

CHAPTER-I 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 who matter 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 favour and fear.

Draft Environmental Impact Assessment report is prepared to comply with the Terms of Reference (TOR) received from SEAC vide Letter no. : 317/SEIAA dated 29 august, 2023 under EIA notification of the MoEF dated 14-9-2006, as amended on 1st Dec 2009 & 4th April 2011 of MoEF, Govt. of India, for seeking environmental clearance for applied mining lease area measuring above 5ha (individual or in cluster form) falling under category “B1”.The lease of Shri Thakur Singh Gariya., has applied application for lease of soapstone mineral measuring over an area of 2.231 ha in village- Surkaligaon, Tehsil-dugnakuri, district Bageshwar, State- Uttarakhand.

State Govt. has considered granting mining lease vide letter no 1260/VII-1/12-Soapstone/16 dated 05-08-2016. At the time of demarcation 2.231 ha. considered for grant of mining lease.

Likewise MoEF, GoI made prior Environmental Clearance mandatory under the notification, Sep 2006, as amended in 2009, 2012, 2016, mining projects with lease area of more than 5.0 ha of single lease or in 500m cluster which total is more than 5.0 ha are require prior Environment Clearance and thereof.

Table 0: Project type

Project Activity	Category A	Category B	General Condition
Mining of Minerals (1a)	> 250 ha of mining lease area in respect of non coal mine lease >150 ha of mining lease area in	≤ 250 ha ≥5 ha of mining lease area in respect of non-coal mine lease ≤ 150 ha ≥ 5 ha	Any project or activity specified in category B will be treated as category A, if located in whole or in part within. “General Conditions shall apply except for mining of minor minerals.”; 10 km from the boundary of: Protected areas notified under the Wildlife (Protection) Act, 1972;

	respect of coal mine lease Asbestos mining irrespective of mining area	of mining lease area in respect of coal mine lease	Critically polluted areas as identified by the Central Pollution Control Board (CPCB) from time to time Eco-sensitive areas as notified under section 3 of the Environment (Protection) Act, 1986, such as, Mahabaleswar Panchangi, Matheran, Pachmarhi, Dahanu, Doon Valley and Inter-state boundaries and international boundaries Provided that the requirement regarding distance of 10km of the inter-state boundaries can be reduced or completely done away with by an agreement between the respective states or U.Ts sharing the common boundary in the case the activity does not fall within 10 km of the areas mentioned at item (i), (ii) and (iii) above Note: Mineral Prospecting is exempted.
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Source: EIA Notification, 2006 & 2009

1.1 IDENTIFICATION OF PROJECT PROPONENT

The lease of Shri Thakur Singh Gariya., has applied application for lease of soapstone mineral measuring over an area of 2.231 ha in village- Surkaligaon, Tehsil-Dugnakuri, district Bageshwar, State- Uttarakhand

State Govt. has considered granting mining lease vide letter no. no1260/VII-1/12-Soapstone/16 dated 05-08-2016. At the time of demarcation 2.231 considered for grant of mining lease. The Infrastructure has been progressing forward not only in its financial aspect but also has taken a big leap in the direction of diversification of its activities. The basic details are being furnished herewith.

DETAILS OF MINING ACTIVITY

Below overburden soapstone bearing strata is explored. The soapstone mineral in Kumaon Himalaya is an alteration products of magnesium bearing mineable & Soapstone occurs as pockets and sometimes confined to the upper part of the magnesium bearing zones. The mineral body occurs in irregular shape & size. The foliation in the soapstone trending 28° to 29° amount of dip varies 40 deg. to 45 deg. and dip direction varies 10 deg. to 20deg. The area was degraded by mining by local villagers & depth of pit varies 6m to 8m & soapstone bearing strata was exposed in the pit. Due to interruption by Distt. administration, the pits have been backfilled/reclaimed & leveled it. The pits were dug at different levels in the agricultural field & all the pits have temporarily backfilled/reclaimed. On this assumption, 8m depth from surface has been considered as proved category (excluding 2m average thickness of topsoil & overburden), 4m depth below proved category as probable. The inferred mineral resources have been calculated 4m depth below OB strata. The soapstone occurring in this area is weakly foliated, fairly compact, fine grained white to off white in color with its characteristic soapy feel. The recovery of soapstone has been considered as 40% on the basis of present exploration & mining activities in adjoining areas.

1.2 BRIEF DESCRIPTION OF PROJECT

The lease of Shri Thakur Singh Gariya., has applied application for lease of soapstone mineral measuring over an area of 2.231 ha in village- Surkaligaon, Tehsil-Dugnakuri, district Bageshwar, State- Uttarakhand

State Govt. has considered granting mining lease vide letter no. no1260/VII-1/12-Soapstone/16 dated 05-08-2016. At the time of demarcation 2.231 considered for grant of mining lease. Brief Description of the project is described below.

S. No.	Parameters	Description
1.	Name of the Project	Surkhaligaon Soapstone Area at, Village- Surkhaligaon, Tehsil- Dungakuri, District: Bageshwar (Uttarakhand)
2.	Location of the Project	Village- Surkhaligaon, Tehsil- Dungakuri, District: Bageshwar (Uttarakhand)
3.	Project Proponent	Shri Thakur Singh Gariya S/o Madan Singh Gariya R/o-Village: Kiroli, Post- Kafli Tehsil & Distt.-Bageshwar (U.K.)
4.	Lease Status	This is Progressive Mine Closure Plan of mining lease & State Govt. has given its consent to grant mining lease letter no1260/VII-1/12-Soapstone/16 dated 05-08-2016 for a period of 25 years
5.	Topography of Mine lease area	Agriculture Land
6.	Location of the Project	
	Khasra no.	Attached in Approved Mine Plan
	Village	Surkaligaon
	Tehsil	Dugnakuri
	District	Bageshwar (u.k)
	State	Uttrakhand
7.	Total Lease Area	2.231 ha
8.	Category of the Project	“B1”

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9.	Altitude of the Area	The lease area comprises of terraced agricultural field showing undulating topography. The area has mild slope towards South West directions. Seasonal nalla, dendritic pattern, first order flows towards South & South-West direction & confluence to another drainage & flows towards south east direction & finally meets river Pungar which is main catchment of the area. The rain water drain down the slope & meet the local drainages. The highest level of lease hold is 1702.30 towards northeast side, while lowest level is 1642.20mRL towards west.			
10.	Toposheet No	53O/13			
11.	Lease Area Coordinate		Pillar No	Latitude	Longitude
			A.	29°54'51.90"N	79°57'16.74"E
			B.	29°54'53.01"N	79°57'17.61"E
			C.	29°54'53.07"N	79°57'18.55"E
			D.	29°54'52.06"N	79°57'19.05"E
			E.	29°54'52.21"N	79°57'20.15"E
			F.	29°54'53.33"N	79°57'21.51"E
			G.	29°54'53.27"N	79°57'22.10"E
			H.	29°54'52.13"N	79°57'22.66"E
			I.	29°54'50.28"N	79°57'22.05"E
			J.	29°54'49.57"N	79°57'22.25"E
			K.	29°54'48.90"N	79°57'21.97"E
			L.	29°54'47.72"N	79°57'20.20"E
			M.	29°54'48.02"N	79°57'19.63"E
			N.	29°54'48.18"N	79°57'18.00"E
			O.	29°54'48.51"N	79°57'17.95"E
			P.	29°54'48.75"N	79°57'17.43"E
			Q.	29°54'49.14"N	79°57'17.42"E
			R.	29°54'49.90"N	79°57'18.23"E
			S.	29°54'50.19"N	79°57'19.15"E

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			T.	29°54'50.50"N	79°57'19.14"E
			U.	29°54'49.71"N	79°57'17.51"E
			V.	29°54'48.53"N	79°57'16.90"E
			W.	29°54'48.08"N	79°57'16.09"E
			X.	29°54'47.94"N	79°57'16.19"E
			Y.	29°54'48.15"N	79°57'16.77"E
			Z.	29°54'47.71"N	79°57'17.25"E
			Z1	29°54'44.46"N	79°57'17.40"E
			Z2	29°54'47.73"N	79°57'14.62"E
			Z3	29°54'48.54"N	79°57'16.63"E
			Z4	29°54'49.74"N	79°57'17.35"E
			Z5	29°54'51.12"N	79°57'17.81"E
12.	Name of the Mineral Mining	Soapstone			
13.	Method of Mining	Opencast, Semi Mechanised			
14.	Total Geological Reserve	0.102031 Million Tonnes			
15.	Mineable Reserve	0.102031 Million Tonnes			
16.	Capacity of Production	Maximum production 11414TPA			
17.	Operational days/ Year	240 Days			
18.	Total Water Requirement	5.36KLD of water will be used for the project site (Drinking use, Sprinkling &Plantation)			
19.	Source of Water	Potable tankers			
20.	Man power requirement	34 persons			
21.	Drilling / Blasting	No			
22.	Land utilization Pattern	-			
23.	Total Proposed Project Cost	Rs. 51.975 Lakhs			
24.	Proposed CER Cost	Rs. 2.59 Lakhs			
25.	EMP Expenditure	Rs 3.40 Lakhs			

Project Nature, Size & Location:

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Nature

The proposed project is Soap Stone mining project.

Size

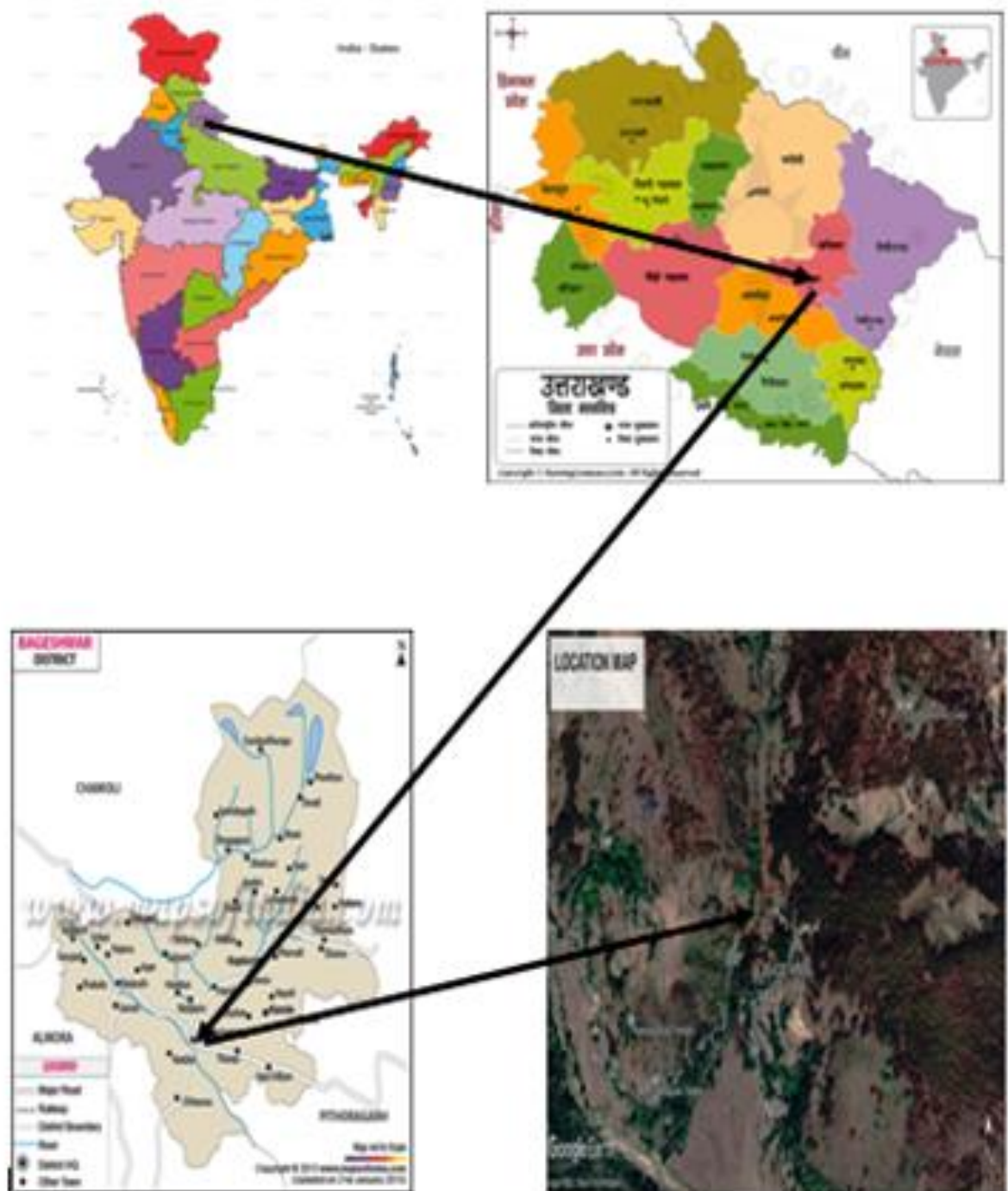
It has been proposed to collect approximately 11414 tones/annum material annually over an area of 2.231ha

YEAR	quantities of soapstone in (tonnes)
2023-24	11132
2024-25	11145
2025-26	11178
2026-27	11356
2027-28	11414
Total	56225

Location:

The area lies between latitude 29°54'44.46"N **to** 29°54'53.33"N and longitude 79°57'14.62"E **to** 79°57'22.66"E in Survey of India Toposheet No. 53 O/13.

LOCATION PLAN



The details of mining lease / proposed project are follows as:

a) Lease Details (Existing Mine)

Lease Details (Existing Mine)

Name of mine : Surkhaligaon Soapstone Mining Project
Village- Surkhaligaon, Tehsil- Dungakuri,
District: Bageshwar (Uttarakhand)
Total applied area: 2.231 ha

Lat/long of any boundary point : The area lies between latitude 29°54'44.46"N to 29°54'53.33"N and longitude 79°57'14.62"E to 79°57'22.66"E in Survey of India Toposheet No. 53 O/13.

Date of grant of lease : It is fresh grant case of mining lease & lease deed yet to be executed.

Period/Expiry Date : 25years/Expiry date will be counted from the date of registration of lease deed.

Name of leaseholder&Postal Address : ShriThakur Singh GariaS/o ShriMadan Singh Garia
Vill- Kiroli& Post-Kafli,Tehsil-Dugnakuri, District-Bageshwar

Telephone : N.A

fax : N.A

Mobile No. : 8808331000

b) Email id :

Details of applied area

Forest Land	Area (ha)	Non Forest Land	Area (ha)
Forest (specify) Area (ha)	Nil	(i) waste land,	Nil
		(ii) grazing land,	Nil
		(iii) Agriculture land,	2.231
		(iv)others(specify) Public Utility Land	Nil
		State Govt. Land	Nil
Total	Nil		2.231

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- Total area after demarcation : **2.231 ha.** Copy of Khasra Map, & Khasra details enclosed as **Annexure No.-8, Annexure No.-9**
- District & State : Bageshwar, Uttarakhand
- Taluka : Dugnakuri
- Village : Surkaligaon
- Whether the area falls under Coastal Regulation Zone(CRZ)?if yes, details thereof : Not applicable
- c) Topo sheet No. with latitude & longitude of all corner boundary point/pillar : The area lies between latitude 29°54'44.46"N to 29°54'53.33"N and longitude 79°57'14.62"E to 79°57'22.66"E in Survey of India Toposheet No. 53 0/13.. State Govt. has principally agreed to grant mining lease G.O. letter no1260/VII-1/12-Soapstone/16 dated 05-08-2016 for a period of 25 years
- Attach a general location map showing area and access routes. It is preferred that the area be marked on a Survey of India topographical map or a cadastral map or forest map as the case may be. However, if none of these are available, the area may be shown on an administrative map. : The area is situated in village Surkaligaon. The area is about 42Km from Bageshwar on Bageshwar-Reema-Pachar road.

Project's importance to the country and the region

The This project operation will provide employment to the people residing in vicinity as about 240 man days will be generated annually and approximately 34 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

- a) There is no legal case against the project and project proponent.
- b) There is no national park / Sanctuary notified under the Wildlife Protection Act in the study area.
- c) Approved Mining Plan of the project been attached as Annexure.
- d) The Mining Plan of the project has been approved by Directorate of Geology & Mining, Uttarakhand, Govt. of Uttarakhand.
- e) There is no legal case against the project and project proponent.

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 soap stone 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.

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The points have been raised by the SEAC-Uttar Pradesh in the ToR and its compliance is as under:-

Point Wise Compliance of ToR

Sr No.	ToR Points	Reference of Compliance
1.	Year-wise production details since 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994. It may also be categorically informed whether there had been any increase in production after the EIA Notification 1994 came into force, w.r.t. the highest production achieved prior to 1994.	The proposed soapstone mine is a new mine. Therefore the year wise production data since 1994 is not applicable.
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 copy of LOI is attached as Annexure II.
3.	All documents including approved mine plan, EIA and Public Hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management, mining technology etc. and should be in the name of the lessee. The above reports should also match with the latest District Survey Report (DSR) notification no- 2827 dated 25 th July, 2018. Data obtained from this DSR should be incorporated in the EIA report for impact identification, Interpretation, prediction, carrying capacity and mitigation.	Will be Complied in final EIA.
4.	All corner coordinates of the mine lease area, superimposed on a High Resolution Imagery/ toposheet, topographic sheet, geomorphology and geology of the area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).	The study area map has been shown in Figure 1.1 of Chapter 1.
5.	Information should be provided in Survey of India Toposheet in 1:50,000 scale indicating geological map of the area, geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil characteristics.	The land use map of the proposed project has been shown in Figure 3.7 of Chapter 3.
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 details have been have been described in Section 4.3 of Chapter 4.

Draft EIA Report of Surkaligaon Soapstone Mine

7.	It should be clearly stated whether the proponent Company has a well laid down Environment Policy approved by its Board of Directors? If so, it may be spelt out in the EIA Report with description of the prescribed operating process/procedures 'infringement/deviation/violation to bring into focus any of the environmental or forest norms/ conditions. The hierarchical system or administrative order of the Company to deal with the environmental issues and for ensuring compliance with the EC conditions may also be given. The system of reporting of non-compliances/violations of environmental norms to the Board of Directors of the company and, /or shareholders or stakeholders at large, may also be detailed in the EIA Report.	Yes the details have been shown in Figure 6.1 of Chapter 6.
8.	Issues relating to Mine Safety, including subsidence study in case of underground mining and slope study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided.	Complied.
9.	The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc. should be for the life of the mine / lease period.	Complied.
10.	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.	The land use map of the proposed project has been shown in Figure 3.7 of Chapter 3.
11.	Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given.	Provided in EIA/EMP Report.
12.	A Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests, the site may be inspected by the State Forest Department along with the Regional Office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the Expert Appraisal Committees.	No forest land is involved in the proposed soapstone mine. The letter from the forest department is in process.

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13.	Status of forestry clearance for the broken up area and virgin forestland involved in the Project including deposition of net present value (NPV) and compensatory afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.	No forest land is involved in the proposed soapstone mine
14.	Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.	Not Applicable
15.	The Vegetation in the RF/PF areas in the study, with necessary details should be given.	Complied
16.	A study shall be got done to ascertain the impact of the Mining Project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly, detailed mitigative measures required, should be worked out with cost implications and submitted.	No wildlife Sanctuary/National Park is situated within 10 km radius from the proposed soapstone mine.
17.	Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/Elephant Reserves/(existing as well as proposed), if any, within 10 km of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the Standing Committee of National Board of Wildlife and copy furnished.	No wildlife Sanctuary/National Park is situated within 10 km radius from the proposed soapstone mine.
18.	A detailed biological study of the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] shall be carried out. Details of flora and fauna, endangered, endemic and RET Species duly authenticated, separately for core and buffer zone should be furnished based on such 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 provisions for their conservation should be prepared in consultation with State Forest and Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.	The detailed biological study of the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] has been described in section 3.11 of Chapter 3.
19.	Similarly, for coastal Projects, A CRZ map duly authenticated by one of the authorized agencies demarcating LTL, HTL, CRZ area, location of the mine lease w.r.t CRZ, coastal 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).	Not Applicable

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20.	R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need based sample survey, family-wise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the State Government. It may be clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to shifting of village(s) including their R&R and socio-economic aspects should be discussed in the Report.	Not Required.
21.	One season (non-monsoon) [i.e. March-May (Summer Season); October-December (postmonsoon season) ; December-February (winter season)] primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and EMP Report. Site-specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the pre- dominant downwind direction. The mineralogical composition of PM10, particularly for free silica, should be given.	The details of Ambient Air Quality have been described in section 3.5 of Chapter 3.
22.	Air quality modeling should be carried out for prediction of impact of the project on the air quality of the area. It should also take into account the impact of movement of vehicles for transportation of mineral. The details of the model used and input parameters used for modeling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind roses showing pre-dominant wind direction may also be indicated on the map.	The Air quality modeling has been described in section 4.4 of Chapter 4.
23.	The water requirement for the Project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the Project should be indicated.	The details of Water requirement for the Project have been described in section 2.9 of Chapter 2.
24.	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.	Not required.
25.	Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided.	Not Applicable.

Draft EIA Report of Surkaligaon Soapstone Mine

26.	Impact of the Project on the water quality, both surface and groundwater, should be assessed and necessary safeguard measures, if any required, should be provided.	The details have been described in section 4.2 of Chapter 4.
27	Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect groundwater table, a detailed Hydro Geological Study should be undertaken and Report furnished. The Report inter-alia, shall include details of the aquifers present and impact of mining 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.	Not Required.
28.	Details of any stream, seasonal or otherwise, passing through the lease area and modification/diversion proposed, if any, and the impact of the same on the hydrology should be brought out.	No streams, seasonal nallahs or river is passing through the proposed the soapstone mine.
29.	Information on site elevation, working depth, groundwater table etc. Should be provided both in AMSL and bgl. A schematic diagram may also be provided for the same.	The details have been described in table 4.1 of Chapter 4
30.	A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the Project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given. The plant species selected for green belt should have greater ecological value and should be of good utility value to the local population with emphasis on local and native species and the species which are tolerant to pollution.	The Green belt Development Plan has been described in section 9.9 of Chapter 9. The Greenbelt and Plantation have been described in section 4.7 of Chapter 4.
31.	Impact on local transport infrastructure due to the Project should be indicated. Projected increase in truck traffic as a result of the Project in the present road network (including those outside the Project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be covered. Project Proponent shall conduct Impact of Transportation study as per Indian Road Congress Guidelines.	The impact on Traffic has been mentioned in section 4.13 of chapter 4.
32.	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.	The temporary rest shelters and mobile toilets will be provided to the mine workers.

Draft EIA Report of Surkaligaon Soapstone Mine

33.	Conceptual post mining land use and Reclamation and Restoration of mined out areas (with plans and with adequate number of sections) should be given in the EIA report.	The details have been described in section 4.1 of Chapter 4.
34.	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre- placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.	The details have been described in section 4.10 of Chapter 4.
35.	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.	Complied and Provided in EIA/EMP report
36.	Measures of socio economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.	The details have been described in section 4.9 of Chapter 4.
37.	Detailed environmental management plan (EMP) to mitigate the environmental impacts which, should inter-alia include the impacts of change of land use, loss of agricultural and grazing land, if any, occupational health impacts besides other impacts specific to the proposed Project.	The detailed Environmental Management Plan (EMP) has been described in Chapter 9.
38.	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.	This is the draft report and is being submitted for conduction of public hearing.
39.	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	No court case is pending in any court against the proposed project.
40.	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.	The budget of Environmental Management Plan has been presented in Table 9.3 of Chapter 9. The budget of CSR has been presented in Table 4.13 of Chapter 4. The budget of CER has been presented in Table 9.4 of Chapter 9.
41.	A Disaster management Plan shall be prepared and included in the EIA/EMP Report.	The detailed Disaster management Plan has been described in section 7.3 of Chapter 7.
42.	Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc.	The detailed project benefits have been described in Chapter 8.

43 Besides the above, the below mentioned general points are also to be followed:-		
(1).	Executive Summary of the EIA/EMP Report	Complied
(2).	All documents to be properly referenced with index and continuous page numbering.	Complied
(3).	Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources should be indicated.	Complied
(4).	Project Proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the MoEF&CC/NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the Project.	Complied
(5).	Where the documents provided are in a language other than English, an English translation should be provided.	Complied
(6).	The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted.	Complied
(7).	While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF&CC vide O.M. No-J-11013/41/2006-IA.II(I) dated 4th August, 2009, which are available on the website of this Ministry, should be followed	Complied
(8).	Changes, if any made in the basic scope and project parameters (as submitted in Form-I and the PFR for securing the TOR) should be brought to the attention of MoEF&CC with reasons for such changes and permission should be sought, as the TOR may also have to be altered. Post Public Hearing changes in structure and content of the draft EIA/EMP (other than modifications arising out of the P.H. process) will entail conducting the PH again with the revised documentation.	Complied
(9).	As per the circular no. J-11011/618/2010-IA.II(I) dated 30.5.2012, certified report of the status of compliance of the conditions stipulated in the environment clearance for the existing operations of the project, should be obtained from the Regional Office of Ministry of Environment, Forest and Climate Change, as may be applicable.	Complied
(10).	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 features of the adjoining area.	Complied
(11).	All pages of technical documents/EIA/EMP should be signed by the consultant and project proponent both.	Complied
(12).	The lease area, its address and production per annum should match with as mentioned in DSR and LOI. In case there is any difference classification/amendment	Complied

Draft EIA Report of Surkaligaon Soapstone Mine

	letter from competent authorities shall be submitted.	
(13).	Plan for using the mine void for productive use in consultation with local administration and gram panchayat	Complied
(14).	In case project proponent intends to temporarily mine out materials outside the mine lease area than NOC from competent authority for doing so should be submitted and details of such area and associated environmental impacts should be included in EIA EMP report this should be clearly mentioned during public hearing.	Complied
(15).	Road network to be used by the project should be clearly shown on survey of India top sheet in 1:20,000 scale. In case road network involves forest road, permission should be obtained from forest department and a copy of the same should be submitted at the time of appraisal of EIA-EMP report.	Complied
(16).	Project proponent should submit action plan for carrying out plantation at least 1000 plants/ha of lease area. In this case PP, should prepare a plan duly approved either by Forest department or Horticulture department for planting either on government land or community land within periphery of 5 Kms from the boundary of lease area along with provision for maintenance for 5 years. Survival of plants below Uttarakhand Forest Departments survival rate will be treated as violation of EC condition.	Complied
(17).	In view of the agricultural land proposed under the mining lease area, the project proponent needs to submit the cost benefit analysis composing the current agricultural production and annual turnover vis-à-vis the mineral cost and beneficiaries	Complied
(18).	To ensure proper monitoring, the project proponent/consultant should provide evidence in for of (A) Raw Data (B) Logbook of their site visit along with activities carried out during monitoring (C) Real time photographs showing monitoring machine, public, lab person etc. Proprietor/proprietor representative should be present at the time of monitoring and monitoring should be conducted as per CPCB SOP/NABET/QCI guidelines. Lab responsible person should be present at the time of EIA presentation.	Complied
(19).	EIA coordinator & FAE should give a photo affidavit during EIA presentation that they have personally visited the site & they have also taken all the mitigating measures for any critical issues involved in the project.	Complied

Draft EIA Report of Surkaligaon Soapstone Mine

(20).	The project proponent will have to inform the schedule of monitoring/data collection programme to the SEIAA, Uttarakhand before start of data collection. In case of failure, the collected baseline monitoring data will be treated as null and void.	Complied
(21).	The details of equipment used for baseline monitoring along with its photograph mentioning date, time and geo coordinates for preparation of EIA report should be clearly displayed to the people present during public hearing and the complete details related to monitoring period must be mentioned in the minutes of public hearing.	Complied
(22).	Original lab analysis report of the project proposal along with EIA report should be uploaded on Parivesh Portal.	Complied
(23).	During The EIA presentation latest KML of site pillar should be presented.	Complied
(24).	Combined KML of all mines in a cluster should be submitted at the time of EIA.	Complied
(25).	The project proponent/Consultant should identify the core & buffer zone (2.5km) of the mining site.	Complied
(26).	Agreement/Consent between project proponent and competent authority/landowner for haulage road from lease site to link road to be submitted at the time of EIA presentation.	Complied
(27).	Proponent/Consultant should submit the plan/information along with technology (photographs of water sprinklers/tankers) to be implemented for mitigating dust at source points in lease area and haulage road during operation activity/vehicular movement. Technology should be displayed at the time of EIA presentation.	Complied
(28).	Proposed plantation plan with area specific plant species, number of plants to be planted and place of plantation along with a proper map to be submitted at the time of EIA presentation.	Comply
(29).	Water requirement details along with sources of water and the permission/agreement with the concerning authority/person to be submitted at the time of EIA presentation.	Complied
(30).	Proponent/Consultant shall present TOR specific/additional conditions compliance, observation/suggestions raised during the public hearing and commitment made by the project proponent in a tabular form with a time bound plan at	Agreed and will be Complied in final EIA.

Draft EIA Report of Surkaligaon Soapstone Mine

	the time of EIA presentation.	
(31).	Corporate Social Responsibility (CSR) to be prepared as per the MoEF&CC guidelines and present it at the time of EIA presentation.	Will be Comply at the time of presentation.
(32)	The project proponent shall carry out geological stability study along with detailed flora and fauna investigation by subject specialist. The project proponent shall submit mitigation plan for avoiding the runoff and leaching of debris during the monsoon.	Agreed. and Complied in Chapter No. 3
(33)	The project proponent shall submit the compliance pertaining to the checklist provided in govt of india MoeEF&CC O.M. no- IA3-22/11/2023-IA.III(E-208230)Dated 28.04.2023	Complied
(34)	The project proponent shall obtained clearance under the Wild life (Proction) Act 1972 from the Competent authority as may be applicable.	Not Applicable As there is no Forest land, Wild Life Century and Nation Park With in 10 Km. Radius.
(35)	The Project proponent shall follow all relevant direction/orders issued by the hon'ble High court /NGT/Supreme court	Agreed
(36)	Copy of all the analysis report duly signed by analyst approved by NABL or MoEF&CC Shall be annexed with the EIA report and original analysis report should be presented at the time of presentation	Will be compiled in Final EIA Report.
(37)	MoU Signed Between the Project Proponent And the Consultant Should be Submitted.	Compiled
(38)	All pages of all document should be signed by pp& EIA Consultant	Compiled

1.4.1 Preparation of EIA

The EIA includes the following details:

- 1) Study of the reports like Geological report, Pre-Feasibility Report (PFR) or mining plan made available by the client.
- 2) Present Environmental Setting
- 3) Identification, prediction and evaluation of Anticipated Environmental Impact due to the proposed mine and related facilities.

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

- Topography and drainage,
- Climate,
- Water quality (Surface/Ground),

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

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

Chapter 1 – Introduction

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

Chapter 2 – Project Description

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

Chapter 3– Description of the Environment

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

Chapter 4 – Anticipated Environmental Impacts and Mitigation Measures

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

Chapter 5 – Analysis of Alternatives (Technology and Site)

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

Chapter 6 – Environmental Monitoring Program

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

Chapter 7 – Additional Studies

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

Chapter 8 – Project Benefits

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

Chapter 9 – Environmental Management Plan

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

Chapter 10 – Summary

This will constitute the summary of EIA Report.

Chapter 11 – Disclosure of Consultant

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

CHAPTER -II

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 2.231 ha. falling under category B1 because of NGT recent order.

S. No.	Parameters	Description
1.	Name of the Project	Surkhaligaon Soapstone Mine at, Village- Surkhaligaon, Tehsil- Dungakuri, District: Bageshwar (Uttarakhand)
2.	Location of the Project	Village- Surkhaligaon, Tehsil- Dungakuri, District: Bageshwar (Uttarakhand)
3.	Project Proponent	SHRI THAKUR SINGH GARIYA S/O MADAN SINGH GARIYA R/O-VILLAGE: KIROLI, POST- KAFLI TEHSIL & DISTT.-BAGESHWAR (U.K.)
4.	Lease Status	This is Progressive Mine Closure Plan of mining lease & State Govt. has given its consent to grant mining lease letter no1260/VII-1/12-Soapstone/16 dated 05-08-2016 for a period of 25 years
5.	Topography of Mine lease area	Agriculture Land
6.	Location of the Project	
	Khasra no.	Attached in Approved Mine Plan
	Village	Surkaligaon
	Tehsil	Dugnakuri
	District	Bageshwar (u.k)
	State	Uttrakhand
7.	Total Lease Area	2.231 ha
8.	Category of the Project	“B1”
9.	Altitude of the Area	The lease area comprises of terraced agricultural field showing undulating topography. The area has mild slope

Draft EIA Report of Surkaligaon Soapstone Mine

		towards South West directions. Seasonal nalla, dendritic pattern, first order flows towards South&South-West direction & confluence to another drainage & flows towards south east direction & finally meets river Pungar which is main catchment of the area. The rain water drain down the slope & meet the local drainages. The highest level of lease hold is 1702.30 towards northeast side, while lowest level is 1642.20mRL towards west.																																																																		
10.	Toposheet No	53O/13																																																																		
11.	Lease Area Coordinate		<table><tr><th>Pillar No</th><th>Latitude</th><th>Longitude</th></tr><tr><td>A.</td><td>29°54'51.90"N</td><td>79°57'16.74"E</td></tr><tr><td>B.</td><td>29°54'53.01"N</td><td>79°57'17.61"E</td></tr><tr><td>C.</td><td>29°54'53.07"N</td><td>79°57'18.55"E</td></tr><tr><td>D.</td><td>29°54'52.06"N</td><td>79°57'19.05"E</td></tr><tr><td>E.</td><td>29°54'52.21"N</td><td>79°57'20.15"E</td></tr><tr><td>F.</td><td>29°54'53.33"N</td><td>79°57'21.51"E</td></tr><tr><td>G.</td><td>29°54'53.27"N</td><td>79°57'22.10"E</td></tr><tr><td>H.</td><td>29°54'52.13"N</td><td>79°57'22.66"E</td></tr><tr><td>I.</td><td>29°54'50.28"N</td><td>79°57'22.05"E</td></tr><tr><td>J.</td><td>29°54'49.57"N</td><td>79°57'22.25"E</td></tr><tr><td>K.</td><td>29°54'48.90"N</td><td>79°57'21.97"E</td></tr><tr><td>L.</td><td>29°54'47.72"N</td><td>79°57'20.20"E</td></tr><tr><td>M.</td><td>29°54'48.02"N</td><td>79°57'19.63"E</td></tr><tr><td>N.</td><td>29°54'48.18"N</td><td>79°57'18.00"E</td></tr><tr><td>O.</td><td>29°54'48.51"N</td><td>79°57'17.95"E</td></tr><tr><td>P.</td><td>29°54'48.75"N</td><td>79°57'17.43"E</td></tr><tr><td>Q.</td><td>29°54'49.14"N</td><td>79°57'17.42"E</td></tr><tr><td>R.</td><td>29°54'49.90"N</td><td>79°57'18.23"E</td></tr><tr><td>S.</td><td>29°54'50.19"N</td><td>79°57'19.15"E</td></tr><tr><td>T.</td><td>29°54'50.50"N</td><td>79°57'19.14"E</td></tr></table>	Pillar No	Latitude	Longitude	A.	29°54'51.90"N	79°57'16.74"E	B.	29°54'53.01"N	79°57'17.61"E	C.	29°54'53.07"N	79°57'18.55"E	D.	29°54'52.06"N	79°57'19.05"E	E.	29°54'52.21"N	79°57'20.15"E	F.	29°54'53.33"N	79°57'21.51"E	G.	29°54'53.27"N	79°57'22.10"E	H.	29°54'52.13"N	79°57'22.66"E	I.	29°54'50.28"N	79°57'22.05"E	J.	29°54'49.57"N	79°57'22.25"E	K.	29°54'48.90"N	79°57'21.97"E	L.	29°54'47.72"N	79°57'20.20"E	M.	29°54'48.02"N	79°57'19.63"E	N.	29°54'48.18"N	79°57'18.00"E	O.	29°54'48.51"N	79°57'17.95"E	P.	29°54'48.75"N	79°57'17.43"E	Q.	29°54'49.14"N	79°57'17.42"E	R.	29°54'49.90"N	79°57'18.23"E	S.	29°54'50.19"N	79°57'19.15"E	T.	29°54'50.50"N	79°57'19.14"E		
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Draft EIA Report of Surkaligaon Soapstone Mine

			U.	29°54'49.71"N	79°57'17.51"E	
			V.	29°54'48.53"N	79°57'16.90"E	
			W.	29°54'48.08"N	79°57'16.09"E	
			X.	29°54'47.94"N	79°57'16.19"E	
			Y.	29°54'48.15"N	79°57'16.77"E	
			Z.	29°54'47.71"N	79°57'17.25"E	
			Z1	29°54'44.46"N	79°57'17.40"E	
			Z2	29°54'47.73"N	79°57'14.62"E	
			Z3	29°54'48.54"N	79°57'16.63"E	
			Z4	29°54'49.74"N	79°57'17.35"E	
			Z5	29°54'51.12"N	79°57'17.81"E	
12.	Name of the Mineral Mining	Soapstone				
13.	Method of Mining	Opencast, Semi Mechanised				
14.	Total Geological Reserve	0.102031 Million Tonnes				
15.	Mineable Reserve	0.102031 Million Tonnes				
16.	Capacity of Production	Maximum production 11414TPA				
17.	Operational days/ Year	240 Days				
18.	Total Water Requirement	5.36KLD of water will be used for the project site (Drinking use, Sprinkling & Plantation)				
19.	Source of Water	Potable tankers				
20.	Man power requirement	34 persons				
21.	Drilling / Blasting	No				
22.	Land utilization Pattern	-				
23.	Total Proposed Project Cost	Rs. 51.975 Lakhs				
24.	Proposed CER Cost	Rs. 2.59 Lakhs				
25.	EMP Expenditure	Rs 3.40 Lakhs				

2.1 DESCRIPTION OF THE PROJECT

Surkaligaon Soapstone Mine has applied mining lease for soapstone mineral. At the time of demarcation, 2.231ha area was found suitable for mining lease & recommended to grant mining lease over an area of 2.231ha

The proposed project is for mining of Soapstone from lease area and the estimated project cost is approx. Rs. 51.975 Lakhs. The mining lease has been granted to Surkaligaon Soapstone Mine

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. Ref. No.: Letter no. : 317/SEIAA dated 29 august, 2023 under (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.

2.2 NEED FOR THE PROJECT

The 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

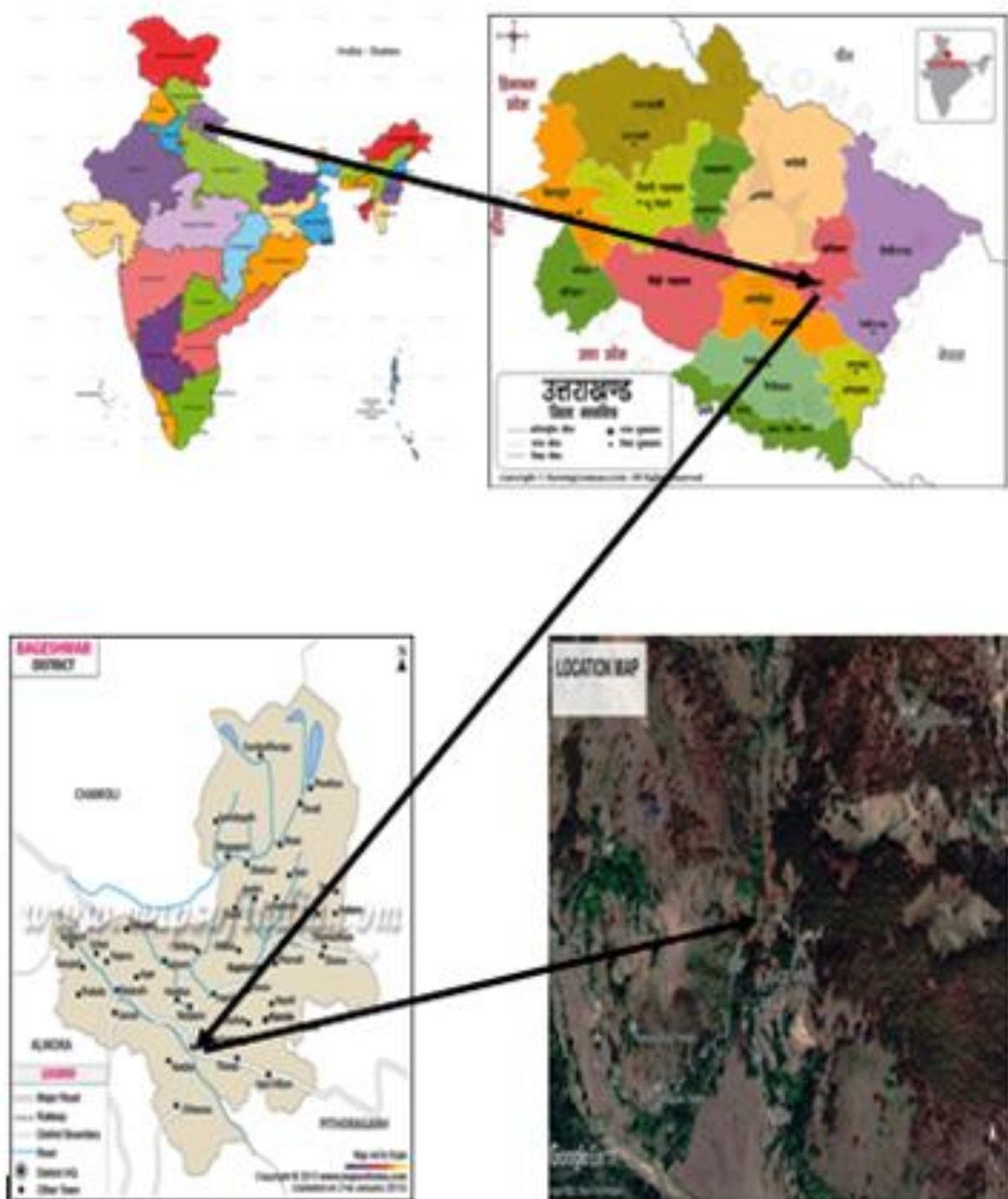
Draft EIA Report of Surkaligaon Soapstone Mine

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. Mineralis available in abundant quantity in area and can be extracted indigenously.

2.3 LOCATION DETAILS

The area lies between latitude 29°-54'-41.38" to 29°-54'-50.67" and longitude 79°-57'-8.68" to 79°-57'-17.78" Survey of India toposheet no 530/13 which is restricted.

LOCATION PLAN



Location of the proposed mining project is given in Figure 2.1 below:

Figure 2.1: Location of Project

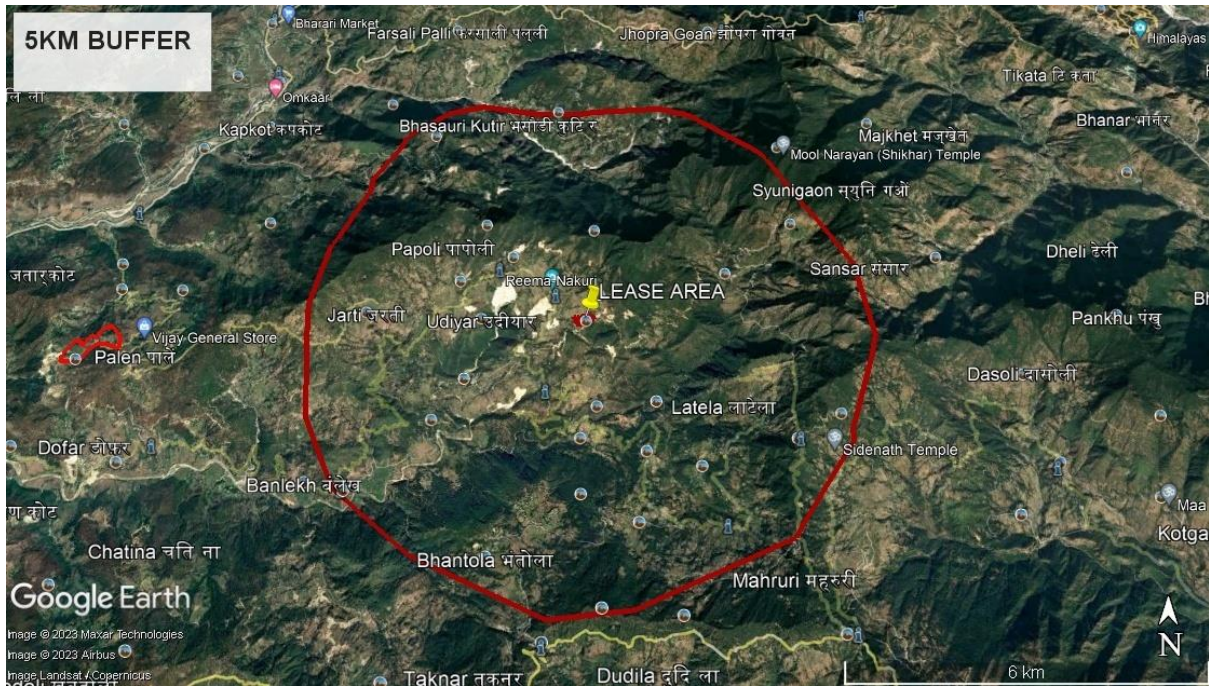


Figure 2.2: Location of Project on 5 km Google map

2.4 LEASE HOLD AREA

The proposed project is for mining of Soapstone from lease area and the estimated project cost is approx. Rs 51.975 Lakhs. The mining lease has been granted to M/s UTTRAKHAND TALC PVT. LTD.

2.5 TOPOGRAPHY & PHYSIOGRAPHY

The lease area comprises of terraced agricultural field showing undulating topography. Slope of the area varies from low to moderate & general slope of the area is towards north east. The highest level of area is 1827mRL while lowest level is 1800mRL. Seasonal drainage exists towards eastern flank of lease area & it is outside the area & flows south to north direction & meet the river Pungar which is the main catchment of the area. The area lies between latitude 29°-54'-41.38" to 29°-54'-50.67" and longitude 79°-57'-8.68" to 79°-57'-17.78" Survey of India toposheet no 530/13 which is restricted.

GEOLOGY

Surface Geological map with contour interval of 6m in the scale of 1:1000 is enclosed (Plate no.3)

Regional Geology:

The area forms the part of Calc Zone of Tejam. The stratigraphical sequence of the region as per monumental work (Geology of Lesser Himalayas; 1980 of Prof. K.S. Valdiya) is as below:

Group/Formation	Lithology
-----------------	-----------

Berinag Formation	Quartzite, Meta quartzite, Longlomerate, Phyllite
-------------------	---

~~~~~Unconformity

~~~~~

Gangolihat Dolomite Dolomite and dolomitic limestone with algal structures. Magnesite with minor talc/talcosephyllite and dolomite intercalations.

~~~~~Unconformity

~~~~~

Sor Slates Shales, Slates and Phyllites

The above sequence as observed in this region is considered to be an inverted one. Soapstone pocket occur within carbonates of Gangolihat Dolomite.

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

The lithological succession within lease area is as below:

Local Geology:

Alluvial Cover:

A thin layer of brownish colour of soil exists in the whole area. The thickness of soil varies from 0.10 m. to 0.30m. having an average thickness of 0.20m.

Below soil cover weathered dolomitic & magnesite boulders occur having an average thickness of 1.80m & same is treated as overburden/waste. Soapstone bearing with low grade Magnesite:

Draft EIA Report of Surkaligaon Soapstone Mine

Below overburden soapstone bearing strata is explored. The soapstone mineral in Kumaon Himalaya is an alteration products of magnesium bearing mineable & Soapstone occurs as pockets and sometimes confined to the upper part of the magnesium bearing zones. The mineral body occurs in irregular shape & size. The foliation in the soapstone trending 2800 to 2900, amount of dip varies 40 deg. to 45 deg. and dip direction varies 10 deg. to 20deg.

The area was degraded by mining by local villagers & depth of pit varies 6m to 8m & soapstone bearing strata was exposed in the pit. Due to interruption by Distt administration, the pits have been backfilled/reclaimed & leveled it. The pits were dug at different levels in the agricultural field & all the pits have temporarily backfilled/reclaimed. On this assumption, 8m depth from surface has been considered as proved category (excluding 2m average thickness of topsoil & overburden), 4m depth below proved category as probable. The inferred mineral resources have been calculated 4m depth below OB strata. The soapstone occurring in this area is weakly foliated, fairly compact, fine grained white to off white in color with its characteristic soapy feel. The recovery of soapstone has been considered as 40% on the basis of present exploration & mining activities in adjoining areas.

Low Grade Magnesite/Dolomitic Rock: Low grade magnesite boulders are intermixed with soapstone body. It is fine to medium grained, compact & massive well jointed & light grey to dark grey in colour & same is considered as interburden & its recovery has been taken as 60% on the basis of present exploration in the applied area & from existing mining activities in the vicinity of the area.

The Geological Plan in the scale of 1:1000 is shown in Plate No. 4. Geological section is deposited in plate no.5.

(II) Disposition of litho-units/rock types traced or inferred.

The lease area is terrace agriculture land with soil cover. The exposure of Low grade magnesite boulders are intermixed with soapstone mineralization. No contact of foot wall/hanging wall is seen in all past mining pits.

(III) Attitudes like strike and dip available in adequate numbers.

Due to the past exploration, five exploratory pits were dug in different levels & occurrence of soapstone established in each pits. The foliation plane of soapstone trending 3050 to 3100, amount of

Draft EIA Report of Surkaligaon Soapstone Mine

dip varies 40 deg. to 45 deg. and dip direction varies 35 deg. to 40deg. The strike of low grade dolomitic rock trends 2800N to 2900N, amount of dip varies 400 to 450 & dip direction varies from 10deg N to 20deg N.

(IV) Structural features such as joints, folds, faults and their attitudes.

No structural features such as joints, folds, faults etc. observed within lease area.

(V) Delineation of mineralized/ore zones with definite demarcation of observed and inferred.

Exploratory pits in shallow depth were carried out by local villagers. Due to intervention by District Administration, mining pits were backfilled & leveled it. In the mined out pit occurrence of soapstone bearing strata exists & persists in depth. On the basis of above assumption, it has been revealed. 50m horizontal extension from mining pits has been considered under G-1 & G-2 level & beyond it upto applied boundary has been considered as G3 axis. Same is marked on plate no.4. PWD road exists within applied area & 50m horizontal extension from PWD road has been considered under restricted zone for mining & same is treated as inferred mineral resources.

RESERVES

Depletion of Reserves/Resources: Quantities of soapstone were depleted from reserves. Updated estimated mineral reserves/resources in different Categories of UNFC are given below: (As on 30.06.2023)

Category	UNFC Code	Quantity in tonnes	Grade
A. Total Mineral Reserve			
Proved Mineral Reserve	111	102031	Paper & Detergent
Probable mineral Resource	121	Nil	Nil
	122	Nil	Nil
B. Total Remaining Resources			
Feasibility mineral Resource	211	113044	Paper & Detergent
Prefeasibility mineral resource	221 & 222	Nil	Nil
Measured mineral resource	331	Nil	Nil
Indicated mineral resource	332	Nil	Nil
Inferred mineral resource	333	20280	Paper & Detergent

Draft EIA Report of Surkaligaon Soapstone Mine

Reconnaissance mineral resource	334	Nil	Nil
Total Reserves + Resources		235355	

Balance (updated reserves in R&R if any (As on 30.06.2023))

Category	Updated reserves in (Tonnes)	Resources (Tonnes)
Proved Mineral Reserves (111)	102031	Nil
Probable Mineral Reserves (122)	Nil	Nil
Feasibility Mineral Resources (211)	Nil	113044
Pre-feasibility Mineral Resources (222)	Nil	Nil
Inferred Mineral Resources (333)	Nil	20280

MINING

OPEN CAST MINING:

(i) Existing Method of Mining:

It is open cast mechanized mine. An excavator is being deployed for the removal of overburden & interburden. Soapstone is being exploited manually with conventional hand tools. Dressing, breaking, sorting & sizing is being carried out at pit the pit head & different grade of soapstone is filled in 50kg plastic bags, & transported manually/mules upto road head side. From PWD road, the soapstone bags loaded manually into trucks & transported Haldwani. Mining was carried out in one pit with formation of benches. The height of benches is kept 8m to 10m, width of benches is kept 5m with face slope 85deg. At present all the working pits have been backfilled/reclaimed.

Due to past mining area degraded by one mining pit & dimension of pit is as below:

Exploratory	Length (M)	Width (M)	Depth (M)	Thickness (M)	Lithology	Status
E1	120	92	10-12	10-12.0m	Soapstone bearing with low grade magnesite	Open

Due to past mining working about 1.10ha area was degraded by mining pit and total mined out areas open. The qualitative grade of soapstone is detergent and paper. The yield of soapstone is 40% of the total excavation of soapstone.

The broad parameters of working benches:

Item	Details
i) Method of Mining	Mining operation has been proposed by mechanized open cast method.
ii) Benches parameters	The broad parameters of working benches:

Draft EIA Report of Surkaligaon Soapstone Mine

Bench Height	8-10m	
Width	5.0m	
Haul road width	6.0m	
Bench slope	85deg	
Over all Pit slope	48deg	
Maximum depth of Mining pit due to past mining activities	In pit no. E110m to 12m (from 1697mRL to 1685mRL)	
Gradient of Haul Road	1:16	
Grid reference of existing working location	Pit name	Location
	E1	In between local grid coordinates N1099to N1214& E1092 to E1202
Water table	No water table will be encountered due to proposed mining activities.	
Pumping of water	No water will accumulate in the mining pit therefore no such proposal has given for pumping water.	
Surface water management	Seasonal drainage passes within lease area & flows towards south & south-west direction. Mining activities are proposed far away from drainage & mining operations shall be temporarily suspended during monsoon period. During monsoon period all mining pits shall be backfilled, therefore there shall be no adverse impact on water on water regime. Few check dams are proposed across the drainage to settle down suspended solids if any. Cleaning of check dams & its maintenance shall be carried out regularly.	

(ii) Proposed method of Mining:

It will be open cast mechanized mine. Excavator shall be deployed for the removal of overburden & interburden. The waste (interburden) to be generated during course of mining shall be used in backfilled over mined out pit. Mining shall be carried out in one pit viz. pit I. The width of benches shall be kept 5m, height of benches shall be kept 7m with face slope 68°. The soapstone will be extracted manually with the help of crow bar, chisels, pickaxe, hammers, spade etc. Soapstone is soft mineral therefore no drilling & blasting shall be required. No further beneficiation will be required except breaking & sorting. The different grade of soapstone will be filled into 50 kg plastic bags & transported up to road side by manually. From road side the soapstone bags will be loaded into trucks through manually and transported to Haldwani. Copy of machine permission from DGMS is enclosed as **Annexure No. 18**.

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

Mining shall be carried out in one pit viz pit I. Bench height will be kept 5.0m width of benches shall be kept 7.0m with face slope 68°.

Draft EIA Report of Surkaligaon Soapstone Mine

Development work will be construction of foot track to different working benches and removal of the top soil. Seasonal nalla & habitation are far away from proposed mining pits. Mined out pit shall be back filled before the commencement of monsoon therefore there shall be no adverse impact on habitation due to mining activities.

In future no mining & allied activities shall be carried out within 7.5m barrier zone. Gravity retaining walls having width & height 1.5m & 1.0m shall be provided at the base of waste dump.

All quantities of waste material to be generated each year shall be dumped within lease area secured with Gravity retaining wall.

The broad parameters of working benches:

Item	Details
i) Method of Mining	Mining operation has been proposed by mechanized open cast method.
ii) Benches parameters	The broad parameters of working benches:
Bench Height	5.0m
Width	7.0m
Haul road width	6.0m
Bench slope	68deg
Over all Pit slope	34deg
Overall depth of mine during plan period	24m
Gradient of Haul Road	1:16
Grid reference of proposed working location	Pit I will be in between local coordinates N1099 to N1215 & E1090 to E1202
Water table	No water table will be encountered due to proposed mining activities.
Pumping of water	No water will accumulate in the mining pit therefore no such proposal has been given for pumping water.
Surface water management	Seasonal drainage exists within the lease area & flows south east, direction. Mining activities are proposed far away from drainage & mining operations shall be temporarily suspended during monsoon period. During monsoon period all mining pits shall be backfilled, therefore there shall be no adverse impact on water on water regime.

Gravity retaining wall having width 1.5m & height 1.0m shall also be erected at the base of backfilled pit and at the base & side of dump.

The year wise schedule of completion of activities is as below:

Pit-I

Draft EIA Report of Surkaligaon Soapstone Mine

Activities	2023-24	2024-25	2025-26	2026-27	2027-28
i) Gravity Retaining Wall at the base of dump	90m	To be Maintained	To be Maintained	To be Maintained	To be Maintained
ii) Gravity Retaining Wall at the sides of dump	50m	To be Maintained	To be Maintained	To be Maintained	To be Maintained
iii) Gravity Retaining wall at the base of backfilled pit	50m	50m	50m	50m	50m

(iii) **Last five Year production Target & achievement:**

Year	Proposed production as approved Mining Plan (Tonnes)	Production Achieved (tonnes)
2018-19	9683	3491.90
2019-20	9788	2670.00
2020-21	10191	12044.37
2021-22	10685	5046.00
2022-23	11505	7522.63
Total	51852	30774.9

Copy of Production details for 2018-19 to 2022-23 is enclosed as **Annexure no.15**.

Geotechnical Studies:-Geotechnical Studies like slope failure, slip failure, rock failure etc. shall be carried out yearly. The retaining wall having proper shape & size shall be erected considering all technical parameters.

The width of benches shall kept 7m height of benches shall be kept 5.0m& slope of faces shall be kept 68°. Approach road having width 6.0m gradient 1:16 shall be provided to connect each mining faces. In Pit I, mining faces shall advance towards east&north east direction & alignment of faces by & large North Southdirection. Interburden to be generated from pit I during next five years shall be backfilled over mined out pit. Initially interburden will be filled in the mined out pit & lateral on soil shall be spread over it, to restore to its maximum original topography. After backfilling the mined out area shall be used for agriculture purpose. Therefore no proposal has been envisaged for separate dumping of waste material.

Extent of Mechanization:

Excavator shall be deployed to remove the interburden& dump on dumping ground. For the breaking of hard rock/boulders, rock breaker shall be used.

The make & model of excavator is as below:

Machinery	Bucket Capacity	Aron length	Boom length	No. of units
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Draft EIA Report of Surkaligaon Soapstone Mine

Excavator	1.5cum	2.85m	3mm	2 nos
Rock Breaker	1mtr length		Dia 6"	1 nos

Mining activities shall be carried out in one shift only & excavator/rock breaker shall be deployed from 8.0am to 5.0pm in day time.

Future proposal of mining is given in one pit and 0.562m fresh area shall be broken due to mining pit during next five years & out of this 0.419m area shall be backfilled/reclaimed.

The ultimate depression with respect to original topography shall be 2m to 2.5m. 0.157ha area shall be occupied by waste dump.

The total year wise quantities of soapstone & waste generated from Pit-I, is tabulated below:

YEAR	quantities of soapstone in (tonnes)	Waste (Cum)
2023-24	11132	6422
2024-25	11145	6430
2025-26	11178	6449
2026-27	11356	6552
2027-28	11414	6586
Total	56225	32439

(iv) **Proposed four year production target:**

The year wise production schedule of soapstone from different benches in different pits are given below:

Year (2023-24)

Bench Level (mRL)	Top Soil (m)	Bench Area (m2)		Face length (m)	Volume (Cum)			Quantities of Soapstone (Tonnes)	Total Waste (Cum)
		OB	SBS		t/s	OB	SBS		
1665	0	0	78	68	0	0	5304	5516	3182
1660	0	0	108	50	0	0	5400	5616	3240
							10704	11132	6422

Year (2024-25)

Bench Level (mRL)	Top Soil (m)	Bench Area (m2)		Face length (m)	Volume (Cum)			Quantities of Soapstone (Tonnes)	Total Waste (Cum)
		OB	SBS		t/s	OB	SBS		
1670	0	0	46	70	0	0	3220	3349	1932

Draft EIA Report of Surkaligaon Soapstone Mine

1665	0	0	44	64	0	0	2816	2929	1690
1660	0	0	78	60	0	0	4680	4867	2808
Total							10706	11145	6430

Year (2025-26)

Bench Level (mRL)	Top Soil (m)	Bench Area (m2)		Face length (m)	Volume (Cum)			Quantities of Soapstone (Tonnes)	Total Waste (Cum)
		OB	SBS		t/s	OB	SBS		
1675	0	0	48	78	0	0	3744	3894	2246
1670	0	0	36	68	0	0	2448	2546	1469
1665	0	0	50	70	0	0	3500	3640	2100
1660	0	0	22	48	0	0	1056	1098	634
Total							10748	11178	6449

Year (2026-27)

Bench Level (mRL)	Top Soil (m)	Bench Area (m2)		Face length (m)	Volume (Cum)			Quantities of Soapstone (Tonnes)	Total Waste (Cum)
		OB	SBS		t/s	OB	SBS		
1675	0	0	50	78	0	0	3900	4056	2340
1670	0	0	38	70	0	0	2660	2766	1596
1665	0	0	50	68	0	0	3400	3536	2040
1660	0	0	24	40	0	0	960	998	576
Total							10920	11356	6552

Year (2027-28)

Bench Level (mRL)	Top Soil (m)	Bench Area (m2)		Face length (m)	Volume (Cum)			Quantities of Soapstone (Tonnes)	Total Waste (Cum)
		OB	SBS		t/s	OB	SBS		
1675	0	0	51	78	0	0	3978	4137	2387
1670	0	0	39	70	0	0	2730	2839	1638
1665	0	0	52	66	0	0	3432	3569	2059
1660	0	0	22	38	0	0	836	869	502
Total							10976	11414	6586

WATER SUPPLY

There will be very little requirement of water is anticipated to carry out operations as it will be done in Semi-mechanized/ (OTFM) using EMM and Loaders manner. The water will be required either for drinking purposes or for dust suppression. It is projected that approx 18 laborers will be required for the proposed project. Considering the fresh water requirement for site laborers it is estimated that 0.27 KLD water will be required. Apart. Thus, Total water requirement of 5.36KLD will be met through nearby existing borewells/ private water tankers.

Infrastructure:

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

Manpower Requirement:

The manpower requirement for the proposed project will be around 25. Apart from these the local manpower may also be required for excavation, transportation and loading/unloading in dumpers/trucks/trolleys.

Employment Potential/Mine Management Plan:

The details of personnel to be employed are given below:

Managerial Staff:

1. Mine Manager (Full time) = 1 no.

(Having minimum five years of professional experience of working in supervisory category in the field of mining)

2. Geologist (Full time) = 1 no.

Draft EIA Report of Surkaligaon Soapstone Mine

(Having minimum five years of professional experience of working in supervisory category in the field of mining)

3. Skilled workers = 2 nos.

4. Unskilled workers = 14

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

OTHER MINE LEASE PRESENT WITHIN THE STUDY AREA

Cluster certificate is enclosed as Annexure 9 showing 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 Soapstone Mining Project located at Village- Surkhaligaon, Tehsil- Dungakuri, 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 April 2023 to June 2023 (pre Monsoon Season).

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 Noida Testing Laboratories, Gt-20, Sector -117, Noida- 201301 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.

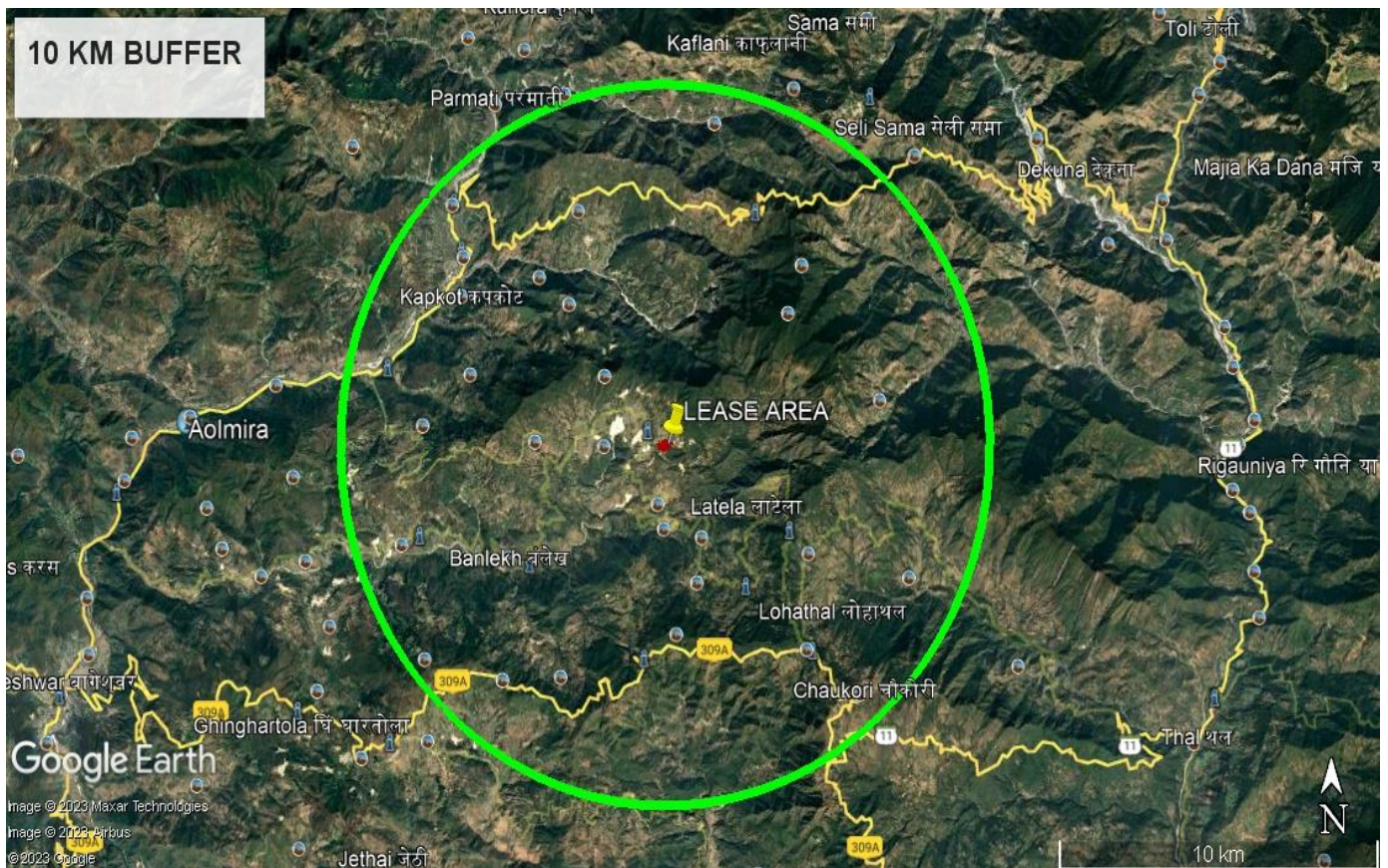


Fig 3.1: Study Area Map (10 Km. Radius)

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 field showing undulating topography. The area has mild slope towards South West directions. Seasonal nalla, dendritic pattern, first order flows towards South&South-West direction & confluence to another drainage & flows towards south east direction & finally meets river Pungar which is main catchment of the area. The rain water drain down the slope & meet the local drainages. The highest level of lease hold is 1702.30 towards northeast side, while lowest level is 1642.20mRL towards west.

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 msl) 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 3.1 and Fig. 3.2 shown below mentioned the total land use cover of the study area.

Table 3.1 Shows Land Use Pattern of the Study Area

Landuse/Landcover	Area (Ha)
River/Stream	435.18
Forest, Evergreen	16523.26
Grass/Grazing	295.31
Forest, Scrub	1343.22
Forest, Deciduous	715.12
Built-up, Mining	316.38
Agriculture, Plantation	7546.41
Agriculture, Fallow	2504.74
Barren, Scrub Land	1331.46
Built up, Urban	332.15
Built up Rural	77.27
TOTAL	31420.49

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 PM₁₀, PM_{2.5}, SO₂, NO₂ with the sampling frequency of twice a week at each station for a study period of 3 months (April to June 2023).

a. Wind Rose Diagram

Description of monitoring sampling locations
Duration: April 2023 to June 2023

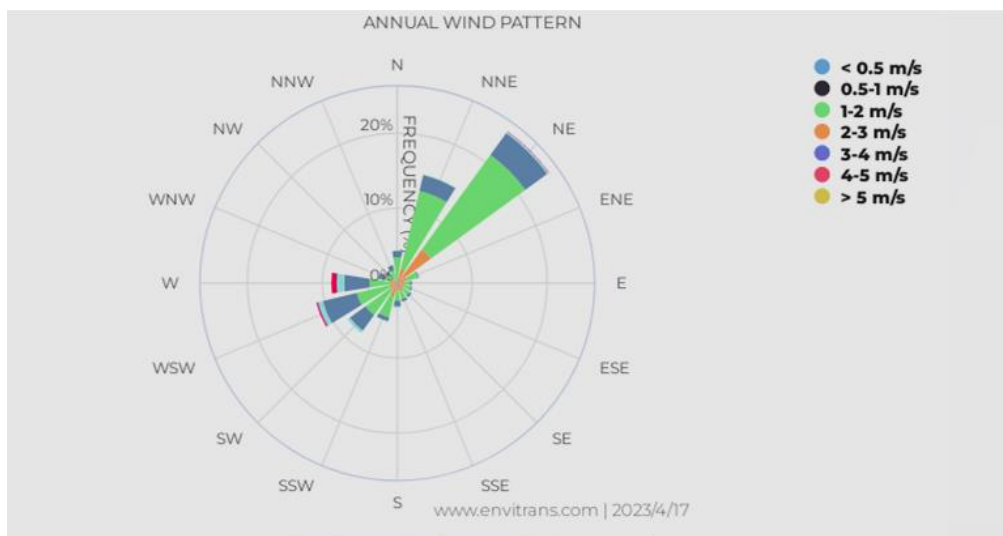


Figure 3.3: Wind Profile of the Study Area

Observations:

The prominent seasonal wind directions are NE & SW 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 3.2(i)**:

Table 3.2(i): Methods adopted for PM_{2.5}, PM₁₀, SO₂ and NO_x (as NO₂)

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 PM₁₀ and PM_{2.5} respectively. Gaseous pollutants like SO₂, and NO_x 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 PollutionControl 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.

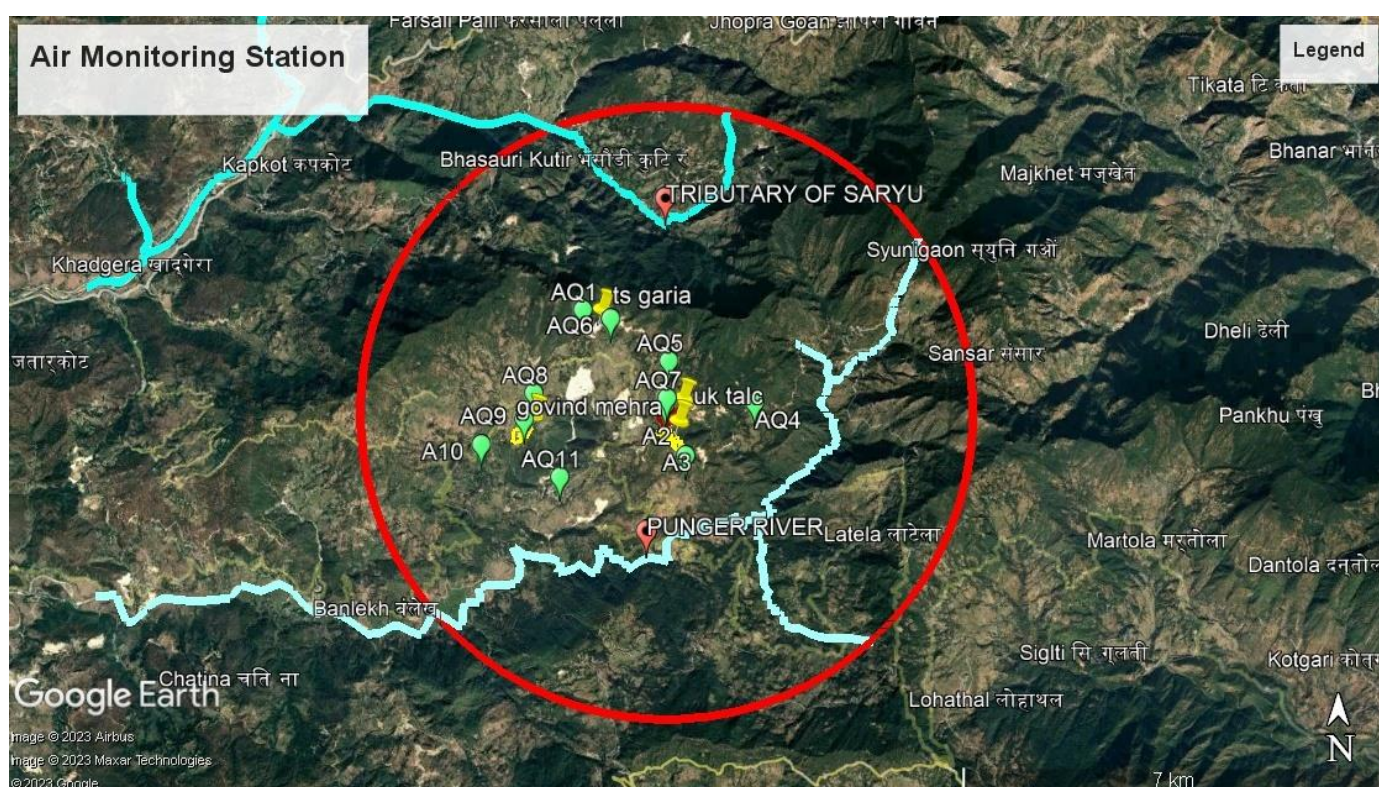
The ambient air quality data were collected from various locations as per details given in **Table**

(ii) to find the existing GLC in the study area. The baseline ambient air quality data obtainedfrom above from study area is depicted in **Table No. 3.2 (iii)**

Table 3.2 (ii)
Description of Air Quality monitoring sampling locations

Location Code	Station Name	Distance and Direction from the lease area	
AQ1	Project Site- (T.S. Garia Lease)	-	-
AQ2	At Govind Mehra Lease	100 m	S
AQ3	Maholi	0.960 km	S
AQ4	Baikori	1.46 km	E
AQ5	Wafilagaon Talla	700 m	N
AQ6	Near Gairssaneti	1.64 km	NW
AQ7	Near at UK Talc Lease	2.01 km	NW
AQ8	Near Udiyar	2.20 km	W
AQ9	Near D.S. Garia lease	2.38km	SW
AQ10	Near Rangdeo at Joshiji Home	3.15 km	SW
AQ11	Oliyagon	2.12 km	SW

Fig: 3.4- Air quality monitoring location



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Table 3.2 (iii): Ambient Air Quality Status

Location		Particulate Matter	Particulate Matter	Sulphur Dioxide SO ₂ (µg /m ³)	Nitrogen Dioxide NO ₂ (µg /m ³)	Carbon monoxide CO (mg /m ³)
		PM10 (µg /m ³)	PM2.5 (µg /m ³)			
		IS:5182 (P-23)	IS:5182(P-24)			
AQ1	Minimum	80.26	39.98	10.60	20.15	0.38
	Maximum	89.61	57.61	12.53	22.35	0.62
	Average	83.48	43.20	11.62	21.26	0.54
	98 th Percentile	89.10	56.66	12.53	22.35	0.61
AQ2	Minimum	80.25	39.98	10.53	19.37	0.38
	Maximum	89.60	80.10	12.69	22.35	1.01
	Average	83.55	44.11	11.63	21.12	0.58
	98 th Percentile	89.60	69.75	12.63	22.14	0.89
AQ3	Minimum	80.25	39.98	10.53	20.10	0.38
	Maximum	89.60	57.60	12.52	22.35	0.62
	Average	84.53	44.16	11.58	21.08	0.52
	98 th Percentile	89.60	57.60	12.52	22.35	0.61
AQ4	Minimum	78.75	40.15	10.55	20.10	0.45
	Maximum	84.65	57.60	13.78	21.90	0.90
	Average	80.86	42.80	12.14	21.22	0.67
	98 th Percentile	84.24	54.36	13.77	21.90	0.88
AQ5	Minimum	80.25	39.98	10.53	20.10	0.38
	Maximum	89.60	57.60	12.52	22.35	0.75
	Average	84.49	43.14	11.63	21.06	0.53
	98 th Percentile	89.60	57.60	12.52	22.14	0.70
AQ6	Minimum	79.80	39.98	10.53	20.10	0.38
	Maximum	89.60	57.60	12.52	22.35	0.75
	Average	82.98	43.78	11.53	21.14	0.53
	98 th Percentile	89.09	56.66	12.52	22.35	0.68
AQ7	Minimum	78.75	39.98	10.53	20.10	0.42
	Maximum	84.80	57.60	13.78	22.35	0.90
	Average	81.67	43.19	11.76	21.01	0.62
	98 th Percentile	84.73	56.66	13.38	22.35	0.88
AQ8	Minimum	78.75	39.98	10.53	20.10	0.42
	Maximum	84.80	57.60	13.78	22.35	0.90
	Average	81.67	43.19	11.76	21.01	0.62
	98 th Percentile	84.73	56.66	13.38	22.35	0.88
AQ9	Minimum	80.26	39.98	10.60	20.15	0.38
	Maximum	89.61	57.61	12.53	22.35	0.62
	Average	83.48	43.20	11.62	21.26	0.54
	98 th Percentile	89.10	56.66	12.53	22.35	0.61

AQ10	Minimum	79.85	39.98	10.53	20.15	0.42
	Maximum	84.80	57.60	13.78	22.35	0.90
	Average	82.07	44.22	11.65	21.05	0.58
	98 th Percentile	84.73	56.66	13.38	22.35	0.85
AQ11	Minimum	79.35	39.98	10.55	20.10	0.45
	Maximum	89.60	57.60	13.78	21.90	0.90
	Average	82.94	42.45	12.09	21.22	0.66
	98 th Percentile	89.60	54.36	13.77	21.90	0.88

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 3.3 (i) and the physico-chemical analysis of the water samples is given in the **Table 3.3 (ii)**.

Table 3.3 (i) Ground water sampling locations

Location Code	Station Name	Distance and Direction from the lease area	
		Distance	Direction
GWQ1	Wafillagaon	1.31	SE
GWQ2	Reema	1.34 m	SE
GWQ3	Maholi	2.62km	SE

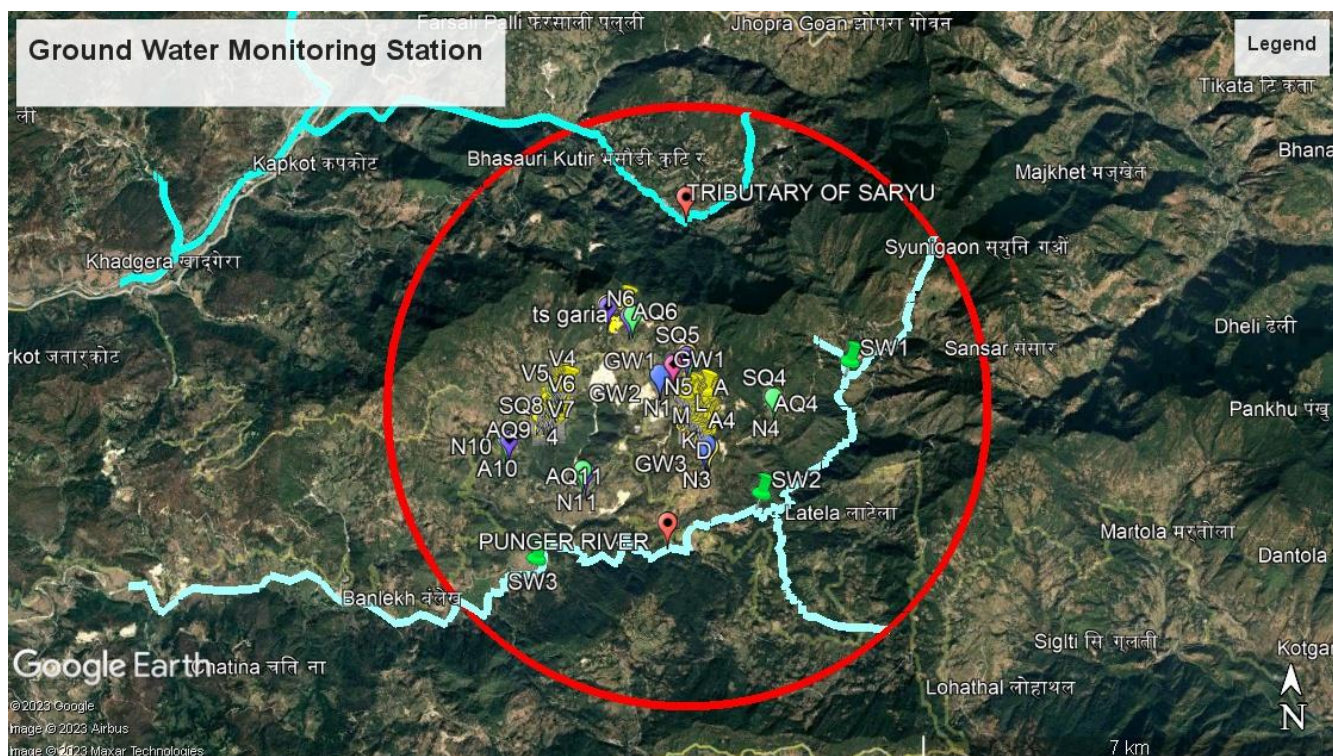


Fig: 3.5 - Ground water quality monitoring location

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Table: 3.3 (ii) Ground water Monitoring Result

S. No.	Parameter	Test Method	TEST RESULTS (as per IS 10500:2012)					
			Results			Units	Acceptable Limit	Permissible Limit in the Absence of Alternate Source
			W-1	W-2	W-3			
1	pH	IS:3025(Part-11)	7.25	7.37	7.25	-	6.5-8.5	-
2	Colour	IS:3025(Part-04)	<5.0	<5.0	<5.0	Hazen	5	15
3	Odour	IS:3025(Part-05)	Agreeable	Agreeable	Agreeable	-	Agreeable	Agreeable
4	Taste	IS:3025(Part-07)	Agreeable	Agreeable	Agreeable	-	Agreeable	Agreeable
5	Turbidity	IS:3025(Part-10)	<1.0	<1.0	<1.0	NTU	1	5
6	Total Hardness (as CaCO ₃)	IS:3025(Part-21)	146	157	125	mg/l	200	600
7	Calcium(as Ca)	IS:3025(Part-40)	20.85	24.25	17.65	mg/l	75	200
8	Magnesium(as Mg)	IS:3025(Part-46)	22.49	23.48	19.64	mg/l	30	100
9	Chloride(as Cl)	IS:3025(Part-32)	75	85	72	mg/l	250	1000
10	Iron(as Fe)	IS:3025(Part-53)	0.085	0.088	0.080	mg/l	0.3	No Relaxation
11	Fluoride(as F)	IS:3025(Part-60)	0.35	0.42	0.29	mg/l	1	1.5
12	Free Residual chlorine	IS:3025(Part-26)	<0.1	<0.1	<0.1	mg/l	0.2	1
13	Total Dissolved Solid	IS:3025(Part-16)	397	415	379	mg/l	500	2000
14	Phenolic Compound (as C ₆ H ₅ OH)	IS:3025(Part-43)	<0.001	<0.001	<0.001	mg/l	0.001max	0.002 Max
15	Anionic Detergents (as MBAS)	Annex K of IS 13428	<0.1	<0.1	<0.1	mg/l	0.2	1.0
16	Sulphate (as SO ₄)	IS:3025(Part-24)	15.5	17.8	14.3	mg/l	200	400
17	Nitrate (as NO ₃)	IS: 3025 (Part-34)	1.76	1.99	1.67	mg/l	45	No Relaxation
18	Alkalinity(as CaCO ₃)	IS:3025(Part-23)	153	167	145	mg/l	200	600

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19	Chloramines (as Cl ₂)	IS:3025(Part-26)	< 1.0	< 1.0	< 1.0	mg/l	4	No Relaxation
20	Cadmium (as Cd)	IS:3025(Part-41)	<0.001	<0.001	<0.001	mg/l	0.003	No Relaxation
21	Lead (as Pb)	IS:3025(Part-47)	<0.01	<0.01	<0.01	mg/l	0.01	No Relaxation
22	Total Chromium (as Cr)	IS:3025(Part-52)	<0.01	<0.01	<0.01	mg/l	0.05	No Relaxation
23	Copper (as Cu)	IS:3025(Part-42)	<0.01	<0.01	<0.01	mg/l	0.05	1.5
24	Total Ammonia	IS: 3025 (Part-34)	<0.5	<0.5	<0.5	mg/l	0.5	No Relaxation
25	Nickel (as Ni)	IS:3025(Part-54)	<0.01	<0.01	<0.01	mg/l	0.02	0.2
26	Zinc (as Zn)	IS:3025(Part-49)	0.164	0.188	0.148	mg/l	5	15
27	Manganese (as Mn)	IS:3025(Part-59)	<0.1	<0.1	<0.1	mg/l	0.1	0.3
28	Boron (as B)	IS:3025(Part-57)	<0.1	<0.1	<0.1	mg/l	0.5	1
29	Selenium (Se)	IS:3025(Part-56)	<0.01	<0.01	<0.01	mg/l	0.01	No Relaxation
30	Arsenic (as As)	IS:3025(Part-37)	<0.01	<0.01	<0.01	mg/l	0.01	0.05
31	E. Coli	IS-1622:1981	N.D. (<2)	N.D. (<2)	N.D. (<2)	E.Coli / 100ml	Shall not be detectable in100 ml sample	
32	Total Coliform	IS-1622:1981	Absent	Absent	Absent	MPN / 100ml	Shall not be detectable in100 ml sample	

(b) Surface Water- Two surface water samples were collected from the Pungar River & Pungar River. The location of surface water quality sampling & physico-chemical analysis of the water samples is given in the **Table 3.3 (iii)& Table 3.3 (iv)** respectively.

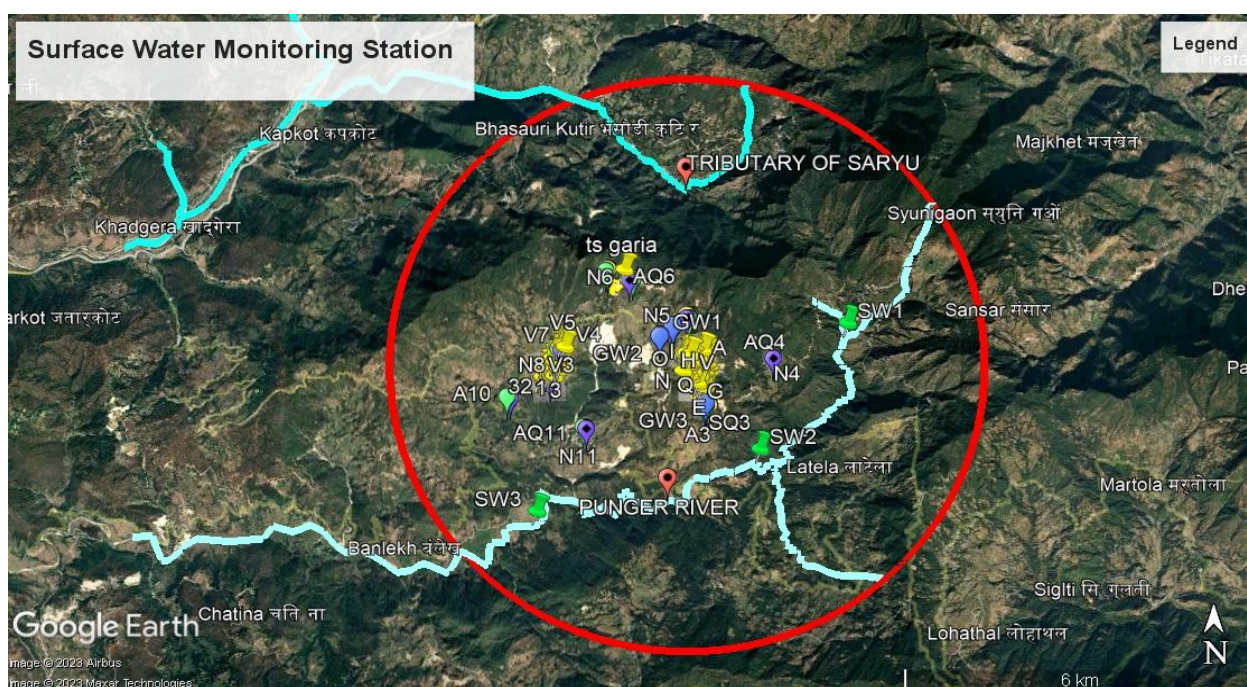
Table 3.3(iii): Location of surface water quality sampling

Description of Surface water Quality monitoring sampling locations

Location	Station Name	Distance and Direction from the lease area (Km)	
SW1	Pungar River (Upstream)	4.10	SE
SW2	Pungar River	3.25	SE
SW3	Pungar River	4.28	SW

Fig: 3.6 - Surface water quality monitoring location

Table: 3.3 (iv) Surface Water Monitoring Result (Pungar River)



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TEST RESULTS									
SWQ1									
S. No.	Parameter	Test Method	Results	Units	Tolerance Limit as per IS:2296				
					Class A	Class B	Class C	Class D	Class E
1	pH	IS:3025(Part-11)	7.35	-	6.5-8.5	6.5-8.5	6.5-8.5	6.5-8.5	6.5-8.5
2	Temperature	IS:3025(Part-09)	18.8	°C	-	-	-	-	-
3	Turbidity	IS:3025(Part-10)	<1.0	NTU	-	-	-	-	-
4	Conductivity @25°C	IS:3025(Part-14)	445	µs/cm	-	-	-	1000	2250
5	Total Suspended Solid	IS:3025(Part-17)	<1.0	mg/l	-	-	-	-	-
6	Total Alkalinity (as CaCO ₃)	IS:3025(Part-23)	72.5	mg/l	-	-	-	-	-
7	Biological Oxygen Demand (Max.) (at 270C for 3 days)	IS:3025(Part-44)	<2.0	mg/l	2	3	3	-	-
8	Dissolved Oxygen (as O ₂) Min.	IS:3025(Part-38)	7.5	mg/l	6	5	4	4	-
9	Calcium(as Ca)	IS:3025(Part-40)	25.8	mg/l	80	-	-	-	-
10	Magnesium(as Mg)	IS:3025(Part-46)	4.88	mg/l	24	-	-	-	-
11	Chloride(as Cl),Max	IS:3025(Part-32)	68.5	mg/l	250	-	-	-	600
12	Iron(as Fe),Max	IS:3025(Part-53)	0.15	mg/l	0.3	-	50	-	-
13	Fluoride(as F),Max	IS:3025(Part-60)	0.65	mg/l	1.5	1.5	1.5	-	-
14	Total Dissolved Solid	IS:3025(Part-16)	295	mg/l	500	-	1500	-	2100
15	Total Hardness (as CaCO ₃)	IS:3025(Part-21)	84.5	mg/l	300	-	-	-	-
16	Sulphate (as	IS:3025(Part-24)	22.5	mg/l	400	-	400	-	1000

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	SO ₄)Max								
17	Phosphate (as P)	IS:3025(Part-31)	<0.2	mg/l	-	-	-	-	-
18	Sodium (as Na)	IS:3025(Part-45)	16.8	mg/l	-	-	-	-	-
19	Manganese (as Mn)	IS:3025(Part-59)	<0.1	mg/l	0.5	-	-	-	-
20	Total Chromium (as Cr)	IS:3025(Part-52)	<0.05	mg/l	0.05	0.05	0.05	-	-
21	Zinc (as Zn)	IS:3025(Part-49)	0.285	mg/l	15	-	15	-	-
22	Potassium (as K)	IS:3025(Part-45)	1.98	mg/l	-	-	-	-	-
23	Nitrate (as NO ₃),Max	IS: 3025 (Part-34)	<0.5	mg/l	20	-	50	-	-
24	Cadmium (as Cd)	IS-3025(Part-41)	<0.01	mg/l	0.01	-	0.01	-	-
25	Lead (as Pb)	IS:3025(Part-47)	<0.01	mg/l	0.1	-	0.1	-	-
26	Copper (as Cu)	IS:3025(Part-42)	<0.01	mg/l	1.5	-	1.5	-	-
27	Chemical Oxygen Demand (asO ₂)	IS-3025(Part-58)	<4.0	mg/l	-	-	-	-	-
28	Arsenic (as As)	IS:3025(Part-37)	<0.01	mg/l	0.05	0.2	0.2	-	-
29	Total Coli Form	IS:1622	12	MPN/ 100m l	50	500	5000	-	-

TEST RESULTS									
SWQ2									
S. No.	Parameter	Test Method	Results	Units	Tolerance Limit as per IS:2296				
					Class A	Class B	Class C	Class D	Class E
1	pH	IS:3025(Part-11)	7.40	-	6.5-8.5	6.5-8.5	6.5-8.5	6.5-8.5	6.5-8.5
2	Temperature	IS:3025(Part-09)	19.35	°C	-	-	-	-	-
3	Turbidity	IS:3025(Part-10)	<1.0	NTU	-	-	-	-	-
4	Conductivity @25°C	IS:3025(Part-	456.5	µs/c	-	-	-	1000	2250

Draft EIA Report of Surkaligaon Soapstone Mine

		14)		m.					
5	Total Suspended Solid	IS:3025(Part-17)	<1.0	mg/l	-	-	-	-	-
6	Total Alkalinity (as CaCO ₃)	IS:3025(Part-23)	76.5	mg/l	-	-	-	-	-
7	Biological Oxygen Demand (Max.) (at 270C for 3 days)	IS:3025(Part-44)	<2.0	mg/l	2	3	3	-	-
8	Dissolved Oxygen (as O ₂) Min.	IS:3025(Part-38)	6.8	mg/l	6	5	4	4	-
9	Calcium(as Ca)	IS:3025(Part-40)	27.3	mg/l	80	-	-	-	-
10	Magnesium(as Mg)	IS:3025(Part-46)	5.87	mg/l	24	-	-	-	-
11	Chloride(as Cl),Max	IS:3025(Part-32)	74.15	mg/l	250	-	-	-	600
12	Iron(as Fe),Max	IS:3025(Part-53)	0.17	mg/l	0.3	-	50	-	-
13	Fluoride(as F),Max	IS:3025(Part-60)	0.69	mg/l	1.5	1.5	1.5	-	-
14	Total Dissolved Solid	IS:3025(Part-16)	312	mg/l	500	-	1500	-	2100
15	Total Hardness (as CaCO ₃)	IS:3025(Part-21)	92.11	mg/l	300	-	-	-	-
16	Sulphate (as SO ₄)Max	IS:3025(Part-24)	24.7	mg/l	400	-	400	-	1000
17	Phosphate (as P)	IS:3025(Part-31)	<0.2	mg/l	-	-	-	-	-
18	Sodium (as Na)	IS:3025(Part-45)	17.5	mg/l	-	-	-	-	-
19	Manganese (as Mn)	IS:3025(Part-59)	<0.1	mg/l	0.5	-	-	-	-
20	Total Chromiun (as Cr)	IS:3025(Part-52)	<0.05	mg/l	0.05	0.05	0.05	-	-
21	Zinc (as Zn)	IS:3025(Part-49)	0.297	mg/l	15	-	15	-	-
22	Potassium (as K)	IS:3025(Part-45)	2.09	mg/l	-	-	-	-	-
23	Nitrate (as NO ₃),Max	IS: 3025 (Part-34)	<0.5	mg/l	20	-	50	-	-
24	Cadmium (as Cd)	IS-3025(Part-41)	<0.01	mg/l	0.01	-	0.01	-	-
25	Lead (as Pb)	IS:3025(Part-47)	<0.01	mg/l	0.1	-	0.1	-	-

Draft EIA Report of Surkaligaon Soapstone Mine

26	Copper (as Cu)	IS:3025(Part-42)	<0.01	mg/l	1.5	-	1.5	-	-
27	Chemical Oxygen Demand (asO ₂)	IS-3025(Part-58)	<4.0	mg/l	-	-	-	-	-
28	Arsenic (as As)	IS:3025(Part-37)	<0.01	mg/l	0.05	0.2	0.2	-	-
29	Total Coli Form	IS:1622	17.5	MPN/ 100m l	50	500	5000	-	-

TEST RESULTS									
SWQ3									
S. No.	Parameter	Test Method	Results	Units	Tolerance Limit as per IS:2296				
					Class A	Class B	Class C	Class D	Class E
1	pH	IS:3025(Part-11)	7.39	-	6.5-8.5	6.5-8.5	6.5-8.5	6.5-8.5	6.5-8.5
2	Temperature	IS:3025(Part-09)	18.8	°C	-	-	-	-	-
3	Turbidity	IS:3025(Part-10)	<1.0	NTU	-	-	-	-	-
4	Conductivity @25°C	IS:3025(Part-14)	429	µs/cm.	-	-	-	1000	2250
5	Total Suspended Solid	IS:3025(Part-17)	<1.0	mg/l	-	-	-	-	-
6	Total Alkalinity (as CaCO ₃)	IS:3025(Part-23)	64.12	mg/l	-	-	-	-	-
7	Biological Oxygen Demand (Max.) (at 270C for 3 days)	IS:3025(Part-44)	<2.0	mg/l	2	3	3	-	-
8	Dissolved Oxygen (as O ₂) Min.	IS:3025(Part-38)	7.13	mg/l	6	5	4	4	-
9	Calcium(as Ca)	IS:3025(Part-40)	24.15	mg/l	80	-	-	-	-
10	Magnesium(as Mg)	IS:3025(Part-	3.92	mg/l	24	-	-	-	-

Draft EIA Report of Surkaligaon Soapstone Mine

		46)							
11	Chloride(as Cl),Max	IS:3025(Part-32)	71.6	mg/l	250	-	-	-	600
12	Iron(as Fe),Max	IS:3025(Part-53)	0.13	mg/l	0.3	-	50	-	-
13	Fluoride(as F),Max	IS:3025(Part-60)	0.56	mg/l	1.5	1.5	1.5	-	-
14	Total Dissolved Solid	IS:3025(Part-16)	283	mg/l	500	-	1500	-	2100
15	Total Hardness (as CaCO ₃)	IS:3025(Part-21)	76.55	mg/l	300	-	-	-	-
16	Sulphate (as SO ₄)Max	IS:3025(Part-24)	17.16	mg/l	400	-	400	-	1000
17	Phosphate (as P)	IS:3025(Part-31)	<0.2	mg/l	-	-	-	-	-
18	Sodium (as Na)	IS:3025(Part-45)	15.95	mg/l	-	-	-	-	-
19	Manganese (as Mn)	IS:3025(Part-59)	<0.1	mg/l	0.5	-	-	-	-
20	Total Chromiun (as Cr)	IS:3025(Part-52)	<0.05	mg/l	0.05	0.05	0.05	-	-
21	Zinc (as Zn)	IS:3025(Part-49)	0.245	mg/l	15	-	15	-	-
22	Potassium (as K)	IS:3025(Part-45)	1.85	mg/l	-	-	-	-	-
23	Nitrate (as NO ₃),Max	IS: 3025 (Part-34)	<0.5	mg/l	20	-	50	-	-
24	Cadmium (as Cd)	IS-3025(Part-41)	<0.01	mg/l	0.01	-	0.01	-	-
25	Lead (as Pb)	IS:3025(Part-47)	<0.01	mg/l	0.1	-	0.1	-	-
26	Copper (as Cu)	IS:3025(Part-42)	<0.01	mg/l	1.5	-	1.5	-	-
27	Chemical Oxygen Demand (asO ₂)	IS-3025(Part-58)	<4.0	mg/l	-	-	-	-	-
28	Arsenic (as As)	IS:3025(Part-37)	<0.01	mg/l	0.05	0.2	0.2	-	-
29	Total Coli Form	IS:1622	15.5	MPN/100ml	50	500	5000	-	-

Observation:

- The analysis results indicate that the pH ranges between 7.35 and 7.40
- Dissolved Oxygen (DO) was observed in the range of 6.8 to 7.13 mg/l.
- The chlorides and Sulphates were found to be in the range of 17.16-22.5 mg/l
- Bacteriological examination of surface water samples revealed the presence of total coliform in range of 304 MPN/100 ml is 12 -15.5 MPN/100ML

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 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

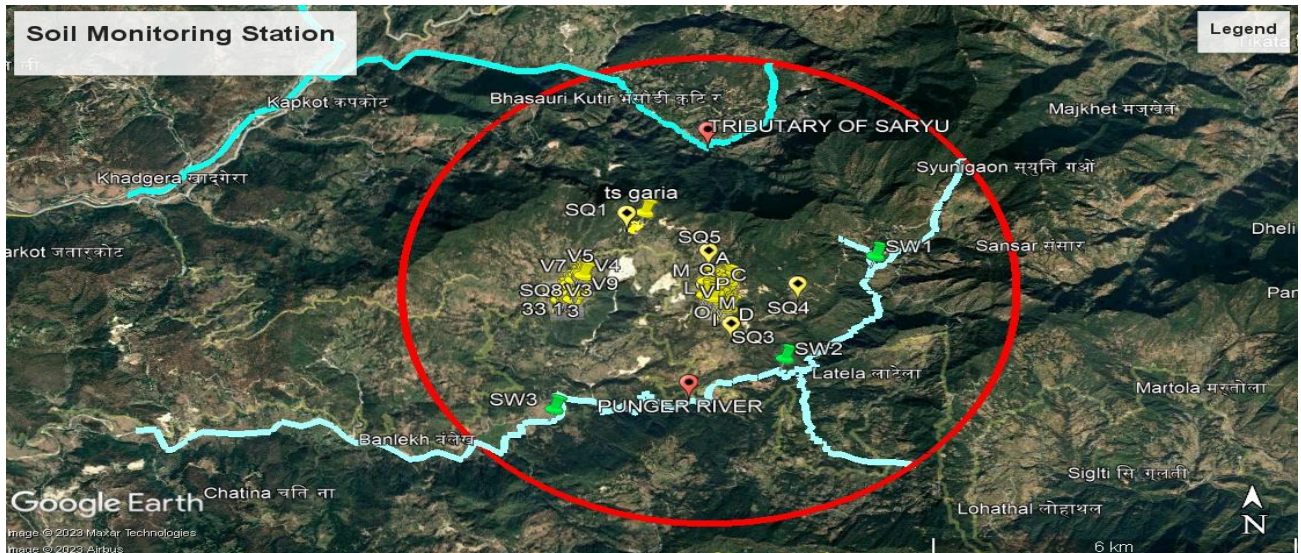
- The sampling was done by auger sampler/ Khurpi. Samples were stored in air tight Polythene Bags. Parameters were analyzed as per standard procedure / method given in IS: 2720 (Revised Parts), and Soil Chemical Analysis by M. L. Jackson.
- The physico-chemical characteristics of these soil samples are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

3.4(i).

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

Location Code	Station Name	Distance and Direction from the lease area	
SQ1	Project Site- (Near at T.S Garia lease)	-	-
SQ2	At Govind Mehra Lease	100 m	S
SQ3	Maholi	0.960 km	S
SQ4	Baikori	1.46 km	E
SQ5	Wafilagaon Talla	700 m	N
SQ6	Near Gairssaneti	1.64 km	NW
SQ7	Near at UK Talc Lease	2.01 km	NW
SQ8	Near Udiyar	2.20 km	W

Fig: 3.7 - Soil quality sampling location



Draft EIA Report of Surkaligaon Soapstone Mine

Table 3.4 (ii): Physico-chemical properties of soil

S. No.	Parameter	Units								
			SQ-1	SQ-2	SQ-3	SQ4	SQ5	SQ6	SQ7	SQ8
1	Texture	-	Sandy Clay	Clay Loam	Clay Loam	Clay Loam	Clay Loam	Clay Loam	Clay Loam	Clay Loam
	Sand	%	16.9	14.5	22.6	26.5	20.10	23.15	21.95	23.55
	Clay	%	59.95	63.85	49.85	48.66	50.65	50.25	53.7	50.5
	Silt	%	23.35	21.95	27.78	25.18	28.58	26.78	24.56	26.19
2	pH(1:2.5 Suspension)	-	6.77	6.56	6.86	6.66	6.75	6.58	6.86	6.78
3	Electrical Conductivity	µmhos/cm	108	117	103	94.8	109	99.6	114	106
4	Potassium (as K)	mg/kg	391.07	372.95	367.25	380.36	377.56	392.75	395.15	370.79
5	Sodium (as Na)	mg/kg	124.03	120.62	117.39	121.68	118.37	123.80	123.48	116.91
6	Calcium (as Ca)	mg/kg	353.35	329.59	350.95	338.45	344.65	356.28	347.57	339.74
7	Magnesium (as Mg)	mg/kg	202.48	190.55	202.25	196.88	205.50	199.65	208.35	201.18
8	Sodium Absorption Ratio	-	1.88	1.87	1.82	1.85	1.83	1.84	1.85	1.80
9	Water Holding Capacity	%	28.55	29.88	27.48	29.35	28.35	30.28	31.68	27.10
10	Total Kjeldahl Nitrogen	%	0.040	0.041	0.046	0.042	0.050	0.048	0.058	0.048
11	Phosphorous	mg/kg	58.67	55.92	56.25	60.19	54.76	57.35	62.35	51.80
12	Bulk Density	gm/cc	1.30	1.32	1.25	1.35	1.31	1.36	1.38	1.29
13	Organic Matter	%	2.86	2.62	3.11	3.19	2.99	3.18	2.98	2.88

Observations:

Samples collected from identified locations indicate the soil is sandy type and the pH value ranging from 6.77 at SQ1 to 6.86 at SQ4 which shows that the soil is alkaline in nature. Potassium is found to be from 392.75mg/kg (SQ6) to 367.25mg/kg (SQ4). The water holding capacity is found in between 31.68% (SQ7) to 27.10 % (SQ8).

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 3.5 (i)** and **Fig. 3.8** and the levels recorded are as stated in **Table 3.5 (ii)**.

Table 3.5 (i) Noise quality monitoring stations

Location Code	Station Name	Distance and Direction from the lease area	
NQ1	Project Site- (T.S. Garia Lease)	-	-
NQ2	At Govind Mehra Lease	100 m	S
NQ3	Maholi	0.960 km	S
NQ4	Baikori	1.46 km	E
NQ5	Wafilagaon Talla	700 m	N
NQ6	Near Gairssaneti	1.64 km	NW
NQ7	Near at Uttrakhand Talc Pvt. Ltd.	2.01 km	NW
NQ8	Near Udiyar	2.20 km	W
NQ9	Near D.S. Garia lease	2.38km	SW
NQ10	Near Rangdeo at Joshiji Home	3.15 km	SW
NQ11	Oliyagon	2.12 km	SW

Fig: 3.8 - Noise quality monitoring location

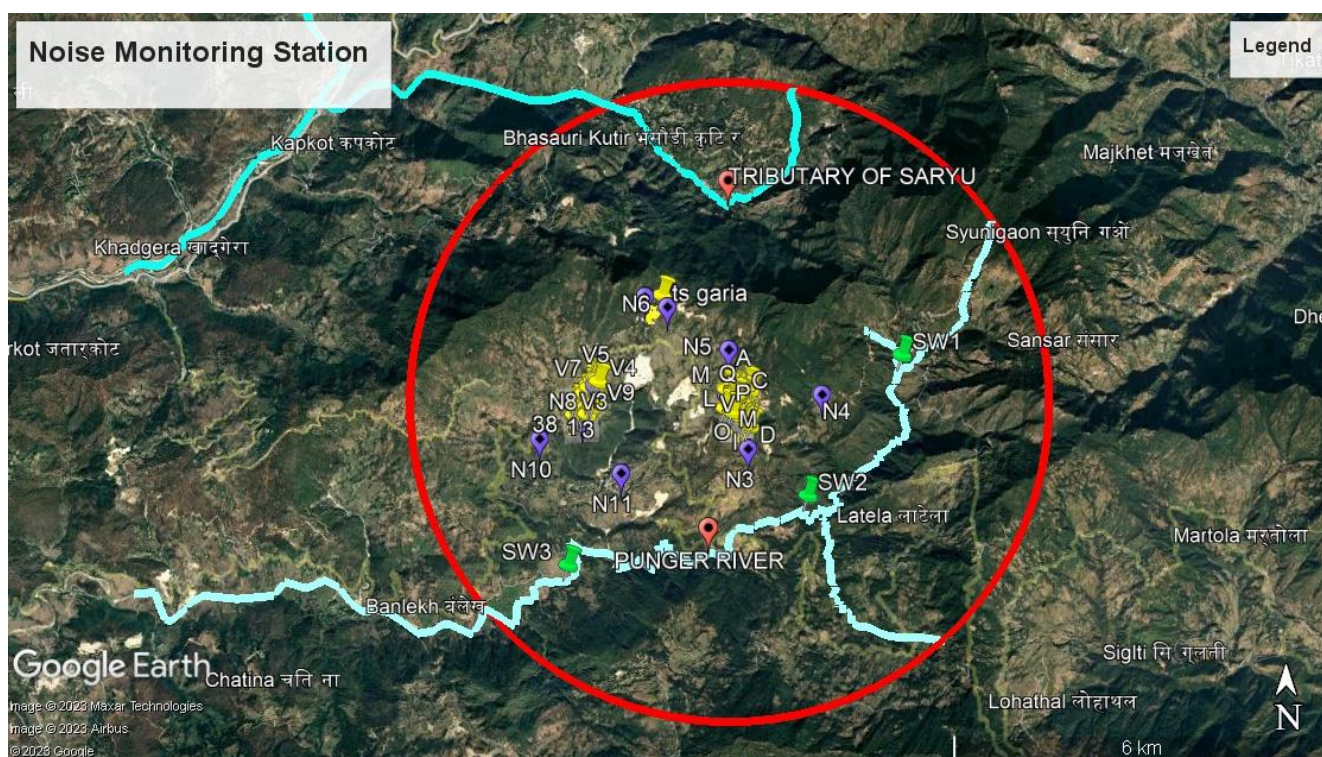


Table No. 3.5 (ii):Noise level status

TEST RESULT							
S. No	Location	Observed Value Leq dB(A)			Limit as per CPCB Guidelines Leq. dB(A)		Zone
		Day*	Night*	Average	Day*	Night*	

Draft EIA Report of Surkaligaon Soapstone Mine

				Day/Night			
NQ1	Project Site- (T. S. Garia Lease)	65.5	58.6	62.11	75.0	70.0	Industrial
NQ2	At Govind Mehra Lease	64.75	57.98	61.65	75.0	70.0	Residential
NQ3	Maholi	52.85	41.65	47.95	55.0	45.0	Residential
NQ4	Baikori	44.55	33.16	39.46	55.0	45.0	Residential
NQ5	Wafilagaon Talla	48.25	39.75	44.55	55.0	45.0	Residential
NQ6	Near Gairssaneti	46.65	36.95	42.10	55.0	45.0	Residential
NQ7	Near at UK Talc Lease	46.15	35.65	41.25	55.0	45.0	Residential
NQ8	Near Udiyar	51.35	40.45	46.15	55.0	45.0	Residential
NQ9	Near D.S. Garia lease	47.45	38.55	43.75	55.0	45.0	Residential
NQ10	Near Rangdeo at Joshiji Home	45.25	34.75	40.55	55.0	45.0	Residential
NQ11	Oliyagon	43.55	32.85	37.45	55.0	45.0	Residential
*Day Time		Leq (6.00AM TO 10.00 PM)					
*Night Time		Leq (10.00PM TO 6.00 AM)					

Observations- Noise monitoring reveals that the maximum & minimum noise levels at day time were recorded as 65.5 dB (A) at NQ-1 & 43.55 dB (A) at NQ-11 respectively. The maximum & minimum noise levels at night time were found to be 58.6 dB (A) at NQ-1 & 32.85 dB (A) at NQ-11 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.

TRAFFIC STUDY

Traffic study is carried out by understanding the existing carrying capacity of the road in the vicinity of site and flow towards State highway 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 as recommended by Indian Road Congress (IRC).

The connecting road from the mine is State Highway No-309A. 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 3.6(i)** and **3.6 (ii)**.

Table 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
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V= Volume in PCU"s/day & C= Capacity in PCU"s/ day

During Mine operation

Average Capacity of mine/year	: 20946 TPA
No. of working days	: 240 days
Total Capacity of mine/day	: $82632/240 = 344$ tonnes
Truck Capacity	: 9 tonnes
No. of trucks deployed per day	: $344/9 = 38$ trucks per day
No. of trucks deployed/day to & fro	: $38*2 = 76$
Trucks Increase in PCU/day	76

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

Table 3.6: (ii): Additional Traffic Scenario & LOS due to proposed project

Road	V	C	Modified V/C Ratio	LOS
NH-309A	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 7 trucks/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.

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 into 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 29°40' and 30°20' N and longitudes 79°25' and 80°10' 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 crops 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 projectsite
Bufferzone : Around the project site in 10 km radius.

Methodology:

Table 3.7 (i): Mode of data collection & parameters considered during the survey

Aspect	Data	Mode of data collection	Parameters monitored
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Draft EIA Report of Surkaligaon Soapstone Mine

	Primary data collection	By conducting field survey	Floral and Faunal diversity
Terrestrial Ecology	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.
	Primary data collection	By conducting field survey	Floral and Faunal Diversity
Aquatic Ecology	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, Cynodon dactylon, Eleusine indica, Trifolium alexandrinum, etc. can be seen growing in the area. The large weeds which infest uncultivated tracts are Calotropis procera, Cannabis sativa, Lantana camara and Ziziphus jujuba. Other noxious weeds and those which appear in crops are Carthamus oxyacantha, Argemone mexicana, Solanum xanthocarpum, Parthenium hysterophorus 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 (Mangifera indica), Jamun (Syzygium cumini), Bail (Aegle marmelos), Dakain (Melia azedarach), Neem (Azadirachta indica), Peepal (Ficus religiosa), Bhimal (Grewia optiva) etc.

Draft EIA Report of Surkaligaon Soapstone Mine

In agricultural waste land and along the road side, growth of weeds like *Argemonemexicana*, *Cannabis sativa*, *Cenchrusciliaris*, *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 3.7 (ii)**.

Table 3.7 (ii): Flora of the Study Area

Vernacular Name	Botanical Name	Family
Cheer	<i>Pinusroxburghii</i>	Pinaceae
Utis	<i>Alnusnepalensis</i>	Betulaceae
Tooun	<i>Toonaciliata</i>	Meliaceae
Khanor	<i>Aesculusindica</i>	Sapindaceae
Siris	<i>Albizziachinensis</i>	Leguminosae
Siris	<i>Albizzialebbek</i>	Leguminosae
Kala Siris	<i>Albizziaprocera</i>	Leguminosae
Dhau, Chhal, Bakli	<i>Anogessiuslatifolia</i>	Combretaceae
Neem	<i>Azadirachtaindica</i>	Meliaceae
Kachnar	<i>Bauhinia variegata</i>	Fabaceae
Katai	<i>Flacourtiaindica</i>	Salicaceae
Kathsagun	<i>Haplophragmaadenophyllum</i>	Bignoniaceae
Kathbilava	<i>Buchananialatifolia</i>	Anacardiaceae
Kamhar	<i>Gmelinaarborea</i>	Lamiaceae
Kubbhi	<i>Careyaarborea</i>	Lecythidaceae
Kumia	<i>Ficusracemosa</i>	Moraceae
Kusum	<i>Schleicheraoleosa</i>	Sapindaceae

Kooda	<i>Holarrhenaantidysenterica</i>	Apocynaceae
Kekra	<i>Phoebe lanceolata</i>	Lauraceae
Bel	<i>Aegle marmelos</i>	Rutaceae
Pangar	<i>Aesculusindica</i>	Sapindaceae
Utis	<i>Alnusnepalensis</i>	Betulaceae
Genthi	<i>Boehmeriaregulosa</i>	Urticaceae
Semal	<i>Bombaxceiba</i>	Bombaceae
Bottle brush	<i>Callistemon citrinus</i>	Myrtaceae
Devdaar	<i>Cedrusdeodara</i>	Coniferae
Kharak	<i>Celtisaustralis</i>	Ulmaceae

Draft EIA Report of Surkaligaon Soapstone Mine

Safeda	<i>Eucalyptus globulus</i>	Mrtaceae
Timal	<i>Ficusauriculata</i>	Moraceae
Bargad	<i>Ficusbengalensis</i>	Moraceae
Bedu	<i>Ficuspalmata</i>	Moraceae
Pipal	<i>Ficusriligosa</i>	Moraceae
Jacrada	<i>Jacaranda mimosifolia</i>	Bignoniaceae
Akhrot	<i>Jugansregia</i>	Juglandaceae
Jhingan	<i>Lanneacoramandelica</i>	Anacardiaceae
Shuru	<i>Litseaumbrosa</i>	Lauraceae
Ruin	<i>Mallotusphilippinensis</i>	Euphorbiaceae
Dhenk	<i>Melia azedarach</i>	Meliaceae
Poplar	<i>Poplusciliata</i>	Salicaceae
Aloocha	<i>Rrunuscommunis</i>	Rosaceae
Aroo	<i>Prunuspersica</i>	Rosaceae
Phaja	<i>Prunusgranatum</i>	Punicaceae
Mehal	<i>Pyruspashia</i>	Rosaceae
Ban	<i>Quercusincana</i>	Fagaceae
Burans	<i>Rhododendron arboreum</i>	Ericaceae
Gadhbains	<i>Salix tetrasperma</i>	Salicaceae
Ritha	<i>Sapindusmukorossi</i>	Sapindaceae
Khinna	<i>Sapium insigne</i>	Euphorbiaceae
Jamun	<i>Syzygiumcuminii</i>	Myrtaceae
Kakru	<i>Toonaserrata</i>	Meliaceae
Jamal ghotu	<i>Jatropha curcas</i>	Euphorbiaceae
Mango	<i>Mangifera indica</i>	Anacardiaceae
Saoni	<i>Lagerstroemia indica</i>	Lythraceae
Tezapatta	<i>Cinnamomumtamala</i>	Lauraceae
Apple	<i>Pyrusmalus</i>	Rosaceae
Himalayan maple	<i>Acer oblongum</i>	Sapindaceae

Draft EIA Report of Surkaligaon Soapstone Mine

Peepal	<i>Ficus religiosa</i>	Moraceae
Indian fig	<i>Ficus racemosa</i>	Moraceae
Golden shower	<i>Cassia fistula</i>	Fabaceae
castor oil	<i>Ricinus communis</i>	Euphorbiaceae
Indian siris	<i>Albizia lebbek</i>	Fabaceae
white orchid-tree	<i>Bauhinia acuminata</i>	Fabaceae
Banjh oak	<i>Quercus leucotricophora</i>	Lauraceae
chinaberry tree	<i>Melia azedarach</i>	Meliaceae
Wild Tamarind	<i>Leucaena leucocephala</i>	Fabaceae
orchid tree	<i>Bauhinia variegata</i>	Fabaceae
Beleric	<i>Terminalia bellerica</i>	Combretaceae
Shilikha	<i>Terminalia chebula</i>	Combretaceae
Gulmohar	<i>Delonix regia</i>	Fabaceae
Himalayan white pine	<i>Pinus wallichiana</i>	Pinaceae
Honeyberry	<i>Celtis australis</i>	Cannabaceae
Bhimal	<i>Grewia optiva</i>	Tiliaceae
Ayar	<i>Andromeda ovalifolia</i> Wall	Ericaceae
Kharsu	<i>Quercus semecarpifolia</i>	Fagaceae
Chimula	<i>Rhododendron campanulatum</i>	Ericaceae
Tiloi/Moru	<i>Quercus himalayana</i>	Fagaceae
Mehal/ Pear	<i>Pyrus pashia</i>	Rosaceae
Bhojpatra	<i>Betula utilis</i>	Betulaceae
Rai	<i>Picea smithiana</i>	Pinaceae
Khumani	<i>Prunus armeniaca</i>	Rosaceae
SHRUBS		
Kaphal	<i>Myrica esculenta</i>	Myricaceae
Basinga	<i>Adhatodavasisa</i>	Acanthaceae
Ramban	<i>Agave Americana</i>	Cactaceae
Kubash	<i>Artemisia vulgaris</i>	Compositae
Kashmoi	<i>Berberis aristata</i>	Berberidaceae
Rubber tree	<i>Calotropis gigantea</i>	Asclepiadaceae
Bhang	<i>Cannabis spinarum</i>	Cannabaceae
Karonanda	<i>Carissa spinarum</i>	Apocynaceae
Bindu	<i>Colebrookea oppositifolia</i>	Lamiaceae
Makhoi	<i>Coriaria nepalensis</i>	Coriariaceae
Ruinish	<i>Cotoneaster acuminata</i>	Rosaceae
Datura	<i>Datura stramonium</i>	Solanaceae
Sihanru	<i>Debregeasia hypoleuca</i>	Urticaceae
Martoi	<i>Desmodium tiliaefolium</i>	Leguminosae

Draft EIA Report of Surkaligaon Soapstone Mine

Dhaul	<i>Erythrinasuberosa</i>	Leguminosae
Kala bansa	<i>Eupatorium adenophorum</i>	Asteraceae
Shuru	<i>Euphoribiaroyleana</i>	Euphorbiaceae
Phiunli	<i>Hypericumoblongifolium</i>	Hypericaceae
Shunjai	<i>Jasminauhumile</i>	Oleaceae
Nashpati	<i>Pyruscommunis</i>	Rosaceae
Chichiri	<i>Plectranthuscoesta</i>	Labiatae
Bhekal	<i>Princepiautilis</i>	Rosaceae
Gingararu	<i>Pyracanthacrenulata</i>	Rosaceae
Tung	<i>Rhusparviflora</i>	Anacardiaceae
Kunja	<i>Rosa brunonii</i>	Rosaceae
Rubber Bush	<i>Calotropisprocera</i>	Asclepiadaceae
BhansiaBamar	<i>Cassia occidentalis</i>	Fabaceae
Ban Tulsi	<i>Croton bonplandianum</i>	Euphorbiaceae
Atibala	<i>Abutilon indicum</i>	Malvaceae
Bhringraj	<i>Eclipta alba</i>	Nyctaginaceae
plum	<i>Ziziphusmauritiana</i>	Rhamnaceae
thorn-apple	<i>Daturainnoxia</i>	Solanaceae
dwarf wild brinjal	<i>Solanumvirginianum</i>	Solanaceae
Jaundice Berry	<i>Berberis vulgaris</i>	Berberidaceae
Kandali	<i>Urticamairea</i>	Urticaceae
GarhRingal	<i>Chemmobambusafalcata</i>	Poaceae
HERBS		
Aghada	<i>Achyranthesaspera</i>	Amaranthaceae
Gunriya	<i>Ageratum conzoides</i>	Asteraceae
Prickly poppy	<i>Argemonemexicana</i>	Papaveraceae
Meen	<i>Arisaemaflavum</i>	Araceae
Pati	<i>Artemisia capillaris</i>	Compositae
Kunjha	<i>Artemisia vulgaris</i>	Asteraceae
Silphara	<i>Bergenia ligulata</i>	Saxifragaceae
Kura	<i>Bidens bipinnata</i>	Asteraceae
Chakunda	<i>Cassia tora</i>	Asteraceae
Brahmi	<i>Centella asiatica</i>	Apiaceae
Kanjalu	<i>Cestrum verutum</i>	Solanaceae
Malo	<i>Bauhinia vahlii</i>	Leguminosae
Bathwa	<i>Chenopodium album</i>	Chenopodiaceae
Trivagandha	<i>Chromolaena odorata</i>	Asteraceae
Kauniabali	<i>Clematis montana</i>	Ranunculaceae
Pindalu	<i>Colocasia affinis</i>	Araceae
Gokhru	<i>Echinopsechinatus</i>	Araceae

Draft EIA Report of Surkaligaon Soapstone Mine

Horse weed	<i>Erigeron bellidioides</i>	Compositae
Bhumla	<i>Fragaria indica</i>	Compositae
joyweed	<i>Alternanthera paronychioides</i>	Amaranthaceae
khutura	<i>Alternanthera pungens</i>	Amaranthaceae
Kantachaulai	<i>Amaranthus spinosus</i>	Amaranthaceae
Taro	<i>Colocasia esculenta</i>	Araceae
Janglipudina	<i>Ageratum conyzoides</i>	Asteraceae
mukhtari	<i>Grangea maderaspatana</i>	Asteraceae
Carrot Grass	<i>Parthenium hysterophorus</i>	Asteraceae
Charota	<i>Cassia tora</i>	Fabaceae
bhang	<i>Cannabis sativa</i>	Cannabaceae
Bathu	<i>Chenopodium album</i>	Chenopodiaceae
Satyanashi	<i>Argemone Mexicana</i>	Papaveraceae
Doob	<i>Cynodon dactylon</i>	Poaceae
Jangalimarua	<i>Eleusine indica</i>	Poaceae
Bharbhusi	<i>Eragrostis tenella</i>	Poaceae
Kussa	<i>Saccharum spontaneum</i>	Poaceae
Rasbhari	<i>Physalis minima</i>	Solanaceae
Marchya	<i>Galinsoga parviflora</i>	Rosaceae
Bhumla	<i>Fraseria vesica</i>	Asteraceae
Hattajuri	<i>Heliotropium strigosum</i>	Boraginaceae
Kutki	<i>Picorhiza scrophulariiflora</i>	Scrophulariaceae
Amesh	<i>Hippophae ramnoides</i>	Elaeagnaceae
CLIMBERS		
Sahansarpali	<i>Asparagus racemosus</i>	Liliaceae
Malo	<i>Bauhinia vahili</i>	Leguminosae
Kanguli	<i>Clematis connata</i>	Ranunculaceae
Besharam	<i>Ipomoea purpurea</i>	Convolvulaceae
Dudhi Bel	<i>Vallaris solanaceae</i>	Apocynaceae
GRASSES		
PhiralNaru	<i>Arundinodax</i>	Gramineae
Dhub	<i>Cynodon dactylon</i>	Gramineae
Godia	<i>Chrysopogon fulvus</i>	Gramineae
CROPS		
Wheat/ Genhu	<i>Triticum aestivum</i>	Poaceae or Gramineae
Rice/ Chawal	<i>Oryza sativa</i>	Poaceae
Soyabean	<i>Brassica rapus</i>	Brassicaceae

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 (*Funambulus palmarum*) and field mouse (*Apodemus sylvaticus*) 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 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 3.8(i): Fauna of the Study Area

Common Name	Scientific name	IWPA	IUCN
MAMMALS			
Squirrel	<i>Funambulus pennant</i>	IV	DD
Rat	<i>Rattus rattus</i>	V	LC
Wild pig	<i>Sus scrofa cristatus</i>	III	LC
Yellow throated marten	<i>Martes flavigula</i>	III	LC
Monkey	<i>Macaca mulata</i>	II	LC
Fruit bat	<i>Rousettus leschenaulti</i>	IV	LC
Common langoor	<i>Presbytis entellus</i>	II	LC
Indian Porcupine	<i>Hystrix indica</i>	IV	LC

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

Draft EIA Report of Surkaligaon Soapstone Mine

<i>Jungle Babbler</i>	<i>Turdoidesstriatus</i>	IV	LC
<i>House Sparrow</i>	<i>Passer domesticus</i>	IV	LC
<i>Red-vented Bulbul</i>	<i>Pycnonotuscafer</i>	IV	LC
<i>Himalayan Bulbul</i>	<i>Pycnonotusleucogenys</i>	IV	LC
<i>Alexandrine Parakeet</i>	<i>Psittaculaeupatria</i>	IV	LC
<i>Spotted Dove</i>	<i>Streptopeliachinensis</i>	IV	LC
<i>Red-wattled Lapwing</i>	<i>Vanellusindicus</i>	IV	LC

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

SOCIO-ECONOMIC REPORT

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

- Literature 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 house holds
- 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 $n = \sqrt{\{(1.96 \cdot \sigma) / \Delta\}}$; 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 k th 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 $\frac{N}{n}$ 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 was 12.

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 Nileshtar to its east and west and by the SurajKund 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 3.9(i)**. According to the 2011 census of India, Bageshwar has a population of 2,59,898.

Table 3.9 (i): Demographic details of Project District and Tehsil

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

Source: Census of India, 2011

Table 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 1,982, which is 0.76% of the total population.

Table 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 3.9(iii)**.

Table 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 3.9 (iv)** shows below the Sub-district wise distribution of villages in the Study Area.

Table 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	20	2
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 3.10**.

**Table 3.10: Demographic Particulars of the Study Area of Soapstone Mining
Project at Bageshwar, Uttarakhand**

Parameters	Values
Household	1410
Total population	7820
Male	4010

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Female	3942
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 3.11** below:

Table 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

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CHAPTER-4

ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

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.

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:

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 Production is given below in **Table4.1 (i)**:

(iii) **Last five Year production Target & achievement:**

Year	Proposed production as approved Mining Plan (Tonnes)	Production Achieved (tonnes)
2018-19	9683	3491.90
2019-20	9788	2670.00
2020-21	10191	12044.37
2021-22	10685	5046.00
2022-23	11505	7522.63
Total	51852	30774.9

Copy of Production details for 2018-19 to 2022-23 is enclosed as **Annexure no.15**.

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Geotechnical Studies:-Geotechnical Studies like slope failure, slip failure, rock failure etc. shall be carried out yearly. The retaining wall having proper shape & size shall be erected considering all technical parameters.

The width of benches shall kept 7m height of benches shall be kept 5.0m& slope of faces shall be kept 68°. Approach road having width 6.0m gradient 1:16 shall be provided to connect each mining faces. In Pit I, mining faces shall advance towards east&north east direction & alignment of faces by & large North Southdirection. Interburden to be generated from pit I during next five years shall be backfilled over mined out pit. Initially interburden will be filled in the mined out pit & lateral on soil shall be spread over it, to restore to its maximum original topography. After backfilling the mined out area shall be used for agriculture purpose. Therefore no proposal has been envisaged for separate dumping of waste material.

Extent of Mechanization:

Excavator shall be deployed to remove the interburden& dump on dumping ground. For the breaking of hard rock/boulders, rock breaker shall be used.

The make & model of excavator is as below:

Machinery	Bucket Capacity	Aron length	Boom length	No. of units
Excavator	1.5cum	2.85m	3mm	2 nos
Rock Breaker	1mtr length		Dia 6"	1 nos

Mining activities shall be carried out in one shift only & excavator/rock breaker shall be deployed from 8.0am to 5.0pm in day time.

Future proposal of mining is given in one pit and 0.562m fresh area shall be broken due to mining pit during next five years & out of this 0.419m area shall be backfilled/reclaimed.

The ultimate depression with respect to original topography shall be 2m to 2.5m. 0.157ha area shall be occupied by waste dump.

The total year wise quantities of soapstone & waste generated from Pit-I, is tabulated below:

YEAR	quantities of soapstone in (tonnes)	Waste (Cum)
2023-24	11132	6422
2024-25	11145	6430
2025-26	11178	6449
2026-27	11356	6552
2027-28	11414	6586
Total	56225	32439

(iv) **Proposed four year production target:**

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The year wise production schedule of soapstone from different benches in different pits are given below:

Year (2023-24)

Bench Level (mRL)	Top Soil (m)	Bench Area (m2)		Face length (m)	Volume (Cum)			Quantities of Soapstone (Tonnes)	Total Waste (Cum)
		OB	SBS		t/s	OB	SBS		
1665	0	0	78	68	0	0	5304	5516	3182
1660	0	0	108	50	0	0	5400	5616	3240
							10704	11132	6422

Year (2024-25)

Bench Level (mRL)	Top Soil (m)	Bench Area (m2)		Face length (m)	Volume (Cum)			Quantities of Soapstone (Tonnes)	Total Waste (Cum)
		OB	SBS		t/s	OB	SBS		
1670	0	0	46	70	0	0	3220	3349	1932
1665	0	0	44	64	0	0	2816	2929	1690
1660	0	0	78	60	0	0	4680	4867	2808
Total							10706	11145	6430

Year (2025-26)

Bench Level (mRL)	Top Soil (m)	Bench Area (m2)		Face length (m)	Volume (Cum)			Quantities of Soapstone (Tonnes)	Total Waste (Cum)
		OB	SBS		t/s	OB	SBS		
1675	0	0	48	78	0	0	3744	3894	2246
1670	0	0	36	68	0	0	2448	2546	1469
1665	0	0	50	70	0	0	3500	3640	2100
1660	0	0	22	48	0	0	1056	1098	634
Total							10748	11178	6449

Year (2026-27)

Bench Level (mRL)	Top Soil (m)	Bench Area (m2)		Face length (m)	Volume (Cum)			Quantities of Soapstone (Tonnes)	Total Waste (Cum)
		OB	SBS		t/s	OB	SBS		
1675	0	0	50	78	0	0	3900	4056	2340
1670	0	0	38	70	0	0	2660	2766	1596

Draft EIA Report of Surkaligaon Soapstone Mine

1665	0	0	50	68	0	0	3400	3536	2040
1660	0	0	24	40	0	0	960	998	576
Total							10920	11356	6552

Year (2027-28)

Bench Level (mRL)	Top Soil (m)	Bench Area (m2)		Face length (m)	Volume (Cum)			Quantities of Soapstone (Tonnes)	Total Waste (Cum)
		OB	SBS		t/s	OB	SBS		
1675	0	0	51	78	0	0	3978	4137	2387
1670	0	0	39	70	0	0	2730	2839	1638
1665	0	0	52	66	0	0	3432	3569	2059
1660	0	0	22	38	0	0	836	869	502
Total							10976	11414	6586

Storage and Preservation of top soil

Mining during next five years shall be commenced from degraded land therefore no top soil shall be generated due to mining activities no such proposal has been envisaged for its storage & preservation.

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. 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

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.

WATER ENVIRONMENT

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 4.4**.

Table-4.4 Site Elevation and Working Depth Details

PARTICULARS	DETAILS
Elevation	The highest level of lease hold is 1702.30 towards northeast side, while lowest level is 1642.20mRL towards west flank at boundary pillar 22
Ground water Table	45m to 50 m below the lowest bench
Ultimate working Depth	20

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

Seasonal drainage exists outside applied area & flows towards south west direction & confluence to another drainage flows north to south direction & it is towards western side, outside of applied area & finally meets the river Pungar which is main catchment of area. therefore nochange 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.

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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.

Wastewater Generation, Treatment & Disposal

The total water consumption in the proposed Soapstone Mine shall be about 5.36 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.

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 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

Regular monitoring of water levels and quality in the existing open wells and bore wells in the vicinity will be carried out. If found necessary, additional observation wells will be sunk for monitoring the water levels and quality around the mine representing both upstream

and downstream conditions. No springs are reported within the site, therefore chances of surface runoff mixing with ground water is negligible.

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

AIR ENVIRONMENT

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, PM_{2.5}) 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**.

PROPOSED MITIGATION MEASURES FOR DUST SUPPRESSION

Soapstone is a talcose rock mineral composed of hydrous magnesium silicate: $3 \text{ MgO} \cdot 4\text{SiO}_2 \cdot 2\text{H}_2\text{O}$. 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 mineworkers.
- 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-4.5**.

Table 4.5: Sources of Pollutants from Mining Activities

S. NO.	SOURCE	TYPE OF POLLUTANT
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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, NO _x

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.

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 4,485 plants will be planted in the plan period.

Greenbelt Development in ML area

The entire plantation will be done on the periphery of the reclaimed area. Precautionary measures will be taken for care of the forestation made by regular watering in the plantation area, to protect from grazing animals and proper manuring.

Trees 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, March 2000.

Table-4.6: Species Suggested for Plantation

Sl.No.	Species	Family	Habit
1.	<i>Alternantheraparonychioides</i>	Amaranthaceae	Herb
2.	<i>Alternantherapungens</i>	Amaranthaceae	Herb
3.	<i>Amaranthusspinosus</i>	Amaranthaceae	Herb
4.	<i>Colocasiaesculenta</i>	Araceae	Herb
5.	<i>Ageratum conyzoides</i>	Asteraceae	Herb
6.	<i>Grangeamaderaspatana</i>	Asteraceae	Herb
7.	<i>Partheniumhysterophorus</i>	Asteraceae	Herb
8.	<i>Cassia tora</i>	Fabaceae	Herb
9.	<i>Cannabis sativa</i>	Cannabaceae	Herb
10.	<i>Chenopodium album</i>	Chenopodiaceae	Herb

Draft EIA Report of Surkaligaon Soapstone Mine

11.	<i>Argemone Mexicana</i>	Papaveraceae	Herb
12.	<i>Brachiaria ramosa</i>	Poaceae	Herb
13.	<i>Cynodon dactylon</i>	Poaceae	Herb
14.	<i>Eleusineindica</i>	Poaceae	Herb
15.	<i>Eragrostistenella</i>	Poaceae	Herb
16.	<i>Saccharumspontaneum</i>	Poaceae	Herb
17.	<i>Physalis minima</i>	Solanaceae	Herb
18.	<i>Calotropisprocera</i>	Asclepiadaceae	Shrub
19.	<i>Cassia occidentalis</i>	Fabaceae	Shrub
20.	<i>Croton bonplandianum</i>	Euphorbiaceae	Shrub
21.	<i>Abutilon indicum</i>	Malvaceae	Shrub
22.	<i>Bougainvillea spectabilis</i>	Nyctaginaceae	Shrub
23.	<i>Ziziphusmauritiana</i>	Rhamnaceae	Shrub
24.	<i>Daturainnoxia</i>	Solanaceae	Shrub
25.	<i>Solanumvirginianum</i>	Solanaceae	Shrub
26.	<i>Lantana camara</i>	Verbenaceae	Shrub
27.	<i>Berberis vulgaris</i>	Berberidaceae	Shrub
28.	<i>Mangifera indica</i>	Anacardiaceae	Tree
29.	<i>Ficusracemosa</i>	Moraceae	Tree
30.	<i>Cassia fistula</i>	Fabaceae	Tree
31.	<i>Ricinuscommunis</i>	Euphorbiaceae	Tree

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 at least 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.

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 National Highway No-15. These may be reinforced to facilitate easy and smooth movement of heavy duty trucks.

Table 4.7(i): Existing Traffic Scenario & LOS

Road	V(PCU/day)	C(PCU/day)	Existing V/C Ratio	LOS
National 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 11505 TPA
No. of working days : 240 days
Total Capacity of mine/day : 11505/240 = 48 tonnes
Truck Capacity : 9 tonnes
No. of trucks deployed per day : 48/9 = 6 trucks per day
No. of trucks deployed/day to & from : 6*2 = 12
Trucks Increase in PCU/day: 12

The addition to traffic by the proposed project during its operation is given in **Table-4.7(ii)**.

Table 4.7 (ii): Additional Traffic Scenario & LOS due to proposed project

Road	V	C	Modified V/C Ratio	LOS
NH-15	922	4500	0.20	A
Near By road	622	2000	0.31	B

Table 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

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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 10 trucks per hour, in particular. Due to the proposed project there will be an addition 7 trucks/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.

Draft EIA Report of Surkaligaon Soapstone Mine

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 every 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.

Soapstone 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 upliftment 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.

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.

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:

Air Quality Monitoring

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

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 punger 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.

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.

Soil Quality Monitoring

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

Plantation

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

Ecological Monitoring

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

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 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

CHAPTER – 7 ADDITIONAL STUDIES

Public Consultation

Yet to be done

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 land slides

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

Draft EIA Report of Surkaligaon Soapstone Mine

other similar drives.

- Implementation of safety mining plan

Blasting

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

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.

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.

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.

Draft EIA Report of Surkaligaon Soapstone Mine

- Time to time analysis of the soil, water resources etc. will be done in order to analyze the negative impacts of mining activities on the environment.
- To prepare management plans for village landscapes. Villages to be seen as landscapes of diverse elements such as forests, scrub, grassland, streams/river, ponds etc.

Earthquake Management Plan

Following measures will be under taken:

- 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 45° and the slope angle of the inner benches will not be greater than 70° and bench height would be 3m.
- Slope will be stabilized with the help of *Chrysopogon zizanioides* 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.

Safety Measures

Safety Measures at the proposed Open Cast Mining Project

- The opencast mines have been planned for working with shovel tipper system which requires proper benching not only for slope stability but also for movement of tippers and other machinery. The inclination of the quarry sides at the final stage i.e. at the dip most point will not exceed 45° to the horizontal. (This angle is measured between the line joining the toe of the bottom most bench to the crest of the top most bench and the horizontal line);
- The gradient of the haul road inside the pit, access trench and on the dumps will not be steeper than 16°
- The slope of the sides of the OB and IB dump to the horizontal will not exceed 37° 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;

Draft EIA Report of Surkaligaon Soapstone Mine

- To avoid dangers while reversing the trackless vehicles, especially at the embankment and tripping points, all areas for reversing of lorries should, as far as possible, be made man free, and there should be a light and sound device to indicate reversing of trucks.
- A statutory provision of the fence, constant education, training etc. will go a long way in reducing the incidence of such accidents.

Measures to Prevent the Danger of Overburden

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

Measures to Prevent Accidents due to Trucks and Tippers

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

DISASTER MANAGEMENT PLAN

Objectives of Disaster Management Plan

The Disaster Management Plan is aimed to ensure safety of life, protection of environment, protection of installation and restoration of production. For effective implementation of the Disaster Management Plan, it should be widely circulated and personnel training should be given.

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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.

CHAPTER 8 PROJECT BENEFITS

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.

IMPROVEMENT IN THE PHYSICAL INFRASTRUCTURE

The impact on the civic amenities will be substantial after the commencement of mining activities.

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

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

IMPROVEMENT IN THE SOCIAL INFRASTRUCTURE

- Generation of employment and improved standard of living;
- Increased revenue to the State by way of royalty, taxes and duties; and
- Superior communication and transport facilities etc.

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.

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- Overall the proposed project will change living standards of the people and improve the socio- economic conditions of the area.

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 40 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.

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:

CER Project Details

Soapstone mine has proposed to provide financial assistance of Rs. 2.59 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. 74,000).
- Up gradation of toilets of government school in nearby villages. (Rs. 69,000).
- Distribution of Books and Notebooks among meritorious girl, Child belonging to Scheduled Caste and Scheduled Tribe population (Rs. 30,000).

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- Repair and Painting of School Building in the project village (Rs. 87,000).

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. Letter no. : 317/SEIAA dated 29/08/ 2023 under for soapstone mining project, the Environmental Cost Benefit analysis is not required.

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 long time impacts.
- Ensure effective operation of all control measures.

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.

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.

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 borewells.
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, Liaisoning 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

AIR QUALITY MANAGEMENT

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. 62 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.

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.

WATER QUALITY MANAGEMENT

Water for drinking and operations is required to be 5.36 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 rise 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 for monitoring 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 physiographic will be land use on the hilly terrain will undergo radical changes due to the open cast mining. During the next five years mining, 1.107 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.

WASTE MANAGEMENT

Solid waste - Generation and management and disposal: The top soil will be removed with the help of excavator, dozer, shovels, pick axe, 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 soil will be removed with the help of excavator, dozer, shovels, pickaxe, spade & crowbar and loaded manually to stack on the dump yard. The spread of stacks will be undertaken through mechanically and manually both & average dump height kept 1.5m.

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.

GREENBELT AND PLANTATION

2500 plants (500 plants/ha) will be planted in the village Surkaligaon in consultation with the local DFO/Agriculture department. The year wise plantation of trees has been shown in **Table 10.1**.

Table 10.1: Year wise afforestation scheduled

YEAR	NO. OF SAPLINGS
FIRST YEAR	50
SECOND YEAR	50
THIRD YEAR	50
FOURTH YEAR	50
FIFTH YEAR	50
TOTAL	250

The following characteristics should be taken into consideration while selecting plant species for greenbelt 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.

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.

Draft EIA Report of Surkaligaon Soapstone Mine

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 frame work 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 10.2**.

Table 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

Draft EIA Report of Surkaligaon Soapstone Mine

	<p>of forest life.</p> <p>No tract or new road for movement of labourso vehicles be laid in reserve forest area, this wi prevent forest fragmentation, encroachmen and human – animal encounter.</p> <p>Care will be taken that noise produced durin vehicles movement for carrying ore material are within the permissible noise level. Highe noise level in the forest area will lead to restles and failure in detection of calls of mates an young ones.</p> <p>Care will be taken that no hunting of animal carried out by labours.</p> <p>If wild animals are noticed crossing the cor zone, it will not be disturbed at all.</p> <p>Labours will not be allowed to discards food plastic etc., which can attract animals near th core site.</p> <p>Only low polluting vehicle will be allowed fo carrying ore materials. All vehicles allowed i the project site area will have to provid pollution under control certificate at the end o three months.</p> <p>No honk will be allowed in the forest area, nois level will be within permissible limit (siler zone-50dB during day time) as per nois pollution (regulation and control), rules, 2000 CPCB norms.</p>
Harvesting of forest flora	<p>No tree cutting, chopping, lumbering, uprootingof shrubs and herbs should be allowed.</p> <p>No pilling of ore material should in the reserve</p>

	forest area. Collections of economically important plants will be fully restricted.
--	--

OCCUPATIONAL HAZARDS AND SAFETY

Occupational safety and health is very closely related to productivity and good employer-employee relationship. The factors of occupational health in 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.

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

Draft EIA Report of Surkaligaon Soapstone Mine

management practices that provide for maximum protection of people

and the environment. To this end, the owner resolves that company will follow the below mentioned practices:

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

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

Budget 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 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

Draft EIA Report of Surkaligaon Soapstone Mine

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 10.3 Cost of EMP

B. Break-up of Expenditure on Environment Protection & Environment Management			
5.	Haulage Road Repair & Maintenance <ul style="list-style-type: none"> • Filling, Leveling and widening of the road up to width of 6m and length of 200 m. • Setting & Fixing of Cut Stone on the leveled road. 	300 m (L) x 6 m (W)	1,00,000
6.	Water Sprinkling on Haulage Road for Dust Suppression	Assuming Rs.688/day for 240 days of working Tanker Cost: Rs. 688/Tanker Tanker Capacity: 5000 liter, No. of Tankers required: 1	1,65,000
7.	Plantation along the road side & post plantation care	Plantation with post plantation care @100/sapling 50sapling within one year 50 sapling x 5 year =250sapling 250 x 100= 25000/= <p><i>Note: Annual cost will increase with increase in no. of sapling.</i></p>	2,50,00
8.	Environmental Monitoring & Compliances.	<p>➤ Half Yearly Monitoring of Environmental Parameters viz. Air, water, Noise & Soil.</p> <p>➤ Half Yearly Submission of Compliances.</p>	50,000
	Total Environment Protection & Management Cost (B)		Rs. 3,40,000 (3.40Lakhs)

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).

CER Project Details

CER (Corporate Environment Responsibility) details for the Project

CER (Corporate Environment Responsibility) details for the Project

CER plan is given below:

Total Cost of the Project = Rs. 51,97,500 Lakhs

Yearly CER cost for the project, i.e. 5% of the total project cost -

Rs. 51,97,500 Lakhs x 0.05 = Rs. (2,59,875 Rupee)

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.

CHAPTER 11 - SUMMARY & CONCLUSION

INTRODUCTION OF PROJECT&PROPONENT

Draft Environmental Impact Assessment report is prepared to comply with the Terms of Reference (TOR) received from SEAC vide Letter no. : 317/SEIAA dated 29/08/ 2023 under EIA notification of the MoEF dated 14-9-2006, as amended on 1st Dec 2009 & 4th April 2011 of MoEF, Govt. of India, for seeking environmental clearance for applied mining lease area measuring above 5.0 ha (individual or in cluster form) falling under category "B1". The lease of Shri Thakur singh gariya, has applied application for lease of soapstone mineral measuring over an area of 2.231 ha in Village- Surkhaligaon, Tehsil- Dungakuri, District: Bageshwar (Uttarakhand)

State Govt. has considered granting mining lease vide letter no. State Govt. has principally agreed to grant mining lease G.O no. no1260/VII-1/12-Soapstone/16 dated 05-08-2016 for a period of 25 years

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.

Location

The area lies between latitude 29°54'44.46"N to 29°54'53.33"N and longitude 79°57'14.62"E to 79°57'22.66"E in Survey of India Toposheet No. 53 0/13. The Key Plan is enclosed as Plate No. 2. Each corner pillars have been surveyed by G.P.S.

Draft EIA Report of Surkaligaon Soapstone Mine

Pillar No	Latitude	Longitude
A.	29°54'51.90"N	79°57'16.74"E
B.	29°54'53.01"N	79°57'17.61"E
C.	29°54'53.07"N	79°57'18.55"E
D.	29°54'52.06"N	79°57'19.05"E
E.	29°54'52.21"N	79°57'20.15"E
F.	29°54'53.33"N	79°57'21.51"E
G.	29°54'53.27"N	79°57'22.10"E
H.	29°54'52.13"N	79°57'22.66"E
I.	29°54'50.28"N	79°57'22.05"E
J.	29°54'49.57"N	79°57'22.25"E
K.	29°54'48.90"N	79°57'21.97"E
L.	29°54'47.72"N	79°57'20.20"E
M.	29°54'48.02"N	79°57'19.63"E
N.	29°54'48.18"N	79°57'18.00"E
O.	29°54'48.51"N	79°57'17.95"E
P.	29°54'48.75"N	79°57'17.43"E
Q.	29°54'49.14"N	79°57'17.42"E
R.	29°54'49.90"N	79°57'18.23"E
S.	29°54'50.19"N	79°57'19.15"E
T.	29°54'50.50"N	79°57'19.14"E
U.	29°54'49.71"N	79°57'17.51"E
V.	29°54'48.53"N	79°57'16.90"E
W.	29°54'48.08"N	79°57'16.09"E

Draft EIA Report of Surkaligaon Soapstone Mine

X.	29°54'47.94"N	79°57'16.19"E
Y.	29°54'48.15"N	79°57'16.77"E
Z.	29°54'47.71"N	79°57'17.25"E
Z1	29°54'44.46"N	79°57'17.40"E
Z2	29°54'47.73"N	79°57'14.62"E
Z3	29°54'48.54"N	79°57'16.63"E
Z4	29°54'49.74"N	79°57'17.35"E
Z5	29°54'51.12"N	79°57'17.81"E

RESERVES

Estimation All quantities of soapstone occurring within restricted zone & 4m depth below the surface has been considered as inferred mineral resource (333).

All quantities of soapstone occurring 8m depth from surface has been considered under proved mineral reserves (G1) & excluding thickness of overburden 2.0m, the net thickness of soapstone bearing strata has been considered as 8.0m. Further 4m depth from proved limit has been considered under probable mineral reserves (G2).

Reserves & Resources along three axis as per UNFC is as below:

- On the Basis of mining done & exploration done in the area, mineral reserve on UNFC method has been estimated up to 12m depth.
- Area of minerals blocks is given below:

Sr. No.	Block	Mineral area m³	G1	G2	G3
1	A	18785	6m	3m	3m
2	B	5030	5m	3m	3m
3	C	781	6m	3m	3m

Draft EIA Report of Surkaligaon Soapstone Mine

4	D	1690	6m	3m	3m
	Total	29286			

• **Non-mineable area**

Activity	Area	Remark
Safety zone	10610	5m
Mule track with safety zone	1259	3-4m safety zone with mule track area
Huts infrastructure	2917	15-20 m on both side and housing block
Ghadera with safety zone	398	7-8 m both side
Total	15204	

• **Total resource in mt.**

	Total resource in mt.	Blocked in non-mineable blocks in mt.	Blocked in benching in mt.	Available mineral (feasibility) in mt.	
Measured	208213	71155	27412	109646-3903 =106143	Measured & feasible
Indicated	104107	35577	20559	47971	Indicated & Pre-feasible
Inferred	104107	35577	34260	34260	Inferred & pre-feasible
Total	416427	142309	82232	188378	

Total Measured mineral in the area 208213Mt . out of which is blocked 98567Mt and now remaining is 106143Mt. Indicated mineral is 104107Mt out of which is blocked 56136mt and remaining is 47971Mt. Based on the adjacent mining lease areas it is expected that the mineral soapstone is occurring upto 12m depth.

MINING

Proposed method of Mining:

It will be open cast mechanized mine. Excavator shall be deployed for the removal of overburden & interburden. The overburden consists of weathered boulders of low grade magnesite & dolomitic stone intermixed with yellowish soil cover & average thickness has been considered as 2.0m. Below overburden, soapstone, intermixed with magnesite & dolomitic boulders occurs. The overburden/interburden will be dumped separately towards slope of working pit secured with Gravity retaining walls. Mining shall be carried out in one pit viz. pit I. The width of benches shall be kept 8m, height of benches shall be kept 6m with face slope 68°. The soapstone will be extracted manually with the help of

Draft EIA Report of Surkaligaon Soapstone Mine

crow bar, chisels, pickaxe, hammers, spade etc scattered habitation exists towards north east side of the area. 50m lateral extension from habitation has been considered under inferred mineral resources. Soapstone is soft mineral therefore no drilling & blasting shall be required. No further beneficiation will be required except breaking & sorting. The different grade of soapstone will be filled into 50 kg plastic bags & transported up to road side by manually. From road side the soapstone bags will be loaded into trucks through manually and transported to Haldwani. Applicant shall obtain requisite permission from DGMS for deployment of HEMM.

Proposed five year production target:

The year wise production schedule of soapstone from different benches in different pits are given below:

Year wise plans

Year wise development plan and section shows proposed benches from where top soil, waste and mineral is likely to be excavated and the place where soil and waste will be stacked and manner in which the backfilled will be done at the end of the particular year. (Refer Plate No. V)

Following benches will be worked during the year:

2020-21

The mining is proposed by forming 4 benches from 1818mRL in one pit as per the details given below. The area of bench wise excavation and the thickness of mineral available benches wise have been given. The benches will advance in SE direction respectively in pit no. 1. The overburden removed will be backfilled in pit no.1. at the lower level after constructing retaining wall at the toe of dump and will be terraced. The topsoil will be spread over the backfilled are in the pit. The existing mule track which connects road point will be further extended to connect the mining benches dump area as shown in Plate No. V in this year total mineral produced will be 11344tonnes, topsoil generated will be 1804tonnes and waste generated will be 26464 tonnes. The land utilized in the

Draft EIA Report of Surkaligaon Soapstone Mine

mining mule track. Topsoil and waste dumping is given in table below:

The spread of dumps and protective measure proposed have been discussed in Chapter No. 5.5 and 5.6 separately.

Pit no.	Section	Area M ²	Depth M ²	Grav.	ROM in MT	Mineral MT 30%	Waste MT
	A2 A2' A3A3'1. 2 1.2'	1818 - 1815	1.5	316	6022	1807	4215
	A2 A2' A3A3'1. 2 1.2'	1815 - 1812	3	343	17792	5338	12454
	A2 A2' A3A3'1. 2 1.2'	1812 - 1809	3	566	11872	3562	8310
	A3A3'	1809 - 1806		16	2122	637	1485
	Total				27808	11344	26464

Details :

RL	Width of benches (m)	Height of bench (m)	Bench slope	Ultimate Pit slope	Depth of working pit	Khasra No.	Owner Name
1284 Above	10-15	1.5-3		35 ⁰ -45 ⁰	660 RL	57,62,66,67, 69, 70 to 76 & 90, 92	khata Land on the field jotdar available has to be paid compensation
Waste stacking							
Quantity of waste				26464mt	Backfilled		
Quantity of top-soil				1804mt	Backfilled		

2021-22

The mining is proposed by forming 4 benches from 1822mRL to 1812mRL in pit as per the details given below. The area of bench wise excavation and the thickness of mineral

Draft EIA Report of Surkaligaon Soapstone Mine

available benches wise have been given. The benches will advance in SW direction respectively in pit no.1. The overburden removal will be backfilled in pit no. 1. At the lower level after constructing retaining wall at the toe of dump and will be terraced. The topsoil will be spread over the backfilled area in the pit no. 1. The existing male track which connects road point will be further extended to connect the mining benches dump areas, as shown in Plate No. V in this year total mineral produced will be 13941tonnes topsoil generated will be 2841tonnes and waste generated will be 32527tonnes. The land utilized in the mining mule track. Topsoil and waste dumping is given in table below:

Pit no.	Section	R.L.	Area M ²	Depth	M ²	Sp. Grav.	ROM in MT	Mineral MT 30%	Waste MT
1	A2 A2' A3A3'1.2 1.2'	1821-Above	1617	1.5	2426	2.6	6366	1892	4414
2	A2 A2' A3A3'1.2 1.2'	1821-1818	2923	3	8769	2.6	22799	6840	15959
3	A2 A2' A3A3'1.2 1.2'	1818-1815	1761	3	5283	2.6	13736	4121	9615
4	A3A3'	1815-1812	465	3	1393	2.6	3627	1088	2539
		Total					46468	13941	32527

Details :

Pit	RL	Width of benches (m)	Height of bench (m)	Bench slope	Ultimate Pit slope	Depth of working pit	Khasra No.	Owner Name
1	181 Above	10-15	1.5-3	80°	35°-45°	1812RL	95,97 to 101,111 to 115,117 119 to 123	Golkhata and on the field jotdar available has to be paid compensation
Waste stacking								
Quantity of waste				32527mt		Backfilled		
Quantity of top-soil				2547mt		Backfilled		

Draft EIA Report of Surkaligaon Soapstone Mine

2022-23

The mining is proposed by forming 7 benches from 1818mRL to 1797mRL in pit as per the details given below. The area of bench wise excavation and the thickness of mineral available benches wise have been given. The benches will advance in SW direction respectively in pit no.1. The overburden removal will be backfilled in pit no. 1. At the lower level after constructing retaining wall at the toe of dump and will be terraced. The topsoil will be spread over the backfilled area in the pit no. 1. The existing male track which connects road point will be further extended to connect the mining benches dump areas, as shown in Plate No. V in this year total mineral produced will be 17880tonnes topsoil generated will be 2841tonnes and waste generated will be 41719tonnes. The land utilized in the mining mule track. Topsoil and waste dumping is given in table below:

Pit no.	Section	R.L.	Area M ²	Depth	M ²	Sp. Grav.	ROM in MT	Mineral MT 30%	Waste MT
1	A4 A4'	1821-1815	573	1.5	860	2.6	2235	670.5	1564.5
2	A4 A4'	1815-1812	1198	2.5	2995	2.6	7787	2336	5451
3	A4 A4'	1812-1809	1665	3	4995	2.6	12987	3896	9091
4	A4 A4' 1.2 1.2'	1809-1806	1543	3	4629	2.6	12035	3610.5	8424.5
5	A4 A4' 1.2 1.2'	1806-1803	1446	3	4338	2.6	11279	3384	7895
6	A4 A4'	1803-1800	1272	3	3816	2.6	9922	2977	6945
7	A4 A4'	1800-1797	430	3	1290	2.6	3354	1006	2348
		Total					59599	17880	41719

Details :

	RL	Width of	Height	Bench	estimate	Depth	Khasra No.	Owner Name
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Draft EIA Report of Surkaligaon Soapstone Mine

		Benches (m)	of bench (m)	slope	Pit slope	of working pit		
	818Above	10-15	1.5-3	80°	35°-45°	1797RL	2 to 8, 48 to 5, 77 to 80, 23 to 4629, 4580	Golkhata Land on the field jotdar available has to be paid compensation
Waste stacking								
Quantity of waste					41719mt	Backfilled		
Quantity of top-soil					2841mt	Backfilled		

2023-24

The mining is proposed by forming 7 benches in pit no. from RL1821-1803 to 1797 as per the details given below. The area of bench wise excavation and the thickness of mineral available benches wise have been given. The benches will advance in SW direction respectively in pit no.1. The overburden removal will be backfilled in pit no. 1. At the lower level after constructing retaining wall at the toe of dump and will be terraced. The topsoil will be spread over the backfilled area in the pit. The existing male track which connects road point will be further extended to connect the mining benches dump areas, as shown in Plate No. V in this year total mineral produced will be 18521tonnes topsoil generated will be 2860tonnes and waste generated will be 43214tonnes. The land utilized in the mining mule track. Topsoil and waste dumping is given in table below:

Pit no.	Section	R.L.	Area M²	Depth	M²	Sp. Grav.	ROM in MT	Mineral MT 30%	Waste MT
1	A4 A4'	1821-Above	1004	1.5	506	2.6	3916	1175	2741
2	A4 A4'	1821-1818	2174	2.5	5435	2.6	14131	4239	9892
3	A4 A4'	1818-1815	2355	3	7065	2.6	18369	5511	12858
4	A4 A4'	1815-1812	1529	3	4587	2.6	11926	3578	8348
5	A4 A4'	1812-1809	835	3	2505	2.6	6513	1954	4559
6	A4 A4'	1809-1806	342	3	1026	2.6	2665	800	1865

Draft EIA Report of Surkaligaon Soapstone Mine

7	A4 A4'	1806-1803	540	3	620	2.6	4212	1264	2918
		Total					61735	18521	43214

Details :

	RL	Width of benches (m)	Height of bench (m)	Bench slope	Ultimate Pit slope	Depth of working pit	Khasra No.	Owner Name
	1821 Above	10-15	1.5-3	80 ⁰	35 ⁰ -45 ⁰	1803RL	101 to 103, 4617 to 4621, 113 to 118, 128 to 132	Golkhata Land in the field jotdar available has to be paid compensation
Waste stacking								
Quantity of waste					43214mt	Backfilled		
Quantity of top-soil					2860mt	Backfilled		

2024-25

The mining is proposed by forming 7 benches in pit no.1 from RL1821-1809 & 5 benches from RL1828mRL to 1815mRL in pit -2. as per the details given below. The area of bench wise excavation and the thickness of mineral available benches wise have been given. The benches will advance in SE direction respectively in pit no.1. and pit -2. The overburden removal will be backfilled in pit no. 1. At the lower level after constructing retaining wall at the toe of dumps and will be terraced. The topsoil will be spread over the backfilled area in the pit. The existing male track which connects road point will be further extended to connect the mining benches dump areas, as shown in Plate No. V in this year total mineral produced will be 209461tonnes topsoil generated will be 3529tonnes and waste generated will be 48874tonnes. The land utilized in the mining mule track. Topsoil and waste dumping is given in table below:

Pit no.	Section	R.L.	Area M ²	Depth	M ²	Sp. Grav.	ROM in MT	Mineral MT 30%	Waste MT
1	A4 A4'	1821-1818	167	1.5	251	2.6	651	195	456
2	A4 A4'	1818-1815	245	2.5	690	2.6	1793	538	1256
3	A4 A4'	1815-1812	590	3	770	2.6	4602	1381	3221
4	A4 A4'	1812-1809	470	3	410	2.6	3666	1100	2566

Draft EIA Report of Surkaligaon Soapstone Mine

5	A4 A4' 1.3 1.3'	1827-Above	623	3	623	2.6	1620	486	1134
6	A4 A4' 1.3 1.3'	1827-1824	2412	3	7236	2.6	18814	5644	13170
7	A4 A4' 1.3 1.3'	1824-1821	3298	3	9894	2.6	25724	7717	18007
	A4 A4'	1821-1818	1360	3	4089	2.6	10608	3182	7426
	A4 A4'	1818-1815	300	3	900	2.6	2342	703	1638
		Total					69821	20946	48874

Details :

	RL	Width of benches (m)	Height of bench (m)	Bench slope	Ultimate Pit slope	Depth of working pit	Khasra No.	Owner Name
	1827Above	10-15	1.5-3		35 ⁰ -45 ⁰	1815RL	101 to 103, 4617 to 4621, 113 to 118, 128 to 132	Golkhata Land on the field jotdar available has to be paid compensation
Waste stacking								
Quantity of waste			4887mt		Backfilled			
Quantity of top-soil			3509mt		Backfilled			

Indicate quantum of development of production expected as in table below:

Proposed five year production target:

Year	Quantities of soapstone (metric tonnes)
27/12/2020 to 26/12/2021	11344
2021-22	13941

Draft EIA Report of Surkaligaon Soapstone Mine

2022-23	17880
2023-24	18521
2024-25	20946
Total	82632

WATER SUPPLY

There will be very little requirement of water is anticipated to carry out operations as it will be done in Semi-mechanized/ (OTFM) using EMM and Loaders manner. The water will be required either for drinking purposes or for dust suppression. It is projected that approx 18 laborers will be required for the proposed project. Considering the fresh water requirement for site laborers it is estimated that 0.27 KLD water will be required. Apart. Thus, Total water requirement of 5.36 KLD will be met through nearby existing bore wells/ private water tankers.

Table No.11.3: Water Requirement

Source	Purpose	Detail	Avg. Demand/Day
Portable Tanker	Drinking@15lpcd/worker	34 workers x 15 lpcd =510lpcd	0.51 KLD
	Mine operation/others	-	1.0 KLD
	Average requirement of water in Land reclamation/ plantation @1 Lit/Tree	250Trees x 1 lpsd = 250 lpcd (Requirement of water increases with no of sapling plantation)	0.25KLD

Draft EIA Report of Surkaligaon Soapstone Mine

	Dust suppression @2 Lit/Sq.m (Twice in a day)	Haul Road Area = (300 m Length x 6m Width = 1200 m ²) x 2lpcd/Sq.m = 3600 lpcd	3.6 KLD
Total			5.36 KLD

10.5 BASE LINE DATA

This study contains the description of baseline studies of the 10 km radius of the area Pagana 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 11.4: BASELINE ENVIRONMENTAL STATUS

Attribute	Baseline status
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Draft EIA Report of Surkaligaon Soapstone Mine

<p>Ambient Air Quality</p> <p>Ambient air quality was monitored at 5 locations within a 5 km radius of</p>	<p>Ambient Air Quality Monitoring reveals that the maximum & minimum concentrations of PM₁₀ for all the 11 AQ monitoring stations were found to be 89.10µg/m³ at AAQ-1 and 89.60µg/m³ at AAQ-5, respectively, Whereas the maximum & minimum concentrations of PM_{2.5} for all the 11 AQ monitoring stations were found to be 69.75µg/m³ at AAQ-2 and 56.66µg/m³ at AAQ-1, respectively.</p> <p>As far as the gaseous pollutants SO₂ and NO₂ are concerned, the prescribed NAAQS limit of 80µg/m³ for residential and rural areas has never surpassed at any station. The maximum & minimum concentrations of SO₂ were found to be 12.53 µg/m³ at AAQ-1 & 12.52 µg/m³ at AAQ-3 respectively. The maximum & minimum concentrations of NO_x were found to be 20.10 µg/m³ at AAQ-5 & 22.35 µg/m³ at AAQ-5 respectively.</p>
<p>Noise Levels</p>	<p>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.</p> <p>There are several other sources in the 10 km radius of study area, which contributes to the local noise level of the area. Traffic activities as well as activities in nearby villages and agricultural fields add to the ambient noise level of the area.</p>

Draft EIA Report of Surkaligaon Soapstone Mine

Water Quality	<p>5 Groundwater samples and 3 surface water samples were analyzed and concluded that:</p> <p>The ground water from all sources remains suitable for drinking purposes as all the constituents are within the limits prescribed by drinking water standards promulgated by Indian Standards IS: 10500.</p> <p>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.</p>
Soil Quality	<p>Samples collected from identified locations indicate the soil is sandy type and the pH value ranging from 6.77 at SQ1 to 6.86 at SQ4 which shows that the soil is alkaline in nature. Potassium is found to be from 392.75mg/kg (SQ6) to 367.25mg/kg (SQ4). The water holding capacity is found in between 31.68% (SQ7) to 27.10 % (SQ8).</p>
Ecology and Biodiversity	<p>There are no Ecologically Sensitive Areas present in the study area, but many reserved forests surround the project area.</p>
Socio-economy	<p>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.</p>

11.6 BIOLOGICAL ENVIRONMENT

Area supports moderately healthy vegetation, the main forest species are scattered

Draft EIA Report of Surkaligaon Soapstone Mine

all over the hills, riparian vegetation found along the Punger 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 Ziziphusjajuba. Other noxious weeds and those which appear in crops are Carthamusoxycantha, 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, Cenchrusciliaris, 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, Albizialebbbeck,

Delonixregia, Ficusreligiosa, etc.

Table 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.	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• The riparian ecosystem or the wetlands will not be destroyed by the mine owners.
Monitoring of upstream and downstream water quality	<ul style="list-style-type: none">• 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

Draft EIA Report of Surkaligaon Soapstone Mine

soil will be temporarily stored and used for Green belt development. 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.

AIR ENVIRONMENT

Anticipated impacts and evaluation

Information on air quality was studied and various modeling 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.

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 soapstone 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 Soapstone. 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.

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 measuresOn-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

Draft EIA Report of Surkaligaon Soapstone Mine

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.

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

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.

ENVIRONMENTAL MANAGEMENT PLAN (EMP)

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

Draft EIA Report of Surkaligaon Soapstone Mine

- 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 jack hammer drillers and crusher operators.
- Care should be taken that noise produced during vehicles movement for carrying soapstone 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

Draft EIA Report of Surkaligaon Soapstone Mine

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 themines and the persons employed.
- Celebration of annual mines safety week and environmental week in order to develop safetyawareness amongst employees.
- Pre joining medical check-up shall be done and regular health check-up in 6 monthly intervals isplanned 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 propertreatment 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.

Draft EIA Report of Surkaligaon Soapstone Mine

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.

BUDGET ALLOCATION FOR EMP IMPLEMENTATION

Table 11.7: COST OF EXPENDITURE

S. No.	Description	Unit	Total (Rs.)
A. Project Operation Cost			
1.	Manpower Cost: Geologist - 01 Mine Engineer -01 Skilled Worker-02 Unskilled Worker-30	(Total Man power 34) Assuming 240days Rs. 25,000/ month= 2,00,000/= Rs. 25,000/ month= 2,00,000/= Rs.550 / day x2 x 240= 264000/= 450 x 240 x 30= 3240000/=	39,04,000
2.	Expenditure on Occupational Health: PPE & hand sanitizer ,thermal scanner , mask (due to covid -19 epidemic)with first aid kit Medical checkup and Medicine (Once in a month)	1000/worker (1000 x 34)= 34,000 <i>Doctor's visit:</i> 10000/ month (9working months) =90,000 <i>Medicines</i> (Assuming 500/worker/month) 500 x 34 x 9 = 1,395,00	2,63,500
3.	Equipment's/Tools/Machineries	240 days Assuming Rs.1500/day	3,60,000
4.	Drinking and Sanitary Facilities	➤ Rs. 1000/day for drinking/domestic (240days)=2,40,000 ➤ Rs. 30,000/ Bio-toilets x 2=60,000	3,30,000
	Total Project Operation Cost (A)		Rs. 48,57,500 (48.57 Lakh)

Draft EIA Report of Surkaligaon Soapstone Mine

B. Break-up of Expenditure on Environment Protection & Environment Management			
5.	Haulage Road Repair & Maintenance <ul style="list-style-type: none"> Filling, Leveling and widening of the road up to width of 6m and length of 200 m. Setting & Fixing of Cut Stone on the leveled road. 	300 m (L) x 6 m (W)	1,00,000
6.	Water Sprinkling on Haulage Road for Dust Suppression	Assuming Rs.688/day for 240 days of working Tanker Cost: Rs. 688/Tanker Tanker Capacity: 5000 liter, No. of Tankers required: 1	1,65,000
7.	Plantation along the road side & post plantation care	Plantation with post plantation care @100/sapling 50sapling within one year 50 sapling x 5 year =250sapling 250 x 100= 25000/= <p><i>Note: Annual cost will increase with increase in no. of sapling.</i></p>	2,50,00
8.	Environmental Monitoring & Compliances.	<p>➤ Half Yearly Monitoring of Environmental Parameters viz. Air, water, Noise & Soil.</p> <p>➤ Half Yearly Submission of Compliances.</p>	50,000
	Total Environment Protection & Management Cost (B)		Rs. 3,40,000 (3.40Lakhs)
	Total Project Cost (A+B)		Rs. 48.575 +3.40 (51,97,500Lakhs)

Corporate Environment Responsibility:

CER (Corporate Environment Responsibility) details for the Project

Draft EIA Report of Surkaligaon Soapstone Mine

CER plan is given below:

Total Cost of the Project = Rs. 51,97,500 Lakhs

Yearly CER cost for the project, i.e. 5% of the total project cost -

Rs. 51,97,500 Lakhs x 0.05 = Rs. (2,59,875 Rupee)

MONITORING SCHEDULE AND PARAMETERS

Table 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 groundwater around the site b) Drinking water must conform to drinking water standards	Once in a season for 4 seasons in a year
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

BENEFIT OF MINING

The opening of the proposed project will enhance the socio-economic activities in the

Draft EIA Report of Surkaligaon Soapstone Mine

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.

CER Project Details

Soapstone mine has proposed to provide financial assistance of Rs. 2.59 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. 85,000).
- Up gradation of toilets of government school in nearby villages. (Rs.,75,000).
- 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.50,000).