RISK ASSESSMENT

1.1 Risk Assessment

The complete mining operation will be carried out under the management control and direction of a qualified mine manager. Moreover, mining staff will be sent to refresher courses from time to time to keep them alert. However, following natural/industrial hazards may occur during normal operation.

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

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

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

1.2.1 Blasting

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

1.2.2 Overburden & Interburden

The overburden (soil) and interburden dumps may cause landslides. High overburden dumps created at the quarry edge may cause sliding of the overburden and interburden dump or may cause failure of the pit slope due to excessive loading, thereby causing loss of life and property.

Siltation of surface water may also cause run-off from overburden and interburden dumps.

1.2.3 Machinery

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

1.2.4 Water Logging

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

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

Natural resource conservation

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

1.2.5 Earthquake Management Plan

Following measures will be undertaken:

- The project site is mainly a plain area. There will be no drilling and blasting during mining.
- The overall slope angle of the upper pit wall will be kept to 30º and the slope angle of the inner benches will not be greater than 38º to 40º 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.

1.2.6 Safety Measures

Safety Measures at the proposed Open Cast Mining Project

- The opencast mines have been planned for working with shovel tipper system which requires proper benching not only for slope stability but also for movement of tippers and other machinery. The inclination of the quarry sides at the final stage i.e. at the dip most point will not exceed 45º to the horizontal. (This angle is measured between the line joining the toe of the bottom most bench to the crest of the top most bench and the horizontal line);
- The gradient of the haul road inside the pit, access trench and on the dumps will not be steeper than 1 in 16;

- The slope of the sides of the OB and IB dump to the horizontal will not exceed 37º, and the height of the OB and IB dumps has been restricted to a max of 12 m;
- The quarries will be protected by garland drains around the periphery for storm water drainage;
- A minimum safe distance of 50m will be kept between the surface edge of the quarry and the nearest public building, roads etc.

Measures Suggested to Avoid Accidents due to Blasting

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

Measures to Prevent the Danger of Overburden

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

Measures to Prevent Accidents due to Trucks and Tippers

- All transportation within the main working area should be carried out under the direct supervision and control of the management.
- The vehicles must be maintained in good repairs and checked thoroughly at least once a week by a competent person authorized for this purpose by the management;
- Broad signs should be provided at each and every turning point specially for the guidance of the drivers at night;
- To avoid dangers while reversing the trackless vehicles, especially at the embankment and tripping points, all areas for reversing of lorries should, as 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.

1.3 DISASTER MANAGEMENT PLAN

1.3.1 Objectives of Disaster Management Plan

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

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

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

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

Fire Fighting Facilities

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

Emergency Medical Facilities

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

1.4 Social Impact Assessment, Rehabilitation & Resettlement (R&R) Action Plan

Introduction- In this section of the report an attempt has been made to measure Socio-economic impact of the proposed Soapstone at Village- Simkhet, Post- Ghinghartola, Tehsil- Bageshwar, District- Bageshwar, Uttarakhand. The various attributes that have been taken into account are population composition, employment generation, occupational shift, household income, consumption pattern, ethnic issue and law & order problem. The key objective of the study is to assess possible impact of the project on socio-economic life of the people in the neighborhood known as study area.

The objectives of the socio-economic impact assessment are as follows:

a) To collect baseline data of the study area.
b) To know the socio-economic status of the people living in the study area of the proposed mining project.
c) To assess the possible impact of the project on socio-economic aspects in the study area.

d) To measure the impact of the project on Quality of life of the people in the study area.

Approach & Methodology

a) A mixture of both quantitative and qualitative approach has been adopted in the current socio-economic study.

b) The study has been conducted based on primary and secondary data. While primary data has been collected through a sample survey of selected households in the study area, the secondary data has been collected from the administrative records of the Government of Uttarakhand Census 2011.

c) The details regarding population composition, number of literates, workers, etc. have been collected from secondary sources and analyzed. Also village/city/town wise details regarding amenities available in the study area have been collected from secondary sources like Census 2011, and analyzed.

d) Two stage sampling design has been adopted to select the sampling units. The first stage units are census villages in the rural areas and towns/cities in urban areas. The ultimate stage units are households in the selected villages and towns/cities. Probability sampling has been adopted to select the sampling units.

e) Estimation of various parameters has been made based on sample data and bottom top approach has been adopted.

f) On the basis of a preliminary reconnaissance survey, two questionnaires were developed to make it suitable to fulfill the objectives of the study. The questionnaires contained both open ended and close ended questions

g) The data collected during the above survey was analyzed to evaluate the prevailing socio-economic profile of the area.

h) Based on the above data, impacts due to mining operation on the community have been assessed and recommendations for improvement have been made.

Concept & Definition of Terms Used

a) **Study Area:** The study area, also known as impact area has been defined as the sum total of core area and buffer area with a radius of 10 Kilometers from the periphery of the project site. The study area includes all the landmarks both natural and manmade, falling therein.

b) **QoL**: The Quality of Life (QoL) refers to degree to which a person enjoys the important possibilities of his/her life. The 'Possibilities' result from the opportunities and limitations, each

person has in his/her life and reflect the interaction of personal and environmental factors. Enjoyment has two components: the experience of satisfaction and the possession or achievement of some characteristic.

c) **Household**: A group of persons who normally live together and take their meals from a common kitchen are called a household. Persons living in a household may be related or unrelated or a mix of both. However, if a group of related or unrelated persons live in a house but do not take their meals from the common kitchen, then they are not part of a common household. Each such person is treated as a separate household. There may be one member households, two member households or multi-member households.

d) **Sex Ratio:** Sex ratio is the ratio of females to males in a given population. It is expressed as 'number of females per 1000 males'.

e) **Literates:** All persons aged 7 years and above who can both read and write with understanding in any language are taken as literate. It is not necessary for a person to have received any formal education or passed any minimum educational standard for being treated as literate. People who are blind but can read in Braille are also treated as literates.

f) **Literacy Rate:** Literacy rate of population is defined as the percentage of literates to the total population aged 7 years and above.

g) **Labour Force:** The labour force is the number of people employed and unemployed in a geographical entity. The size of the labour force is the sum total of persons employed and unemployed. An unemployed person is defined as a person not employed but actively seeking work. Normally, the labour force of a country consists of everyone of working age (commencing from 14 to 16 years) and below retirement (around 65 years) that are participating workers, that is people actively employed or seeking employment. People not counted under labour force are students, retired persons, stay-at home people, people in prisons, permanently disabled persons and discouraged workers.

h) **Work:** Work is defined as participation in any economically productive activity with or without compensation, wages or profit. Such participation may be physical and/or mental in nature. Work involves not only actual work but also includes effective supervision and direction of work. The work may be part time or full time or unpaid work in a farm, family enterprise or in any other economic activity.

i) **Worker:** All persons engaged in 'work' are defined as workers. Persons who are engaged in cultivation of land or milk production even solely for domestic consumption are also treated as workers.

j) **Main Workers**: Those workers who had worked for the major part of the reference period (i.e. 6 months or more in the case of a year) are termed as Main Workers.

k) **Marginal Workers:** Those workers who did not work for the major part of the reference period (i.e. less than 6 months) are termed as Marginal Workers**.**

l) **Work participation rate**: The work participation rate is the ratio between the labour force and the overall size of their cohort (national population of the same age range). In the present study the work participation rate is defined as the percentage of total workers (main and marginal) to total population.

Findings of the Study

Study Area

The field investigation has revealed that the entire study area of the proposed mining project is located at Village- Simkhet, Post-Ghinghartola, Tehsil-Bageshwar, District- Bageshwar, Uttarakhand.

Baseline Data of the Impact Area

Table 1.1: Demographic details of Project District and Tehsil

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

Source: Census of India, 2011

Table 1.2 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 is27.72% of the total population, while ST population is 1982, which is 0.76% of the total population.

Table 1.2: Caste wise distribution of population

Sl. No.	District/Project Area	Schedule Caste (SC)		Schedule Tribes (ST)	
		Total	% of SC	Total	% of ST
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 1.3.**

Table 1.3: 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 approximately0.6 % following it. In Bageshwar district, Christianity is followed by 0.2 %.

Table 1.4: Sub-district wise distribution of villages in the Study Area

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

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.

Table 1.5: Demographic Particulars of the Study Area of Soapstone Mining Project at Bageshwar, Uttarakhand

Parameters	**Values**
Household	1454
Total population	7930
Male	4018
Female	3912
Population under 6yrs of age.	2745
Household size	5.4
Proportion of Male	50.51%
Proportion ofFemale	49.43%

Various amenities available in the study area are given in the **table 1.6** below:

Table 1.6: 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
	Registered Private	9

	Medical Practitioners	
Drinking Water	Tap	2
	Tank / Tube well	14
	Hand pump	17
Post & Telegraph	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 2011

Possible Impact Assessment

Impact on population composition

Due to unemployment in the study area, population of the study area are migrating towards urban areas due to which the skewed sex ratio may make permanent social effects like rise in exploitation of women, higher crime rate, increase in sexual diseases and depression among youth. But due to proposed project, the impact on population composition will be marginal as most of the staff will be recruited from local areas.

Impact on employment generation

The proposed mining project is expected to provide employment opportunities to 50 persons of which 4 will be skilled workers and the remaining 46 will be unskilled workers. It is understood that all the persons to be deployed for various mining activities will be recruited locally and there is very little scope for migration of people from outside the study area. The employment potentiality of the project is expected to ameliorate the economic condition of the families of those persons who will get employed in the proposed mining project. However, the mining project will provide seasonal employment. Further, the project will provide indirect employment to about 100 people who will be

involved in segregation of extracted mining materials, crushing of Soapstone, petty business and service-oriented industries.

Impact on Health

Extraction of Soapstone may cause serious health risks due to dust, quarrying and stone crushing. The effects will vary depending upon the nature of the dust particles, silica content in it and the size of the particles. Pneumoconiosis is an occupational lung disease often caused to miners, due to the inhalation of dust. Silica content in the sand may also lead to Silicosis, which is again an occupational lung disease. Miners may also suffer with occupational respiratory ailments, skin allergies etc., but the same are preventable if exposure is minimized. Further, regular health check-up of the miners is required to prevent any negative impact on their health. In the present mining project, no adverse impact on health is expected if the miners take minimum precautions.

Impact on consumption pattern

The field survey has revealed that people in the study are poverty ridden. Increased household income may change the consumption pattern of few families due to increased purchasing power.

Impact on road development

Movement of trucks and other vehicles to and fro the quarry is expected to increase substantially, when mining will start. The existing roads connecting the quarry with the national and state highways are mostly narrow mud roads. There will be mudslide and traffic bottleneck if these roads are not widened and their conditions are not improved by making them paved roads. Hence, there is ample scope for road development in and around the mining areas.

Impact on law & Order

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

Public Perception about The Project- Visit to project village has revealed that no villager was opposed to the proposed mining project. They whole-heartedly welcomed it, as they were disgusted with perennial poverty. They hoped that the upcoming mining project would definitely increase

their income that in turn will increase their purchasing power. They however, demanded that the beneficiaries should be selected from those who belong to BPL category and registered under SGSY scheme.

The villagers living in the distant villages located within the study area were found either not aware or partially aware of the upcoming mining project and they did not make any comment about its utility. They however demanded that labour intensive projects should be implemented in their villages, to fight poverty.

1.5 Suggestions

Provision of First Aid at mining site

Extraction of Soapstone poses serious health risks due to dust, quarrying. The effects vary depending on the nature of the dust particles, silica content in it and the size of the particle. To meet any emergency during extraction of the mineral and subsequent loading in the transport vehicles, provision for First Aid should be made by the project proponent. Before the affected person is removed to a doctor or health institution for necessary medical aid, the miner should be provided with First Aid.

Tie up with the nearest PHC for medical help- To meet the medical needs of the mine workers it is suggested that tie-ups with nearest hospital or Primary Health Center (PHC) may be made. Few beds may be exclusively reserved for the mine workers in the above health institutions. This will ensure timely medical aid to the affected persons.

Supply of Mask and Gloves -The mine workers are subject to respiratory diseases, muscular-skeletal and gastro-intestinal disorders and skin diseases. For protection from dust it may be made compulsory for all mine workers to wear masks and gloves while working in the mines.

Regular health checkups

The miners may be encouraged to undergo health checkups at regular intervals in order to protect themselves from various diseases. The health Department of Uttarakhand Government must Organize Health Camps at regular intervals preferably in every quarter. Further, free medical facilities may be made available to the workers and their family members.

Administration of Anti-venom injections

Provision of Anti-venom therapy must be made available at the near health institution. Anti-venom injections may be administrated to the mine workers in case of snake, spider and insect bites, while working in the mines.

Special telephone number

A special telephone number may be made available to the mine workers. In case of emergency the miners can dial the above number for medical assistance. Vehicle may be provided to the patients in short duration for shifting to the health institution.

Special Group Insurance Scheme

All the mine workers may be covered under a Group Insurance Scheme of LIC or any other Insurance company, if not so far.

Distribution of Blankets and Quilts

During winter season the mine workers may be distributed blankets and quilts free of cost.

1.6 Conclusion

The implementation of the soapstone project will throw opportunities to local people for both direct and indirect employment. The project will also provide impetus to industrialization of the area. It is likely the intending entrepreneurs will venture to set up micro and small scale units in the near future making the area a mixed society, dependent on industry, trade and business. At present agriculture is the main occupation of the people. 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.

The study area is still lacking in education, health, housing, water, electricity etc. It is expected that it will improve to a great extent due to proposed mining project and associated industrial and business activities.

Proposed activities and expenses on Corporate Environmental Responsibility will be as per CER Mandate of the Government.