	No wildlife Sanctuary/National Park is situated within 10 km Radius from the proposed soapstone mine.
17	Location of National Parks, Sanctuaries, Biosphere Reserve, 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 project 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.	There is no wild life sanctuary, wild life corridors, Ramsar, tiger and elephant reserve and national park near with the periphery 10 km.

18	A detailed biological study of the study area (core zone and buffer zone [(10 km radius of the periphery of the mine lease)] shall be carried out. Details of flora and fauna, endangered endemic and RET Species duly authenticated, separately for the 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 along with budgetary provision 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.	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. 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.
19	Proximity to Areas declared as Critically polluted" or the project areas likely to come under the 'Aravali Range' (attracting court restriction for mining operations), should also be indicated and where so required, clearance certification 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.	Not Applicable

20	Similarly, for coastal projects, A CRZ map duly authenticated by one of the authorized agencies demarcating LT, HTL, CRZ area, location of the mine lease w.r.t CRZ, costal features such as mangroves, if any should be furnished. (Note: The Mining projects falling under CRZ would also need to obtain approval of the concerned Coastal Zone Management Authority).	Mining lease area is a hilly slope area, no CRZ zone is situated within 10 km radius.
21	R&R plan/compensation details for the project Affected people (PAP) should be furnished. While preparing the R&R plan, the relevant State/National Rehabilitation & Resettlement policy should be kept in view. In respect of SCs/ STs and other weaker section of the society in the study area, a need based sample survey, family-wise, should be undertaken to assess their requirement, and action programmers prepared and submitted accordingly, integrating the sectoral programmers of line department of the State Government. It may be clearly brought out whether the villages located in the mine lease area will be shifted or not. The issues relating of villages including their R&R and socio-economic aspects should be discussed in the report.	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 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. Details mentioned in Chapter-4.
22	One season (non-monsoon) [i.e. March-May (Summer Season); October- December (post monsoon season); December- February (winter season)] baseline data on ambient air quality as per	Baseline environmental data generation for air, water, noise and soil quality monitoring has been conducted at project site and four other locations from March to May, 2019. Apart from field monitoring, additional data was also collected from secondary sources like

	CPCB Notification of 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so complied presented date-wise in the EIA and EMP report. Site - specific metrological data should also be collected. The location of the monitoring stations should be such as 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	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, NGO,s, etc.
23	Air quality modeling should be carried out for prediction of impact of the project on the air quality of the area. It should be also take into account the impact of movement of vehicles for transportation of minerals. 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.	The results of AAQ are given in Chapter 3. 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.
24	The water requirement for the project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water	Overall Water requirement is estimated around 3.0 KLD i.e. for Drinking purposes, Dust Suppression & Plantation/Green belt development. The Specific detail given in Chapter2.

	requirement for the project should be indicated.	
25	Necessary clearance from the Competent Authority for drawl of requisite quality of water for the project should be provided.	Not Applicable.
26	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.	Not Applicable.
27	Impact of the project on the water quality both surface and ground water should be assessed and necessary safeguard measure, if any required, should be provided.	The water quality at project site and other locations within the 10 km impact zone was monitored during December 2019 to February 2020. The details mentioned in Chapter- 3 & 4
28	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 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.	In the project site generally water availability is very deep and Mining operation will not intersect the ground water so necessary permission from CGWA is not required.
29	Details of any stream, seasonal or otherwise, passing through the lease area and modification/diversion	Not any seasonal or other stream passing from the lease area.

	proposed, if any, and the impact of the same on the hydrology should be brought out.	
30	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.	Highest & lowest levels found in the area are of RL 1476.38 m and 1368.26 m. proposed mine working has been described in chapter 4 & Mining Plan of the project (Attached).
31	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 be raised in 7.5m barrier zone along the boundaries of the mining lease area 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. Detail discussed in chapter 10.
32	Impact on local transport infrastructures due to the project should be indicated. Projected increase in truck traffic as a result of the project in the present road network (including those outside the project area) should be worked out, indicating whether it is capable of handling the incremental load.	The impact on traffic has been mentioned in Chapter- 4.

	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.	
33	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA report.	Site service such as first aid room, drinking water facilities etc. will be provided to workers. Detail mentioned in Chapter- 7
34	Conceptual post mining land use and Reclamation and Restoration of mined out areas (with plans and with adequate number of section) should be given in the EIA report.	The mining has been proposed in such a way that the land will be reclaimed concurrently from the end of third year onward in each pit to restore its maximum original topography, the backfilled area shell be leveled and it can be used for agriculture purpose.
35	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.	Occupational safety and health is very closely related to productivity and good employer- employee relationship. The factors of occupational health in soapstone Mining project are mainly dust and land degradation. Safety of employees during operation and maintenance etc. shall be as per Mines rules and regulations. Detail given in Chapter- 4 & 10.
36	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.	Complied and provided in EIA/EMP report

37	Measures of socio economics 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 timeframes for implementation.	The mine area does not cover any habitation. Hence the mining activity does not involve any displacement of human settlement. No public buildings, places, monuments etc. exist within the lease area or in the vicinity. The mining operation will not disturb/ relocate any village or need resettlement. Thus no adverse impact is anticipated.
38	Detailed environmental management plan (EMP) to mitigate the environment impact which, should inter-alia include the impact of change of land use, loss of agricultural and grazing land, if any, occupational health impact besides other impacts specifics to the proposed project.	The detailed Environmental Management Plan (EMP) has been described in Chapter-10.
39	Public hearing points raised and commitment of the project proponent on the same along with time bound Action plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the project.	Complied.
40	Details of litigation pending against the project, if any with direction /order passed by any Court of Law against the project should be given.	No court case is pending in any court against the proposed project.
41	The cost of project (capital cost and recurring coast) as well as the cost towards implementations of EMP should be clearly spelt out.	Cost of project is 35 Lac. & cost towards implementations of EMP is approx.7.87 Lac. Detail mentioned in Chapter- 10.
42	A Disaster management plan shall be prepared and included in the EIA/EMP Report	The Disaster Management Plan is aimed to ensure safety of life, protection of environment, protection of installation and restoration of production. Detail mentioned in Chapter- 7

43	Benefits of the project if the project is implemented should be spelt out. The benefits of the project shall clearly indicates environmental, social, economic, employment potential, etc.	The impact on the civic amenities will be substantial after the commencement of mining activities. Detail project benefits mentioned in Chapter 8.
44.	**GENERAL POINTS**	
a.	Executive summary of the EIA/EMP report	Executive summary of the project is enclosed with the EIA report.
b.	All documents to be properly referenced with index and continuous page numbering.	All documents are properly referenced with indexed and continuous page numbering.
c.	Where data is prescribed in the report especially Tables, the period in which the data were collected and the sources should be indicated.	Agreed.
d.	Project proponent shall enclose all the analysis/testing reports of water, air, noise, soil etc. using the MOEF&CC/NABL accredited laboratories. All the original analysis/testing reports should be available during the appraisal of the project.	Monitoring was done by **Eco Laboratories & Consultants Pvt. Ltd.** which is NABL accredited lab, Certificate No.–. **NABET/EIA/1720/SA095** dated 01.10.2019 valid till 10.03.2021.
e.	Where the documents are provided are in a language other than English, an English translation will be provided.	Agreed
f.	The questionnaire for environmental appraisal of mining project as devised earlier by the Ministry shall also be filled and submitted.	Agreed. All the required documents as devised earlier by the Ministry was filled and submitted.
g.	While preparing the EIA report, the instructions for the proponents and instruction for the consultants	Agreed.

	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.	
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 reason 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 modification arising out of the P.H. process) will entail conducting the PH again with the revised documentation.	Agreed. No such changes incorporated in the basic scope and project parameters.
i.	As per the circular no. J-11011/618/2010-IA-II(I) dated 30.05.2012, certified report of the status of compliance of the conditions stipulated in the environment clearance for the existing operation of the project, should be obtained from the Regional office of Ministry of Environment, Forest and Climate Change as may be applicable.	Agreed.
j.	The EIA report should also include (i) surface plan of the area indicating contours of main topographic features, drainage and mining area, (ii) geological maps and sections and (iii) sections of the mine pit and external dumps, if any clearly showing the land feature of the developing area.	Surface plan of the area including contour of main topographic features, drainage and mining area, geological maps and sections and sections of the mine pit and external dumps are enclosed as **Drawing3.**

CHAPTER 1
INTRODUCTION

1.0 PURPOSE OF THE REPORT

Environmental Impact Assessment (EIA) is a decision making tool, in the hands of the Authorities which brings forth the factual position about a project that enables them in arriving at an appropriate conclusion for the proposed projects, to retain them if environmentally sound, and reject if found having deleterious overall impact. EIA identifies the extent of the environmental, social and economic impacts of a project prior to decision-making. EIA systematically examines both beneficial and adverse impacts of the proposed project over and above the prevailing conditions of environmental parameters and ensure that these impacts are taken into account during the project designing stage itself and the values of the combined impacts are never allowed to exceed and remain within the statutory norms. This process has been envisioned and set in motion by the Ministry of Environment and Forests for sustainable development and the final decision is arrived at only, when those to whom it matters are made known of the salient features of the project being envisaged close to them and their opinion has been sought in a widely advertised Public Hearing Event under the chairmanship of the district authorities so that public could also express their opinion free, without favor and fear.

Final 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 14-9-2006, as amended on 1st Dec, 2009 & 4th April 2011 and also the EIA Guidance Manual for Mining of Minerals (Feb, 2010) of MoEF, Govt. of India, for seeking environmental clearance for mining of soapstone in the applied mining lease area measuring **2.480 ha**. The proposed project falls under Category "B2" as per EIA Notification 2006 its amendment 2009, 2011, 2012 & 2016 of the Ministry of Environment and Forests, New Delhi but due to NGT recent order it falls/considered under B1 Category. The report also incorporates the public Hearing Proceedings.

1.1 IDENTIFICATION OF PROJECT & PROJECT PROPONENT

The proposed project Udiyar soapstone, which covers an area of 2.480 Ha near Village- Udiyar, Tehsil- Dugnakuri, District-Bageshwar, Uttarakhand. Letter of Intent (LoI) has been granted in favor of Shri Rajendra Singh S/o Shri Madho Singh *vide* **G.O./letter of intent No. 1147/VII-1/1/2018/6soapstone/18,** dated **26-12-2018**, attached as **Annexure 2**. The EIA-EMP report is prepared as per the TOR granted under the EIA Notification. In order to assess the impact on environment due to

proposed mine, it is necessary to ascertain present status of environment prevailing at the project site and identification and assessment of impacts on the environment of the proposed operations.

1.2 Brief description of nature, size and location of the project:

The proposed project is for mining of Soapstone from lease area and the estimated project cost is approx. Rs. 35 Lakhs. The mining lease has been granted to Shri Rajendra Singh S/o Shri Madho Singh, Village- Udiyar, Tehsil-Dugnakuri, District-Bageshwar, Uttarakhand.

The proposed mining project is categorized as category 'B1' project. The EIA-EMP report is prepared as per the TOR granted under the EIA Notification. Based on the primary information documents been submitted and the presentation made before SEAC-Uttarakhand, the Authority prescribed & released the Terms of Reference (TOR) vide Letter No. 256/SEAC dated 11.11.2021 (attached as **Annexure-I**), for grant of EC consideration of the project. Further to assess the impact on environment due to proposed mine, it is necessary to ascertain present status of environment prevailing at the project site and proposed operation including identification and assessment of impact on the environment.

1.2.1 Location

The mining area is located in Village- **Udiyar**, Tehsil-Dugnakuri, District-Bageshwar, Uttarakhand. Location of the project is shown in Fig. 1.1. The area is about 40-42 kms from Bageshwar on Bageshwar-Banlek Reema road.

The nearest post office is at Jarati which is about 1km from applied lease area. One primary school is at village- Udiyar, which is about 1 km of applied area. One junior high school is in Udiyar, which is about 1 km of applied area. One nearest intermediate college is at Udiyar which is about 1 km from the applied lease area. For the higher education students usually goes to Bageshwar which is about 40-42 km from the applied area. The nearest private clinics are available at Bageshwar, which is about 40 to 42 km from the applied area.

The co-ordinate of the mine lease area is:

Table No 1.1

Latitude	29°54'8.10"N	(Pillar No. A)
Longitude	79°57'3.26"E	
Nearest Railway Station	Kathgodam Railway Station; 171 Km SW direction	
Nearest Airport	Pithoragarh Airport; 45 Km SE (Aerial distance)	
Nearest Highway	Bageshwar – Banlek Reema, West, .39km (Aerial distance)	

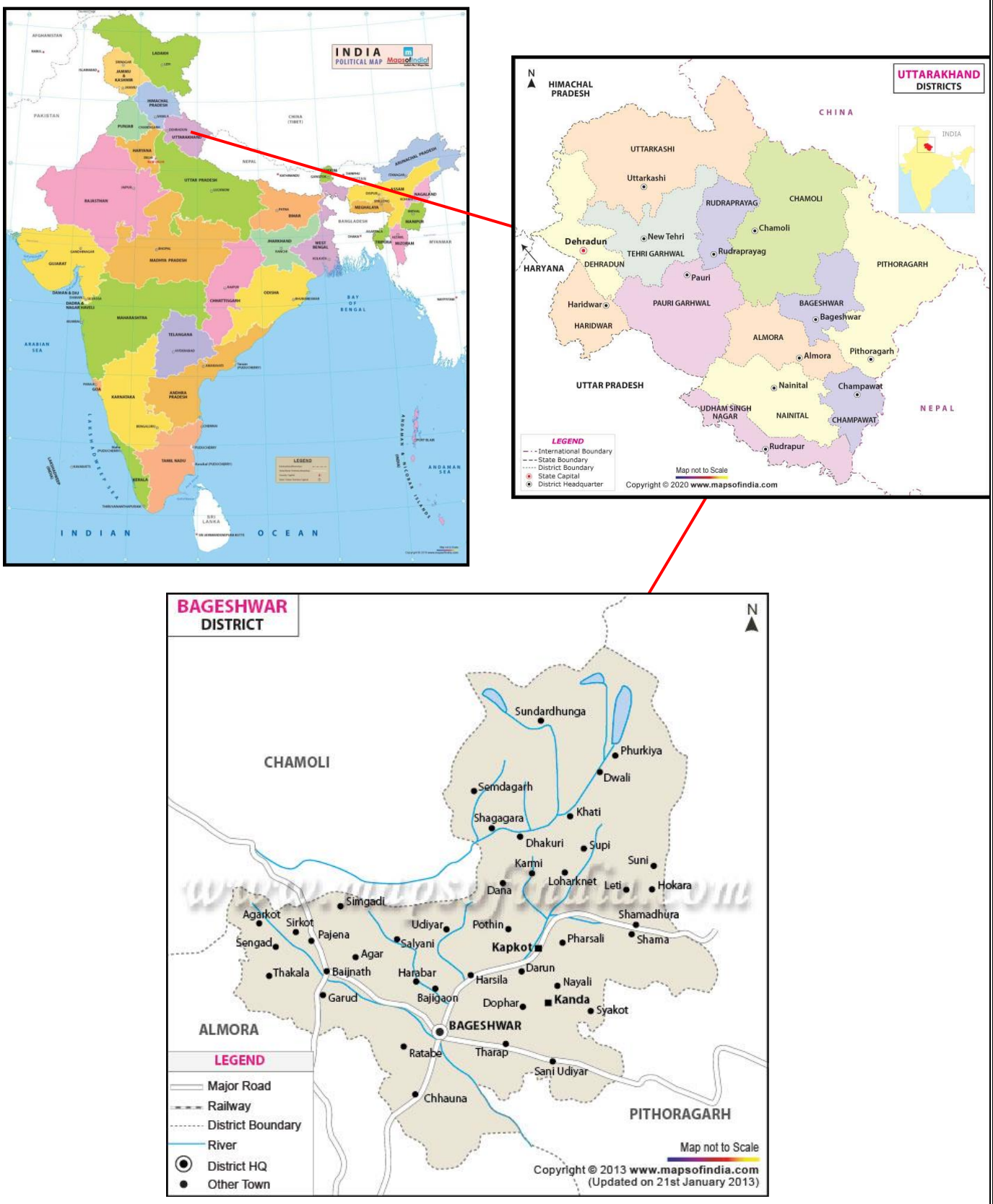

FIGURE 1.1: THE PROPOSED PROJECT LOCATION

1.2.2 Project's importance to the country and the region

This project operation will provide employment to the people residing in vicinity as about 240 man days will be generated annually and approximately 37 people may be benefited directly and some indirectly by the project.

Soapstone finds its uses in all aspects of life and commercial business. Soapstone has wide applications across various industries. Some uses for soapstone or talc are paper, textile, cosmetics, paint, ceramics, detergents, animal feed, insecticide, plastics and various drying powder. Soapstone, also known as Talc or Talcum Powder, is a mineral that is naturally found in nature. The chemical name for Talc or Talcum Powder is hydrated magnesium silicate.

1.3 REGULATORY COMPLIANCES & APPLICABLE LAWS/REGULATIONS

- Approved Mining Plan of the project been attached as **Annexure-3**.
- The Mining Plan of the project has been approved by Directorate of Geology & Mining, Uttarakhand, Govt. of Uttarakhand.
- There is no National Park, Wildlife Sanctuary, National Monument, Protected Forest within 10 km radius of the proposed mine lease area. No Objection Certificate from forest department (DFO office).
- There is no legal case against the project and project proponent (Fresh Application).

1.4 SCOPE OF THE STUDY

This study contains various information on environmental and social aspects associated to the proposed mining activity. These factors include air, water, noise, health, socio-economic, land use and agricultural pattern, etc. It discusses the predicted impact of the mining activities on these factors. Broadly under the scope it is envisaged as:

- To assess the present status of air, water, land, noise, biological & socio economic components of environment.
- To identify, quantify & evaluate positive or negative impacts of various operations on different environmental components.
- To evaluate proposed pollution control measures and to suggest additional control strategies, if any, to mitigate the adverse effects.
- To identify risk factors & suggest their mitigation including occupational health of the workers.
- To prepare Environmental Management Plan for utilization and adoption of safety measures.
- To delineate future Environmental quality monitoring programme.
- To identify the needs of study area and suggest supportive measures under Corporate Social

Responsibility.

Various steps involved in Environmental Impact Assessment study of the project are divided into the following phases:

- Identification of significant environmental parameter sand study of the existing status of air, water, noise, soil and socio-economic components of the environment.
- Study of various activities of the proposed project for manufacture of final products and to identify the area leading to impact/change in environmental quality.
- Identification/prediction of impacts for the identified activities and to study levels of impacts on various environmental components.
- Evaluation of final levels of various parameters after super imposing the predicted impacts over the base line quality.
- Formulation of Environmental Management Plan for implementation for the proposed project.

****

CHAPTER – 2

PROJECT DESCRIPTION

2.0 GENERAL

The Environmental Impact Assessment report has been prepared in terms of EIA notification of the MoEF dated 14-9-2006, as amended on 1st Dec 2009, 4th April 2011 and the EIA Guideline Manual for Mining of Minerals (Feb, 2010) of MoEF, Govt. of India, for seeking environmental clearance for mining in the soapstone mining lease measuring 2.480 ha. falling under category B1 because of NGT recent order.

2.1 TYPE OFPROJECT

The project proposed for the excavation of soapstone from the hill slope (Agricultural land) is a new mine. It is an opencast mining project where the entire activity will be done in a semi mechanized way and mining of Soapstone will be done. The estimated project cost of the mine is approximately Rs 35 Lakhs. The anticipated life of the mine is 25 years with maximum production 52786 tonnes.

The State Govt. willing to grant Mining Lease over an area of 2.480 Ha. to Shri Rajendra Singh S/o Shri Madho Singh, Village- Udiyar, Tehsil- Dugnakuri, District- Bageshwar, Uttarakhand, vide G.O./letter of intent **No. 1147/VII-1/2018/6soapstone/18,** dated **26-12-2018,** for a period of Twenty-Five(25) years. Copy of LOI attached as **Annexure 2**. The Mining Plan has been approved by Directorate of Geology and Mining, Dehradun, Uttarakhand.

2.2 NEED FOR THE PROJECT

Soapstone finds its uses in all aspects of life and commercial business. Soapstone has wide applications across various industries. Some uses for soapstone or talc are paper, textile, cosmetics, paint, ceramics, detergents, animal feed, insecticide, plastics and various drying powder. Soapstone, a variety of Talc, is a mineral that is naturally found in nature. The chemical name for Talc is hydrated magnesium silicate. The region Uttarakhand accounts for 29% of India's soapstone production. Talc is used mostly in pulverized form as a filler and extender in various industries. Total reported consumption of talc/steatite/ soapstone in the organized sector was at 368 thousand tonnes in 2012-13. About 56% consumption was in Paper Industry, followed by Paint

(20%), Pesticide (11%), Ceramic (8%) and Cosmetic (4%) industries. Nominal consumption was shared by Fertilizer, Rubber, Textile, Chemicals and other industries.

The demand in the domestic market is high for Soapstone. The Industry's demand for fine powder is continuously prompting advancements to meet this purpose. Mineral is available in abundant quantity in area and can be extracted indigenously.

2.3 LOCATION DETAILS

The lease area is in Village- Udiyar, Tahsil-Dugnakuri, District- Bageshwar. The area is about 40-42 kms from Bageshwar on Bageshwar-Banlekh Reema road Satellite image of the proposed lease area is shown in below **Fig.2.1.**

The nearest post office is at Jarati which is about 1km from applied lease area. One primary school is at village- Udiyar, which is about 1 km of applied area. One junior high school is in Udiyar, which is about 1 km of applied area. One nearest intermediate college is at Udiyar which is about 1 km from the applied lease area. For the higher education students usually goes to Bageshwar which is about 40-42 km from the applied area. The nearest private clinics are available at Bageswar, which is about 40 to 42 km from the applied area. Salient features of project shown in **Table No. 2.2**

The co-ordinates of the mine lease area are:

Table No. 2.1

Latitude	29°54'8.10"N	(Pillar No. A)
Longitude	79°57'3.26"E	
Nearest Railway Station	Kathgodam Railway Station; 171 Km SW direction	
Nearest Airport	Pithoragarh Airport; 45 Km SE (Aerial distance)	
Nearest Highway	Banlekh Reema Road, 0.39 km (Aerial distance)	

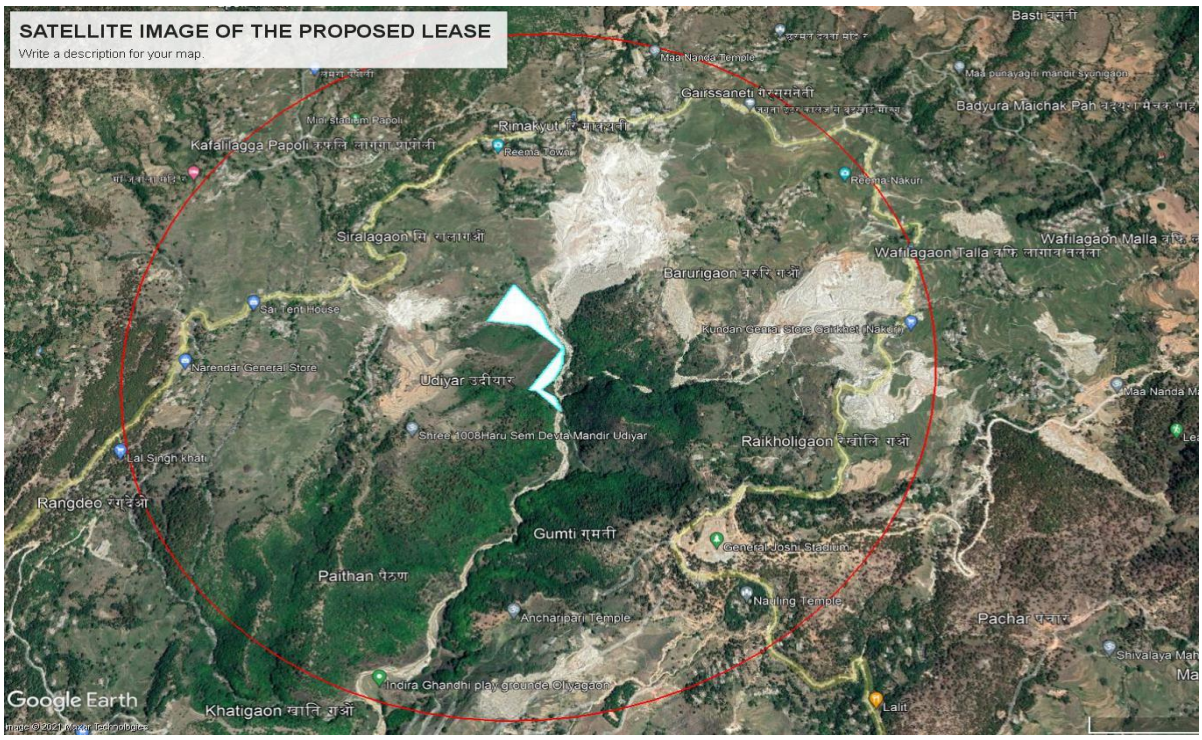

FIGURE 2.1. SATELLITE IMAGE OF THE PROPOSED LEASE

FIGURE 2.1.1. SITE PHOTOGRAPHS

TABLE NO. 2.2: SALIENT FEATURES OF PROJECT

Name of the applicant	**Shri Rajendra Singh**	
Address	Village- Udiyar, Tehsil- Dugnakuri, District- Bageshwar, Uttarakhand	
Name of Mine	Udiyar, Soapstone Mining Project	
Village	Udiyar	
District & State	Bageshwar, Uttarakhand	
Latitude	29°54'8.10"N	Pillar no. A
Longitude	79°57'3.26"E	
Mineral	Soapstone	
Area (ha)	2.480Ha	
Period of Lease (Yrs.)	25	
Status of Mine	New	
Cost of the project	35 Lac (Approximate)	
Man Power Requirement	37	
Water Requirement & Source	3.0 KLD Approx. for Drinking & Dust Suppression/Plantation & Source: Nearby villages & natural springs.	
Elevation(RL)	Highest & lowest levels found in the area are of RL 1476.38m to 1368 m	
Nearest National Highway /State Highway	SH – Banlekh Reema Road NW 360m (Aerial Distance	
Nearest Railway Station	Kathgodam Railway Station; 171 Km SW (Aerial Distance)	
Nearest Airport	Pithoragarh Airport; 45 Km SE (Aerial Distance)	
Ecological Sensitive Areas(Wildlife Sanctuaries)	None	
Reserved/Projected Forests	None	
Nearest Village/Town/City	Jarati, 1 Km Bageshwar, 40-42 Km,	
Nearest School	Govt. Primary School, Udiyar, 1 Km	

Nearest Hospital	Government Hospital Khantoli, 8.38 km, SW
Nearest River	Saryu River; 36.26 Km NW (Aerial)
Seismic Zone	Zone – V

2.4 LEASE HOLD AREA

The entire lease hold area of 2.480 Ha lies in Village- Udiyar, Tehsil-Dugnakuri, District-Bageshwar, Uttarakhand. The breakup of the land use for ancillary feature around the mining area is given below: -

TABLE NO. 2.3: LEASE HOLD AREA

Final Demarcated Area	**NONE-FOREST LAND, AS CATEGORIZED AS BELOW**					
	Ag. Category-1 (Ka) land	**Ag. Category-4 land**	**Govt. Category-5 land**	**Category-9 (Na.) land**	**Pub. Utility Category-10(1), 10(2) & 10(4)land**	**Total land**
Village- Udiyar	1.937 Hac.	0.014 Hac	0.076 Hac	0.410 Hac	0.043 Hac	2.480 Hac
Total	**1.937 Hac.**	**0.014 Hac.**	**0.076 Hac.**	**0.410 Hac.**	**0.043 Hac.**	**2.480 Hac.**

2.5 PHYSIOGRAPHY

Physiography: -(The aspects to be looked in to are topography of terrain, drainage pattern, and vegetation, climate, and rainfall data of the area applied/mining lease area)

The lease area comprises of hill terraced agricultural fields showing terraced topography. The slope of area is gentle (18 to 25°) is about north-west to south-east direction. The higher levels are found towards the northern side of the area near boundary pillar B whereas the lowest horizons within the area are found towards the southern side. The highest & lowest levels found in the area are of 1476 mRL and 1368 mRL respectively. The slopes in hill area vary from moderate to gentle. The area is infertile in nature. The physiography of the area shows on Surface/Geological Plan of the area, surface and geological plan enclosed as **Plate No-3**.

2.6 SURFACE DRAINAGE PATTERN

Drainage of the area is mainly controlled by Saryu, Gomti and Pindar Rivers and their tributaries (locally called Nadi, Gad or Gadhera) viz. Pungar Nadi, Khir Ganga Nadi, Bhadrapati Nadi, Revti Ganga, Kanal Gad, LahorNadi, Jagtana Gad, Kulur Gad, Sukunda Gad etc. Sub-trellis, sub-rectangular and sub-dendritic are the most common drainage patterns in the area. The Central and North-Central parts of the district are drained by Saryu River. Gomti River drains the western and south eastern parts whereas Pindar River drains the northern part. These 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. The surface drainage pattern map is shown in **Fig.-2.2**

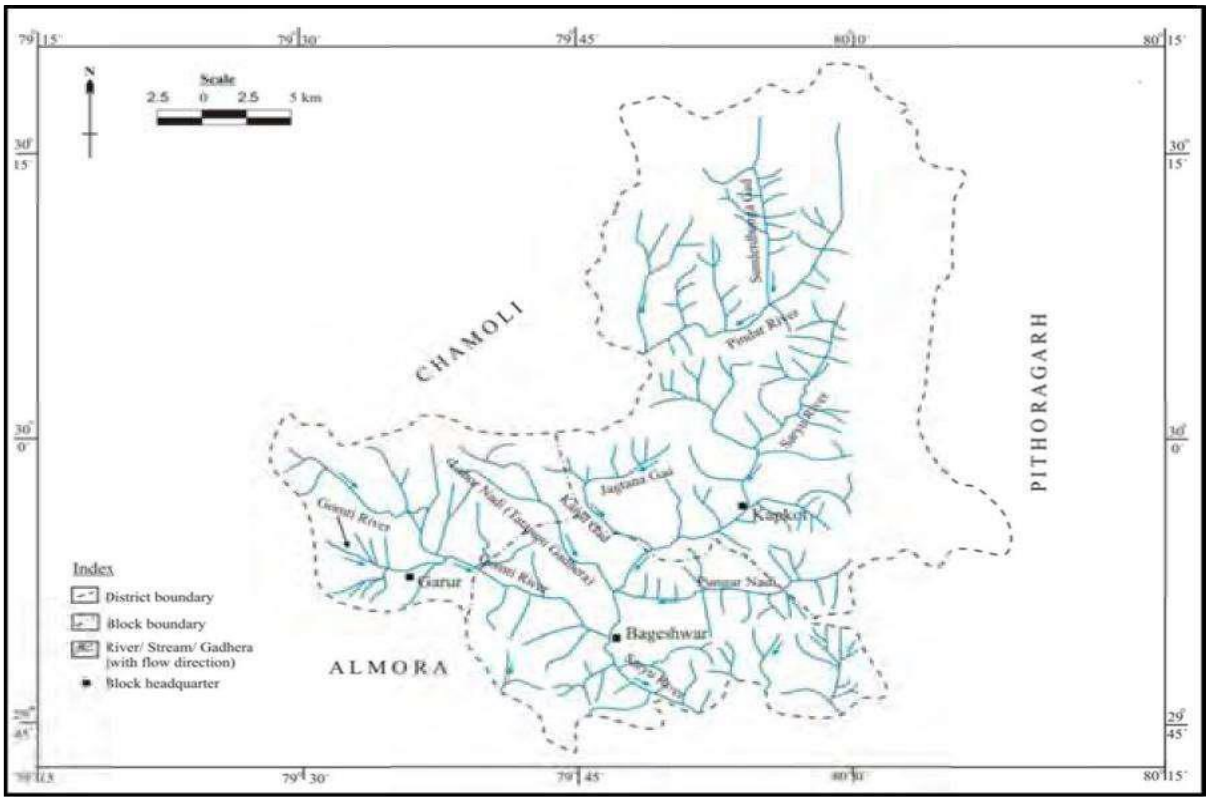

FIG. 2.2: SURFACE DRAINAGE PATTERN OF THE DIST.

2.7 GEOLOGY

TOPOGRAPHY & GEOLOGY

Topography

Bageshwar district comprises two broad physiographic divisions from north to south viz. Central Himalayan Zone (north of the Main Central Thrust) and Lesser Himalayan Zone (south of the

Main Central Thrust). The area shows an extremely rugged topography characterized by precipitous hills and deep gorges with sharp variation of high magnitude in surface relief. The general slope is towards south. In the northern parts the elevation of the land surface ranges from about 3000 m to 6861 m above mean sea level whereas in the valleys of southern part, the altitude is as low as 795 m. The soils of Bageshwar district can be broadly classified into two types, viz. Soils of Lesser Himalaya and Soils of Greater or Central Himalaya. Majority of the area is covered by the first type. The soils in this area are exposed in massive mountainous tracts and tangled mass of series of ridges divided fromeach other by deep, narrow valleys. The soils of Lesser Himalaya are further subdivided into a) Soils of Summits and Ridge tops, b) Soils of Side Slopes, c) Soils of Glacio-Fluvial Valleys, d) Soils of Fluvial Valleys and e) Soils of Cliffs. The soils of Greater 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.

The topography of the proposed project area lies on southern slope of a hill in a mountainous terrain of rough and rugged topography. The area is drained by few seasonal nalas. The applied forms a transverse ridge of Surkaligaon village ending northwards in the valley. The area has sloppy undulating surface and at places gentle sloping terraces also. The highest RL is about 1757 m on the north side of the applied area, while the lowest RL recorded on the southern side of the applied area is about 1687.9 m. General slope of the lease area is 20o – 35o in southern direction.

5.2 GEOLOGY:

(Surface geological map with contour interval maximum of 10 meter on a scale of 1:2000/1:1000 may be examined for features detailed below)

5.2.1 Regional Geology:-

District Bageshwar is mainly 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. Valdiya (1980) carried out extensive geological and structural mapping in this area. The rock units exposed in various parts of Bageshwar district comprise current-bedded quartzite with associated volcanics, mica-talc schist, limestone, conglomerate, slate, quartzite, granodiorite, augen gneiss, and migmatite and granite gneiss. Many areas in the northern part of the district are yet to be mapped by conventional field methods due to inaccessibility and permanent snow cover. However a group of regionally metamorphosed rocks

known as the Central Crystallines are exposed in this area. The Central Crystallines of the Central Crystallines are exposed in this area. The Central Crystallines of the Central Himalayan Zone occur as thrus sheets over the metasedimentary and sedimentary rocks of Lesser Himalayan Zone in varied tectonic settings. Major rock types of Central Crystallines are migmatites, psammitic and mica gneiss, calc gneiss, quartzite, marble, mica schist and amphibolites. Granites of different ages ranging from Paleoproterozoic to Mesozoic-Tertiary intrude the Central Crystallines. Major parts of Bageshwar district falls under the geotectonic zone known as the Lesser Himalaya. Rock types in the Lesser Himalayan Zone include sedimentaries, metasedimentaries and plutonic igneous rocks. The various rock units have suffered multiple phases of deformation and metamorphism in major parts of the district.

Geological framework of Almora-Bageshwar regions is so wide where that region is divided in different litho-tectonic units. The geology of the area consists of three Stratigraphic and tectonic units, namely (a) The Central Crystalline, (b) The Baijnath Crystalline and (c) The Garhwal Group. In the north the meta-sedimentary rocks of the Garhwal group have been thrust over by the Central Crystalline and the contact is known as the Main Central thrust. In the south the Kausani thrust separates the Garhwal group from the physically overlying Baijnath Crystalline. In the central part of the Bageshwar region there are rocks of Garhwal group is found to expose.

On the basis of previous works by Heim and Gansser (1939) and Gansser (1964) gave an account of different lithogical units and structural trends, with regional interpretations in the Kumaun Himalaya. Rocks of the central part of the Bageshwar region is remarked as a part of "The Calc zone of Tejam". The first geological map of the area was published by Misra and Banerjee (1968). Subsequently it was revised by Misra and Bhattacharya (1972), after that work has been carried out by A. Ahmad (GSI, 1975), A.R. Bhattacharya (1979) and besides those workers K.S. Valdiya (1980) and A.K. Sinha (1981) also gave their contribution in the account of the Geology of the region.

The proposed lease area belongs to a part of Calc Zone of Tejam. The Stratigraphic sequence of the region as per monumental work (Geology of Lesser Himalaya, 1980) of Prof. K.S. Valdia, given as below- **(Table No-5.1)**

Table No.2.4

Soil	
Berinag Quartzite ----------	**Unconformity**----------
Gangolihat Dolomite ----------	Dolomite and Dolomitic limestone with Algal structures, Magnesite with minor talc/Talcose phyllite and dolomitic intercalations. **Unconformity** ----------
Sor Slates	Shales, Slates and Phyllites

The above Stratigraphic sequence as observed in this region is considered to be an inverted one. Soapstone pockets/lenses occurs within carbonates of Gangolihat Dolomite.

(I) Disposition of all lithological units with clear nomenclature and their description

Local Geology:

Locally the area only shows the part of carbonates of Gangolihat Dolomite sequence. The local stratigraphy shows that the mineralized zone lies between upper & lower carbonates as below-

Upper Carbonates: Magnesite sporadic dolomite

Middle Talcose phyllite: Talc in pockets

Lower Carbonates: Dolomite & dolomitic intercalations

As per UNFC, the deposit is lenticular of all dimensions, **UNFC category IV.**

2.8 CLIMATE

Climatically the area falls in temperate zones with pleasant summer & extreme cold winters. The area receives moderate snowfalls during winters between January & February. The maximum temperature goes up to 35°. While the average minimum temperature goes up to 2° to 4° in the months of January & February.

2.8.1 Temperature, Relative Humidity and Wind

Climatically the area falls in temperate zones with pleasant summer & extreme cold winters. The area receives moderate snowfalls during winters between January & February. The maximum temperature goes up to 35º. While the average minimum, temperature goes up to 2º to 4º in the month of January & February.

January is the coldest month with mean maximum temperature of 10°C, the mean minimum temperature being about 2°C. Temperature drops down to –6°C during January and February in the northern part of the district. June is the warmest month with the mean maximum and the mean minimum temperatures of 25°C and 15°C respectively. The maximum temperature recorded in the district was 43ºC (May 2003) whereas the minimum temperature recorded was 4ºC (January 2003).

The relative Humidity shows rise from June to February with highest values in the month of January and decreases during months of April & May. On the basis of past experience reveals that the maximum average humidity in the month of January is about 96.33% while the minimum average humidity is about 32.43% during month of April.

2.8.2 Rainfall

Most of the rainfall, about 75% of the annual value, occurs during monsoon months of June to September. July is the rainiest month followed by August. In September, depressions from Bay of Bengal occasionally reach Uttarakhand and affect the weather of Bageshwar district too. This phenomenon may cause heavy rains. With the withdrawal of monsoon in September, the intensity of rainfall rapidly decreases. The decrease continues till November, which is a practically rainless month. Winter precipitation is associated with the passage of the Western Disturbances and is in the form of snowfall over higher elevations. The monthly and annual average rainfall data of District Bageshwar in year 2013, 2014, 2015, 2016 is 1697 mm, 1157.38 mm, 1241.52 mm, and 1346.34 mm respectively. Maximum rainfall occurred in July 2016 is 1684.05 mm. **(Ref: Dist. Survey Report).**

2.9 RESERVES

Description of Geological reserve has been given in the table below:

TABLE NO. 2.5: ESTIMATION OF RESERVES

Mineral Reserve	UNFC Code	Quantity in million Tons	Grade
A. Total Mineral Reserve			
Proved Mineral Reserve	111	0.160796	Cosmetic paper
Probable Mineral Reserve	121	0.047355	Cosmetic paper

B. Total Remaining Resources			
Feasibility mineral Resources	211	0.068488	Cosmetic paper
Prefeasibility mineral Resources	222	0.033336	Cosmetic paper
Measured mineral Resources	331	-	-
Indicated mineral Resources	332	-	-
Inferred mineral Resources	333	0.007936	-
Reconnaissance mineral Resources	334	-	-
Total (A+B)	-	**0.317911**	-

2.10 MINING

OPEN CAST MINING:

1. Existing Method of Mining: It is fresh application for mining lease & mining operations yet to be commenced.

2. Proposed Method of Mining: The mine is proposed to be worked by opencast semi-mechanized method using JCB excavator on contract (all statutory permissions will be required from DGMS and others). The overburden & interburden shall be removed by means of excavator. The soapstone shall be extracted with the help of excavator as well as manually with the help of hand tools like crow bar, chisels, pickaxe, hammers, and spade.

Mineral will be packed in bags and will be transported on manual/mule (*khachar) to* aerial ropeway point (Inlet point) and from where it will be further transported by aerial ropeway to the road head/near road head, then from road head the mineral is transported by trucks to main market Haldwani. Drilling & blasting shall not be required/proposed during the mining operations. The soapstone shall be dressed manually & stacked separately. No further beneficiation shall be undertaken during first five years.

The salient points of proposed method of mining are given below:-

- Mining shall be carried out in two pits.
- It will be opencast semi-mechanized method mine.
- Average thickness of soil has been considered as 0.75 m. & it shall be stacked separately.
- Top soil, overburden & interburden shall be removed by means of excavators.

- Height & width of benches shall be kept 3m and 3m.
- Face slope of benches shall be 70^0 with 45^0 overall pit slope.
- Backfilling will be undertaken after winning the soapstone up to full economical depth. The interburden and top soil will be temporarily dump separately towards the slope of working pit and shall be used for backfilling from third year onwards. Interburden shall be filled into mined out pit and later on thin soil shall be carped over it to restore maximum original topography of the area.

Generally small quantities of magnesite interlocked with soapstone that is inseparable in nature so 5% of total recoverable soapstone has been considered as mining losses.

Reference: Mining Plan.

2.10.1 DRILLING AND BLASTING

Soapstone is soft mineral, its hardness has been estimated as 1 as per as Moh's hardness scale, which can be mined easily therefore, there is no need of drilling and blasting for soapstone mining.

2.10.2 LOADING

Loading of material is done by the labors to the trucks and trolleys.

2.10.3: HAULING/ TRANSPORT-

Hauling of the rejection is not required in the area as the waste material is to be backfilled in the mined out area and the plantation will be carried out in the dump areas. The mined soapstone and boulder after resizing/screening will be loaded manually and transported by the tippers to the end users.

2.10.4: PROPOSED YEAR WISE PRODUCTION DETAIL

FIRST YEAR

Mining shall be carried out of four benches from 1470mRL to 1458mRL. About 2154 cum of soil and about 4499 cum of interburden will be generated which will be kept separately near the working pit and all the quantities shall be used in backfilling. The width of benches shall kept 3m and height of benches shall be kept 3m. 7108 tonnes of soapstone will be excavated. The

Production will be achieved through the opening and advancement of benches 1461m RL to 1458mRL.

The bench-wise demonstrated reserves, excavation of soapstone, saleable quantities of soapstone and balance demonstrated reserve at the end of the year is given below:-

FIRST YEAR-(Table No.2.6)						
Bench level (mRL)	**Bench Area (m2)**	**Depth (m)**	**Volume (cum)**	**Top soil (cum)**	**Interburden (cum)**	**Soapstone (Tonnes)**
1470-1467	115	3	345	298	207	327
1467-1464	200	3	600	412	360	568
1464-1461	308	3	924	437	554	878
1461-1458	1877	3	5631	1007	3378	5338
TOTAL			**7500**	**2154**	**4499**	**7108**

SECOND YEAR

Mining shell be carried out of two benches from 1458mRL to 1452mRL.About 1949cum of soil and about 5708cum of interburden will be generated which will be kept separately near the working pit and all the quantities shall be used in backfilling. The width of benches shall kept 3m and height of benches shall be kept 3m. About 9020tonnes of soapstone will be excavated. The Production will be achieved through the opening and advancement of benches 1455m RL to 1452mRL.

The bench-wise demonstrated reserves, excavation of soapstone, saleable quantities of soapstone and balance demonstrated reserve at the end of the year is given below:-

SECOND YEAR-(Table No. 2.7)						
Bench level (mRL)	**Bench Area (m2)**	**Depth (m)**	**Volume (cum)**	**Top soil (cum)**	**Interburden (cum)**	**Soapstone (Tonnes)**
1452-1455	2400	3	8328	1294	4996	7894
1455-1452	396	3	1188	655	712	1126

TOTAL			**9516**	**1949**	**5708**	**9020**

THIRD YEAR

Mining shell be carried out of two benches from 1455mRL to 1449mRL. About 2160 cum of soil and about 7162 cum of interburden will be generated which will be kept separately near the working pit and all the quantities shall be used in backfilling. The width of benches shall kept 3m and height of benches shall be kept 3m. 11316tonnes of soapstone will be excavated. The Production will be achieved through the opening and advancement of benches 1455m RL to 1449mRL.

The bench-wise demonstrated reserves, excavation of soapstone, saleable quantities of soapstone and balance demonstrated reserve at the end of the year is given below:-

THIRD YEAR-(Table No. 2.8)

Bench level (mRL)	Bench Area (m2)	Depth (m)	Volume (cum)	Top soil (cum)	Interburden (cum)	Soapstone (Tonnes)
1455-1452	365	3	1095	651	657	1038
1452-1449	3614	3	10842	1509	6505	10278
TOTAL			**11937**	**2160**	**7162**	**11316**

FOURTH YEAR

Mining shell be carried out in two benches from 1449mRL to 1443mRL. About 2552 cum of soil and about1965 cum of interburden will be generated which will be kept separately near the working pit and all the quantities shall be used in backfilling. The width of benches shall be kept 3m and height of benches shall be kept 3m. 12205tonnes of soapstone will be excavated. The Production will be achieved through the opening and advancement of benches 1446m RL to 1443mRL.

The bench-wise demonstrated reserves, excavation of soapstone, saleable quantities of soapstone and balance demonstrated reserve at the end of the year is given below:-

FOURTH YEAR-(Table No. 2.9)

Bench level (mRL)	Bench Area (m2)	Depth (m)	Volume (cum)	Top soil (cum)	Interburden (cum)	Soapstone (Tonnes)
1449-1446	3200	3	9600	1618	5760	9100
1446-1443	1092	3	3276	934	1965	3105
TOTAL			**12876**	**2552**	**7725**	**12205**

FIFTH YEAR

Mining shell be carried out of three benches from 1446mRL to 1437mRL. About 3763 cum of soil and about 8314 cum of interburden will be generated which will be kept separately near the working pit and all the quantities shall be used in backfilling. The width of benches shall kept 3m and height of benches shall be kept 3m. 13137tonnes of soapstone will be excavated. The Production will be achieved through the opening and advancement of benches 1440m RL to 1437mRL.

The bench-wise demonstrated reserves, excavation of soapstone, saleable quantities of soapstone and balance demonstrated reserve at the end of the year is given below:-

FIFTH YEAR-(Table No.2.10)						
Bench level (mRL)	**Bench Area (m2)**	**Depth (m)**	**Volume (cum)**	**Top soil (cum)**	**Interburden (cum)**	**Soapstone (Tonnes)**
1446-1443	456	3	1368	741	820	1296
1443-1440	2256	3	6768	1410	4060	6415
1440-1437	1908	3	5724	1612	3434	5426
TOTAL			**13860**	**3763**	**8314**	**13137**

TABLE No. 2.11: PRODUCTION FOR FIRST FIVE (5)

YEAR	TOTAL PRODUCTION SOAPSTONE (TONNES)
FIRST	7108

SECOND	9020
THIRD	11316
FOURTH	12205
FIFTH	13137
TOTAL	**52786**

2.10.5 WASTE GENERATION DURING MINE PERIOD

The top soil from the working benches will be removed by means of an excavator and stacked separately and used for backfilling from second year onwards. The interburden is low grade magnesite and shall be removed manual means and to be dumped separately and used for backfilling from third year onwards. The top soil and interburden material will be dumped separately on mineralized land, but these dumps are temporary in nature and it will be used in reclamation purpose. The yearly generation of soil and inter burden is given below:-

Table No. 2.12: Disposal of Waste

YEAR	TOP SOIL (CUM)	INTERBURDEN (CUM)
FIRST	2154	4499
SECOND	1949	5708
THIRD	2160	7162
FOURTH	2552	7725
FIFTH	3763	8314
TOTAL	**12578**	**33408**

Storage and prevention of top Soil: -

The top soil shall be scraped & preserved for short period towards the slope side along the working pits. Dumping shall be carried out in single terrace & slope of dump shall be kept 35^0 to 40^0. All the quantities shall be used in backfilling before the commencement monsoon period. Therefore no proposal has been envisaged for its separate dumping at mine side. Before the commencement of monsoon all the pits shall be backfilled.

Proposal for reclamation of Land affected by mining activities: -

The mining has been proposed in such a way that land will be reclaimed concurrently from end of first year onward in each pit to restore its maximum original topography. The backfilled area shall be leveled and it is use for agriculture purpose.

TABLE 2.13: Reclamation

Year	Quantities of soil + interburden to be generated & dumped (cum)	Space available for backfilling (cum)	Dimension of backfilled pit (m)			Quantities of soil+ interburden to be used in backfilling (cum)	Balance quantities to be dumped (cum)
			l	w	d		
FIRST	6653	-	-	-	-	-	6653
SECOND	7657	15750	75	35	6	14310	-
THIRD	9322	10920	65	42	4	9322	-
FOURTH	10277	11550	70	33	5	10277	-
FIFTH	12077	12768	76	28	6	12077	-
TOTAL	**45986**	**71808**				**45986**	**6653**

2.11 UTILITIES

2.11.1 Water

The water required is mainly for dust suppression, green belt development and drinking during mining operations. The total requirement is assessed around **3.0 KLD**. Only fresh water will be used for drinking purpose. The requirement of water will be fulfill from nearby available sources& Water conservation practices within the proposed lease area for dust suppression & Green belt development. The break up for water requirement is given below:

TABLE NO. 2.14: WATER REQUIREMENT TABLE

S.No.	Purpose	**Water Requirement** (KLD)
1.	Drinking	1.5
2.	Dust Suppression	1
3.	Miscellaneous	0.5

TOTAL	**3.0**

2.11.1.1 Rain Water Conservation

- Rain water harvesting in the soapstone mining project will mainly involve the channelization and storage of rain water in storage pits.
- For proper drainage and collection of rain water, a set of garland drainages will be made in the mining lease area and the water will be accumulated at the lower most gradient by constructing a pit which will act as water storage in the area. This will also protect rain water accumulation in the mining pits.
- One pits with HDPE linings having capacity 20 KL each has been proposed to collect the water during rain which will further be used for green belt development and dust suppression.
- HDPE lining is proposed to assure that no groundwater contamination is there due to leaching.

2.11.2 Power

No power consumption will be there, as mine will work only in day time.

2.11.3 Infrastructure

The site services like temporary rest shelter, first aid box with anti-venoms, drinking water facilities and sanitary facilities will be provided to workers at the mine site.

2.11.4 Manpower

As per the proposed production the total manpower requirement will be limited to a specific number of miners. However, the number of unskilled labour may increase/decrease depending on the quantum of overburden removal. The lessee will employ around 46 unskilled workers for removal of overburden, quarry cleaning and road repairing, etc. which includes the following.

TABLE NO. 2.15: MANPOWER REQUIREMENT

S.NO.	**Category** (Full Time)	**Numbers**
1.	Geologist/Consultant Geologist	1
2.	Part time medical officer (1)	-
3.	Part time Environment Consultant (1)	-
4.	Mining Engineer/Mine Manager	1
5.	Supervisor/Skilled workers	3

6.	Unskilled	32
	Total	**37**

2.12 STATUTORY REQUIREMENTS-

It is accepted that effective resource management cannot be done in isolation. The proponent therefore vigorously pursues approaches towards coordination and integration where possible, so as to lead to coordinated regulatory systems. Various acts dealing with matters relating to the conservation and protection of the environment and which a holder of a mining authorization must also take cognizance of include inter alia, the following:

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

2.13 OTHER MINE LEASE PRESENT WITHIN THE STUDY AREA

Cluster certificate is enclosed as the details of other mine present within 10 km radius of the lease area.

****

CHAPTER 3

DESCRIPTION OF THE ENVIRONMENT

3.1 INTRODUCTION

The entire proposed mine lease area is considered as core zone. The surrounding area covering 10 km radius from the periphery of the core zone is considered as buffer zone. The core zone and the buffer zone combined together make the study area. The study area covers 10 km radius of the Shri Rajendra Singh S/o Shri Madho Singh located at Village- Udiyar, Tehsil- Dugnakuri District-Bageshwar, Uttarakhand.

The baseline environment quality represents the background environmental scenario of various environmental components. The sources of emission in the study area are existing mines and stone crushing plants, vehicular traffic, unpaved roads etc. Ambient Air Quality, Ground and Surface water quality, Noise Levels, present land use pattern, soil quality, biological environment, socio-economic status, health status etc. within a study area of 10 Km. radius around the project site has been studied.

The main aim of the impact assessment study depends mainly on two factors. One of the estimation of impact from proposed project on the environment and second one is the assessment of the environmental condition. Both are key factors to arrive at the post project scenario. The estimated impact due to the mine lease area can be superimposed over the existing conditions to arrive at the post project scenario. The scope of the baseline studies includes detailed characterization of following environmental components, which are most likely to be influenced by the setting up of a mine lease area.

1. Metrological conditions
2. Ambient Air Quality
3. Noise levels
4. Water Quality (Surface and Ground water)
5. Soil Quality
6. Socio economic status

BASELINE MONITORING OF ENVIRONMENTAL COMPONENTS

Study Area and Period

The base-line data has been collected at the project site and 10 km buffer zone for prominent environmental attributes like Ambient Air Quality, Ambient Noise Level, Water quality and Soil profile. Study area map is shown below in **Fig. 3.1**. Primary and Secondary data has also been collected for other environmental attributes for the preparation of EIA/EMP report. The baseline study for the project was conducted during March 2019 to May 2019(Pre-Monsoon).

The baseline data monitoring procedures conforms to the requirement of EIA Notification, 2006 (as amended on 14.09.2006). The monitoring and analysis was done through ECON Laboratory and Consultancy, Dehradun which is NABL accredited.

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.

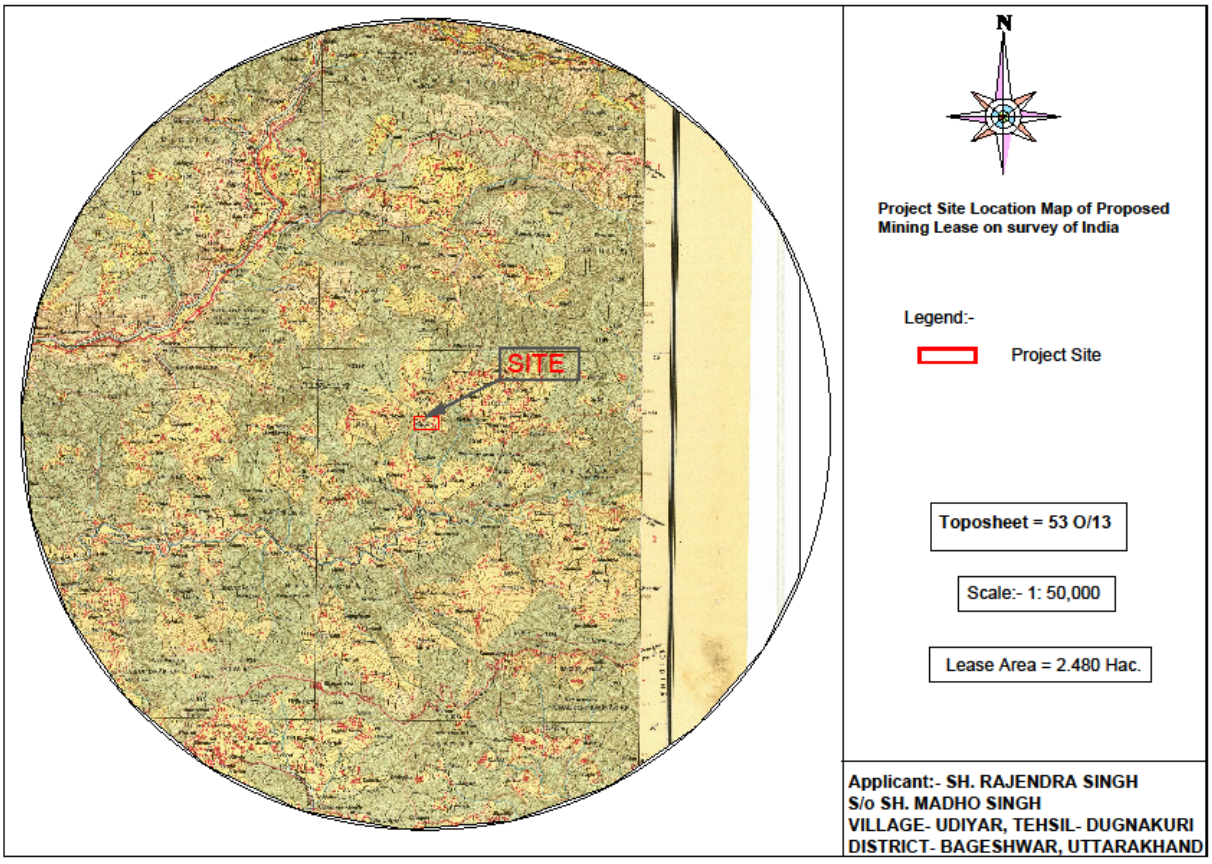

Fig 3.1: Study Area Map (10 Km. Radius)

3.1 LAND ENVIRONMENT

Land use planning is aimed to minimize the adverse impact of mining activities on land environment and it will also help in economy of the clusters as well as effective restoration and reclamation of land surface, this needs detail study of the area from various angles before suggesting the environment measures for mining operations. Based on the baseline data, a detailed environmental management plan will help in minimizing the impact of mining activities on its surrounding. This will also help in reclamation and restoration of the area when mining activity in the area will over.

Land Cover is the physical material at the surface of the earth (it includes grass, asphalt, trees, bare ground, water etc.) whereas Land use is the human use of land. Land Use involves the management and modification of natural environment or wilderness into built environment such as fields, pastures and settlements. It has also been defined as "the arrangements, activities and inputs people undertake in a certain land cover type to produce, change or maintain it". Studies on land use aspects of eco-system play an imperative role in identifying susceptible issues and to take 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 mining lease so that temporal changes due to the mining activities on the surroundings could be assessed in future.

Topography

The lease area comprises of terraced agricultural fields showing undulating topography. The slope of area is gentle (14 to 25°) is towards east to west direction. The higher levels are found towards the eastern side of the area near boundary pillar A whereas the lowest horizons within the area are found towards the western side. The highest & lowest levels found in the area are of 1476.38mRL and 1368.26mRL respectively. The slopes in hill area vary from moderate to gentle. The drainage pattern of the area is dendrites in pattern & in first & second order.

Meteorology

Meteorology is the key to understand the air quality. The essential relationship between meteorology and atmospheric dispersion involves the wind in the broadest sense. Wind fluctuations over a very wide range of time, accomplish dispersion and strongly influence other processes associated with them.

A meteorological station was set up at the proposed mine premises. Meteorological data was

generated during the post-monsoon monitoring period (March, April and May, 2019). The following parameters were recorded at hourly intervals continuously during monitoring period, except rainfall which was recorded on daily basis.

- Wind speed
- Wind Direction
- Air Temperature
- Rainfall

Climate

The average temperature for the year in Bageshwar is 20.4 °C (68.8 °F). The warmest month, on average, is June with an average temperature of 27.3 °C (81.2 °F). The highest temperature ever recorded was 38°C, recorded on 5 June 2017. The coolest month on average is January, with an average temperature of 11 °C (51.8 °F). The average amount of precipitation for the year in Bageshwar is 48.1" (1221.7 mm). The month with the most precipitation on average is July with 13.0" (330.2 mm) of precipitation. The month with the least precipitation on average is November with an average of 0.2" (5.1 mm).

The climate varies from Sub-tropical monsoon type (mild winter, hot summer) to tropical upland type (mild winter, dry winter, short warm summer). The northern, northwestern, northeastern and western part of the district is perennially under snow cover; here the climate is sub-arctic type as the area is represented by lofty.

Larger part of the district is situated on the southern slopes of the outer Himalayas, monsoon currents can penetrate through trenched valleys, the rainfall reaches its maximal in the monsoon season that spans between June to September. Rainfall, spatially, is highly variable depending upon the altitude. In the Lesser Himalayan Zone (1000-3000m amsl) maximum rainfall occurs about 70 to 80% in southern half, August being the rainiest month. Rainfall rapidly decreases after September and it is the least in November. About 55 to 65% rainfall occurs in the northern half in Central Himalayan Zone. About 17% of the annual precipitation occurs in winter season. The winter precipitation is in association with the passage of the western disturbances and is mostly in the form of snowfall, particularly at higher elevations. The precipitation during the pre-monsoon month, which is about 7% of the annual total and the post-monsoon months, is frequently associated with thunderstorms. Its average normal annual rainfall is 1230.8 mm. The actual rainfall for the year 2018 is 859.3 mm.

The relative humidity is high during monsoon season, generally exceeding 70% on the average. The driest part of the year is the pre-monsoon period when the humidity may drop to 35% during the afternoon. The normal annual average humidity is 64% during morning and 56% during evening *(Ref: IMD)*

Land use / Land cover statistics of project study area

To assess the land use pattern surrounding the 10 km radius of the site, a detailed study was carried out. The table no. **3.1** and **Fig. 3.2** shown below mentioned the total land use cover of the study area.

Table No. 3.1 Shows Land Use Pattern of the Study Area

Land use/Land cover	Area (Ha)
River/Stream	435.18
Forest, Evergreen	16523.26
Grass/Grazing	295.31
Forest, Scrub	1343.22
Forest, Decidous	715.12
Builtup, Mining	316.38
Agriculture, Plantation	7546.41
Agriculture, Fallow	2504.74
Barren, Scrub Land	1331.46
Builtup, Urban	332.15
Builtup Rural	77.27
TOTAL	**2.480**

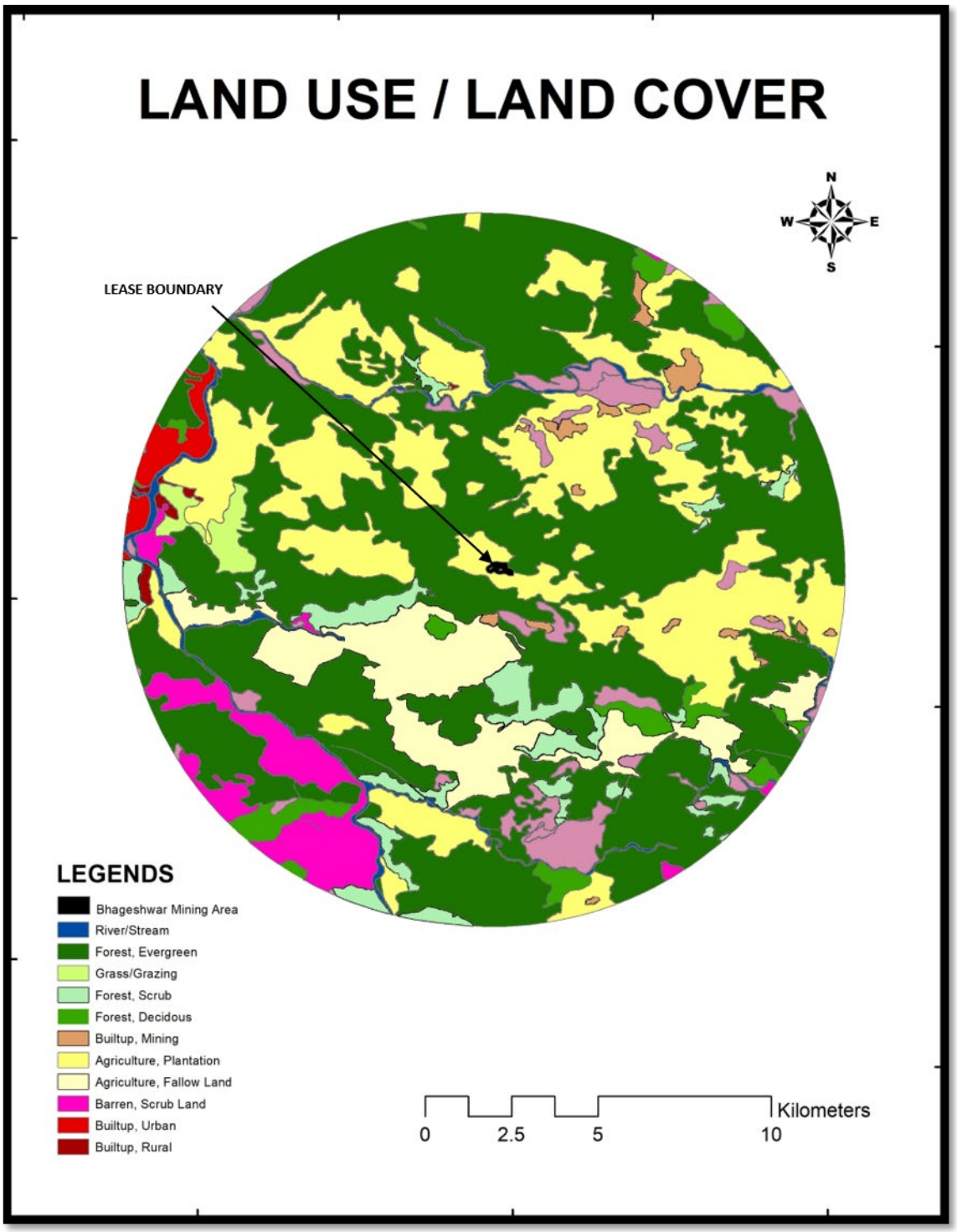

Figure 3.2: Land use Map of Study Area

3.2 AIR ENVIRONMENT

Selection of Air Quality Monitoring Stations

Ambient air quality monitoring stations were selected primarily on the basis of surface influence, demographic influence and meteorological influence. From the meteorological data already available at the near-most site, the frequency and duration of wind is preliminary determined from which the likely wind rose diagram is first drawn. To assess the ambient air quality level, 5 monitoring stations were set up**. Fig. 3.3** shows the wind profile of the study area.

24 hourly monitoring was carried out for PM_{10}, $PM_{2.5}$, SO_2, NO_2 with the sampling frequency of twice a week at each station for a study period of 3 months (March to May, 2019).

a. Wind Rose Diagram

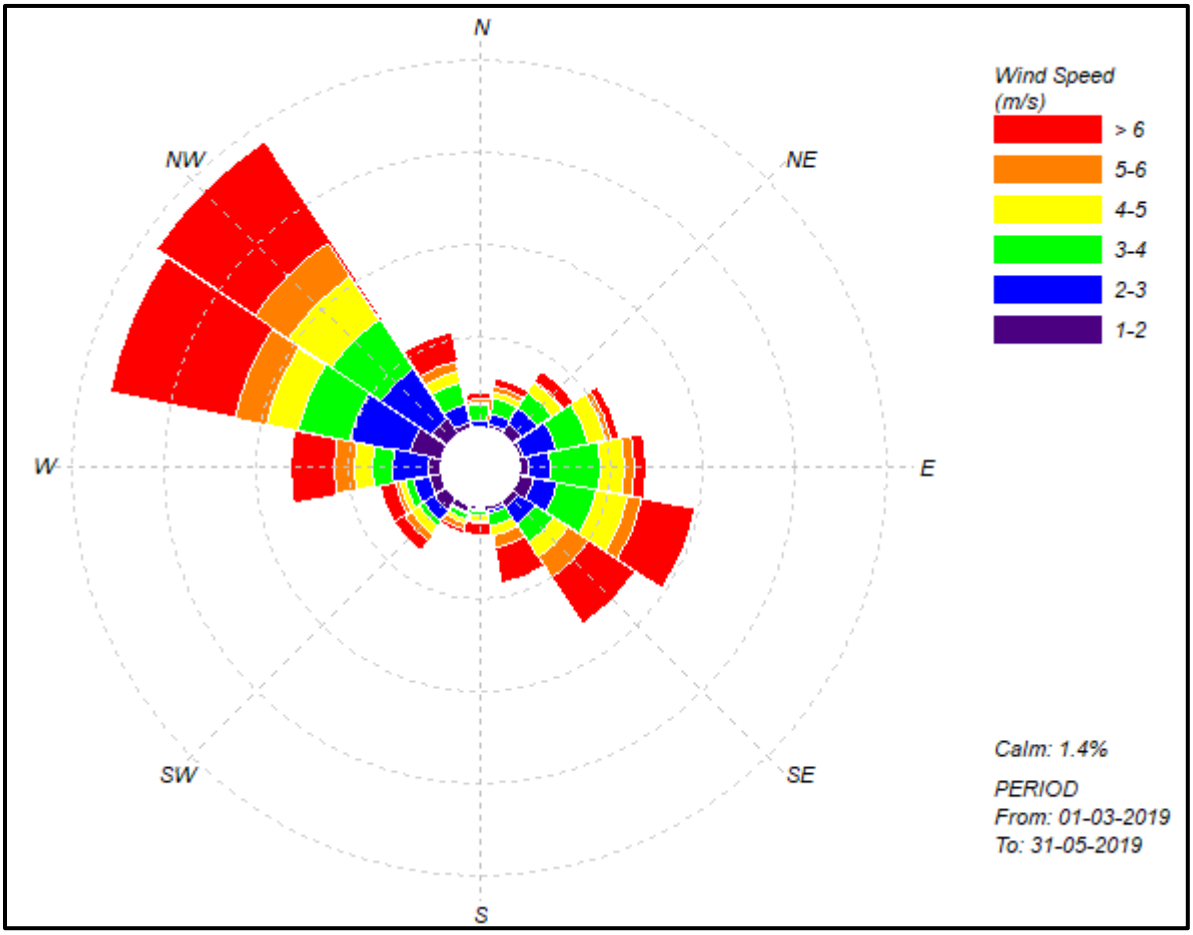

Figure 3.3: Wind Profile of the Study Area

Observations:

The prominent seasonal wind directions are NW & SE direction.

Methods for monitoring

The Central Pollution Control Board (CPCB) has published comprehensive document on Guidelines for the Measurement of Ambient Air Pollutants Volume-I, May 2011. Those procedures relevant to the Manual Sampling & Analyses of Ambient Air Pollutants monitoring are summarized below **Table No. 3.2 (i):**

Table No. 3.2 (i): Methods adopted for $PM_{2.5}$, PM_{10}, SO_2 and NO_X (as NO_2)

Parameters	**Technique**	**Technical Protocol**
$PM_{2.5}$	Gravimetric method	**CPCB Guidelines - Volume-I, May 2011**
PM_{10}	Gravimetric method	**IS 5182 (Part-XXIII)**
Sulphur Dioxide	West and Gaeke Method	**IS-5182 (Part-II)**
Nitrogen Oxide	Jacob & Hochheiser Method	**IS-5182 (Part-VI)**

i. Particulate Matter (PM) and Gases:

Respirable dust samplers (APM 460 BL) & Fine particulate Samplers(APM 550) were used for monitoring Particulate Matter PM_{10} and $PM_{2.5}$ respectively. Gaseous pollutants like SO_2, and NOx were collected by Gaseous Pollutant Sampler APM 411. Sampling & Analysis of Ambient Air Pollutants is carried out as per the relevant Indian standard methods and Guidelines for the Measurement of Ambient Air Pollutants Volume-I, May 2011 published by the Central Pollution Control Board (CPCB).

ii. Equipment calibration:

For accurate testing of Ambient Air Pollutants, the sampling Instruments and Gaseous attachments are calibrated by Master Calibrator having direct traceability from FCRI Palaghat and NPL.

The ambient air quality data were collected from various locations as per details given in **Table No. 3.2 (ii)** to find the existing GLC in the study area. The baseline ambient air quality data obtained from above from study area is depicted in **Table No. 3.2 (iTable No. 3.2 (ii): Ambient air quality monitoring stations**

Location Code	Location	Direction	Approx. Distance from Mine site
AAQ1	Project Site	-	-
AAQ2	Dhapolasera	SW	9.84 KM
AAQ3	Siri	NE	8.98 KM
AAQ4	Khunoli	WS	9.93 KM
AAQ5	Gainar	WN	9.12 KM

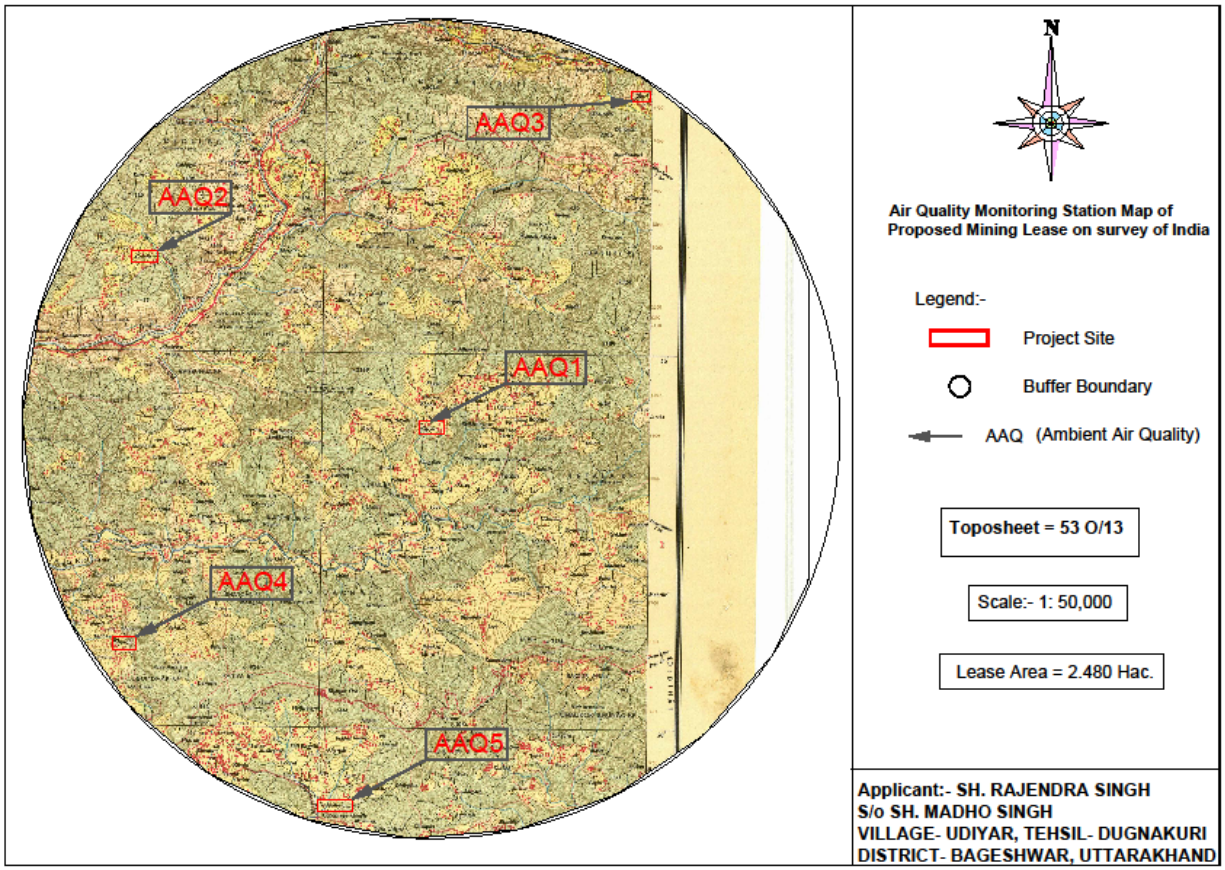

Fig: 3.4- Air quality monitoring location

Table No. 3.2 (iii): Ambient Air Quality Status

S. No.	Pollutant	Location Code	Location Name	Minimum	Maximum	Average	98th Percentile	NAAQS Standards
1	SO_2 (µg/m^3)	AAQ1	Project Site	5.6	9.2	7.85	9.818	80
		AAQ2	Dhapolasera	6.3	9.1	7.9	9.532	
		AAQ3	Siri	5.2	6.5	6	6.864	
		AAQ4	Khunoli	6.4	8.6	8.05	9.538	
		AAQ5	Gainar	7	7.3	6.85	7.666	
2	NO_x (µg/m^3)	AAQ1	Project Site	13.2	24.8	19.9	25.372	80
		AAQ2	Dhapolasera	15	20.9	17.95	21.742	
		AAQ3	Siri	12.9	18	16.6	18.904	
		AAQ4	Khunoli	12.2	16.5	15.1	16.444	
		AAQ5	Gainar	11.4	31.5	22.05	31.122	
3	PM_{10} (µg/m^3)	AAQ1	Project Site	62.35	81.85	72.7	81.484	100
		AAQ2	Dhapolasera	62.86	89.3	78.105	88.8522	
		AAQ3	Siri	76.9	83.55	74.225	83.177	
		AAQ4	Khunoli	23.5	86.15	77.775	85.815	
		AAQ5	Gainar	61.68	86.95	73.76	86.4224	
4	$PM_{2.5}$ (µg/m^3)	AAQ1	Project Site	25.32	38.57	31.45	38.2852	60
		AAQ2	Dhapolasera	28.3	41.65	33.475	41.323	
		AAQ3	Siri	26.85	34.5	29.73	34.3092	
		AAQ4	Khunoli	26.35	35.6	30.975	35.415	
		AAQ5	Gainar	27.2	33.1	30.15	32.982	

Observations:

Ambient Air Quality Monitoring reveals that the maximum & minimum concentrations of PM_{10} for all the 5 AQ monitoring stations were found to be 89.30µg/m^3 at AAQ-2and 60.57µg/m^3 at AAQ-5, respectively, Whereas the maximum & minimum concentrations of $PM_{2.5}$ for all the 5 AQ monitoring stations were found to be 41.65µg/m^3 at AAQ-2 and 24.33µg/m^3 at AAQ-1, respectively.

As far as the gaseous pollutants SO_2 and NO_2 are concerned, the prescribed NAAQS limit of 80µg/m^3 for residential and rural areas has never surpassed at any station. The maximum & minimum concentrations of SO_2 were found to be 9.9µg/m^3 at AAQ-1&5.1µg/m^3 at AAQ-3 respectively. The maximum & minimum concentrations of NO_x were found to be31.5µg/m^3 at AAQ-5&12.6µg/m^3 at AAQ-5respectively.

3.3 WATER ENVIRONMENT

Sampling Frequency and Sampling Techniques

Parameters for analysis of water quality were selected based on the utility of the particular source of water as per MoEF guidance. Hence quality of ground water was compared with IS: 10500: 2012 for drinking purposes. Surface water quality was analyzed for parameters as mentioned in the 'Methods of Monitoring & Analysis published by CPCB (in Annexure IV of CPCB guidelines)' and it was rated according to the CPCB Water Quality Criteria (Designated Best Use). Grab water samples were collected from sampling locations in a 5-liter plastic jerry can and 500 ml sterilized clean glass bottles for complete physico-chemical and bacteriological tests respectively. The samples were analyzed as per standard procedure / method given in IS: 3025 (Revised Part), IS:1622-1981 reaff.2003 and Standard Method for Examination of Water and Wastewater Ed. 23rd (2017), published jointly APHA, AWWA and WEF.

As per the standard practice, one sample from each station was taken in the study period. Sampling was done by standard sampling technique as per the Standard Methods IS: 3025 (Revised Part), IS: 1622-1981 reaff.2003. Necessary precautions were taken for preservation of samples.

3.3 (a) Ground Water

Five water samples were collected from the study area. The location of sampling points is shown in **Table No. 3.3 (i)** and the physico-chemical analysis of the water samples is given in the **Table No. 3.3 (ii).**

Table No. 3.3 (i) Ground water sampling locations

Location Code	Location	Direction	Approx. Distance from Mine site
GW1	Project Site	-	-
GW2	Dhapolasera	SW	9.84 KM
GW3	Siri	NE	8.98 KM
GW4	Khunoli	WS	9.93 KM
GW5	Gainar	WN	9.12 KM

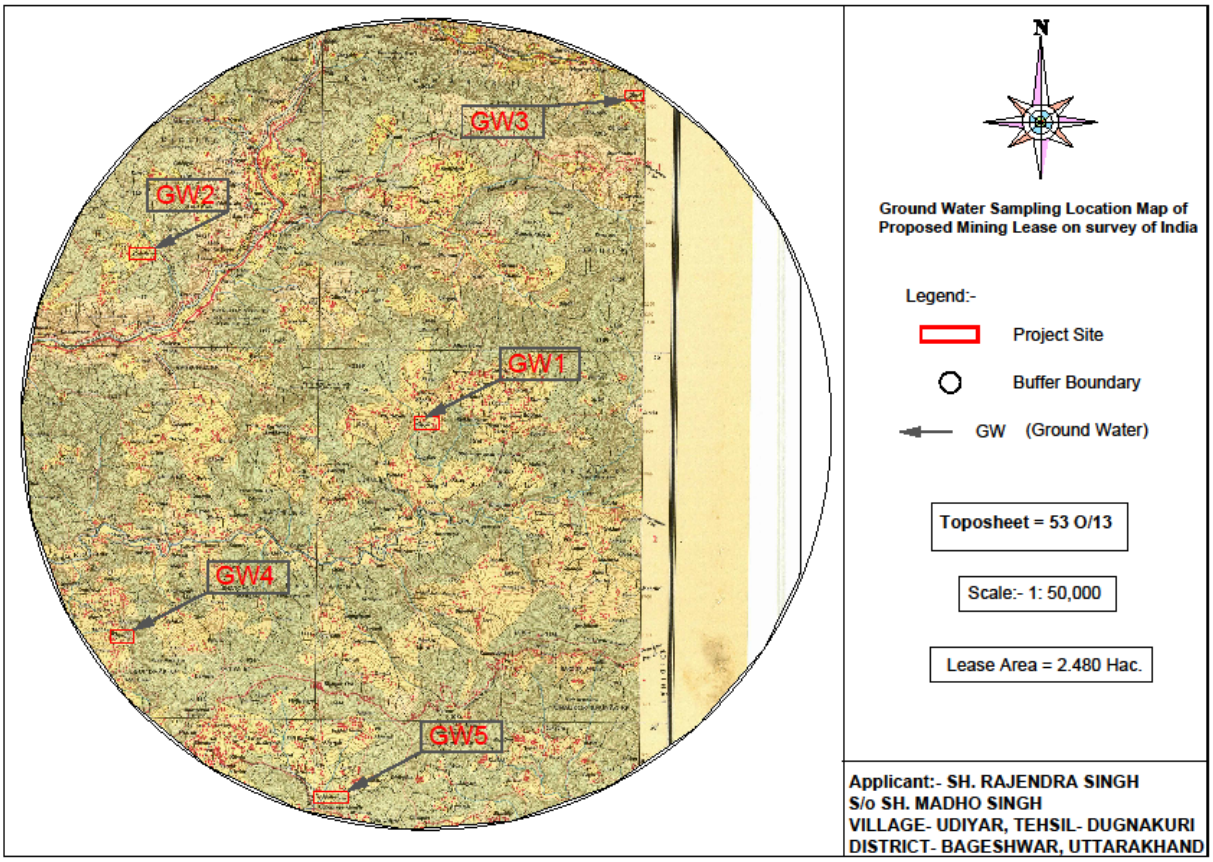

Fig: 3.5 - Ground water quality monitoring location

Table No. 3.3 (ii) Ground water Monitoring Result

SI. No.	Parameter	Limit (as per IS:10500)		Unit	GW1	GW2	GW3	GW4	GW5
		Desirable Limit	Permissible Limit		Project Site	Dhapolasera	Siri	Khunoli	Gainar
1	Colour	5	24	Hazen	<5	<5	<5	<5	<5
2	Odour	Un	-	-	Un	Un	Un	Un	Un
3	Taste	Agreeable	-	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Turbidity	5	10	NTU	<1	<1	<1	<1	<1
5	pH	6.5-8.5	No Relaxation	-	7.20	7.40	7.31	7.28	7.29
6	Total Hardness (as CaCO3)	300	600	mg/l	184	184	180.5	171.8	175.3
7	Iron (as Fe)	0.3	1	mg/l	0.28	0.21	0.18	0.24	0.27
8	Chlorides (as Cl)	250	1000	mg/l	22	14	18	14	19
9	Fluoride (as F)	1	1.5	mg/l	0.2	0.5	0.8	0.78	0.98
10	TDS	500	2000	mg/l	260	270	254	282	263
11	Calcium(as Ca2+)	75	200	mg/l	45.5	40.5	46.0	46.8	47.7
12	Magnesium (as Mg2+)	30	100	mg/l	18	17	20	16	19
13	Copper (as Cu)	0.05	1.5	mg/l	0.03	0.04	0.04	0.03	0.03
14	Manganese(as Mn)	0.1	0.3	mg/l	0.04	0.05	0.05	0.04	0.04
15	Sulphate (as SO4)	200	400	mg/l	18	15	19.5	18.8	13.3

16	Nitrate(as NO3)	45	No Relaxation	mg/l	2	5	4.5	5.8	3.3
17	Phenolic Compounds (as C6H5OH)	0.001	0.002	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001
18	Mercury (as Hg)	0.001	No Relaxation	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001
19	Cadmium (as Cd)	0.01	No Relaxation	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
20	Selenium (as Se)	0.01	No Relaxation	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
21	Arsenic (as As)	0.01	No Relaxation	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
22	Cyanide (as CN)	0.05	No Relaxation	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
23	Lead (as Pb)	0.05	No Relaxation	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
24	Zinc (as Zn)	5	15	mg/l	0.03	0.04	0.06	0.05	0.06
25	Anionic Detergent (as MBAS)	0.2	1	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
26	Chromium (as Cr6+)	0.05	No Relaxation	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
27	Mineral oil	0.01	0.03	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
28	Alkalinity (as CaCO3)	200	600	mg/l	176	186	190.5	172.75	181.06
29	Aluminum (as Al)	0.03	0.2	mg/l	0.02	0.04	0.03	0.03	0.03
30	Boron (as B)	1	5	mg/l	0.2	0.3	0.25	0.23	0.24
Microbiological Parameter									
1	Total Coliform	10 , Max	-	MPN/100 ml	<2	<2	<2	<2	<2
2	E.coli	Absent	-	E.coli /100ml	Absent	Absent	Absent	Absent	Absent

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 6.5to8.5 beyond this range the water will affect the mucus membrane or water supply system.

Observations:

Analysis results of ground water reveal the following: -

- pH varies from 7.20 at GW-1in the month of May, 2019to 7.40 at GW-2 in the month of May, 2019.
- Total hardness varies from 171.8 mg/l at GW-4 in the month of May, 2019 to 184 mg/l at GW-1 & GW-2 respectively in the month of May, 2019.
- Total dissolved solids vary from 255 mg/l at GW-3 in the month of May, 2019to 272 mg/l at GW-4 in the month of May, 2019.
- The ground water from all sources remains suitable for drinking purposes as all the constituents are within the limits prescribed by drinking water standards promulgated by Indian Standards IS-10500.

3.3 (b) Surface Water- Two surface water samples were collected from the Saryu River. The location of surface water quality sampling & physico-chemical analysis of the water samples is given in the **Table No. 3.3 (iii) & Table No. 3.3 (iv)** respectively.

Table No. 3.3(iii): Location of surface water quality sampling

Location Code	Sample collected from
SW – 1	Saryu River (Upstream)
SW – 2	Saryu River (Downstream)

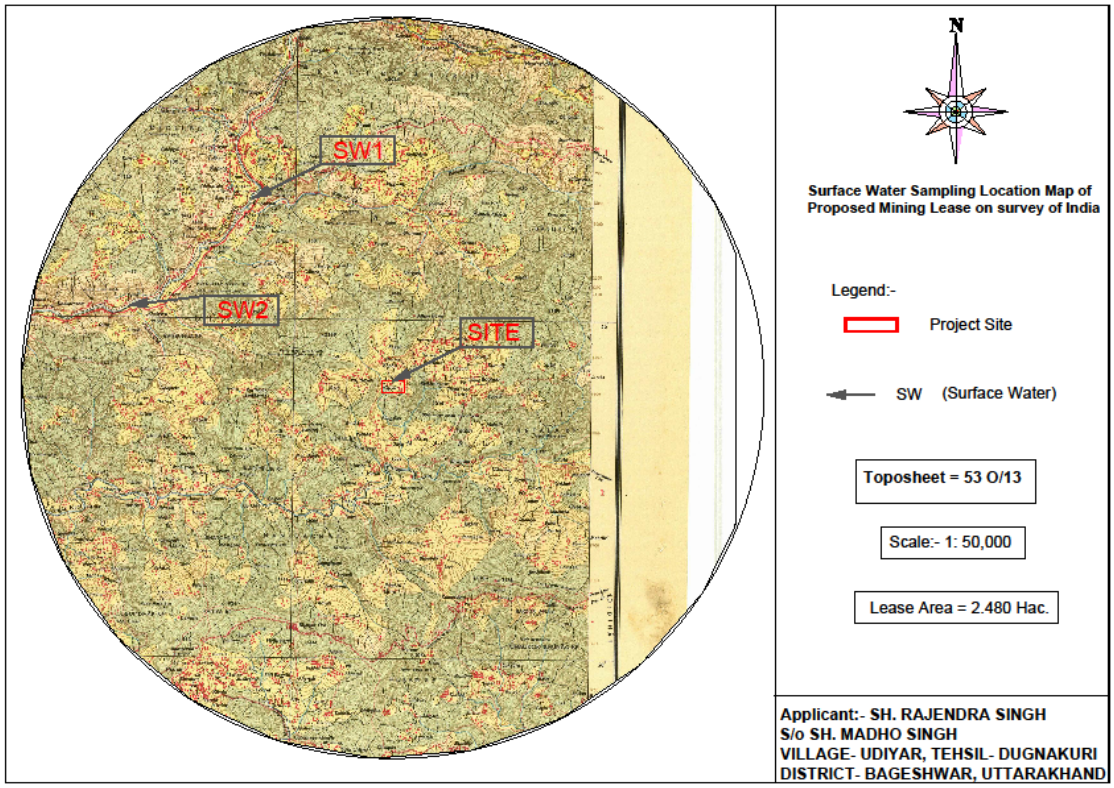

Fig: 3.6 - Surface water quality monitoring location

Table No. 3.3 (iv) Surface Water Monitoring Result (Saryu River)

S.No.	**Parameter**	**Unit**	**S.W. 1**	**S.W. 2**
			Saryu upstream	**downstream**
1	pH	-	7.61	7.74
2	Dissolved Oxygen	mg/l	6.2	6.1
3	BOD (3 Days at 27 °C)	mg/l	2.1	2.6
4	Free Ammonia (asN)	mg/l	<0.1	<0.1
5	Sodium Adsorption Ratio	-	0.54	0.61
6	Boron	mg/l	BDL	BDL
7	Conductivity	µmhos/cm	225	220
8	Turbidity	NTU	3.0	2.9
9	Magnesium hardness (as CaCO3)	mg/l	22	24
10	Total Alkalinity (as CaCO3)	mg/l	69	62
11	Chloride (as Cl)	mg/l	18	12
12	Sulphate (as SO4)	mg/l	10	12
13	Nitrate (as NO3)	mg/l	0.05	0.06

14	Fluoride (as F)	mg/l	0.42	0.38
15	Sodium (as Na)	mg/l	11.5	10.5
16	Potassium (as K)	mg/l	2.2	2.6
18	Total Phosphorous (as P)	mg/l	0.003	0.002
19	COD	mg/l	8	7
20	Phenolic compounds (as C6H5OH)	mg/l	<0.001	<0.001
21	Iron (as Fe)	mg/l	0.11	0.14
22	Zinc (as Zn)	mg/l	0.5	0.84
23	Arsenic (as As)	mg/l	<0.01	<0.01
24	Mercury (as Hg)	mg/l	<0.001	<0.001
25	TDS	mg/l	134	127
	Microbiological Parameters			
1	Total Coliform	MPN/100ml	310	304
2	Faecal Coliform	MPN/100ml	60	70

Observation:

- The analysis results indicate that the pH ranges between 7.68 and 7.74.
- Dissolved Oxygen (DO) was observed in the range of 6.9 to 6.1 mg/l. BOD values were observed in the range of 2.1-2.6 mg/l.
- The chlorides and Sulphates were found to be in the range of 12-18 mg/l and 10-12 mg/l respectively.
- Bacteriological examination of surface water samples revealed the presence of total coliform in range of 304 MPN/100 ml to 310 MPN/100 ml.

3.4 SOIL ENVIRONMENT

Soil may be defined as a thin layer of earth's crust, and support medium for the growth of plants. The soil characteristics include both physical and chemical properties. The soil survey and soil samples were carried out / collected to assess the soil characteristics of the study area. Soil samples were collected from 5 locations (project site, one upstream & one downstream side) as shown in **Table No. 3.4(i)** and analyzed as per CPCB norms.**Fig.3.7** showing the soil monitoring stations. 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.

Methodology

- The sampling was done by auger sampler / Khurpi. Samples were stored in air tight Polythene Bags. Parameters were analyzed as per standard procedure / method given in IS: 2720 (Revised Parts), and Soil Chemical Analysis by M. L. Jackson.
- The physico-chemical characteristics of these soil samples are given in **Table No. 3.4(ii).**

Methodology

- The sampling was done by auger sampler/ Khurpi. Samples were stored in air tight Polythene Bags. Parameters were analyzed as per standard procedure / method given in IS: 2720 (Revised Parts), and Soil Chemical Analysis by M. L. Jackson.
- The physico-chemical characteristics of these soil samples are given in **Table No. 3.4(i).**

Table No. 3.4 (i): Description of soil sampling locations

Location Code	Location	Direction	Approx. Distance from Mine site
SQ1	Project Site	-	-
SQ2	Dhapolasera	SW	9.84 KM
SQ3	Siri	NE	8.98 KM
SQ4	Khunoli	WS	9.93 KM
SQ5	Gainar	WN	9.12 KM

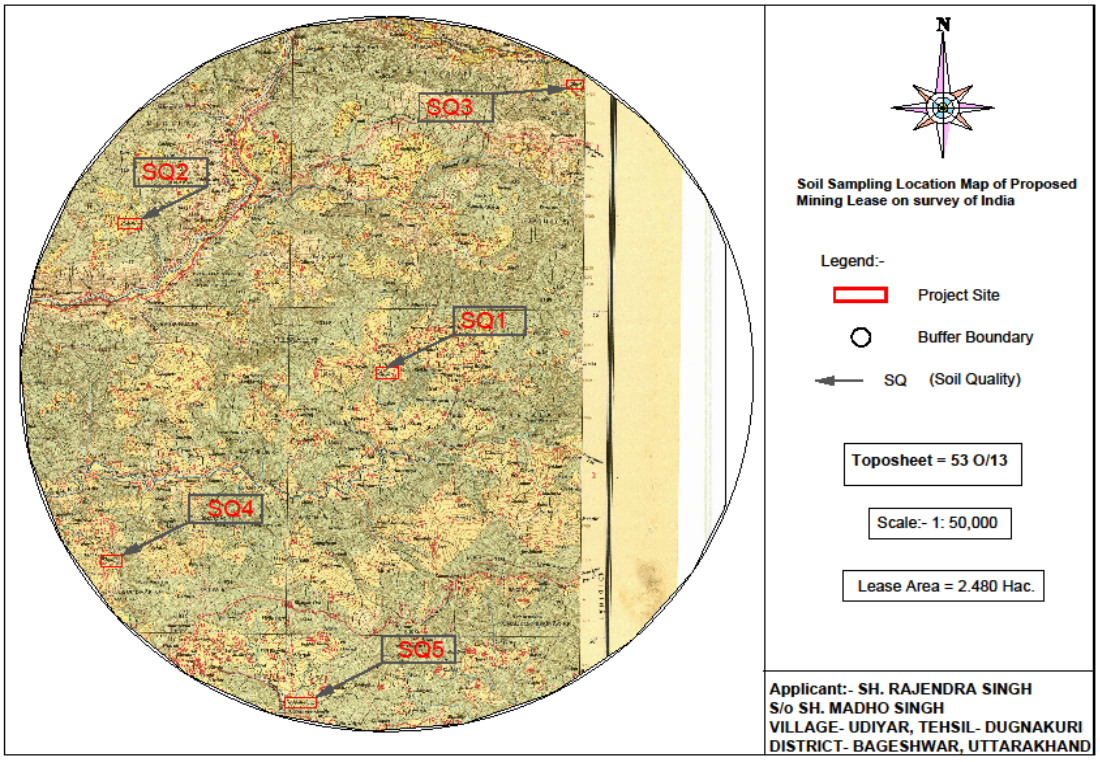

Fig: 3.7 - Soil quality monitoring location

S.No	Parameter	Unit	SQ-1	SQ-2	SQ-3	SQ-4	SQ-5
1	Silt	%	24.1	21.2	23.0	20.6	22.6
	Clay	%	18.6	19.4	18.7	17.9	18.6
	Sand	%	56.4	59.4	55.3	56.3	54.8
2	pH	-	7.16	7.34	7.38	7.56	7.22
3	Electrical Conductivity	µmhos/cm	270	280	301	333	278
4	Cation exchange capacity	meq/100 gm	15.5	16.3	17.5	15.4	16.7
5	Potassium	mg/kg	121.8	116.2	127.3	131.5	129.4
6	Sodium	mg/kg	89.8	88.3	115.9	144.2	118.2
7	Calcium	mg/kg	2289	2367	2453	2354	2200
8	Magnesium	mg/kg	389	489	455	437.9	429.5
9	Sodium Absorption Ratio	-	0.96	0.33	0.81	0.95	1.11
10	Water Holding Capacity	%	38.6	36.0	35.8	37.9	36.4
11	Porosity	%	34.8	36.9	38.7	36.8	33.7

Table No. 3.4 (ii): Physico-chemical properties of soil

Observations:

Samples collected from identified locations indicate the soil is sandy type and the pH value ranging from 7.16 at SQ1to 7.56 at SQ4 which shows that the soil is alkaline in nature. Potassium is found to be from 116.2mg/kg (SQ2) to 131.5mg/kg (SQ4). The water holding capacity is found in between 34.8% (SQ1) to 38.7 % (SQ3).

3.5 NOISE ENVIRONNENT

Noise is one of the most undesirable and unwanted by-products and may affect human health and well being. It 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 proposed site. The main sources of noise can be domestic activities, industrial activities and vehicular traffic.

The noise levels within the study area were recorded using Sound Level Meter and noise monitoring results were compared with the Ambient Noise Quality Standard notified under Environment Protection Act, 1986. The noise level monitoring locations are shown in **Table No. 3.5 (i)** and **Fig. 3.8** and the levels recorded are as stated in **Table No. 3.5 (ii).**

Table No. 3.5 (i) Noise quality monitoring stations

Location Code	Location	Direction	Approx. Distance from Mine site
NQ1	Project Site	-	-
NQ2	Dhapolasera	SW	9.84 KM
NQ3	Siri	NE	8.98 KM
NQ4	Khunoli	WS	9.93 KM
NQ5	Gainar	WN	9.12 KM

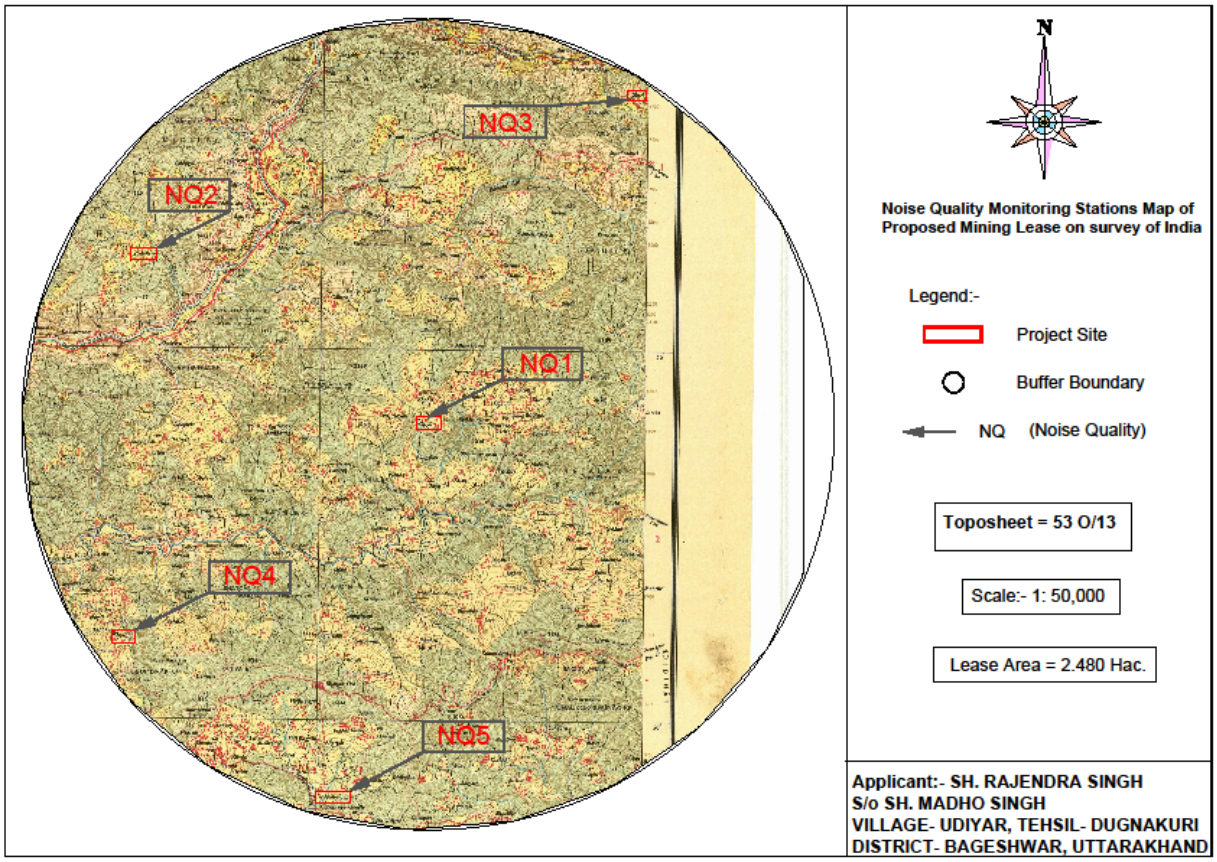

Fig: 3.8 - Noise quality monitoring location

Table No. 3.5 (ii): Noise level status

S. No.	Locations		Equivalent Noise Level, dB (A)			
			Limit (as per CPCB Guidelines), Leq, dB(A)		Observed value Leq, dB(A)	
			DAY*	NIGHT*	DAY*	NIGHT*
1	Project Site	Residential Zone	75	70	44.46	42.63

2	Dhapolasera	Residential Zone	55	45	42.21	38.21
3	Siri	Residential Zone	55	45	41.89	36.42
4	Khunoli	Residential Zone	55	45	43.73	35.66
5	Gainar	Residential Zone	55	45	39.42	37.34

Observations- Noise monitoring reveals that the maximum & minimum noise levels at day time were recorded as 44.46dB (A) at NQ-1&39.42dB(A) at NQ-5 respectively. The maximum & minimum noise levels at night time were found to be 42.63dB (A) at NQ-1&35.66 dB(A) at NQ-4 respectively.

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

3.6 TRAFFIC STUDY

Traffic study is carried out by understanding the existing carrying capacity of the road in thevicinity of site and flow towards State highway in the area. Then depending on the capacity of themine, the number of trucks that will be added to the present scenario will be compared to thecarrying capacity as recommended by Indian Road Congress (IRC).

The connecting road from the mine is State Highway No-37. These may be reinforced to facilitate easy and smooth movement of heavy duty trucks. The existing and additional Traffic scenario and LOS is mentioned below in **Table No. 3.6 (i)** and **3.6 (ii).**

Table No. 3.6: (i): Existing Traffic Scenario & LOS

Road	V (PCU/day)	C (PCU/day)	Existing V/C Ratio	LOS
State Highway	900	4500	0.20	A
Near By road	600	2000	0.30	B

V= Volume in PCU‟s/day & C= Capacity in PCU‟s/ day

During Mine operation

Average Capacity of mine/year : 13137 TPA

No. of working days : 240 days

Total Capacity of mine/day : 13137/240 = 55tonnes

Truck Capacity : 5tonnes

No. of trucks deployed per day : 55/5 = 11 trucks per day

No. of trucks deployed/day to & fro : 11*2= 22

Trucks Increase in PCU/day : 22

The addition to traffic by the proposed project during its operation is given in **Table- 3.6(ii).**

Table No. 3.6: (ii): Additional Traffic Scenario & LOS due to proposed project

Road	V	C	Modified V/C Ratio	LOS
SH-37	922	4500	0.20	A
Near By road	622	2000	0.31	B

At present the traffic load at highway is less than 10 trucks per day, in particular. Due to the proposed project there will be an addition of 6trucks/day in the existing traffic having the capacity of 9 tonnes, hence the changes will be at small level and will not affect the existing environment. Transportation route map is given below in **Fig. 3.9.**

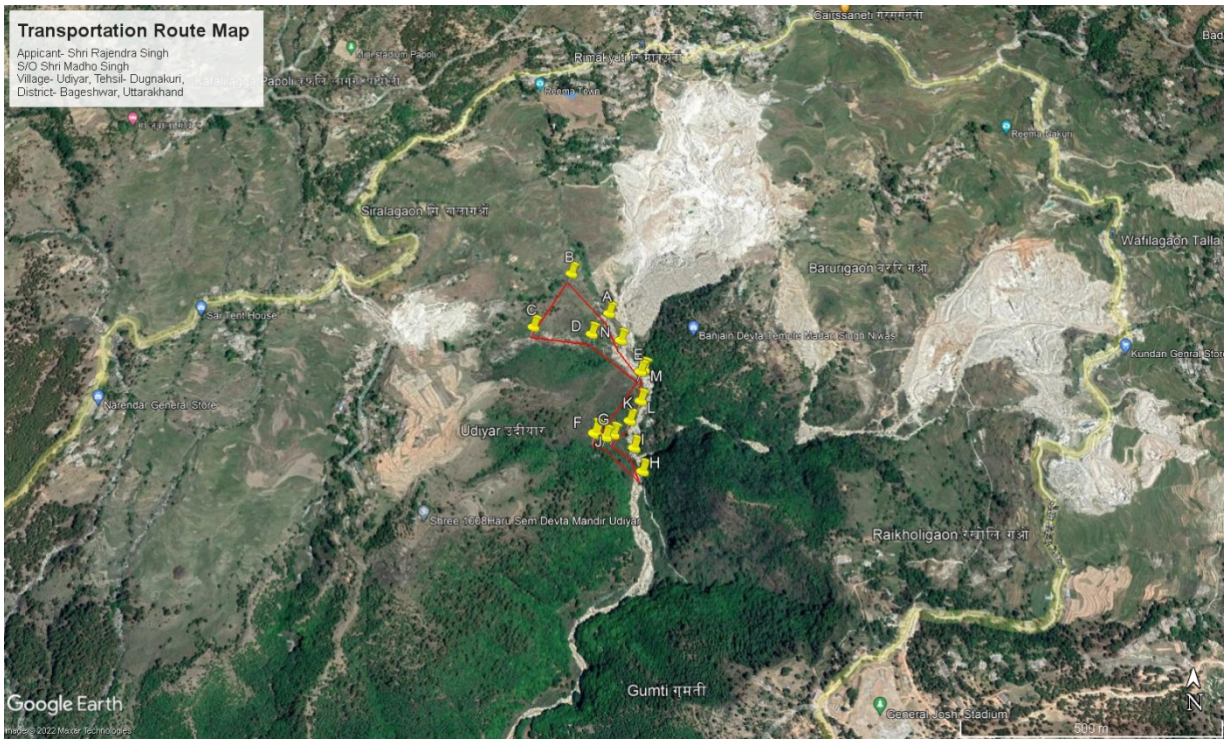

Fig. 3.9 : Transportation Route Map

3.7 BIOLOGICAL ENVIRONMENT

Biological diversity comprises the variability of species, genus and ecosystems and is very crucial for maintaining the basic processes on which the life depends. Broadly it can be divided in to two types i.e. the floral diversity and faunal diversity. Conservation of the biodiversity is essential for the sustainable development as it not only provides the food, fodder and medicine but also contribute in improvement of essential environmental attributes like air, water, soil, etc.

Before starting any Environmental Impact Assessment study, it is necessary to identify the

baseline of relevant environmental parameters which are likely to be affected as a result of operation of the proposed project. A similar approach has been adopted for conducting the study on Biological Environment for this Project. Both terrestrial and aquatic ecosystems have been studied to understand the biological environment.

(a) Physical Environment of the study area:

Bageshwar is one of the mountainous districts of Uttarakhand State. Prior to its formation as a separate district, Bageshwar constituted a part of Almora district. The district was included in Uttarakhand State after the state was carved out of Uttar Pradesh on 9th November 2000. The district lies between latitudes 29º40' and 30º20' N and longitudes 79º25' and 80º10' E (Survey of India Degree Sheet Nos. 53N and 53O). The district is bounded by Almora district in the south, Chamoli district in the north and northwest and Pithoragarh district in the east. The geographical area of the district is 1687.8 km2 (Census, 2001).

(b) Drainage:

Drainage of the area is mainly controlled by Saryu, Gomti and Pindar Rivers and their tributaries (locally called Nadi, Gad or Gadhera) viz. Pungar Nadi, Khir Ganga Nadi, BhadrapatiNadi, Revti Ganga, Kanal Gad, LahorNadi, Jagtana Gad, Kulur Gad, Sukunda Gad etc. Sub-trellis, sub-rectangular and sub-dendritic are the most common drainage patterns in the area. The Central and North-Central parts of the district are drained by Saryu River. Gomti River drains the western and south eastern parts whereas Pindar River drains the northern part. These 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.

(c) Climate:

January is the coldest month with mean maximum temperature of 10°C, the mean minimum temperature being about 2°C. Temperature drops down to – 6°C during January and February in the northern part of the district. June is the warmest month with the mean maximum and the mean minimum temperatures of 25°C and 15°C respectively. The Relative Humidity increases rapidly with the onset of monsoon and reaches at about 80% during July to September. The driest part of the year is the pre-monsoon period, when the humidity is as low as 30% in the afternoons. 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).

(d) Forests cover and Forest Type:

The forest of the district includes the vast range found in the Himalayas, varying from the sub-tropical species which grow in the outer ranges of low hills to the rich Alpine flowers in the north. The forest cover in the Uttarakhand state, based on interpretation of satellite data of October-November 2008 mentioned in the India State of Forest Report 2011, is 45.80% of the state's geographical area. In terms of forest canopy density classes, the state has 4762 km2 area under very dense forest, 14167 km2 areas under moderately dense forest and 5567 km2 area under open forest. Out of 3642 km2 total area of Tehri district, 298 km2 area is under very dense forest, 1232 km2 fall under moderately dense forest and 617 km2 area is open forest, 58.95% area of district encompasses forest cover.

(e) Agriculture:

Agriculture is the main occupation of the people. However, intensive cultivation is not possible as major part of the district is mountainous. Agricultural activities are common on gentle hill slopes and in relatively plain, broad river valleys of Gomti and Saryu Rivers. Rice wheat, mandua, barley, maize and sawan are the principal cops grown in the district. Garur valley has the maximum cultivated area. Due to high production of rice, the area is known as "Rice Bowl of Kumaun".

(f) Study period and methodology

Detailed survey was conducted to evaluate floral and faunal composition of the study area. Primary data on floral and faunal composition was recorded during site visit and secondary data was collected from the Forest department and published relevant literature. Inventory of flora and fauna has been prepared on the basis of collected data.

Field study period: The ecological survey has been conducted for one season. All data were collected in winter period in order to reduce metrological biasness. The details are given as below:

Survey sites : Around the project site in 10 km radius

Core zone : At the project site

Buffer zone : Around the project site in 10 km radius.

Methodology:

Table No. 3.7 (i): Mode of data collection & parameters considered during the survey

Aspect	Data	Mode of data collection	Parameters monitored

Terrestrial Ecology	Primary data collection	By conducting field survey	Floral and Faunal diversity
	Secondary data collection	From authentic sources like Range office and Forest Department of Uttarakhand and available published literatures	Floral and Faunal diversity and study of vegetation, forest type, importance etc.
Aquatic Ecology	Primary data collection	By conducting field survey	Floral and Faunal Diversity
	Secondary data collection	From authentic sources like Range office and Forest Department of Uttarakhand and available published Literatures	Floral and Faunal diversity and study of vegetation, forest type, importance etc.

General Vegetation Study of the area:

Area supports moderately healthy vegetation, the main forest species are scattered all over the hills, riparian vegetation found along the Saryu River and upper reaches of hills covered with pine forest. Species of Quercus, Siris, Sisam, Subabul, Neem, etc. found in mixed deciduous forest. Ground vegetation mainly consists of grasses and small shrubs. Useful fodder grasses, Cynodondactylon, Eleusineindica, Trifoliumalexandrinum, etc. can be seen growing in the area. The large weeds which infest uncultivated tracts are Calotropisprocera, Canabis sativa, Lantana camara and Ziziphusjujuba. Other noxious weeds and those which appear in crops are Carthamusoxyacantha, Argemonemexicana, Solanumxanthocarpum, Partheniumhysterophorus and Cannabis sativa.

Flora of the Core zone

The core zone comprises of private agriculture land, where mining operation is proposed. There is no tree species found in core zone. Few shrub species like lantana, ank, cannabis etc are grown as weed in area. No ecologically sensitive plant species has been reported from this area.

Flora of the Buffer zone: Buffer zone of the proposed project falls in Lesser and Greater Himalaya region. Many tree species are planted in the area because of their usefulness, economic and aesthetic values. The tree species observed in the area are, Aam (Mangiferaindica), Jamun (Syzygiumcumini), Bail (Aegle marmelos), Dakain (Melia azedarach), Neem (Azadirachtaindica),

Peepal (Ficusreligiosa), Bhimal (Grewiaoptiva) etc.

In agricultural waste land and along the road side, growth of weeds like Argemonemexicana, Cannabis sativa, Cenchruscilitaris, Lantana camara, Partheniumhysterosporus, etc. are very common. These weeds are affecting the agricultural productivity of the region due to fast growth, short life cycle and enormous production of seeds.

Vegetation in and around human settlement

Vegetation pattern in villages and surrounding areas are slightly different from the rest of the areas. The common species grown near villages are mostly edible or useful plants such as Mangiferaindica, Azadirachtaindica, Albizialebbeck, Delonixregia, Ficusreligiosa, etc.

A list of flora of the study area is discussed as **Table No. 3.7 (ii).**

Table No. 3.7 (ii): Flora of the Study Area

Vernacular Name	***Botanical Name***	**Family**
Cheer	*Pinusroxburghii*	Pinaceae
Utis	*Alnusnepalensis*	Betulaceae
Tooun	*Toonaciliata*	Meliaceae
Khanor	*Aesculusindica*	Sapindaceae
Siris	*Albizziachinensis*	Leguminosae
Siris	*Albizzialebbek*	Leguminosae
Kala Siris	*Albizziaprocera*	Leguminosae
Dhau, Chhal, Bakli	*Anogessiuslatifolia*	Combretaceae
Neem	*Azadirachtaindica*	Meliaceae
Kachnar	*Bauhinia variegata*	Fabaceae
Katai	*Flacourtiaindica*	Salicaceae
Kathsagun	*Haplophragmaadenophyllum*	Bignoniaceae
Kathbilava	*Buchananialatifolia*	Anacardiaceae
Kamhar	*Gmelinaarborea*	Lamiaceae
Kubbhi	*Careyaarborea*	Lecythidaceae
Kumia	*Ficusracemosa*	Moraceae
Kusum	*Schleicheraoleosa*	Sapindaceae
Kooda	*Holarrhenaantidysenterica*	Apocynaceae
Kekra	*Phoebe lanceolata*	Lauraceae
Bel	*Aegle marmelos*	Rutaceae
Pangar	*Aesculusindica*	Sapindaceae
Utis	*Alnusnepalensis*	Betulaceae
Genthi	*Boehmeriaregulosa*	Urticaceae
Semal	*Bombaxceiba*	Bombaceae

Bottle brush	*Callistemon citrinus*	Myrtaceae
Devdaar	*Cedrusdeodara*	Coniferae
Kharak	*Celtisaustralis*	Ulmaceae
Safeda	*Eucalyptus globulus*	Mrtaceae
Timal	*Ficusauriculata*	Moraceae
Bargad	*Ficusbengalensis*	Moraceae
Bedu	*Ficuspalmata*	Moraceae
Pipal	*Ficusriligosa*	Moraceae
Jacrada	*Jacaranda mimosifolia*	Bignoniaceae
Akhrot	*Jugansregia*	Juglandaceae
Jhingan	*Lanneacoramandelica*	Anacardiaceae
Shuru	*Litseaumbrosa*	Lauraceae
Ruin	*Mallotusphilippinenisis*	Euphorbiaceae
Dhenk	*Melia azedarach*	Meliaceae
Poplar	*Popluscilia*ta	Salicaceae
Aloocha	*Rrunuscommunis*	Rosaceae
Aroo	*Prunuspersica*	Rosaceae
Phaja	*Prunusgranatum*	Punicaceae
Mehal	*Pyruspashia*	Rosaceae
Ban	*Quercusincana*	Fagaceae
Burans	*Rhododendron arboreum*	Ericaceae
Gadhbains	*Salix tetrasperma*	Salicaceae
Ritha	*Sapindusmukorossi*	Sapindaceae
Khinna	*Sapium insigne*	Euphorbiaceae
Jamun	*Syzygiumcuminii*	Myrtaceae
Kakru	*Toonaserrata*	Meliaceae
Jamal ghota	*Jatropha curcas*	Euphorbiaceae
Mango	*Mangifera indica*	Anacardiaceae
Saoni	*Lagerstroemia indica*	Lythraceae
Tezapatta	*Cinnamomumtamala*	Lauraceae
Apple	*Pyrusmalus*	Rosaceae
Himalayan maple	*Acer oblongum*	Sapindaceae
Peepal	*Ficusreligiosa*	Moraceae
Indian fig	*Ficusracemosa*	Moraceae
Golden shower	*Cassia fistula*	Fabaceae
castor oil	*Ricinuscommunis*	Euphorbiaceae
Indian siris	*Albizia lebbeck*	Fabaceae
white orchid-tree	*Bauhinia acuminate*	Fabaceae
Banjh oak	*Quercusleucotricophera*	Lauraceae

chinaberry tree	*Melia azedarach*	Meliaceae
Wild Tamarind	*Leucaenaleucocephala*	Fabaceae
orchid tree	*Bauhinia variegate*	Fabaceae
Beleric	*Terminalia bellerica*	Combretaceae
Shilikha	*Terminalia chebula*	Combretaceae
Gulmohar	*Delonixregia*	Fabaceae
Himalayan white pine	*Pinuswallichiana*	Pinaceae
Honeyberry	*Celtisaustralis*	Cannabaceae
Bhimal	*Grewiaoptiva*	Tiliaceae
Ayar	*Andromeda ovalifolia Wall*	Ericaceae
Kharsu	*Quercussemecarpifolia*	Fagaceae
Chimula	*Rhododendron campanulatum*	Ericaceae
Tiloj/Moru	*Quercushimalayana*	Fagaceae
Mehal/ Pear	*Pyruspashia*	Rosaceae
Bhojpatra	*Betulautilis*	Betulaceae
Rai	*Piceasmithiana*	Pinaceae
Khumani	*Prunusarmeniaca*	Rosaceae
SHRUBS		
Kaphal	*Myricaesculenta*	Myricceae
Basinga	*Adhatodavasica*	Acanthaceae
Ramban	*Agave americana*	Cactaceae
Kubash	*Artemesia vulgaris*	Compositae
Kashmoi	*Berberisaristata*	Berberidaceae
Rubber tree	*Calotropisgigantea*	Asclepiadaceae
Bhang	*Cannabis spinarum*	Cannabaceae
Karonanda	*Carissa spinarum*	Apocynaceae
Bindu	*Colebrookeaoppositifolia*	Lamiaceae
Makhoi	*Coriarianepalensis*	Coriariaceae
Ruinish	*Cotoneaster acuminata*	Rosaceae
Datura	*Daturastromonium*	Solanaceae
Sihanru	*Debregeasiahypoleuca*	Urticaceae
Martoi	*Desmodiumtiliaefolium*	Leguminosae
Dhaul	*Erythrinasuberosa*	Leguminosae
Kala bansa	*Eupatorium adenophorum*	Asteraceae
Shuru	*Euphoribiaroyleana*	Euphorbiaceae
Phiunli	*Hypericumoblongifolium*	Hypericaceae
Shunjai	*Jasminauhumile*	Oleaceae
Nashpati	*Pyruscommunis*	Rosaceae
Chichiri	*Plectranthuscoesta*	Labiatae

Bhekal	*Princepiautilis*	Rosaceae
Gingaru	*Pyracanthacrenulata*	Rosaceae
Tung	*Rhusparviflora*	Anacardiaceae
Kunja	*Rosa brunonii*	Rosaceae
Rubber Bush	*Calotropisprocera*	Asclepiadaceae
BhansiaBamar	*Cassia occidentalis*	Fabaceae
Ban Tulsi	*Croton bonplandianum*	Euphorbiaceae
Atibala	*Abutilon indicum*	Malvaceae
Bhringraj	*Eclipta alba*	Nyctaginaceae
plum	*Ziziphusmauritiana*	Rhamnaceae
thorn-apple	*Daturainnoxia*	Solanaceae
dwarf wild brinjal	*Solanumvirginianum*	Solanaceae
Jaundice Berry	*Berberis vulgaris*	Berberidaceae
Kandali	*Urticamairea*	Urticaceae
GarhRingal	*Chemmobambusafalcata*	Poaceae
HERBS		
Aghada	*Achyranthesaspera*	Amaranthaceae
Gunriya	*Ageratum conzoides*	Asteraceae
Prickly poppy	*Argemonemexicana*	Papaveraceae
Meen	*Arisaemaflavum*	Araceae
Pati	*Artemisia capillaris*	Compositae
Kunjha	*Artemisia vulgaris*	Asteraceae
Silphara	*Bergenialigulata*	Saxifragaceae
Kura	*Bidensbipinnata*	Asteraceae
Chakunda	*Cassia tora*	Asteraceae
Brahmi	*Centellaasiatica*	Apiaceae
Kanjalu	*Cestrum verutum*	Solanaceae
Malo	*Bauhinia vahlii*	Leguminosae
Bathwa	*Chenopodium album*	Chenopodiaceae
Trivagandha	*Chromolaenaodorata*	Asteraceae
Kauniabali	*Clematis montana*	Ranunculaceae
Pindalu	*Colocasiaaffinis*	Araceae
Gokhru	*Echinopsechinatus*	Araceae
Horse weed	*Erigeron bellidioides*	Compositae
Bhumla	*Fragariaindica*	Compositae
joyweed	*Alternantheraparonychioides*	Amaranthaceae
khutura	*Alternantherapungens*	Amaranthaceae
Kantachaulai	*Amaranthusspinosus*	Amaranthaceae
Taro	*Colocasiaesculenta*	Araceae

Janglipudina	*Ageratum conyzoides*	Asteraceae
mukhtari	*Grangeamaderaspatana*	Asteraceae
Carrot Grass	*Partheniumhysterophorus*	Asteraceae
Charota	*Cassia tora*	Fabaceae
bhang	*Cannabis sativa*	Cannabaceae
Bathu	*Chenopodium album*	Chenopodiaceae
Satyanashi	*Argemone Mexicana*	Papaveraceae
Doob	*Cynodon dactylon*	Poaceae
Jangalimarua	*Eleusineindica*	Poaceae
Bharbhusi	*Eragrostistenella*	Poaceae
Kussa	*Saccharumspontaneum*	Poaceae
Rasbhari	*Physalis minima*	Solanaceae
Marchya	*Galinsogaparviflora*	Rosaceae
Bhumla	*Frageriavesica*	Asteraceae
Hattajuri	*Heliotropiumstrigosum*	Boraginaceae
Kutki	*Picorhizascrophulariiflora*	Scrophulariaceae
Amesh	*Hippophaerhamnoides*	Elaeagnaceae
CLIMBERS		
Sahansarpali	*Asparagus racemosa*	Liliaceae
Malo	*Bauhinia vahili*	Leguminosae
Kanguli	*Clematis connata*	Ranunculaceae
Besharam	*Ipomeapurpurea*	Convolvulaceaca
Dudhi Bel	*Vallarissolancaceae*	Apocynaceae
GRASSES		
PhiralNaru	*Arundodonax*	Gramineae
Dhub	*Cynodon dactylon*	Gramineae
Godia	*Chrysopoganfulvus*	Gramineae
CROPS		
Wheat/ Genhu	*Triticumaestivum*	Poaceae or Gramineae
Rice/ Chawal	*Cryzasative*	Poaceae
Soyabean	*Brassica riapus*	Brassicaceae

Pinusroxburghii- Cheer

Achyranthesaspera- Aghada

Asparagus racemosa- Sahansarpali

Piceasmithiana- Kathela

Fig 3.10 Flora in the Study Area

Fauna of the study area:

Area does not support any significant wild mammalian species. Two Schedule-I species (Leopard and Asiatic Black Bear) are found in the study. Saryu River flows near to the project site, river supports many aquatic wildlife including fish species, phytoplankton and zooplankton.

As far as the reptile community was concerned, Indian cobra, garden gecko and house lizard are recorded from the study area. Area does not support any healthy wild mammalian species and after a potential search, neither any direct sighting nor the indirect evidences were found in whole study area. A list of wild fauna of the study area has been prepared on the basis of local inquiry from the village people and from the available published literatures. The conservation value at regional level of identified fauna was gathered from the Wildlife protection Act, 1972 moreover, global conservation status of species was estimated from Red data book of IUCN was used. No established habitats of any mammals or birds are noticed in river bed and along the banks.

Mammals: There are two Schedule-I species (Leopard and Asiatic black bear) found in the study area and for small mammals like Indian palm squirrel (Funambuluspalmarum) and field mouse (Apodemussylvaticus) are noticed in vicinity of village. Inquiry from village peoples regarding wild animals reveals that Rhesus. Detailed study of fauna in core and Buffer zone is mentioned below in **Table No. 3.8 (i)** and **3.8 (ii).**

Conservation Plan for Schedule – I species:

Wildlife Protection Act (1972) provide us with Statutory frame work for wildlife conservation and declared that hunting is a crime against while, forestation will be done surrounding the Mine Area for enhancement of habitat protecting the loss of Leopard and Asiatic Black bear diversity due to habitat loss.

Table No. 3.8(i): Fauna of the Study Area

Common Name	*Scientific name*	IWPA	IUCN
MAMMALS			
Squirrel	*Funambulus pennant*	IV	DD
Rat	*Rattusrattus*	V	LC
Wild pig	*Susscrofacristatus*	III	LC
Yellow throated marten	*Martesflavigula*	III	LC
Monkey	*Macacamulata*	II	LC
Fruit bat	*Rousettusleshenaulti*	IV	LC
Common langoor	*Presbytis entellus*	II	LC
Indian Porcupine	*Hystrixindica*	IV	LC

Indian Leopard	*Pantherapardus*	I	NT
Asiatic black bear	*Ursusthibetanus*	I	VU
Jungle Cat	*Felis. chaus*	II	LC
Himalayan goat	*Naemorhedusgorl*	I	NT
Barking Deer	*Muntiacusmuntjak*	-	LC
Golden jackal	*Canis aureus*	III	LC
AMPHIBIANS			
Common Toad	*Duttaphrynusmelanostictus*	IV	NA
India bull frog	*Rana tigrina*	IV	DD
Indian tree frog	*Polypedatesmaculatus*	IV	NA
Skipping frog	*Bufostomaticus*	IV	NA
Garden lizard	*Calotes versicolor*	-	NA
House lizard	*Hemidactylus sp.*	IV	NA
FISHES			
Unera	*Labeodero*	---	NA
Kali Rohu	*Labeodyocheilus*	---	LC
Gadera	*Nemacheilusrupicola*	---	NA
Dhaur , Hill Trout	*Bariliusbendelisis*	---	LC
Bhagnera	*Garralamta*	---	LC
AVIFAUNA			
Jungle Myna	*Acridotheresfuscus*	IV	LC
Common Myna	*Acridotherestristis*	IV	LC
Blyth"s Reed Warbler	*Acrocephalusdumetorum*	IV	LC
Clamorous Reed Warbler	*Acrocephalusstentoreus*	IV	LC
Common Kingfisher	*Alcedoatthis*	IV	LC
House Crow	*Corvussplendens*	IV	LC
Grey-hooded Warbler	*Seicercusxanthoschistos*		
Ashy Drongo	*Dicrurusleucophaeus*	IV	LC
Asian Koel	*Eudynamysscolopacea*	IV	LC
Cattle Egret	*Bubulcus ibis*	IV	LC
Common Rosefinch	*Carpodacuserythrinus*	IV	LC
Rock Dove	*Columba livia*	IV	LC
Greater Coucal	*Centropussinensis*	IV	LC
Oriental Magpie Robin	*Copsychussaularis*	IV	LC
Black Drongo	*Dicrurusmacrocercus*	IV	LC
Coppersmith Barbet	*Megalaimahaemacephala*	IV	LC
Lineated Barbet	*Megalaimalineata*	IV	LC

White Wagtail	*Motacilla alba*	IV	LC
Common Babbler	*Turdoidescaudatus*	IV	LC
Jungle Babbler	*Turdoidesstriatus*	IV	LC
House Sparrow	*Passer domesticus*	IV	LC
Red-vented Bulbul	*Pycnonotuscafer*	IV	LC
Himalayan Bulbul	*Pycnonotusleucogenys*	IV	LC
Alexandrine Parakeet	*Psittaculaeupatria*	IV	LC
Spotted Dove	*Streptopeliachinensis*	IV	LC
Red-wattled Lapwing	*Vanellusindicus*	IV	LC

Table No. 3.8 (ii)

Common Name	**Scientific name**
INSECTS	
Springtail	*Collembola*
Silverfishes	*Thysanura*
Damselflies	*Zygoptera*
Dragonfly	*Anisoptera*
Termites	*Isoptera*
Milkweed bugs	*Lygaeidae*
Shield bugs	*Pentatomidae*
Red bugs	*Pyrrhocoridae*
Ladybird	*Coccinellidae*
Clown beetles	*Histeridae*
Scarab beetles	*Scarabaeidae*
Water scavenger beetles	*Hydrophilidae*
Robber flies	*Asilidae*
Bee flies	*Bombyliidae*
Blow flies	*Calliphoridae*
Flesh fly	*Sarcophagahaemorrhoidalis*
Flower flies	*Syrphidae*
Parasite flies	*Bombyliopsisabrupta*
Gossamer-winged butterflies	*Lycaenidae*
Hawk moths	*Sphingidae*
Butterfly	*Rhopalocera*
Tussock moths	*Lymantriinae*
Sand wasps	*Sphecidae*
Note: LC: Least Concern, NA: Not Assessed, DD: Data deficient, NT: Near threatened	

Martesflavigula- Yellow throated marten

Acridotheresfuscus- Indian Tree Frog

Pycnonotusleucoge

Zygoptera- Damselflies

Lygaeidae - Milkweed Bugs

Rhopalocera- Butterfly

Asilidae- Robber flies

Fig 3.11 Fauna in the Study Area

3.8 SOCIO-ECONOMICREPORT

Introduction

In this part of the EIA report an attempt has been made to assess the Socio-Economic impact of the proposed Soapstone mining project. It is a new project under Category- "B1". As per EIA Notification dated 14th September, 2006 and its amended thereof. The soapstone will be extracted by Open cast semi mechanized method.

Socio-economic Impact Assessment

Socio-Economic Impact Assessment (SEIA) refers to the systematic analysis of various social and economic characteristics of the human beings living in the geographical / study area around the proposed project location. SEIA is carried out separately but concurrently with Environment Impact Assessment (EIA) study. The SEIA focuses on the likely effects of the project on social and economic well-being of the community. The impact(s) may be direct or indirect, positive or negative. In this Chapter of the EIA Report an attempt has been made to assess the composite Socio-Economic Impact of the project.

Various steps taken to prepare the SEIA report were as follows

- Literaturere view
- Identification of habitations in the study area with the help of Google earth
- Visit to project site
- Collection of secondary data
- Planning and designing of the field survey for collection of primary data
- Formulation of Data collection tools(Schedule/Questionnaire)
- Field testing of Schedule/Questionnaire through a pilot survey
- Briefing of field staff
- Conduct of field work in sample villages and households
- Scrutiny of filled-in-schedules
- Data processing and tabulation
- Data analysis and preparation of report

Approach

Research approach plays an important role to decide suitable methodology. It helps to develop research design and increase the effectiveness of research study. In the present study inductive approach has been adopted, which is a bottom top approach. Under this approach first data is

collected both from primary and secondary sources. After scrutiny, tables are generated in pre-designed formats. Subsequently, draft report is prepared after detail analysis of data. The final report is prepared after incorporating the comments and suggestions of the client.

Objectives of Socio-Economic Impact Assessment

The prime objective of the current study is to assess the likely impact of the project on socio-economic characteristics of people living in the study area. Further, it is to be gauged whether the impact would be direct or indirect and whether the said impact would be positive or negative. Lastly, it is to be comprehended if the impact is negative and how the same could be mitigated.

Scope

The Scope of the study is as follows:

a) Collection of baseline data of the study area.
b) Collation of data, analyses and generation of tables.
c) Comprehension of socio-economic status of the people living in the study area.
d) Identification and inventory of probable impacts of the project on social and economic aspects in the study area.
e) Assessment of the probable impacts of the project on the people living in the study area.
f) Suggestion of mitigation measures in case of adverse impact.

Methodology

For composite Socio-Economic Impact Assessment of projects, ECO lab carries out systematic analysis of the various socio-economic characteristics, both in terms of quality and quantity. Accordingly, both qualitative and quantitative data was collected from secondary sources. The secondary data was collected from the published data / information of the Census Authority. Records of the state and district administration were also referred to.

For collection of primary data, a sample survey was conducted in the study area which spans a radius of 10 km from the periphery of the boundary of the project site. In each selected habitation, a specified number of representative households were selected for collection of information through face to face interviews with head of the household or any responsible member of the family.

- **Census and Sample Survey**

To assess the likely impacts of the project, Census data (viz. Population Census Abstract and Amenities- 2011) of all the habitations identified were taken into consideration to prepare the data

base. It is treated as a census survey because all habitations located in the area were considered for the collection of information. Sample Survey was conducted for substantiating of socio-economic data got through the Census. Further, in selected habitation a household survey was conducted by drawing representative sample of households. Since, collection of information from all the households in a habitation is time consuming and expensive, the sample survey approach was adopted for collection of information from the selection of villages and households in the village(s) / town(s).

- **Sample Design**

Two-Stage Sampling Design was adopted in the study area. The First Stage Units were Census village(s) / town(s) and the Ultimate Stage Units were households in the selected village(s) / town(s).

- **Method of selection of First Stage Units**

Probability Proportional to size without replacement and vicinity to the project site was taken into consideration while selecting the habitations from the list of Census village(s) / town(s).

- **Method of selection of Ultimate Stage Units**

The ultimate stage sampling unit is households. The households for survey are selected by simple random sampling technique.

- **Sample Size**

While deciding the sample size the following factors were taken into account: Confidence

- Level (95%, Table value: 1.96); Degree of precision (Δ): 0.5; Variation in population / Standard Deviation (σ); The sample size at each level (village and household) was decided by using the formula n = √ {(1.96*σ) / Δ}; where n=Sample Size, 1.96 is the Table Value of Confidence Limit, σ = Standard Deviation and Δ = Degree of Precision.

- **Survey Instruments**
- The following Schedules / Questionnaires were developed for collection of primary data from the households and villages / towns:
- Probability Proportional to size without replacement and vicinity to the project site was taken into consideration while selecting the habitations from the list of Census village(s) / town(s).
- Questionnaire / Schedule for Village / Town Particulars
- Questionnaire / Schedule for Household Details and Project Perception

- Each of these data instruments has segment blocks and there are both open-ended and closed-ended questions

Method of selection of first stage unit (village)

Probability Proportional to Size (PPS) and vicinity to the project site was adopted to select the villages from the list of villages the size being number of households in a given village.

Selection of ultimate stage units (households)

After completing listing of each structure in a village a list of households was prepared. The sample households were selected by adopting Systematic Sampling method. This method was adopted since the sampling frame i.e. the complete list of households was readily available. Under this method every kth unit was selected. The value of k was determined from the population size (N) and sample size (n) and k was taken as the integer nearest to and sampling interval. The above procedure ensured each element in the population equal probability of selection. Number of households selected for survey in each village was12.

Respondents

The head of the selected household was the respondent for face to face interview and subsequent collection of information.

Tools for data collection

The following schedules/questionnaires were developed to collect information from the head of the households during field survey. Questionnaire 1A: Village Questionnaire the Village Questionnaire was developed for collection of village particulars from the Sarpanch or other village officials.

The Household Questionnaire was developed to collect information on various parameters from the selected households in a village.

Each questionnaire was divided into several blocks. There were open ended and questions. In the household questionnaire an attempt was made to collect information about the perception of the local people about the upcoming Soapstone mining project.

STUDY AREA

Bageshwar District (Project District)

Bageshwar is a town and a municipal board in Bageshwar district in the state of Uttarakhand, India. It is located at a distance of 470 km from the National Capital New Delhi and 332 km from

the State Capital Dehradun. Bageshwar is known for its scenic beauty, Glaciers, Rivers and Temples. It is also the administrative headquarters of Bageshwar district. Situated on the confluence of Sarju and Gomati rivers, Bageshwar is surrounded by the mountains of Bhileshwar and Nileshwar to its east and west and by the Suraj Kund in the north and Agni Kund in the south. Bageshwar was a major trade mart between Tibet and Kumaun, and was frequented by the Bhotia traders, who bartered Tibetan wares, wool, salt and Borax in exchange for Carpets and other local produces in

Population Profile

The description of the project district is presented in **Table No. 3.9 (i)**. According to the 2011 census of India, Bageshwar has a population of 2,59,898.

Table No. 3.9 (i): Demographic details of Project District and Tehsil

S. No.	District/Tehsil	Households	Population					
			Total %	Male	%	Female	%	Sex Ratio
1	Bageshwar	57,941	2,59,898	1,24,326	47.84	1,35,572	52.16	1090

Source: Census of India, 2011

Table No. 3.9 (ii) provides detailed information about the SC, ST population in Bageshwar district as well as on the Project area. The total SC population in Bageshwar district is 72,061 which is 27.72% of the total population, while ST population is 1982, which is 0.76% of the total population.

Table No. 3.9 (ii): Caste wise distribution of population

Sl. No.	District/Project Area	Schedule Caste (SC)		Schedule Tribes (ST)	
		Total	% of Sc	Total	% of Sc
1	Bageshwar	72,061	27.72	1,982	0.76

Source: Census of India, 2011

Literacy Rate

District Bageshwar: The literate population in Bageshwar district is 1,79,483, out of which male & female are 97,546 and 81,937 respectively. The male literates represent 54.35% while female represent 45.65% of the total population. The details of literacy rate and literate people in Bageshwar district and Project area are provided in **Table No. 3.9 (iii).**

Table No. 3.9 (iii): Literacy Rate of Project District and Project Area

S.No.	District/Tehsil	No of Literate			Literacy Rate %	
		Total	Male	Female	Total	% SC
1	Bageshwar	1,79,483	97,546	81,937	54.35	45.65

Source: Census of India, 2011

Religion and Culture

Bageshwar is Hindu majority city with approximately 99.1% of district population following Hinduism as their religion. Muslim is second most popular religion in district with approximately 0.6 % following it. In Bageshwar district, Christianity is followed by 0.2 %.**Table No. 3.9 (iv)** shows below the Sub-district wise distribution of villages in the Study Area.

Table No. 3.9 (iv): Sub-district wise distribution of villages in the Study Area

S.No	Name of the sub district	Number of village
1	Bageshwar	76
2	Garud	6
3	Kanda	78
4	Kapkot	42
Total	**202**	
Source : census of India,2011		

BASELINE DATA

Baseline data refers to basic information collected before a project / scheme is implemented. It is used later to provide a comparison for assessing impact of the project. Any attempt to collect base line data while undertaking impact assessment study is faced with recall errors. The present report is provided with following base line data for the study area as a whole. Demographic Particulars of the Study Area is give below in **Table No. 3.10.**

Table No. 3.10: Demographic Particulars of the Study Area of Soapstone Mining Project at Bageshwar, Uttarakhand

Parameters	Values
Household	1454
Total population	7930
Male	4018
Female	3912
Population under 6yrs of age.	2745

Household size	5.4
Proportion of Male	50.51%
Proportion of Female	49.43%

Various amenities available in the study area are given in the **Table No. 3.11**below:

Table No. 3.11: Amenities available in the Study Area

FACILITIES	Types of each facilities	Status
Education Facilities	Primary School	14
	Middle School	10
	Secondary School	7
	Senior Secondary School	2
	College	2
Medical Facilities	Primary Health Center	5
	Primary Health Sub Center	10
	Hospitals	2
	Community Health Center	14
	Register Private Medical Practitioners	9
Drinking Water	Tap	2
	Tank / Tube well	14
	Hand pump	17
Post & Telegraph Facilities	Post Office	5
	Phone Connection	10
	Post & Telegraph office	2
	Commercial Bank	2
	Co-operative Bank	2
	Agricultural Credit Societies	12
	Non-Agricultural Credit	2
	Domestic	5
	Agriculture	3
	Others	3

Source: Census of India, 2011

CHAPTER-4

ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.0 GENERAL

All development projects have an impact on the natural set up of the environment. This impact may be beneficial or adverse, depending on the improvement or the deterioration it brings about in the status of air, water, land, ecology, natural systems, socio-cultural life styles and economics of the population. Depending on the nature of activities and baseline environment status, the impacts are assessed for their importance. On the basis of the impact analysis, the mitigating action and future monitoring requirement are focused in the Environmental Management plan for countering or minimizing the impacts.

Keeping in mind, the environmental baseline scenario as detailed in chapter-3 and the proposed mining activity described in chapter-2, it is attempted to assess the likely impact and its extent on various environmental parameters and likely mitigation measures to be adopted.

4.1 LAND ENVIRONMENT- Various components of land environment have been identified for study of impact of the mine operations. Details of the same are given below:

4.1.1 Solid waste generation and management

The top soil from the working benches will be removed by means of an excavator and stacked separately and used for backfilling from second year onwards. The interburden is low grade magnesite and shall be removed manual means and to be dumped separately and used for backfilling from third year onwards. The top soil and interburden material will be dumped separately on mineralized land, but these dumps are temporary in nature and it will be used in reclamation purpose. The yearly generation of soil and inter burden is given below in **Table No. 4.1**

Table No. 4.1

YEAR	TOP SOIL (CUM)	INTERBURDEN (CUM)
FIRST	2154	4499
SECOND	1949	5708
THIRD	2160	7162
FOURTH	2552	7725

FIFTH	3763	8314
TOTAL	**12578**	**33408**

4.1.2 Storage and Preservation of top soil

The top soil shall be scraped & preserved for short period towards the slope side along the working pits. Dumping shall be carried out in single terrace & slope of dump shall be kept 35^0 to40^0. All the quantities shall be used in backfilling before the commencement monsoon period. Therefore, no proposal has been envisaged for its separate dumping at mine side. Before the commencement of monsoon all the pits shall be backfilled.

4.1.3 Impact on land use & reclamation of mined out areas

Land use indicating the area likely to be degraded due to quarrying, dumping, roads, workshop etc.

During the first five years mining, land will be degraded due to mining & allied activities. The breakup of the land to be affected during the first five years due to mining operation is given as below:-

Table No. 4.2: Land use Pattern of the Mine Area (Hectares)

ACTIVITIES	AT PRESENT (HA.)	AT END OF PLAN PERIOD (HA.)
Pits and quarries	-	0.9069
Waste Dump	-	-
Habitation	-	-
Foot track/PWD road	0.0377	0.0377
Drainage	-	-
Remaining undisturbed area	2.3703	1.464
TOTAL	**2.480 HA.**	**2.480 HA.**

Ref: Mining Plan

4.1.4 Proposal for reclamation of land affected by mining activities

The mining has been proposed in such a way that land will be reclaimed concurrently from end of first year onward in each pit to restore its maximum original topography. The backfilled area shall be leveled and it is use for agriculture purpose.

TABLE NO. 4.3: PROPOSAL FOR RECLAMATION

Year	Quantities	Space	Dimension of	Quantities of	Balance

	of soil + interburden to be generated & dumped (cum)	available for backfilling (cum)	backfilled pit (m)			soil+ interburden to be used in backfilling (cum)	quantities to be dumped (cum)
			l	w	d		
FIRST	6653	-	-	-	-	-	6653
SECOND	7657	15750	75	35	6	14310	-
THIRD	9322	10920	65	42	4	9322	-
FOURTH	10277	11550	70	33	5	10277	-
FIFTH	12077	12768	76	28	6	12077	-
TOTAL	**45986**	**71808**				**45986**	**6653**

4.2 WATER ENVIRONMENT

4.2.1 Impact on Water Resources

Surface Water Resources

The topography of the area will not be largely changed in view of the proposed concurrent reclamation. During the mining activity period, 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.

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 details of the site elevation and working depth are shown in **Table No. 4.4**.

Table No. 4.4 Site Elevation and Working Depth Details

PARTICULARS	DETAILS
Elevation	Highest & lowest levels found in the 1476.38m to 1368.26m
Ground water Table	±75 to 90m
Ultimate working Depth	12

4.2.2 Impact on Water Quality

Mining activities cause adverse impacts due to mine drainage, siltation due to storm water and contaminated water from workshops and domestic sewage water. Various components have been

identified for study of impact of the mine operations.

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 nontoxic 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 work 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.

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.

4.2.3 `Wastewater Generation, Treatment & Disposal

The total water consumption in the proposed Soapstone Mine shall be about 3.0 KLD. The water is used in the following purposes.

- For dust suppression
- For domestic consumption

It is proposed to obtain water for drinking and plantation from spring and other available source. 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.

4.2.3.1 Measures for Minimizing Adverse Impacts

Seasonal drainage exists near to the project site. The mining is being carried in hilly region. The problem of ground water pumping will not arise. Rain water will not accumulate in the mining pit & it will be channelized along the slopes. The mining work will usually be confined within gullet driven from north-south & a ledge of about one-meter height will be kept on the outer edge so that in discrete water flow will be avoided. The interburden and top soil will be used in backfilling.

Further no significant impact on water quality is anticipated as material exposed will be low grade magnesite & is very feebly react with water that too when water becomes acidic. Even of reaction takes place it gives arise to increased temporary hardness of water. Water is being supplied from the spring. No hydrological studies have been carried out in the area.

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 thebackfilled pits and along the soil and interburden dumps.
- Monitoring of water will be carried out periodically. Water analysis will be carried out seasonally.

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 mineral presenting 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.

4.3 AIR ENVIRONMENT

4.3.1 Change in Ambient air

The air pollution impact of excavation in ordinary earth and boulders and rock is directly dependent upon construction methodology, annual rate of excavation, mode of transport within the construction site, mode of screening and method of crushing. The air pollution sources at the proposed project site can be broadly classified into three categories, viz. area source, line source and instantaneous point source.

Excavation by various activities in project area is construed as an area source which includes excavation pit(s) and activities happening in the excavation area like digging, dozing, hauling and loading/unloading. The dust emission from these areas will be fugitive in nature. The excavator operations, loading/unloading operations will also cause dust emission though it will be confined to the area of operation of the machinery. The gaseous emission from their operation shall be minimal and limited within the project.

Transportation of excavated material from the project site to dumping sites area categorized as line source. Since the dumper movement on haul road will be within the project area, no adverse impact shall be felt in the settlement area.

Dust Dispersion Modeling for Excavation Operation/Air Modeling -

The extra load on the atmosphere by way of releasing air pollutants like particulate matter (PM10, PM2.5) and gaseous pollutants (SO2, NO2, CO) from Emissions of Stationary/ Area/ Point/ Line Sources and other project activities have been taken up to assess the impacts on its surroundings. Entry of pollutants into the atmosphere occurs in the form of gases or particles and continuous mixing; transformation and trans-boundary transportation of these air pollutants make air quality of a locality unpredictable. Dispersion estimates are determined by using distribution equations and/or air

quality models. Complete report on Air Modelling is enclosed as **Annexure – 4.**

4.3.2 PROPOSED MITIGATION MEASURES FOR DUST SUPPRESSION

Soapstone is a talcose rock mineral composed of hydrous magnesium silicate: **3** MgO-4Si02H20. The specific gravity is around 1. Therefore, emissions due to mineral handling during mining operation are not much and restricted to the lease area only. Air pollution is caused mainly due to dust generation added with gaseous emission from transportation activities along with mining operation like evacuation, loading, haulage etc. Proper mitigation measures will be practiced during mining activities to control air pollution load below the prescribed limits. The same are as follows:

Control of Fugitive Emissions

- Use of Personal Protection Equipment's (PPE) like dust masks, ear plugs etc. by the mine workers.
- Ambient Air Quality Monitoring will be conducted on regularly basis to assess the quality of ambient air.
- Rock breaker will be used for breaking over size boulders in order to reduce dust and noise generation, which otherwise would be generated due to secondary blasting.
- Regular water sprinkling on haul roads & loading points will be carried out.
- Development of green belt/plantation around the lease boundary, roads, dumps etc.

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 tarpauling sheet. This will prevent dust emission.

The sources of pollutants from mining activities are given in **Table No. 4.5**.

Table No. 4.5: Sources of Pollutants from Mining Activities

S. NO.	SOURCE	TYPE OF POLLUTANT
1.	Transport of Overburden or soil for dumping/ backfill	SPM
2.	Dumping of waste	SPM
3.	Loading of ore	SPM
4.	Transportation of ore	SPM, NOx

4.4 NOISE ENVIRONMENT

Impact on environment

Noise generated at the mine is due to semi-mechanized mining operations and truck 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.

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

In this case the impact of noise on the nearby settlements is negligible as they are far located from the mine workings.

a. Mitigation measures

i. On-site

a) Blasting: No Blasting is required.

b) Maintenance of Machinery: Regular maintenance of machinery will keep the generated noise level below the minimum prescribed limit i.e. not exceeding 90 dB (A) at a distance of 2 m from the machine. All machines will be as per stipulated standards and will be used at their optimum capacity.

c) Trained Operators: Only trained operators will be allowed to operate machines during mining to reduce any chance of safety failures.

d) Vegetation: Plantation of trees along the barrier zone will be done to dampen the noise, if possible.

e) Hearing Protection: All the miners will be provided with Personal Protective Equipment's such as ear-muffs.

f) Phasing out the old and worn out trucks.

ii. Off-site

The off-site receptors are not significantly affected as they are located far away from the mine site. But some disturbances due to vehicle movement cannot be avoided. Plantation will be done along the barrier zone and roadsides etc. which will more or less dampen the off-site noise level.

4.5 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 4,485plants 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 to be planted: (*Prunuspersica*) Peach, (*Pyrusboissieriana*) Pear, (*Prunusarmeniaca)* Apricot etc. further trees will be also selected from the plants recommended for afforestation are as per Guidelines for Developing Greenbelts, CPCB, March2000.

Table No. 4.6: Species Suggested for Plantation

Sl.No.	Species	Family	Habit
1.	*Alternantheraparonychioides*	Amaranthaceae	Herb
2.	*Alternantherapungens*	Amaranthaceae	Herb
3.	*Amaranthusspinosus*	Amaranthaceae	Herb
4.	*Colocasiaesculenta*	Araceae	Herb
5.	*Ageratum conyzoides*	Asteraceae	Herb
6.	*Grangeamaderaspatana*	Asteraceae	Herb
7.	*Partheniumhysterophorus*	Asteraceae	Herb
8.	*Cassia tora*	Fabaceae	Herb
9.	*Cannabis sativa*	Cannabaceae	Herb
10.	*Chenopodium album*	Chenopodiaceae	Herb
11.	*Argemone Mexicana*	Papaveraceae	Herb
12.	*Brachiaria ramose*	Poaceae	Herb
13.	*Cynodon dactylon*	Poaceae	Herb
14.	*Eleusineindica*	Poaceae	Herb
15.	*Eragrostistenella*	Poaceae	Herb
16.	*Saccharumspontaneum*	Poaceae	Herb
17.	*Physalis minima*	Solanaceae	Herb
18.	*Calotropisprocera*	Asclepiadaceae	Shrub

19.	*Cassia occidentalis*	Fabaceae	Shrub
20.	*Croton bonplandianum*	Euphorbiaceae	Shrub
21.	*Abutilon indicum*	Malvaceae	Shrub
22.	*Bougainvillea spectabilis*	Nyctaginaceae	Shrub
23.	*Ziziphusmauritiana*	Rhamnaceae	Shrub
24.	*Daturainnoxia*	Solanaceae	Shrub
25.	*Solanumvirginianum*	Solanaceae	Shrub
26.	*Lantana camara*	Verbenaceae	Shrub
27.	*Berberis vulgaris*	Berberidaceae	Shrub
28.	*Mangifera indica*	Anacardiaceae	Tree
29.	*Ficusracemosa*	Moraceae	Tree
30.	*Cassia fistula*	Fabaceae	Tree
31.	*Ricinuscommunis*	Euphorbiaceae	Tree

4.6 BIOLOGICAL ENVIRONMENT

Impacts 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. For this, mine owner planted a good roadside plantation along both side of the mine road.

Impacts on agriculture

The area around the mine lease area is all barren and no agriculture activity is going on atleast 2-3 km away from the mine site. Therefore, no significant impact on the agriculture around the project site is expected.

Impacts on aquatic ecology

Mining activities may result in affecting the riverine ecology by polluting the river water. But in this case, river lies almost 0.5 km away from mine site and also nothing is being discharged into the river. However, indiscriminate fishing by labourers etc. may reduce fish stock availability for commercial and sport fishermen. Thus, it is recommended that adequate surveillance measures are implemented during project operation phase to ameliorate such impacts.

Mitigation 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 aesthetic value of the core and the buffer zone. To achieve this, it is planned to increase the area of green cover of plantation and green belts activities. The basic objectives of plantations are as follows:

- Improvement of Soil quality,
- Quick vegetative cover to check soil erosion,
- Improvement in mining site stability,
- Conservation of biological diversity of plants, birds and animals,
- As dust receptor and dust filter, this is likely to be produced during mining.

4.7 TRAFFIC ANALYSIS

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

TRAFFIC STUDY- The connecting road from the mine to State Highway No-37. These may be reinforced to facilitate easy and smooth movement of heavy duty trucks.

Table No. 4.7(i): Existing Traffic Scenario & LOS

Road	V(PCU/day)	C(PCU/day)	Existing V/C Ratio	LOS
State Highway	900	4500	0.20	A
Near By road/connecting road	600	2000	0.30	B

V= Volume in PCU‟s/day & C= Capacity in PCU‟s/ day

During Mine operation

Average Capacity of mine/year : 13137 TPA
No. of working days : 240 days
Total Capacity of mine/day : 13137/240 = 55tonnes
Truck Capacity : 5tonnes
No. of trucks deployed per day : 55/5 = 11 trucks per day
No. of trucks deployed/day to & fro : 11*2= 22
Trucks Increase in PCU/day : 22

The addition to traffic by the proposed project during its operation is given in **Table No. 4.7(ii).**

Table No. 4.7 (ii): Additional Traffic Scenario & LOS due to proposed project

Road	V	C	Modified V/C Ratio	LOS
SH-37	922	4500	0.20	A
Near By road	622	2000	0.31	B

Table No. 4.7: Classification

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

Note: *Capacity as per IRC: 106-1990*

Results- From the above analysis it can be seen that the V/C ratio is remain same 0.20 and with LOS respectively on State Highway remains "A" which is "Excellent" as per classification and on Nearby road its "B" which is "Very Good". So the additional load on the carrying capacity of the concerned roads is not likely to have much significant adverse effect.

At present the traffic load at highway is less than 11 trucks per hour, in particular. Due to the proposed project there will be an addition 11 trucks/day in the existing traffic having the capacity of 10 tonnes, hence the changes will be at small level and will not affect the existing environment.

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CHAPTER 5

ANALYSIS OF ALTERNATIVES (TECHNOLOGY & SITE)

5.0 GENERAL

Examination of alternatives of technology and site are of utmost importance for assuring that the project has long-term sustainability. Deposit characteristics, percentage recovery, requirement of health and safety and environmental concerns, production, scheduling scope of mechanization and automation, workforce requirements wage rates, land reclamation, operating and capital cost estimates are crucial factors in the choice of an actual mining method for a given deposit. The selection of the mining method (development and extraction) is a key decision to be made in the opening up of a mine.

Soapstone mines require very simple operation. Extraction of soapstone and boulder from the lease area is done which does not have any significant interference with the surroundings. Mine of Soapstone is site specific. The mine is to be located where the mineral exists in sufficient quantity to be economically extracted. The site selected has following advantages:

- The project site is a Non-Forest Agriculture land.
- There are many other mines in the study area, however, basic infrastructure such as road and electric connection are available.
- Better availability of experienced labors from nearby villages.
- No endangered species around the mine site.
- The mining project site is mineral specific.

Soap stone mining is a site-specific project depending upon the geological set up and mineable area. The land being barren and non-suitability of land for any other purpose makes it suitable for mining. This will also generate employment to the nearby villagers. Hence, there is not much scope for site alternative.

As per mine plan approved by the Directorate of Geology & Mining, Uttarakhand, most efficient and least polluting technologies have been prescribed. Hence, no alternative technology has been adopted. Thus it will have more acceptability and help in socio economic up liftment of the area.

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CHAPTER-6

ENVIRONMENTAL MONITORING PROGRAMME

6.0 Introduction

Success of any post project environmental monitoring program depends upon the efficiency of the organizational set up responsible for the implementation of the program. Regular monitoring of the various environmental parameters is also necessary to evaluate the effectiveness of the management program so that the necessary corrective measures can be taken in case there are some drawbacks in the proposed program. Since environmental quality parameters at work zone and surrounding areas are important for maintaining sound operating practices of the project in line with conformity with environmental regulations, the post project monitoring work forms part of EMP. Since Environment Monitoring Program is required to ensure sustainable development in the study area 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.

Monitoring includes 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.

6.1.1 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 safe guard 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.

6.1.2 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.

The organizational structure for Environment Cell for mining operations is shown in **Figure-6.1**.

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, Liasoning with State & Central Statutory agency & Committee.

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

The Environment Management Cell shall 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.

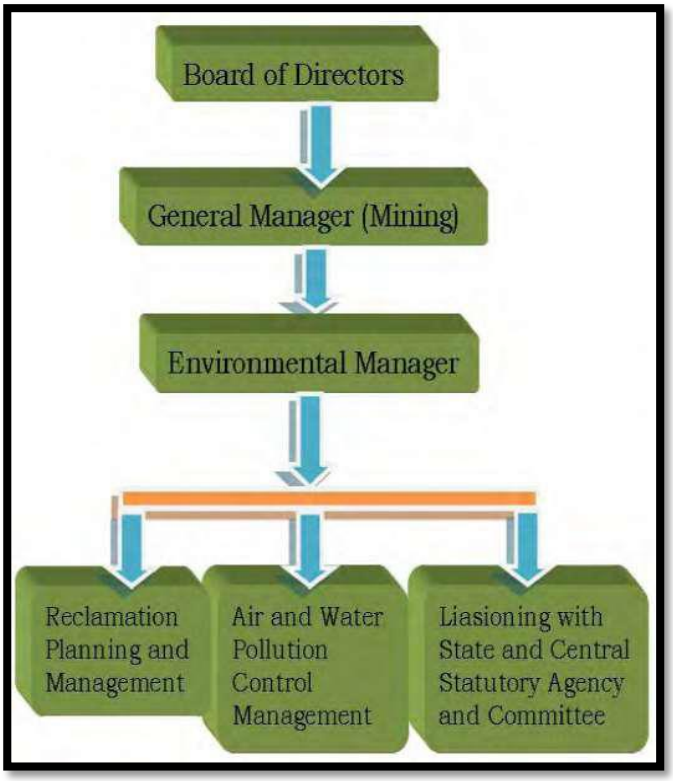

Figure-6.1 Organization Structure for Environment Management

The environmental monitoring will be conducted in the mine operations as follows:

1. Air quality;
2. Water and wastewater quality;
3. Noise levels;
4. Soil Quality; and
5. Greenbelt Development

Monitoring program will be followed till the mining operations cease; every year as per the schedule below:

6.2 Air Quality Monitoring

One location in core zone and four locations in the buffer zone will be monitored twice a week per season except monsoon.

6.3 Water Quality Monitoring

Water environment will be assessed periodically for both surface water and ground water. Surface water quality will be monitored at identified water bodies during all four seasons. Surface water flowing through the Tons river downstream will be measured at least once a month during monsoon and co-relate with the total rainfall during the season to estimate the relative changes, if any. Ground water level and quality on seasonal basis will be assessed in the open/dug wells to evaluate the impacts of ongoing operations. Water levels will also be monitored on seasonal basis in surrounding wells.

6.4 Noise Level Monitoring

Noise levels in the working area will be monitored once in every month till the continuation of operations. Ambient noise levels will also be monitored once in a season in the buffer zone to evaluate the noise levels in surrounding community.

6.5 Soil Quality Monitoring

Soil quality in the working area will be monitored once in two years till the continuation of operations.

6.6 Plantation

Before the onset of monsoon season, will be done progressively till the final closure of the mine.

6.7 Ecological Monitoring

Biannual Monitoring of afforestation program will be done for the survival rate and plant growth within the core zone.

6.8 Socio-Economic Survey and Monitoring

Socio-economic survey shall be done once in 3-4 years to analyze the impact of mining on the surroundings of project area.

Table No. 6.1: Monitoring Schedule and Parameters

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

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CHAPTER – 7

ADDITIONAL STUDIES

7.0 Public Consultation

Yet to be done.

7.1 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. However, following natural/industrial hazards may occur during normal operation.

- Accident due to explosives;
- Accident due to mining equipment; and
- Natural hazards - Subsidence and landslides

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;
- Firefighting 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 other similar drives.
- Implementation of safety mining plan

7.2.1 Blasting

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

7.2.2 Overburden & Interburden

The overburden (soil) 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.

7.2.3 Machinery

Most of the accidents during transport by trucks, excavators and dozers and other heavy vehicles are often attributable to mechanical failures and human errors.

7.2.4 Water Logging

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

- Due care will be taken to provide retaining 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 land scapes of diverse elements such as forests, scrub, grassland, streams/river, ponds etc.

7.2.5 Earthquake Management Plan

Following measures will be undertaken:

- The project site is mainly a plain area. There will be no drilling and blasting during mining.

- The overall slope angle of the upper pit wall will be kept to 45º and the slope angle of the inner benches will not be greater than 70º and bench height would be 3m.
- Slope will be stabilized with the help of *Chrysopogonzizanioides*grass to stabilize the slope.

Flood Management Plan

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

Natural resource conservation

- A green belt will be developed so that minimum soil erosion takes place.
- The excavated soil will be spread over the backfilled mined out area in order to minimize the impact on environment.
- In any case the natural habitats of the existing flora and fauna will not be disturbed.
- Use of traditional knowledge in all aspects of conservation shall be utilized.
- Water conservation techniques will be employed.
- Time to time analysis of the soil, water resources etc will be done in order to analyze the negative impacts of mining activities on the environment.
- To prepare management plans for village landscapes, villages to be seen as landscapes of diverse elements such as forests, scrub, grassland, streams/river, ponds etc. The dynamics of the village as an ecosystem to be assessed, corridors to be devised between major natural landscape elements, so as to facilitate movement of species.

7.2.6 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 tipper sand other machinery. The inclination of the quarry sides at the final stage i.e. at the dip most point will not exceed 45º 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 gradient of the haul road inside the pit, access trench and on the dumps will not be steeper than 1 in 16;
- The slope of the sides of the OB and IB dump to the horizontal will not exceed 37º and the height of the OB and IB dumps has been restricted to a max of 12 m;

- The quarries will be protected by garland drains around the periphery for storm water drainage;
- A minimum safe distance of 50m 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 faras possible, be made man free, and there should be a light and sound device to indicate reversing of trucks.
- A statutory provision of the fence, constant education, training etc. will go a long way in reducing the incidence of such accidents.

Measures to Prevent the Danger of Overburden

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- A statutory provision of the fence, constant education, training etc. will go a long way in reducing the incidence of such accidents.

7.3 DISASTER MANAGEMENT PLAN

7.3.1 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 the mine 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; and

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

Fire Fighting Facilities

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

Emergency Medical Facilities

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

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CHAPTER-8

PROJECT BENEFITS

8.0 GENERAL

The major benefit envisaged is that the project will give a boost to the socio-economic status of the area through royalty, direct and indirect taxes, resource utilization, employment and infrastructure development.

8.1 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.

8.2 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.

In addition to above, due to increase in purchasing power of local habitants:

- 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.

8.3 EMPLOYMENT POTENTIAL

The number of unskilled labour will increase depending on the quantum of overburden removal and

mineral excavation. The lessee has employed miners for raising ores & Workers for removal of overburden, quarry cleaning & road repairing. The details of employment are given in **Chapter-2.**

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 46 persons and persons will be mainly sourced from local as well as other 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.

8.4 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:

8.4.1 CER Project Details

Soapstone mine has proposed to provide financial assistance of Rs. 3.5 lakh every year 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. (Rs. 50,000).
- Up gradation of toilets of government school in nearby villages. (Rs. 1,50,000).
- Distribution of Books and Notebooks among meritorious girl, Child belonging to Scheduled Caste and Scheduled Tribe population (Rs. 50,000).
- Repair and Painting of School Building in the project village (Rs. 1,00,000).

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CHAPTER – 9

ENVIRONMENTAL COST BENEFIT ANALYSIS

9.1 PROJECTCOST

As per EIA Notification dated 14th September, 2006 and its amendments, chapter on "Environmental Cost Benefit Analysis" is applicable only if the same is recommended at the Scoping Stage.

As per the ToR points issued by SEIAA, Uttarakhand vide Letter no. *256/SEAC dated 11.11.2021* for soapstone mining project, the Environmental Cost Benefit analysis is not required.

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CHAPTER -10

ENVIRONMENTAL MANAGEMENT PLAN

10.0 INTRODUCTION

An EMP is prepared including all the administrative aspects of ensuring that mitigative measures are effectively monitored, after approval of the EIA. The final EIA/EMP of the proposed project will be submitted to SEAC, Uttarakhand, for obtaining environmental clearance for the project, in accordance with Environment Impact Assessment (EIA) Notification No. 1533 dt.14.09.2006. The approved Environment Management Plan will be implemented throughout the life of the project and half-yearly monitoring report showing the compliance status of conditions stipulated in Environmental Clearance letter will be submitted to MoEF & CC in every six months. An Environmental monitoring programme has been prepared for the proposed project for periodical assessment of effectiveness of implementation of Environment Management Planned to take corrective measures in case of any degradation in the surrounding environment.

To mitigate the adverse impact which will be caused due to the mining operation and overall scientific development of local habitat, environmental management plan (EMP) has been formulated and integrated with the mine planning. The details of the anticipated impacts and mitigative measures have been discussed in Chapter 4 of this report, based on the results of present environmental conditions and environmental impact assessment. The EMP has therefore been made considering implementation and monitoring of environmental protection measures during and after mining operations.

The aims of Environment Management Plan are:

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

10.1 IMPLEMENTATION OF EMP

As the major environment attributes will continue to be around the project area alone, implementation of the proposed control measures and monitoring thereof will be undertaken on a regional basis. The project proponent will ensure the implementation of the measures within the mine area and carryout efficient monitoring.

In order to implement the measures suggested for mitigating the adverse impacts on the environment, it is suggested to monitor the environmental parameters regularly.

10.2 ENVIRONMENTAL MONITORING

For assessing the prevailing quality of air, water, noise, soil etc., regular monitoring of parameters is necessary. The data assessed will be helpful in predicting the impact and planning suitable measures to improve/protect the environment. In the study area, the lessee will carry out monitoring studies for ambient air quality, fugitive dust, water quality, noise levels and soil quality as per the standard procedures and schedules. The monitoring system will include:

- Monitoring stations in the buffer zone remain the same as selected in this study for Air, water, Soil, Noise etc.,
- Implementation of the planned mitigating measures.
- Monitoring the programme of implementation.

The Environmental parameters will be monitored & samples will be analyzed as per the stipulations of Indian Bureau of Mines & Uttarakhand Pollution Control Board and as per MoEF & CC Guidelines. The above monitoring proposals shall be adhered to and the results shall be intimated to the appropriate authorities for their perusal and records.

10.3 ORGANIZATIONAL SETUP FOR ENVIRONMENT MONITORING

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

1. Collection of air and water samples at strategic locations with frequency suggested and by analyzing thereof. If the parameters exceed the permissible tolerance limits, corrective regulation measure will be taken.
2. Collection of soil samples at strategic locations once in every year and analysis thereof with regard to deleterious constituents, if any.
3. Measurement of water level fluctuations in the nearby surface resources and bore wells.
4. Measurement of noise levels at mine site, stationary and mobile sources, and adjacent villages will be done in every quarter of the year.
5. Monitoring Ground Vibrations: Ground vibrations studies or monitoring is not required as there is no proposal of drilling/blasting for scooping operations.

Environment Management Cell

The organizational structure for Environment Cell for mining operations is shown in **Figure-10.1**.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, Liasoning 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.

Functions of the Cell

- Implementation of the mitigation measures.
- Maintain Records of the operation.
- Monitoring the programme of implementation.
- To estimate the efficiency of measures taken.
- To bring out any other unforeseen effect on environment not covered under the report.
- Inspection and regular maintenance of mining equipments and transport vehicles.

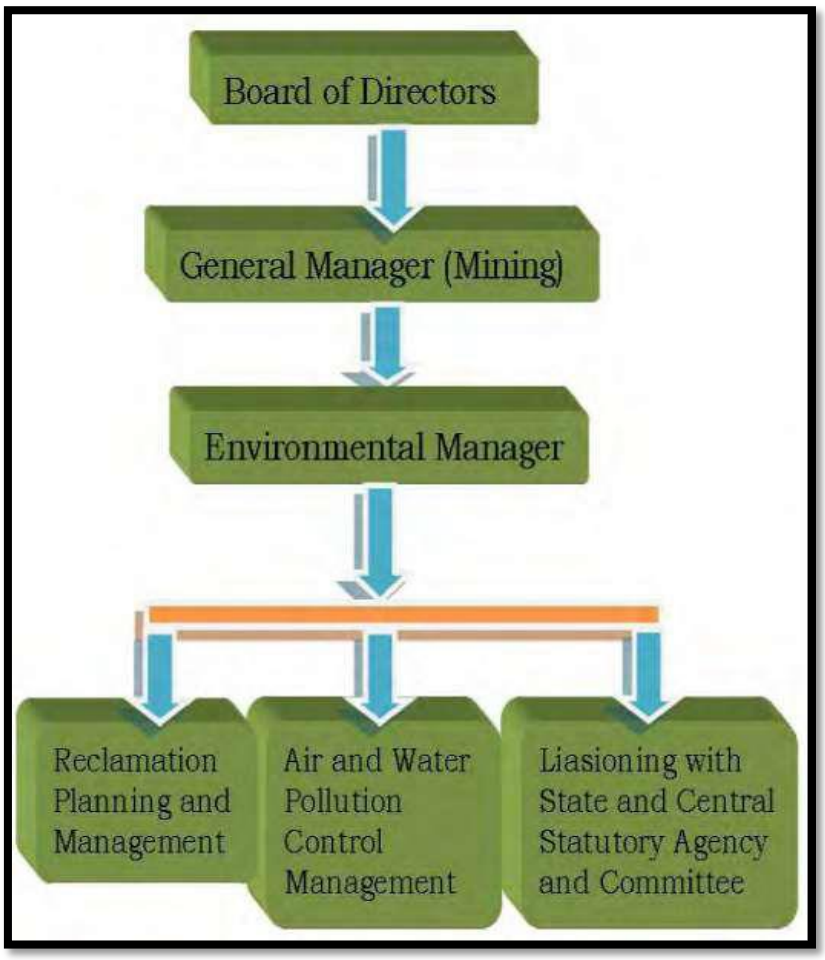

Figure-10.1 Organization Structure for Environment Management

10.4 AIR QUALITYMANAGEMENT

Talc is a hydrous magnesium silicate. In trade, talc often includes: (i) the mineral talc in the form of flakes and fibres; (ii) steatite, the massive compact cryptocrystalline variety of high- grade talc; and (iii) soapstone, the massive talcose rock containing variable talc (usually 50%), soft and soapy to feel. Commercial talc may contain other minerals like quartz, calcite, dolomite, magnesite, serpentine, chlorite, tremolite and anthophyllite as impurities. The properties that give talc a wide variety of uses and markets are its extreme softness and smoothness, good luster and sheen, high slip and lubricating property, low moisture content, ability to absorb oil and grease, chemical inertness, high fusion point, low electrical and heat conductivity, high dielectric strength, good retention for filler purposes, whiteness, good hiding power as pigment and high specific heat.

Control of Fugitive Emissions

- 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

Open cast manual method will be adopted in this case and there is no provision for blasting. The main source of gaseous emissions would be transportation. Approx. 55 tonnes of soapstone will be produced per day and the transportation will be done with covered materials to prevent any spillage and also prevent fugitive dust emission due to wind. Any gaseous emission transportation will be negligible and not impact the ambient quality. Exhaust emission will be monitored of the trucks and to be kept below the permissible limit. 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.

10.5 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 Equipment's (PPE) like ear muffs/ear plugs will be provided to all operators and employees working near mining machineries or at higher noise zone.
- Periodical noise level monitoring will be done.

10.6 WATER QUALITY MANAGEMENT

Water for drinking and operations is required to be 3.0 KLD. The water shall be extracted from the nearby surface water resources or natural springs.

Measures for Minimizing Adverse Impacts- Seasonal drainage exists near to the project site. The mining is being carried out in hilly region. The problem of ground water pumping will not arise. Rain water will not accumulate in the mining pit &it will be channelized along the slopes. The mining work will usually be confined within gullet driven from north-south & a ledge of about one-meter height

will be kept on the outer edge so that in discrete water flow will be avoided. The interburden and top soil will be used in backfilling. Further no significant impact on water quality is anticipated as material exposed will be low grade magnesite &is very feebly react with water that too when water becomes acidic. Even of reaction takes place it gives arise to increased temporary hardness of water. Water is being supplied from the spring. No hydrological studies have been carried out in the area.

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.

Ground Water Pollution- The domestic sewage from the canteen/rest shelter and toilets will be routed to septic tanks. 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 formonitoring the water levels and quality around the mine representing both upstream and downstream conditions.

Impact on land use & reclamation of mined out areas- Opencast mining activities may alter the landscape of the lease area and also cause some disturbance to the surface features of the surrounding areas. Mining will be done after leaving 7.5 m safety barrier. Plantation will be developed in consultation with district administration/ local authority, wherever feasible. The Existing land use pattern is agricultural land. The impact on land form or physiography will be land use on the hilly terrain will undergo radical changes due to the open cast mining. During the next five years mining, 2.480 ha land will be degraded due to mining & allied activities.

All the quantities of top soil & interburden material to be generated by the end of plan/conceptual period shall be used for the purpose of reclamation over the mined unit land. Therefore, no proposal for separate stacking of top soil and interburden dump has been proposed.

10.7 WASTEMANAGEMENT

Solid waste - Generation and management and disposal: The top soil will be removed with the help of excavator, dozer, shovels, pickaxe, spade & crowbar and stacked separately. The soil intermixed with fragments and interburden rejects are low grade magnesite. Part of these rejects will be utilized in

construction and maintenance of retaining walls, parapet walls, check dams and other construction works.

Mitigation measures

- Access roads from public roads will be aligned in such a way that it would cause least damage.
- The banks cut for ramp will also be restored at the closing of mine during monsoon. Vegetation development is proposed along the lease area as restoration work.
- Plantation is proposed along the road sides, civic amenities in consultation with local/ govt. authorities. While selecting the plant species, preference will be given for planting native species of the area.

Storage and preservation of top soil

The top soil shall be scraped & preserved for short period towards the slope side along the working pits. Dumping shall be carried out in single terrace & slope of dump shall be kept 35^0 to 40^0. All the quantities shall be used in backfilling before the commencement monsoon period. Therefore no proposal has been envisaged for its separate dumping at mine side. Before the commencement of monsoon all the pits shall be backfilled.

Proposal for reclamation of land affected by mining activities

The mining will commence from the higher levels and will advance towards lower levels. Intermittent backfilling will commence from the higher levels and subsequently advance towards the lower elevation so that terraced agriculture fields would undertake in such a manner that original land use will be restored i.e. before the onset of monsoon will be handed over to cultivators for cultivation. The final backfilling will be started once the ultimate benches are formed and pit reaches the optimum economic depth. All recovery of the mineral will be of the saleable grade.

10.8 GREENBELT ANDPLANTATION

2408 plants (1000plants/ha) will be planted in the village Udiyar in consultation with the local DFO/Agriculture department. The year wise plantation of trees has been shown in **Table No. 10.1**.

Table No. 10.1: Year wise afforestation scheduled

YEAR	NO. OF SAPLINGS
FIRST YEAR	803
SECOND YEAR	803

THIRD YEAR	803
TOTAL	**2408**

(Note: The plantation work will be carried in first 3 years & protection measures to be done in remaining two years, during first plan period and same will be followed in successive years, upto lease period)

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.

10.9 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 emitted 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 activity will promote the emergence of the primary succession species; hence it will be a silvicultural operation, extremely important for maintaining ecology and environmental health of the area.
- This helps in regeneration & establishment of pioneer plant species saving expose land & land cutting.

These plantations will be carried out around mining zone and both sides of the mine road. About twice the area recommended for mining will be used for afforestation/greenbelt as per the "Forest (Conservation) Amendment Rule, 2004".

The scheme of plantation around the project site is given as follows:

Afforestation will be put under a protective regulatory framework to ensure that it is not degraded or disturbed. No ecologically disruptive activity will be allowed in this zone.

The suggestive measures under EMP are given in **Table No. 10.2.**

Table No. 10.2: Key suggestive measures under EMP

IMPACT PREDICTED	SUGGESTIVE MEASURE
Disturbance of free movement / living of wild fauna	Awareness camps will be conducted for labours to make them aware about sensitivity/importance of forest life. No tract or new road for movement of labours or vehicles be laid in reserve forest area, this will

	prevent forest fragmentation, encroachment and human – animal encounter. Care will be taken that noise produced during vehicles movement for carrying ore materials are within the permissible noise level. Higher noise level in the forest area will lead to restless and failure in detection of calls of mates and young ones. Care will be taken that no hunting of animals carried out by labours. If wild animals are noticed crossing the core zone, it will not be disturbed at all. Labours will not be allowed to discards food, plastic etc., which can attract animals near the core site. Only low polluting vehicle will be allowed for carrying ore materials. All vehicles allowed in the project site area will have to provide pollution under control certificate at the end of three months. No honk will be allowed in the forest area, noise level will be within permissible limit (silent zone-50dB during day time) as per noise pollution (regulation and control), rules, 2000, CPCB norms.
Harvesting of forest flora	No tree cutting, chopping, lumbering, uprooting of shrubs and herbs should be allowed. No pilling of ore material should in the reserve forest area. Collections of economically important plants

	will be fully restricted.

10.10 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 Proposed Soapstone 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.
- 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.

10.11 ENVIRONMENTAL POLICY

The Owner of the proposed Soapstone Mine 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 soapstone. 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.

10.12 Budget Allocation for EMP Implementation

Annual budget for EMP is very essential for successful implementation of EMP. The fund allocated will not be diverted for any other purposes and the top management will be responsible for this. **Table No. 10.3** shows below the cost of EMP. The budget will take into consideration the following capital and operating expenses:

1. Capital cost for installing pollution control systems.
2. Field cost for monitoring of parameters.
3. Cost of any defined out sourcing
4. Cost of chemicals, consumables and transport for data generation
5. Man power cost for environmental cell
6. Any other cost as per EC condition.

Table No. 10.3 Cost of EMP

S. No.	Measures	Capital Cost (In Rs.)	Recurring Cost (In Rs.) (for Subsequent Years)
1	Pollution Control ➢ Dust Suppression	 1,00,000	 1,00,000
2	Pollution Monitoring i) Air pollution ii) Water pollution iii) Soil Pollution iv) Noise Pollution	 1,00,000 60,000 40,000 20,000	 1,00,000 60,000 40,000 20,000
3	Plantation/ Green belt	3,67,875	6,67,875
4	Reclamation of mined out area	--	10,09,380
5	Occupational Health	1,00,000	50,000
Total		**7,87,875**	**20,47,255**

10.13 Monitoring Schedule and Parameters

To evaluate the effectiveness of environmental management program regular monitoring of the important environmental parameters to be monitored are shown in Table 6.1 (Chapter-6).

10.14 CER Project Details

In addition to the CSR, the provision of Rs. 3.5 lakhs every year has been proposed for the Corporate Environmental Responsibility (CER).Following measure **(Table No. 10.4)**will be taken to improve the Social infrastructure of the study area: -

Table No. 10.4: CER Details

S. No.	Activities	Allocation of Fund (Rs. Lakhs)
1	Health Camps	0.50
2	Up gradation of toilets of government school in nearby villages	1.50
3	Distribution of Books and Notebooks among meritorious girl child belonging to Scheduled Caste and Scheduled Tribe	0.50

	population.	
4	Repair and Painting of School Building in the project village	1.0
	Total	**3.5 Lacs**

10.15 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 the proposed Soapstone Mine.

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CHAPTER-11

SUMMARY & CONCLUSION

11.0 INTRODUCTION OF PROJECT& PROPONENT

The proposed project is to mining of Soap stone from lease area and the estimated project cost is Rs. 35 Lakhs. The mining lease has been granted to Shri Rajendra Singh S/o Shri Madho Singh, Village- Udiyar, Tehsil-Dugnakuri, District-Bageshwar, Uttarakhand.

The proposed mining project is categorized as category 'B1' project. The EIA-EMP report is prepared as per the TOR granted under the EIA Notification. Further to assess the impact on environment due to proposed mine, it is necessary to ascertain present status of environment prevailing at the project site and proposed operation including identification and Assessment of impact on the environment.

11.1 LOCATION

Location

The proposed lease area is situated in Village- Udiyar, Tehsil-Dugnakuri, District-Bageshwar, Uttarakhand. The co-ordinate of the mine lease area is:

Table No.11.1: Location

Latitude	29°54'8.10"N	(Pillar No. A)
Longitude	79°57'3.26"E	
Nearest Railway Station	Kathgodam Railway Station; 171 Km SW direction	
Nearest Airport	Pithoragarh Airport; 45 Km NE (Aerial distance)	
Nearest Highway	SH-37, West, 7.50 km (Aerial distance)	

11.2 RESERVES

Description of Geological reserve has been given in the table below:

Table No. 11.2: Estimation of Reserves

MINERAL RESERVE	UNFC CODE	QUANTITY IN MILLION TONS	GRADE
A. Total Mineral Reserve			

Proved Mineral Reserve	111	**0.160796**	Cosmetic/ paper
Probable Mineral Reserve	121	**0.047355**	Cosmetic/ paper
B. Total Remaining Resources			
Feasibility Mineral Resources	211	**0.068488**	Cosmetic/ paper
Prefeasibility Mineral Resources	222	**0.033336**	Cosmetic/ paper
Measured Mineral Resources	331	-	-
Indicated Mineral Resources	332	-	-
Inferred Mineral Resources	333	**0.007936**	-
Reconnaissance Mineral Resources	334	-	-
Total (A+B)	-	**0.317911**	**-**

Ref: Mining Plan

11.3 MINING – OPEN CAST MINING:

1. Existing Method of Mining: It is fresh application for mining lease & mining operations yet to be commenced.

2. Proposed Method of Mining: The mine is proposed to be worked by opencast semi-mechanized method using JCB excavator on contract (all statutory permissions will be required from DGMS and others). The overburden & interburden shall be removed by means of excavator. The soapstone shall be extracted with the help of excavator as well as manually with the help of hand tools like crow bar, chisels, pickaxe, hammers, and spade.

Mineral will be packed in bags and will be transported on manual/mule (*khachar) to* aerial ropeway point (Inlet point) and from where it will be further transported by aerial ropeway to the road head/near road head, then from road head the mineral is transported by trucks to main market Haldwani. Drilling & blasting shall not be required/ proposed during the mining operations. The soapstone shall be dressed manually & stacked separately. No further beneficiation shall be undertaken during first five years.

The salient points of proposed method of mining are given below:-

- Mining shall be carried out in two pits.
- It will be opencast semi-mechanized method mine.

- Average thickness of soil has been considered as 0.75 m. & it shall be stacked separately.
- Top soil, overburden & interburden shall be removed by means of excavators.
- Height & width of benches shall be kept 3m and 3m.
- Face slope of benches shall be 70^0 with 45^0 overall pit slope.
- Backfilling will be undertaken after winning the soapstone up to full economical depth. The interburden and top soil will be temporarily dump separately towards the slope of working pit and shall be used for backfilling from third year onwards. Interburden shall be filled into mined out pit and later on thin soil shall be carped over it to restore maximum original topography of the area.
- Generally small quantities of magnesite interlocked with soapstone that is inseparable in nature so 5% of total recoverable soapstone has been considered as mining losses.

Reference: Mining Plan.

11.4 WATER DEMAND

The water required is mainly for dust suppression, green belt development and drinking during mining operations. The total requirement is assessed around **3.0 KLD**. Only fresh water will be used for drinking purpose. The requirement of Water will be fulfill from nearby available sources& Water conservation practices (dust suppression & Green belt development) within the proposed lease area. The break up for water requirement is given below:

Table No.11.3: Water Requirement

S. No.	Purpose	Water Requirement (KLD)
1.	Drinking	1.5
2.	Dust Suppression	1
3.	Miscellaneous	0.5
TOTAL		**3.0**

11.5 BASE LINE DATA

This study contains the description of baseline studies of the 10 km radius of the area Udiyar Soapstone mine. The data collected has been used to understand the existing environment scenario around the proposed mining project against which the potential impacts of the project can be assessed.

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

(a) Air

(b) Noise

(c) Water

(d) Soil

(e) Ecology and Biodiversity

(f) Socio-economy

Table No. 11.4: BASELINE ENVIRONMENTAL STATUS

Attribute	Baseline status
Ambient Air Quality **Ambient air quality was monitored at 5 locations within a 5 km radius of**	Ambient Air Quality Monitoring reveals that the maximum & minimum concentrations of PM_{10} for all the 5 AQ monitoring stations were found to be 89.30µg/m^3 at AAQ-2 and 60.57µg/m^3 at AAQ-5, respectively, Whereas the maximum & minimum concentrations of $PM_{2.5}$ for all the 5 AQ monitoring stations were found to be 41.65µg/m^3 at AAQ-2 and 24.33µg/m^3 at AAQ-1, respectively. As far as the gaseous pollutants SO_2 and NO_2 are concerned, the prescribed NAAQS limit of 80µg/m^3 for residential and rural areas has never surpassed at any station. The maximum & minimum concentrations of SO_2 were found to be 9.9µg/m^3 at AAQ-1 &5.1µg/m^3 at AAQ-3 respectively. The maximum & minimum concentrations of NO_x were found to be 31.5µg/m^3 at AAQ-5 &12.6µg/m^3 at AAQ-5 respectively.
Noise Levels	Noise monitoring reveals that the maximum & minimum noise levels at day time were recorded as 44.46 dB(A) at NQ-1 & 39.42 dB(A) at NQ-5 respectively. The maximum & minimum noise levels at night time were found to be 42.63 dB (A) at NQ-1 & 35.66 dB (A) at NQ-4 respectively. There are several other sources in the 10 km radius of study area, which contributes to the local noise level of the area. Traffic activities as well as activities in nearby villages and agricultural

	fields add to the ambient noise level of the area.
Water Quality	5 Groundwater samples and 2 surface water samples were analysed and concluded that: The ground water from all sources remains suitable for drinking purposes as all the constituents are within the limits prescribed by drinking water standards promulgated by Indian Standards IS: 10500. From the surface water analysis it is evident that most of the parameters of the samples comply with 'Category C' standards of CPCB Drinking water source with Non-conventional treatment followed by disinfection.
Soil Quality	Samples collected from identified locations indicate the soil is sandy type and the pH value ranging from 7.16 at SQ1 to 7.56 at SQ4 which shows that the soil is alkaline in nature. Potassium is found to be from 116.2mg/kg (SQ2) to 131.5 mg/kg (SQ4). The water holding capacity is found in between 34.8% (SQ1) to 38.7 % (SQ3).
Ecology and Biodiversity	There are no Ecologically Sensitive Areas present in the study area, but many reserved forests surround the project area.
Socio-economy	The implementation of the Mine will throw opportunities to local people for both direct and indirect employment. The study area is still lacking in, health, housing, water, electricity etc. It is expected that same will improve to a great extent due to proposed mining project and associated industrial and business activities.

11.6 BIOLOGICAL ENVIRONMENT

Area supports moderately healthy vegetation, the main forest species are scattered all over the hills, riparian vegetation found along the Saryu River and upper reaches of hills covered with pine forest. Species of Quercus, Siris, Sisam, Subabul, Neem, etc. found in mixed deciduous forest. Ground vegetation mainly consists of grasses and small shrubs. Useful fodder grasses, Cynodondactylon,

Eleusineindica, Trifoliumalexandrinum, etc. can be seen growing in the area. The large weeds which infest uncultivated tracts are Calotropisprocera, Canabissativa, Lantana camara and Ziziphusjujuba. Other noxious weeds and those which appear in crops are Carthamusoxyacantha, Argemonemexicana, Solanumxanthocarpum, Partheniumhysterophorus and Cannabis sativa.

Flora of the Core zone

The core zone comprises of private agriculture land, where mining operation is proposed. There is no tree species found in core zone. Few shrub species like lantana, ank, cannabis etc are grown as weed in area. No ecologically sensitive plant species has been reported from this area.

Flora of the Buffer zone: Buffer zone of the proposed project falls in Lesser and Greater Himalaya region. Many tree species are planted in the area because of their usefulness, economic and aesthetic values. The tree species observed in the area are, Aam (Mangiferaindica), Jamun (Syzygium cumini), Bail (Aegle marmelos), Dakain (Melia azedarach), Neem (Azadirachtaindica), Peepal (Ficusreligiosa), Bhimal (Grewiaoptiva) etc.

In agricultural waste land and along the road side, growth of weeds like Argemonemexicana, Cannabis sativa, Cenchruscilitaris, Lantana camara, Partheniumhysterosporus, etc. are very common. These weeds are affecting the agricultural productivity of the region due to fast growth, short life cycle and enormous production of seeds.

Vegetation in and around human settlement:

Vegetation pattern in villages and surrounding areas are slightly different from the rest of the areas. The common species grown near villages are mostly edible or useful plants such as Mangiferaindica, Azadirachtaindica, Albizialebbeck, Delonixregia, Ficusreligiosa, etc.

Table No. 11.5 Anticipated impact and mitigation measures for biological environment

Impact Predicted	Suggestive measure
Disturbance to free movement / living of wild fauna viz. Birds, Reptiles etc.	• If birds are noticed crossing the core zone, they will not be disturbed at all; • Labors will not be allowed to discards food, plastic etc., which can attract animals/birds near the core site; • Only low polluting vehicles having PUC will be allowed for carrying mining materials.

	• Noise level will be maintained within permissible limit (silent zone-50dB (A) during day time or residential zone 55dB (A)) as per noise pollution (regulation and control), rules, 2000, CPCB norms.
Disturbance of riparian ecosystem/ wetlands	• The riparian ecosystem or the wetlands will not be destroyed by the mine owners.
Monitoring of upstream and downstream water quality	• Water quality will be monitored from upstream and downstream area to assess the impact on water quality and plankton and mining activity will be controlled to maintain the clean water conditions.

11.7 LAND ENVIRONMENT

Various components of land environment have been identified for study of impact of the mine operations. Details of the same are given below:

Solid waste generation and management

There is little top soil generation from the mine. The waste to be generated will be over burden\ side burden which will be utilized in the concurrent back filling. The soil will be temporarily stored and used for Green belt development.

LEASE HOLD AREA- The entire lease hold area of 2.480 Ha lies in Village- Udiyar, Tehsil- Dugnakuri, District-Bageshwar, Uttarakhand. The breakup of the land use for ancillary feature around the mining area is given below: -

Table No. 11.6: Lease Hold Area

Details of applied/Area	**None-Forest land, as Categorized as below-**					
	Ag. Category-1 (Ka) land	**Ag. Category-4 land**	**Govt. Category- 5 land**	**Category-9 (Na.) land**	**Pub. Utility Category-10(1), 10(2) & 10(4)land**	**Total land**
Village-Udiyar	1.937	0.014	0.076	0.410	0.043	**2.480**

	Hac.	Hac.	Hac.	Hac.	Hac.	**Hac.**
Total	**1.937 Hac.**	**0.014 Hac.**	**0.076 Hac.**	**0.410 Hac.**	**0.043 Hac.**	**2.480 Hac.**

As the mineral is non-replenishable, the excavated area at the end of mine life will be converted into an open benched. The measures to be taken are likely to bring forth positive impact on the core zone landscape. The aesthetic environment of the core zone will have a positive impact by the time mining ceases in the area with proposed green belt development.

11.8 AIR ENVIRONMENT

Anticipated impacts and evaluation

Information on air quality was studied and various modelling techniques predicted that the mining activity will not affect the air quality in a significant manner. In mining operations, loading, transportation and unloading operations may cause deterioration in air quality due to handling dry materials. In the present case, from the Air monitoring results it is anticipated that the incremental pollution will remain within the limit and becomes insignificant outside the mine lease area. Also, the blasting is not prescribed and will be only done in the utmost requirement and that too for a very short duration of mere significance.

Mitigation measures

The only air pollution sources are the road transport network of the trucks. The dust suppression measures like water spraying will be done on the roads. Utmost care will be taken to prevent spillage from the trucks. Overloading will be prevented. Plantation activities along the roads will also reduce the impact of dust in the nearby villages.

11.9 WATER ENVIRONMENT

To find out the effect on ground water an extensive hydro-geological study has been conducted and from the study it can be safely concluded that there is no noticeable effect on surrounding ground water resource due to mining. The mining activity does not require water.

Mining of sandstone and boulder does not have any significant impact on the water quality and parameters as the mining does not intercept with the ground water level.

In this project, it is not proposed to divert or truncate any stream. No proposal is envisaged for pumping of water from the river. There will not be any adverse impact on surface hydrology and ground water regime due to this project. The contractor will adhere to all guidelines and rules for proper and scientific method of mining during the period of extracting the Sandstone and boulder.

Thus, the project activities shall not have any adverse effect on the physical components of the environment and therefore may not have any effect on the recharge of ground waters or affect the water quality.

11.10 NOISE ENVIRONMENT

Anticipated impacts and evaluation

Noise generated at the mine is due to semi-mechanized mining operations and truck 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.

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

In this case the impact of noise on the nearby settlements is negligible as they are far located from the mine workings.

Mitigation measures

On-site

a) Blasting No blasting is proposed.

b) Maintenance of Machinery: Regular maintenance of machinery will keep the generated noise level below the minimum prescribed limit i.e. not exceeding 90 dB (A) at a distance of 2 m from the machine. All machines will be as per stipulated standards and will be used at their optimum capacity.

c) Trained Operators: Only trained operators will be allowed to operate machines during mining to reduce any chance of safety failures.

d) Vegetation: Plantation of trees along the bank will be done to dampen the noise, if possible.

e) Hearing Protection: All the miners will be provided with Personal Protective equipments such as ear-muffs.

f) Phasing out the old and worn out trucks.

Off-site

The off-site receptors are not significantly affected as they are located far away from the mine site. But some disturbances due to vehicle movement cannot be avoided. Plantation will be done along the roadsides, civic amenities, etc. which will more or less dampen the off-site noise level.

11.11 TRAFFIC ANALYSIS

Results

From the traffic analysis it can be seen that the V/C ratio is likely to change to 0.20 and 0.31 with LOS being "B" 'very good' as per classification. So the additional load on the carrying capacity of the concerned roads is not likely to have any significant adverse effect.

11.12 SOCIO-ECONOMIC ENVIRONMENT

The implementation of the soapstone mining project will throw opportunities to local people for both direct and indirect employment. The project will also provide impetus to industrialization of the area. With the implementation of the proposed mining project the occupational pattern of the people in the area will change making more people engaged in industrial and business activities rather in agriculture. Thus there will be a gradual shifting of population from agriculture to mining and industry. Further, the mining and industrial activities in the area may lead to rapid increase in population and thereby urbanization. Due to urbanization of the area, employment opportunities will further increase.

11.13 ENVIRONMENTAL MANAGEMENT PLAN (EMP)

Proper environmental management plan is proposed for Udiyar Soapstone mining project to mitigate the impact during the mining operation.

- No overburden or loose sediments will be kept in the working benches particularly during monsoon months.
- Garland drain is proposed to arrest the inflow of run-off water to the quarry area.
- The possibility of the project activity contributing to the pollution of watercourses of the region or to the ground water regime is so less that this does not significantly constitute an area of concern.
- Construction of well-compacted roads.
- Regular water spraying on haul roads and waste dumps by tankers.
- Provision of dust collectors for the drilling & crusher machines.
- Supply of personal protective equipments like dust masks, earplugs, helmets, safety boots etc. for the miners.
- Plantation of wide leaf trees, creepers, tall grasses around quarry sites, waste dumps, road and other surrounding barren zones.
- Proper and regular maintenance of vehicles, compressors and jack hammers.
- Provision of supplying earplugs for jackhammer drillers and crusher operators.
- Care should be taken that noise produced during vehicles movement for carrying sandstone and boulder is within the permissible noise level.

- Carrying of blasting (if any) only during daytime (not during cloudy weather and when strong wind is blowing towards residential areas). Blasting will be carried out with limited explosives at a time so that the noise generation can be well maintained with the prescribed limits.
- Provision of Green Belt (thick foliage) along the lease boundary and road.
- Strict observance of the provisions of Acts, Rules and Regulations in respect of safety both by management and the workers.
- Proper planning and designing of work in order to reduce the risk of hazards.
- Specific instructions and supervisions of working where danger due to fall of side (overhanging, undercutting of bench, fall of objects from higher benches/places is apprehended).
- Training of work persons and the officials.
- Since the haul road will be of considerable length, due importance will be given in the construction of road. The width of road will be maintained more than thrice the width of the vehicle. A code of traffic rules will be implemented.
- A code of practices for tipping in stock piles/dumping of overburden at dump yard and loading point will be implemented.
- In respect of contract work, safety code for contractors and workers will be implemented.
- They will be allowed to work under strict supervision of statutory person/officials only after they will impart training at vocational training centers. All personal protective equipments will be supplied to them.
- A code of practice for fighting fire will be implemented.
- Competent persons like fitters, mechanics will have imparted with special attention to project impact.
- The safe handling of materials while attending to repairs, maintenance of HEMM.
- Provision of pit safety committee meeting every month (20th day) to discuss the safety of the mines and the persons employed.
- Celebration of annual mines safety week and environmental week in order to develop safety awareness amongst employees.
- Pre joining medical check-up shall be done and regular health check-up in 6 monthly intervals is planned for the employees.
- Care will be taken that no cooking, or burning of woods will be allowed in the adjoining area.

- If some causality or injury to animal occurs, it should be informed to forest department and proper treatment should be given.
- Corridor movement of wild mammals (If exists) should be avoided.

11.14 ENVIRONMENTAL MANAGEMENT PLAN IMPLEMENTATION

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

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

a) Collection of air and water samples at strategic locations with frequency suggested and by analyzing thereof. If the parameters exceed the permissible tolerance limits, corrective regulation measure will be taken.

b) Collection of soil samples at strategic locations once in every year and analysis thereof with regard to deleterious constituents, if any.

c) The effectiveness of drainage system depends upon proper cleaning of all drains provided in the surrounding of mine area. Any blockage due to siltation or loose material will be checked at least once in a month.

d) Measurement of water level fluctuations in the nearby ponds, dug wells and bore wells.

e) Measurement of noise levels at mine site, stationary and mobile sources, and adjacent villages will be done in every quarter of the year.

f) Plantation/afforestation as should be done as per program. Regular watering of plant and fencing to protect them from cattle/goats has to be provided. Post plantation, the area will be regularly monitored in every season for evaluation of success rate. For selection of plant species local people should also be involved.

g) Mine management will be in regular touch with local surrounding villages to update the various developmental schemes made by them. They will also consider any immediate requirement, which could be taken care of in near future.

h) Mine management will be in regular touch with State Pollution Control Board, DGM, IBM etc., bind to send them annual progress report. Any new regulations considered/imposed by State/Central Pollution Control Board for the industry will be followed.

11.15 BUDGET ALLOCATION FOR EMP IMPLEMENTATION

Table No. 11.7: COST OF EMP

S. No.	Measures	Capital Cost (In Rs.)	Recurring Cost (In Rs.) (for Subsequent Years)
1	Pollution Control Dust Suppression	1,00,000	1,00,000
2	Pollution Monitoring i) Air pollution ii) Water pollution iii) Soil Pollution iv) Noise Pollution	 1,00,000 60,000 40,000 20,000	 1,00,000 60,000 40,000 20,000
3	Plantation/ Green belt	3,67,875	6,67,875
4	Reclamation of mined out area	--	10,09,380
5	Occupational Health	1,00,000	50,000
Total		**7,87,875**	**20,47,255**

11.16 MONITORING SCHEDULE AND PARAMETERS

Table No. 11.8: Monitoring Schedule and Parameters

S. No.	Description of Parameters	Schedule and Duration of Monitoring
1	**Air Quality** a)In the vicinity of the mine b)In the vicinity of the transportation network	24 hourly samples twice a week for one month in each season except monsoon season
2	**Water Quality** a) Water quality of surface and	Once in a season for 4 season in a year

	groundwater around the site b) Drinking water must conform to drinking water standards	
3	Ambient Noise Level	Twice in a year for couple of years & then once in a year
4	Soil Quality	Once in two years on project monitoring area
5	Inventory of Flora (tree plantation, survival etc.)	Once in two years on project monitoring area
6	Socio-economic condition of local, population, physical survey	Once in 3 or 4 years

11.17 BENEFIT OF MINING

The opening of the proposed project will enhance the socio-economic activities in the adjoining areas. This will result in following benefits: -

- Improvements in physical infrastructure.
- Improvements in Social Infrastructure.
- Increase in Employment Potential
- Contribution to the Exchequer.
- Prevention of illegal mining.
- During and Post-mining enhancement of green cover.

11.17.1 CER Project Details

Soapstone mine has proposed to provide financial assistance of Rs. 3.5 lakhs every year 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. (Rs. 50,000).
- Up gradation of toilets of government school in nearby villages. (Rs. 1,50,000).
- Distribution of Books and Notebooks among meritorious girl, Child belonging to Scheduled Caste and Scheduled Tribe population (Rs. 50,000).
- Repair and Painting of School Building in the project village (Rs. 1,00,000).

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CHAPTER-12

DISCLOSURE OF CONSULTANT ENGAGED

The consultant engaged for the preparation of the EIA/EMP of the project is M/s **ECO LABORATORIES AND CONSULTANCY Pvt. Ltd. Mohali**. The Detail information about the Consultant and Environmental Laboratory involved with address is mentioned below in **Table No. 12.1.**

Table No. 12.1: Details of Consultant and Environmental Laboratory involved

Name of the Consultant	**ECO LABORATORIES AND CONSULTANTS PVT. LTD. MOHALI** **Certificate No. NABET/EIA/1720/AA095,** **Valid Till: 06.06.2021**
Address	**E-207, Phase VIII B, Sector 74, Industrial Area, Mohali- 160071**
Credentials	**Accredited by QCI/NABET**
Environmental Laboratory	**ECON LABORATORY AND CONSULTANCY, DEHRADUN**
Address of the Laboratory	**Village - Khabarwala, P.O. Jaintanwala, Garhicantt, Dehradun**

12.0 INTRODUCTION ABOUT CONSULTANT

Eco Group is having reputed business house working in the field of environment in North India since 1999. To achieve mission of the organization "Preventing pollution with purpose- Bringing profit and goodwill in equal measure" we aim at that our customers achieve effective compliance with legislation including a better public image and earn from waste.

LABORATORY SERVICES DIVISION is known for excellence in monitoring and analysis of environmental parameters. ENVIRONMENT SERVICES DIVISION undertakes various activities as - Environmental Impact Assessment/Environmental Clearances; Environmental Audits; Pollution Control Systems Engineering & Design Services; Performance Evaluation of Pollution Control Systems; Benchmarking and Environment due diligence Consent Management/Feasibility Reports for various pollution control Boards including Punjab, Haryana, Himachal, Chandigarh, J&K, UP,

Uttarakhand, Delhi etc.

Eco Laboratories & Consultants Pvt. Ltd. is accredited by National Accreditation Board for Testing and Calibration Laboratories (NABL), Department of Science & Technology, Government of India vide Certificate No. TC-7477 dated 22.06.2018 and valid till 21.06.2020 in the field of water, wastewater, air and noise testing as well as Biological & Mechanical testing. It is also accredited by QCI-NABET vide Certificate No. NABET/EIA/1720/SA095 dated 01st October 2019. Laboratory is approved by Ministry of Environment, Forest & Climate Change (MoEF & CC) as Environmental Laboratory under the Environment (Protection) Act, 1986. Further, laboratory is approved by Punjab Pollution Control Board vide letter Lab/32-27907 dated 30.06.2017 and Haryana State Pollution Control Board. The unit is also ISO-9001:2008, ISO-14001:2004 and ISO 18001:2007 certified.

It operates from an independent 10,000 square feet built-up area on three levels each in Mohali, Punjab (India). A dedicated team of thirty engineers, scientists along with the support staff qualified in areas as environment, civil, electrical, mechanical, chemical engineering, biotechnology, chemistry and microbiology oversees the various activities.

Sister concern namely Eco Paryavaran Engineers and Consultants Private Limited is a 9001: 2008 organization, that provides engineering and turnkey solutions for pollution control and recycling including- Sewage Treatment Plants/Effluent Treatment Plants; Ultra Filtration-RO Combination Systems for Effluent recycling; Wastewater Treatment Equipments & Components- Aeration Systems; Disinfection systems-Ozone/UV based; Sludge Handling Systems-Filter Press/Bags; Air Pollution Control Systems; Noise Attenuation; Solid Waste Management Systems.

It also undertakes capacity building programs through NGO- Environment Matters, registered under Societies Registration Act.

12.1 RECOGNITIONS/ACCREDITATIONS OF CONSULTANT

- QCI NABET vide Certificate No. NABET/EIA/1720/SA095 dated 01st October 2019. Copy of certificate is shown in **Figure 12.1**.
- Ministry of Environment, Forest & Climate Change, Govt. of India under Environmental Protection Act 1986 vide F.No. Q-15018/14/2016-CPQ dated 2nd August, 2017.
- Lab Approved by NABL in the field of Testing vide Certificate No. TC-7477 dated 22.06.2018.
- ISO 14001:2015, ISO 9000:2015, ISO 18001:2007.
- Approved by Punjab Pollution Control Board vide Letter No. Lab/32-23639 dated 06.08.2018.

NABET Accreditation certificate is enclosed as **Annexure 9** and scope of NABL accredited Lab.

involved in the monitoring of project (Econ Laboratory and Consultancy, Dehradun) is enclosed as **Annexure10.**

Quality Council of India

National Accreditation Board for Education & Training

Certificate of Accreditation

Eco Laboratories and Consultants Pvt Ltd.

E 207, Phase VIII B, Sector 74, Industrial Area, Mohali- 160071, Punjab

***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 only	1	1 (a) (i)	B
2	Metallurgical industries (ferrous & non-ferrous)	8	3 (a)	B
3	Synthetic organic chemicals industry (dyes & dye intermediates; bulk drugs and intermediates excluding drug formulations; synthetic rubbers; basic organic chemicals, other synthetic organic chemicals and chemical intermediates)	21	5 (f)	A
4	Industrial estates/ parks/ complexes/areas, export processing Zones(EPZs), Special Economic Zones(SEZs), Biotech Parks, Leather Complexes	31	7 (c)	A
5	Common Effluent Treatment Plants (CETPs)	36	7 (h)	B
6	Building and construction projects	38	8 (a)	B
7	Townships and Area development projects	39	8 (b)	B

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in SA AC minute dated August 09,2019 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/19/1074 dated Oct. 01, 2019.The accreditation needs to be renewed before the expiry date by Eco Laboratories and Consultants Pvt. Ltd., Mohali following due process of assessment.

Sr. Director, NABET
Dated: Oct. 01, 2019

Certificate No.
NABET/EIA/1720/ SA 095

Valid up to
Dec. 13, 2020

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

Fig. 12.1 NABET Accreditation Certificate

National Accreditation Board for Education and Training
(Member - International Accreditation Forum & Pacific Accreditation Cooperation)

QCI/NABET/ENV/ACO/21/1656 March 10, 2021

To
Eco Laboratories and Consultants Pvt Ltd.,
E 207, Phase VIII B, Sector 74, Industrial Area,
SAS Nagar- Mohali- 160071, Punjab.

Sub.: Extension of Validity of Accreditation till June 09, 2021– regarding
Ref.. Certificate no NABET/EIA/1720/SA095

Dear Sir/Madam

In view of the outbreak of Corona Virus (COVID-19) and subsequent lockdown declared for its control vide order dated 24th March 2020, issued by Ministry of Home Affairs, Govt. of India, NABET hereby extends the Validity of your Accreditation till June 09, 2021.

Meanwhile, you may enclose this with your EIA reports along with the certificate/validity letter. The EAC/SEIAA/SEAC/Other are hereby requested to consider the same as a valid document for the preparation of EIA/EMP report.

With best regards.

(A K Jha)
Sr. Director, NABET

Institute of Town Planners India, 6th Floor, 4-A, Ring Road, I.P Estate, New Delhi-1 10 002, India
Tel. • +9 11 -233 23 4 1 6, 417, 18, 419, 420, 421 ,423 E-mail : ceo.nabet@qcin.org Website : www.qcin.org

National Accreditation Board for Education and Training
(Member - International Accreditation Forum & Pacific Accreditation Cooperation)

QCI/NABET/ENV/ACO/20/1654 Dec 11, 2020

To

Eco Laboratories and Consultants Pvt Ltd
E 207, Phase VIII B, Sector 74,
Industrial Area, SAS Nagar Mohali

Sub.: Extension of Validity of Accreditation till March 10, 2021 - regarding

Dear Sir/Madam

In view of the outbreak of Corona Virus (COVID-19) and subsequent lockdown declared for its control vide order dated 24th March 2020, issued by Ministry of Home Affairs, Govt. of India, NABET hereby extends the Validity of your Accreditation till March 10, 2021.

As soon as, NABET office opens/resumes its operation necessary action regarding issuance of certificate/extension of validity letters / other may be initiated, therefore, ACO to ensure their complete application with NABET, if applicable.

Meanwhile, you may enclose this with your EIA reports along with the certificate/validity letter. The EAC/SEIAA/SEAC/Other are hereby requested to consider the same as a valid document for the preparation of EIA/EMP report.

With best regards.

(A K Jha)
Sr. Director, NABET

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Fig. 12.2 NABET Accreditation Extension letter

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