DRAFT ENVIRONMENTAL IMPACT ASSESSMENT
AND
DRAFT ENVIRONMENTAL MANAGEMENT PLAN

FOR

PROPOSED MINING OF BOULDER STONE

AT

VILLAGE UMBUDA, RAID MARWET,
DISTRICT RI BHOI, MEGHALAYA

AREA: 2.61 HA, PROPOSED CAPACITY: 2,80,260 MTPA (MAXIMUM)

PROJECT PROPONENT

Smt. Falguni Warisa
34, Lachumiere Hills
Shillong, East Khasi Hills District,
Meghalaya

PREPARED BY

ENVIRO INFRA SOLUTIONS PVT. LTD.
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For EIA studies as 'A' Category Consultant
(Sl.No. 53th, List of Accredited Consultant Organizations June 2020)
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CHAPTER 1: INTRODUCTION

1.1 PURPOSE OF THE EIA REPORT

Environmental Impact Assessment (EIA) is one of the proven management tools for integrating environmental concerns in development process and for improved decision making as there is need to harmonize the developmental activities with the environmental concerns into the larger interest of the society. The growing awareness, over the years, on environmental protection and sustainable development, has given further emphasis to the implementation of sound environmental management practices for mitigating adverse impacts from developmental activities. EIA study plays a vital role in sustainable development of a country. Recognizing its importance, the Ministry of Environment, Forest and Climate Change (MoEF&CC), Government of India has formulated policies and procedures governing the industrial and other developmental activities to prevent indiscriminate exploitation of natural resources and to promote integration of environmental concern in project development.

Draft Environmental Impact Assessment report has been prepared to comply with the proposed Terms of Reference (ToR), under EIA notification of the MoEF&CC dated 14th September, 2006 and amended thereof, for seeking environmental clearance for mining of boulder stone in the applied mining lease area.

1.2 IDENTIFICATION OF PROJECT & PROJECT PROPONENT

The project is being proposed by Smt Falguni Warisa. The address of the proponent is given below:

34, Lachumiere Hills

Shillong, East Khasi Hills District,

Meghalaya

The proponent has applied for environmental clearance for mining lease over an area of 2.61 ha near village Umbuda, Raid Marwet, District Ri Bhoi, Meghalaya.

1.3 BRIEF DESCRIPTION OF PROJECT

1.3.1 NATURE

The proposed mining is an opencast mining project where the entire activity will be done in a semi-mechanized way.

1.3.2 SIZE

The mine lease area is 2.61 Ha private non forest land land and the project is contemplated to extracted the mineral (boulder stone) by open cast method of mining.

1.3.3 LOCATION

The proposed lease of boulder stone Mine is situated near village Umbuda, Raid Marwet, District Ri Bhoi, Meghalaya. The location and Salient feature of mining Lease area has

been shown in **Table 1.1**. The google earth and SOI topo sheet showing location map of the mine lease area have been shown in **Figure** 1.1 and 1.2.

Table 1.1: Location and Salient feature of Mining Lease Area

<table>
<tr><th>Sr. No</th><th>Particular</th><th>Details</th></tr>
<tr><td>A.</td><td>Nature of the Project</td><td>Boulder stone Mining Project.</td></tr>
<tr><td>B.</td><td>Size of the Project</td><td></td></tr>
<tr><td>1.</td><td>ML Area</td><td>2.61 Hectare (Non forest Land).</td></tr>
<tr><td>2.</td><td>Proposed Production Capacity</td><td>Total production in 5 years will be 12,72,900 MT and peak production will be 2,80,260 MT/annum.</td></tr>
<tr><td>3.</td><td>Lease Period of Mine</td><td>Lease was granted for a period of 30 Years.</td></tr>
<tr><td>C.</td><td>Method of Mining</td><td></td></tr>
<tr><td>1.</td><td>Method</td><td>Open-Cast Manual Mining</td></tr>
<tr><td>2.</td><td>Blasting / Drilling</td><td>Blasting will be done by short or long holes with the permission of DGMS</td></tr>
<tr><td>D.</td><td>Project Location</td><td></td></tr>
<tr><td>1.</td><td>Location</td><td>Village Umbuda, Raid Marwet, District Ri Bhoi, Meghalaya</td></tr>
<tr><td>2.</td><td>Toposheet No.</td><td>78N/16</td></tr>
<tr><td>3.</td><td>Lease Area Coordinates</td><td>
<table>
<tr><th>S.No.</th><th>Latitude</th><th>Longitude</th></tr>
<tr><td>1</td><td>26°03'42.69"N</td><td>90° 49' 34.94"E</td></tr>
<tr><td>2</td><td>26°03'40.75"N</td><td>90° 49' 34.13"E</td></tr>
<tr><td>3</td><td>26°03'40.65"N</td><td>90° 49' 31.20"E</td></tr>
<tr><td>4</td><td>26°03'41.53"N</td><td>90° 49' 28.15"E</td></tr>
<tr><td>5</td><td>26°03'44.02"N</td><td>90° 49' 25.30"E</td></tr>
<tr><td>6</td><td>26°03'46.18"N</td><td>90° 49' 26.37"E</td></tr>
<tr><td>7</td><td>26°03'45.57"N</td><td>90° 49' 30.23"E</td></tr>
<tr><td>8</td><td>26°03'44.14"N</td><td>90° 49' 31.26"E</td></tr>
<tr><td>9</td><td>26°03'43.06"N</td><td>90° 49' 33.30"E</td></tr>
</table>
</td></tr>
<tr><td>E.</td><td>Cost Details</td><td></td></tr>
<tr><td>1.</td><td>Project Cost</td><td>Rs. 24.50 Lakhs</td></tr>
<tr><td>F.</td><td>Water Demand</td><td></td></tr>
<tr><td>1.</td><td>Requirement</td><td>5 cum</td></tr>
<tr><td>2.</td><td>Source of water</td><td>Nearby villages</td></tr>
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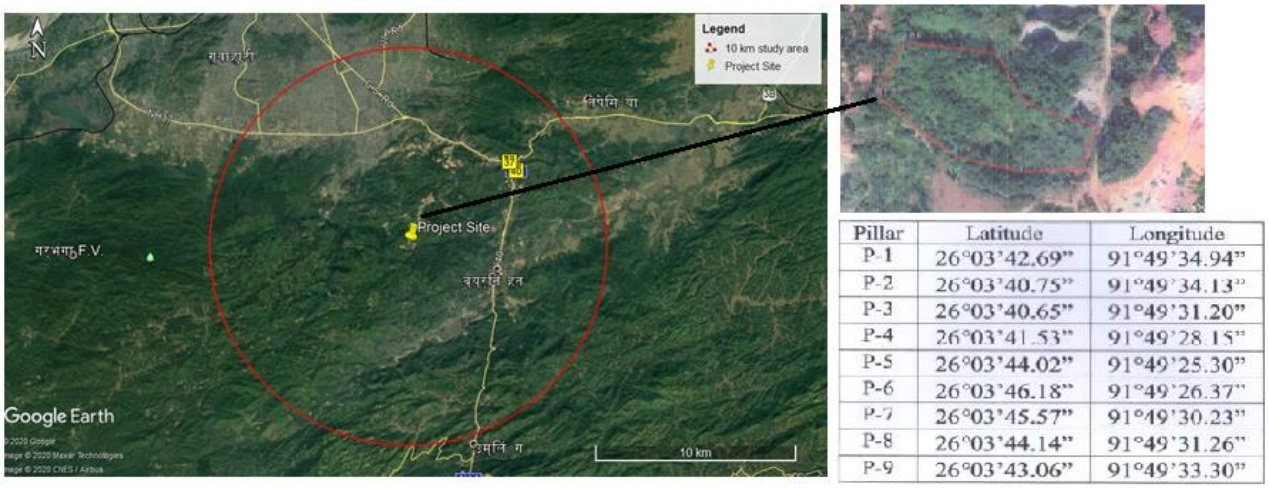
<tr><td>H.</td><td>Environmental Setting</td><td></td></tr>
<tr><td>1.</td><td>Nearest Village</td><td>Umbuda, 2.0 km</td></tr>
<tr><td>2.</td><td>Nearest Town</td><td>Guwahati, 6.0 Km.</td></tr>
<tr><td>3.</td><td>Nearest National / State Highway</td><td>NH 40, 4.5 Km</td></tr>
<tr><td>4.</td><td>Nearest Railway Station</td><td>Guwahati Railway Station, 15.1 Km</td></tr>
</table>

5.	Nearest Airport	Lokpriya Gopinath Bordoloi Airport, 24.1 Km
6.	Ecological Sensitive Areas (National Park, Wild Life Sanctuaries, Biosphere Reserve etc.) within 10 km radius	Eco Sensitive Zone boundary of Amchang Wildlife Sanctuary is 5.5 km from the project site.
7.	Water bodies within 10 km radius of the mine site.	A stream is flowing approx. 4 km SE of the Mine.
8.	Archaeological Important Place	None
9.	Seismic Zone	V



Pillar	Latitude	Longitude
P-1	26°03'42.69"	91°49'34.94"
P-2	26°03'40.75"	91°49'34.13"
P-3	26°03'40.65"	91°49'31.20"
P-4	26°03'41.53"	91°49'28.15"
P-5	26°03'44.02"	91°49'25.30"
P-6	26°03'46.18"	91°49'26.37"
P-7	26°03'45.57"	91°49'30.23"
P-8	26°03'44.14"	91°49'31.26"
P-9	26°03'43.06"	91°49'33.30"

Figure 1.1: Location Map of the mine lease area

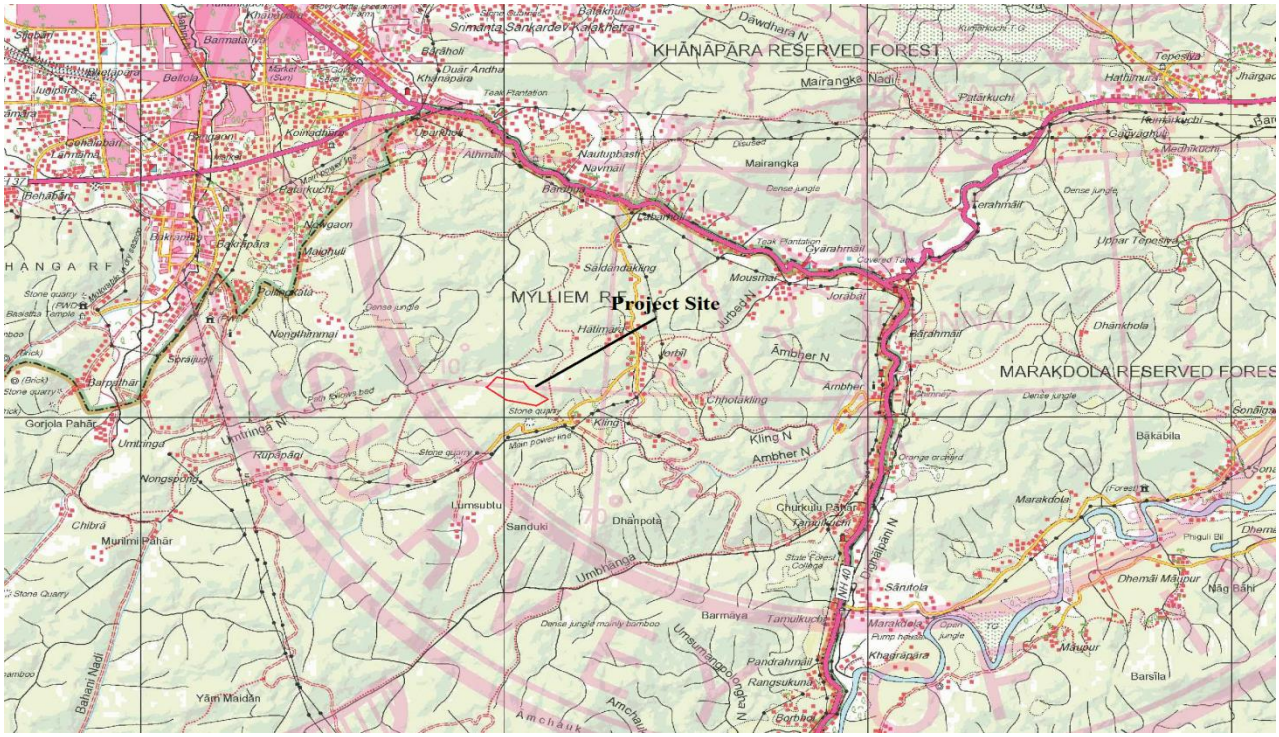


Figure 1.2: SOI topo sheet showing Location Map of the mine lease area

1.4 PROJECT'S IMPORTANCE TO THE COUNTRY AND THE REGION

This project involves collection of boulder stones due to their most diversified use. It is a basic raw material required for manufacturing industries improving the construction activities like buildings, road, bridges infrastructure etc. The requirement for these minerals is always high in the nearby cities, towns and villages. Also, the project will generate direct and indirect employment opportunities to the nearby villages. Economy of the area will get a boost and there will overall growth of the region.

1.5 SCOPE OF THE STUDY

The SEAC in its meeting dated 26th and 28th May, 2020 examined the proposal. After through discussion and deliberation, it has been conveyed by SEAC that draft EIA/EMP report shall be prepared as per approved ToR and after public consultation through Meghalaya Environment Protection and Pollution Control Board .The final EIA/EMP report shall be submitted after incorporating Public Hearing details to SEIAA, Meghalaya for Environmental Clearance.

1.6 POINT WISE COMPLIANCE

The present draft EIA/EMP report of the proposed project is prepared as per proposed TOR and in compliance with the ToR No. ML/SEIAA/MIN/RiBhoi/P-4/2020/1188 dated 23 June 2020 by State Environment Impact Assessment Authority, Meghalaya. The copy of the ToR has been attached as **Annexure I**. The point wise compliance of ToR has been shown in **Table 1.2:**

Table 1.2: Point Wise Compliance for TOR

Sr No.	ToR Points	Reference of Compliance
1.	Year-wise production details since I994 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 boulders tone 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.	Complied
4.	All corner coordinates of the mine lease area, superimposed on a High Resolution Imagery / Topo sheet, Topographic sheet, Geomorphology and Geology of the area should be provided. Such an Imagery of the	The study area map has been shown in Figure 1.1 and 1.2 of Chapter 1.

	proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).	
5.	Information should be provided in Survey of India Topo sheet in I: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.
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. The Institutional Arrangements for Environment Protection and Conservation has been described in section 6.2 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	The land use map of the proposed project has been shown in Figure 3.7 of Chapter 3.

	preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.	
11.	Details of the land for any over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R & R issues, if any, should be given.	Provided in draft 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 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 mine. Non forest land certificate is attached as **Annexure III.**
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 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.	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.	Eco sensitive zone (ESZ) boundary of Amchang Wildlife Sanctuary is 5.5 km from the boundary of mine. Anticipated impact of mining on the same along with suggested mitigation measures are incorporated in section 4.8 of chapter 4.
16.	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	Eco sensitive zone (ESZ) boundary of Amchang Wildlife Sanctuary is 5.5 km from the boundary of mine. Details have been provided in section 3.11.

	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.	
17.	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.
18.	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 SQs /STs and other weaker sections of the society in the study area, d. 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 Applicable
19.	one season (non-monsoon) [i.e. March-May (summer Season); October-December (post monsoon season); December-February (winter season)] primary baseline data on ambient air quality as per CPCB Notification of 2oo9, 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	The details of Ambient Air Quality have been described in section 3.5 of Chapter 3.

	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 predominant downwind direction. The mineralogical composition of PM10, particularly for free silica, should be given.	
20.	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.
21.	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 2.8 of Chapter 2.
22.	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.	Not required.
23.	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.
24.	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.
25.	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.

26.	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 mine.
27.	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
28.	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 Greenbelt Development Plan have been described in section 9.9 of Chapter 9.
29.	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.
30.	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.
31.	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 4.3 of Chapter 4.
32.	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical	The details have been described in section 4.10 of Chapter 4.

	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.	
33.	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
34.	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.
35.	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.
36.	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.	Will be Complied. The project is in draft stage.
37.	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.
38.	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 9.2 of Chapter 9. The budget of CER has been presented in Table 9.3 of Chapter 9.
39.	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.
40.	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.

41.	The Action Plan on the compliance of the recommendations of the CAG as per Ministry's circular No. J-11013/71/2016-IA. I (M) dated 25.10.2017 need to be submitted at the time of appraisal of the project and included in the EIA/EMP Report	Complied
42.	Compliance of the Ministry's Office Notification No. GSR-94 (E) dated 25.01.2OI8 - mandatory implementation of Dust mitigation measures for construction and demolishing activities	Complied
43.	The activities and budget earmarked for Corporate Environmental Responsibility (CER) shall be as per Ministry's O.M. No.22-65/2O17- IA.II (M) dated 01.05.2018 and the action plan on the activities' proposed under CER shall be submitted at the time of the project included in the EIA/EMP Report.	The budget of CER has been presented in Table 9.3 of Chapter 9.
44.	Compliance of the Ministry's office Memorandum No. F:3- 50/2017-IA.III (Pt), dated 30.05.2018 on the Judgement of Hon 'ble Supreme Court, dated the 2"d August, 2OI7 in Writ Petition (Civil) No.114 of 2014 in the matter of Common Cause versus Union of India needs to be submitted and included in the EIA/EMP Report.	Complied
45.	Besides. the above, the below mentioned general points are also to be followed: -	
(i)	All documents to be properly referenced with index and continuous page numbering.	Complied
(ii)	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
(iii)	Project Proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the Mo EF & CC/NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the Project.	Complied
(iv)	Where the documents provided are in a language other than English, an English translation should be provided	Complied
(v)	The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted.	Complied
(vi)	While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF vide O.M. No. J-1 1013/4I/2006-IA.II(I) dated 4th August, 2009, which are	Complied

	available on the website of this Ministry, should be followed	
(vii)	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 the SEIAA, Meghalaya 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
(viii)	As per the circular no. J-110/116L8/2O10-IA. II (l) 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
(ix)	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 in mining plan and the approved mining plan has been attached as **Annexure IV.**
49.	The PP should submit the EIA/EMP report as per the generic structure prescribed in Appendix-Ill of the EIA Notification, 2006, after incorporating the details of public hearing already conducted and covering the above mentioned issues, to take further necessary action for obtaining environmental clearance in accordance with the procedure prescribed under EIA Notification,2006 also in accordance with 'procedure for Environmental Clearance for mining of Minor Minerals including Cluster' as laid down in Appendix -XI {Para 7(iii) of S.O.141(E) dated 15.01 .2016	Complied

CHAPTER 2: PROJECT DESCRIPTION

2.1 TYPE OF PROJECT

The project is proposed for the excavation of boulder stone over an area of 2.61 Ha. It is an opencast mining project where the entire activity will be done in a semi-mechanized way.

2.2 NEED FOR THE PROJECT

The need and the importance of this Mine Project is mainly for the construction purpose for development (Private as well as Government projects). Huge demand for boulderstone in nearby towns and in the upcoming development projects.

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

This project involves collection of boulder stones due to their most diversified use. It is a basic raw material required for manufacturing industries improving the construction activities like buildings, road, bridges infrastructure etc. The requirement for these minerals is always high in the nearby cities, towns and villages. Also, the project will generate direct and indirect employment opportunities to the nearby villages. Economy of the area will get a boost and there will overall growth of the region.

2.3 LOCATION DETAILS

The proposed lease of boulder stone mine is situated near village Umbuda, Raid Marwet, District Ri Bhoi, Meghalaya. The lease co-ordinates and connectivity details are listed in **Table 2.1** below:

Table 2.1: Project site coordinates

S.No.	Latitude	Longitude
1	26°03'42.69"N	90° 49' 34.94"E
2	26°03'40.75"N	90° 49' 34.13"E
3	26°03'40.65"N	90° 49' 31.20"E
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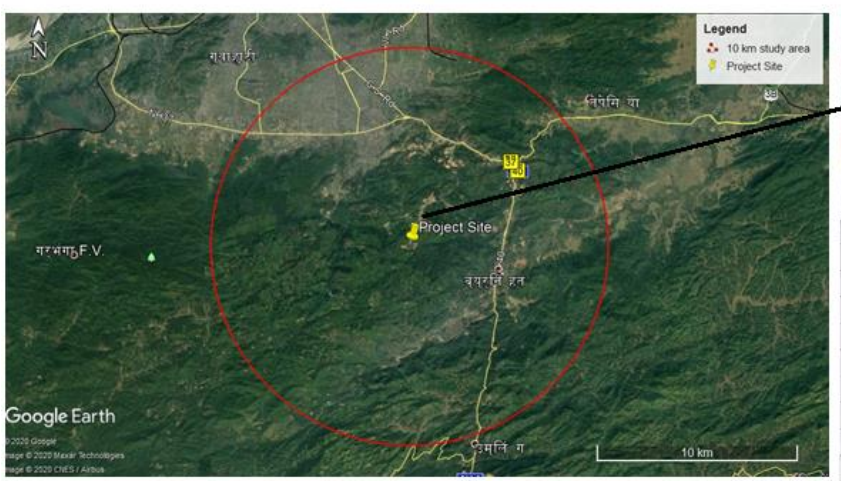
8	26°03'44.14"N	90° 49' 31.26"E
9	26°03'43.06"N	90° 49' 33.30"E

The Mine site is connected through 96 kms by road from state head quarter Shillong and 46 kms by road from district head quarter Nongpoh. The nearest railway station is Guwahati located at a distance 22 kms from the Mine area.

The map and photographs of the project site has been shown in **Figure 2.1 and 2.2** respectively.



Pillar	Latitude	Longitude
P-1	26°03'42.69"	91°49'34.94"
P-2	26°03'40.75"	91°49'34.13"
P-3	26°03'40.65"	91°49'31.20"
P-4	26°03'41.53"	91°49'28.15"
P-5	26°03'44.02"	91°49'25.30"
P-6	26°03'46.18"	91°49'26.37"
P-7	26°03'45.57"	91°49'30.23"
P-8	26°03'44.14"	91°49'31.26"
P-9	26°03'43.06"	91°49'33.30"

Figure 2.1: Map of the project site

Figure 2.2: Photographs of the project site

2.3.1 Lease Hold Area

The lease has been intended to allot vide Letter of intent (LoI) no. KH/8/ML/stone/69/5091 dated 13/09/2019. The copy of Letter of Intent (LOI) has been attached as **Annexure II**.

2.3.2 Details of the Lease Hold Area

Forest	Area (ha)	Non Forest Land	Area(ha)
Forest (specify)	None	2.61 hectares occupied by lesse/applicant	**2.61**
Total	**Nil**	**Total**	**2.61**

2.4 TOPOGRAPHY & GEOLOGY

Topography

The area covers a land of 2.61 ha. near village Umduba, Raid Marwet, District Ri-Bhoi, Meghalaya. The substantial part of the area represents gently sloping terrain with highest altitude of 160mRL in north eastern part where as the south-western part shows the lowest altitude of 95mRL having an elevation difference of 65 m. The general slope is towards south westerly side.

Geology

Geologically, the region is composed of gneiss with old inliers, the sela groups, granites and the Shillong group of rocks. Small patches of Khasi group and Axial groups of rocks are also appearing in the northwestern part of the region. The region has two types of soils, (1) Udalfs-Ochrepts and (2) Ustalfs - Ochrepts - Orthents. The soils of the district are fertile but the district itself is not very healthy due to its people being very frequently attacked by malarial fever. Owing to the high productivity of the land, the district is sometimes called the granary of the Khasi Hills (Composite Khasi Hills district). The region is covered by dense forests of tropical and deciduous type except in the southern part where sub tropical pine forests are found.

The elevation range within the lease area is 390 mRL to 310 mRL. The mineral is exposed in the whole lease area. Drainage in the lease area is almost easterly. General drainage outside the area is easterly to northeast easterly by non perennial nallah. The area is hilly and stony. Area broken by nallahs in the five kilometers periphery. No habitation located in and near the lease area. Nearest habitation is Umduba. The deposit is in private land. No PWD road passes through the area.

Table 2.2: Stratigraphic Sequence

Geological Age	Group Name	Formation Name	Rock Type
Recent	Newer Alluvium	Unclassified	Sand, Silt and Clay
UNCONFIRMITY			

Pliestocene	Older Alluvium	Unclassified	Sand, Clay, Pebble, Gravel and boulder deposits
UNCONFIRMITY			
Mio- Pliocene	Dupitula Group	Unclassified	Mottled Clays, Feldspathic sandstone and conglomerate.
UNCONFIRMITY			
Oligo- Miocene	Garo Group	Chengopara Formation	Sand, Siltstone, Clay, Mart
		Baghmara Formation	Feldspathic Sandstone, Pebble, Conglomerate, Clay, Silty Clay.
		Simsang Formation	Shale, Sandstone, Mart
Eocene	Jaintia Group	Kopili Formation	Siltstone-sandstone altemations, sand
		Shella Formation	Altemation of sandstone-lime stone
		Langpar Formation	Calcareous Shale, Sandstone, Limestone
Upper Cretaceous	Khasi Group	Mahadek Formation	Arkose(glauconitic)
		Bottom Conglomerate Formation	Conglomerate, Arkose
		Jadukata Formation	Sandstone- Conglomerate altemation
UNCONFIRMITY			
Jurassic	Sylhet Trap	-	Basalt, alkali Basalt, Rhyolite acid tuff.
UNCONFIRMITY			
Pre- Cambrian	-	Intrusives (acid and basic)	Ponphyrithic and coarse granites, aplite, quartz vein,epidiorite, dolerite, basalt

		Shillong Group	Quartzite, Phyllite, Conglomerate
UNCONFIRMITY			
Archaean	-	Gneissic Complex	Biotite- gneiss, Biotite- Hornblend gneiss, granitic gneiss, Migmatite, mica- schist, silllimanite-quartz schist, biotite-granulite- amphibolites, pynoxene-granulite etc.

Local Geology

Succession of rocks in the lease area (Local Geology)

Geological Age	Group Name	Formation Name	Rock Type
Recent	Newer Alluvium	Unclassified	Sand, Silt and Clay
UNCONFIRMITY			
Pre- Cambrian	-	Shillong Group	Quartzite

Source: Approved Mining plan

2.5 SURFACE DRAINAGE PATTERN

The district has three important rivers, (1) The Umiam or Barapani (2) The Umtrew and (3) The Umsiang. All the rivers flow northward and empty themselves into the Brahmaputra. Both the Umiam and Umtrew have been dammed for generation of Hydroelectricity.

Drainage pattern in the Ri-Bhoi area represents a most spectacular feature revealing extraordinary straight courses of the rivers, evidently along joints and faults. The drainage system of this area consists of large number of streamlets, many of which are seasonal. During the winter months, the streams dry up. The area has a well-adjusted stream system draining over both the weaker and harder rocks. The weaker rocks such as sandstones, conglomerate has been hollowed out as a result of prolonged erosion. The more resistant rocks such as granites, diorite-gneisses and quartizites are found to have left behind in the stream beds. The valleys of these streams have step like formations. There are extensive flood plains near Byrnihat which are formed by the river Umtru. The summit of ridges and slopes serve as sites for both permanent and jhum cultivation and dwelling, the valley and stream terraces are generally used for wet paddy cultivation. These valleys are terraced to grow crops such as rice, ginger, vegetables, pineapples and so on where runoff water from springs is channeled to them. The drainage system of the Ri-Bhoi District favours a large numbers of agriculture activities which support livelihood.

The drainage pattern map is shown in **Figure 2.3.**

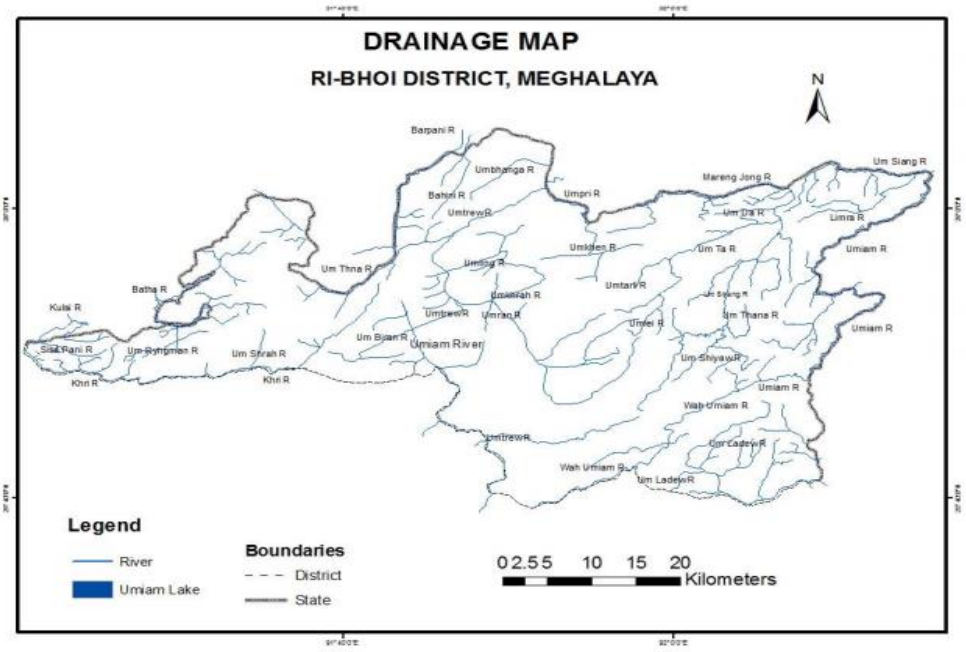


Figure 2.3: Drainage Map of the project district

2.6 PROPOSED METHOD OF MINING

The opencast method of mining with semi mechanization is proposed to excavate the mineral and waste and for other mining activities. Bench height and width are proposed 6 meters each considering semi mechanization. Approach roads will be provided up to the benches time to time. Blasting will be done by short or long holes with the permission of DGMS. The pneumatic breaker and hydraulic breakers will be used for excavation of mineral. The fencing around the pit/ excavation will be provided to check the inadvertent entry of human and livestock in the working zone. The soil if comes across during mining in small layer or cavity will be scraped and stacked separately to be used for plantation during each monsoon.

Drinking water is being brought from nearby tube well and stored in water pitchers at site office and near the working sites for drinking purpose and in cement tanks near the site office for other purpose.

The following works are proposed:

1. The barbed wire fencing will be provided around the proposed and existing workings to check the inadvertent entry of human and livestock in mining zone.
2. The soil which may come across during mining in patches or in cavities will be scraper and stacked separately to be used for plantation ion monsoon.
3. The proper plantation will be done in the lease area and nearby the lease area in each monsoon and will report to the department with photographs.

4. Garland drains with parapet walls will be provided around the pit to check the entry of monsoon flowing water towards working pit.
5. Drinking water will be brought from tube well and stored in water pitchers for drinking purpose and in cement tanks for other purpose.
6. The workings will be done by maintaining the proper benches.
7. The waste will be dumped at one place towards NW side in the lease area. Some waste will be dumped outside the lease area in lessee's land. It is also proposed to dump some waste within the lease area in 0.07 ha area.
8. The site services, site office, water tanks, workshops, kitchen, bathrooms etc will be provided in or near the lease area (outside the lease area).

2.7 RESERVE (AVAILABLE QUANTUM) AND PRODUCTION (EXTRACTABLE QUANTUM)

Proved Category:

The mineral is explored up to 310 mRL in the applied area and in depth near the area towards southeastern side and is continuing in sides. The mineral also exposed in the nearby area Thus, proved category reserves are computed up to 310 mRL that is equivalent to lowest exposers.

Probable Category:

The mineral is exposed in the area and in pit and is continuing in depth and in sides. Thus, considering the continuity in depth the probable category reserves are computed for 30 meters thickness as per the continuity in depth. Thus, probable category reserves are computed between 310 mRL and 280 mRL. The other limits are considered same as proved reserve.

Possible Category:

Considering the possibility of continuing the deposit beyond the probable category limit in depth the possible category reserves are considered for 10 meters in depth vertically beyond the probable category reserves limit. Considering these aspects, the possible category reserves are computed between 280 mRL and 270 mRL. The other limits are considered same as considered for proved category reserves.

The calculation of reserve & resources is shown in **Table 2.3**.

Table 2.3: Details calculation of reserve & resources

Category	Recoverable Reserves (Tonnes)
Proved category	17,92,560
Probable category	13,97,090
Possible category	4,65,610

Mineral reserve/resources: Mineable

A) Mineable Mineral Reserves	Boulder Stone (Tonnes)
Proved mineral reserves	11,65,000
Probable mineral reserves	4,90,400
B) Total remaining resources	

Feasibility mineral resources	6,27,560
Pre- feasibility mineral resources	9,06,690
Inferred mineral resources	4,65,600

Total mineable reserves: 16,55,400 tonnes

Production

In the period of this mining plan the lessee will develop the benches i.e. from bench levels 382mRL (Top bench), 376mRL, 370mRL, 364mRL, 358mRL, 352mRL, 346mRL, 340mRL, 334mRL, 328mRL, 322mRL, 316mRL, 310mRL, 304mRL, 298mRL, 292mRL 286mRL (lowest bench).

The approach roads up to faces will be provided time to time for movement of vehicles. The bench height and width are proposed 6 meters but the lessee may take permission from DGMS for bench height more than 6 meters. The bench slope will be providing 85°. The loading will be from pits or from stocks.

The lessee will work as per proper benches and develop the benches as required. The length and width of workings will be as per the situation at field.

Table 2.4: Proposed Year-wise Production

Year	Tentative excavation in tones (ROM)	Waste / sub-grade of tone in tones	Mineral Stone in tones
I	26400	52800	211200
II	290400	58080	232320
III	343200	68640	274560
IV	343200	68640	274560
V	350330	70070	280260
Total	**1591130**	**318230**	**1272900**

Man Power Requirement:

Owing to the topography of the area, which is a rough terrain, mining activity is needed as the primary source of income for the locals. The mine will provide employment to about 54 workers. It will provide employment to the people residing in vicinity and also indirectly by the development of supporting infrastructure and allied activities. The manpower requirement for the proposed project is shown in **Table 2.5** along with the breakup.

Table 2.5: Details of Manpower requirement

S. No.	Category	Numbers
1.	Mining Engineer/Geologist	4
2.	Mines manager	15
3.	Mining mate/clerk/watchmen	15
4.	Mine labour	20
TOTAL		**54**

Solid Waste Generation & its Disposal

In Boulder stone mine the maximum quantity of excavated rock is saleable in the form of lump, grit and powder.

Waste dump and stabilization:

As per the mining plan around 3,18,230 tonnes of waste will come across during the period of the mining plan. The waste will be used in construction and maintenance of approach roads, construction of site services. The waste will also be lifted by local habitants for construction the walls along the agriculture field.

The waste will be dumped towards western side in an area of 0.20 ha for 8 meters in height in two terrace of 4 meters height each. Some waste will be dumped outside the area in own land lessee. The waste dump will be stabilized by retaining walls of rubble stone. Parapet wall and drain will also be constructed towards lower altitude side to check the wash off during monsoon. The drains will be connected to the siltation to arrest the silt**.**

Top Soil

No separate soil is observed in the applied lease area. The soil may come across in thin layer somewhere at surface. The soil will be scraped and stacked separately to be used for plantation during monsoon. Thus, there will be no permanent stack in the soil.

2.8 SITE FACILITIES AND UTILITIES

Water Supply

Total Water requirement for the proposed project is 5 KLD. Water will be used for the workers for drinking & domestic purpose and also for dust suppression. Fresh water will be only used for drinking purpose. The break up for water requirement is shown in **Figure 2.4.**

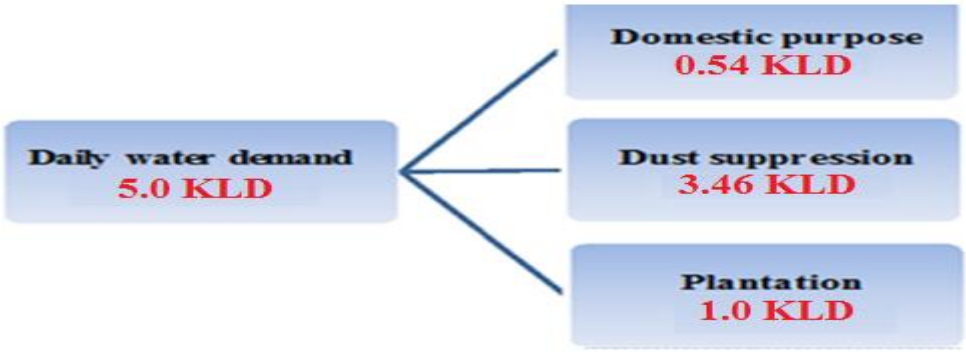


Figure 2.4: Details of water requirement

Temporary Rest Shelter:

A temporary rest shelter will be provided for the workers near to the site for rest.

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

2.9 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:

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

CHAPTER 3: DESCRIPTION OF THE ENVIRONMENT

3.1 PREAMBLE

Baseline environmental studies were conducted to monitor micro-meteorology, 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. To establish the existing physical, natural, socio-economic and cultural environment condition of the study area, data has been collected through primary sources (consultation with the key persons) in addition to information gathered from various secondary sources. All project relevant secondary data has been collected on regional environmental and social features from various reports pertaining to Government Agencies / Institutions and through literature reviews. Relevant data has been compiled from the census data of 2011, for obtaining details regarding the demographic and socio-economic features in the study area.

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.

- Metrological conditions
- Ambient Air Quality
- Noise levels
- Water Quality (Surface and Ground water)
- Soil Quality
- Socio economic status

3.2 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. 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 December 2019 to February 2020 (winter 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 Laboratory which is NABL and MoEF&CC accredited.

Study area map comprising direct impact area is shown in **Figure 3.1**

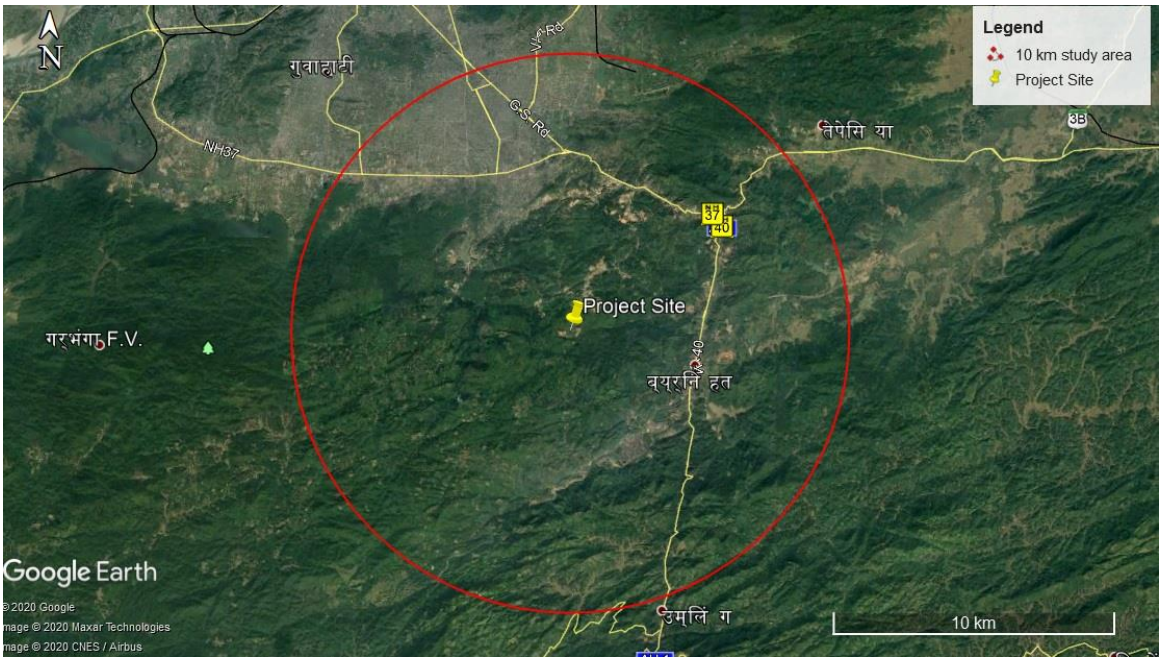


Figure 3.1: Study Area Map (10 km radius)

3.3 METHODOLOGY / APPROACH

3.3.1 Methodology of EIA

Environmental Impact Assessment study has been conducted within an area of 10 km radius around the ML area. The various steps involved in the study for this project are divided into three following phases.

- Identification of significant environmental parameters and assessing the baseline status within the study area and assessment of pollutants envisaged due to proposed activities and the polluting activities in the study area on various environmental parameters.
- Evaluation of impacts after superimposing the predicted pollution load over the baseline condition.
- Prepare Environmental Management Plan for mitigation of impacts on environment arising out of the proposed activity.

3.3.2 Approach

Environmental monitoring in order to establish the baseline environmental status of the study area for Ambient air, Water, Soil, Land use, ecology, etc.

- Collection of site specific meteorological data at the mine site.
- Carrying out a detailed biological study for the Core and Buffer Zone.
- Literature review that includes identification of relevant data and articles from various publications, various government agencies and other sources for socio-economy, meteorology, land use, ecology, etc.

- Identify various existing pollution loads due to mining and domestic activities in the buffer zone.
- Evaluate the predicted impacts on the various environmental attributes in the study area by using scientifically developed and widely accepted Environmental Impact Assessment (EIA) Methodologies.
- Preparation of an Environmental Management Plan (EMP) outlining the measures for improving the environmental quality.

Accordingly, field studies were carried out during the study period (December 2019 to February 2020) to establish the existing baseline conditions.

3.4 METEOROLOGICAL CONDITIONS

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 winter monitoring period.

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

3.4.1 Climate of the project district

The Climate of Ri Bhoi District experiences different types of climate ranging from tropical climate in the areas bordering Assam to the temperate climate adjoining the East Khasi Hills District. The temperature ranges from 10°C in December to 30°C in the month of July and August as recorded in Umsning Station, whereas in Byrnihat station. Normally January and August record minimum (12.3°C) and maximum (35.2°C) temperatures respectively. The average annual rainfall of 11 years (2000 to 2010) in the district was 2935 mm. The maximum and minimum rainfalls of the district were recorded during the year 2004 1998 respectively.

3.4.2 Wind speed/Direction

Generally, light to moderate winds prevail throughout the year with speed ranging from 1 to 19 kmph. Winds were light and moderate particularly during the morning hours, while during the afternoon hours the winds were stronger. The wind rose diagram developed during the study period is shown in **Figure 3.2** reveals that pre-dominant wind direction occurs mostly blowing from South West direction in project site and the average wind speed is 4.5 kmph.

Table 3.1(a) shows the Meteorological Data Parameters at the project site whereas **Table 3.1 (b)** shows the Meteorological Data Parameters of Shillong district (Nearest IMD from the proposed project) for the months of December, 2019 to February, 2020.

Table-3.1 (a): Meteorological Data Parameters at Project site for the months of December, 2019 to February, 2020

Date	Temperature, deg C			Humidity, %			Pressure, hPa			Wind Speed, km/Hr	Predominant Wind Direction	Rainfall mm
	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Avg		
December	4.1	23.7	17.8	59	80	73.2	842.8	843.9	843.2	3.9	SE	12.6
January	2.9	25.2	18.5	57	76	64.5	841.8	842.7	842.3	4.1	SW	13.5
February	3.8	27.4	20.3	56	71	61.9	840.9	842.5	841.7	5.3	W	17.2

Source: Weather station

Table-3.1 (b): Meteorological Data Parameters at Shillong district (Nearest IMD from the proposed project) for the months of December, 2019 to February, 2020

Date	Temperature, deg C			Humidity, %			Pressure, hPa			Wind Speed, km/Hr	Predominant Wind Direction	Rainfall mm
	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Avg		
December	3.8	19.3	12.8	60	89	75.6	841.3	843.5	842.6	3.4	SE	12.8
January	2.7	18.4	10.2	61	87	73.2	840.2	842.3	841.5	3.7	SW	13.8
February	3.6	20.7	13.7	58	76	65.9	839.6	841.5	840.8	5.4	W	19.3

Source: IMD

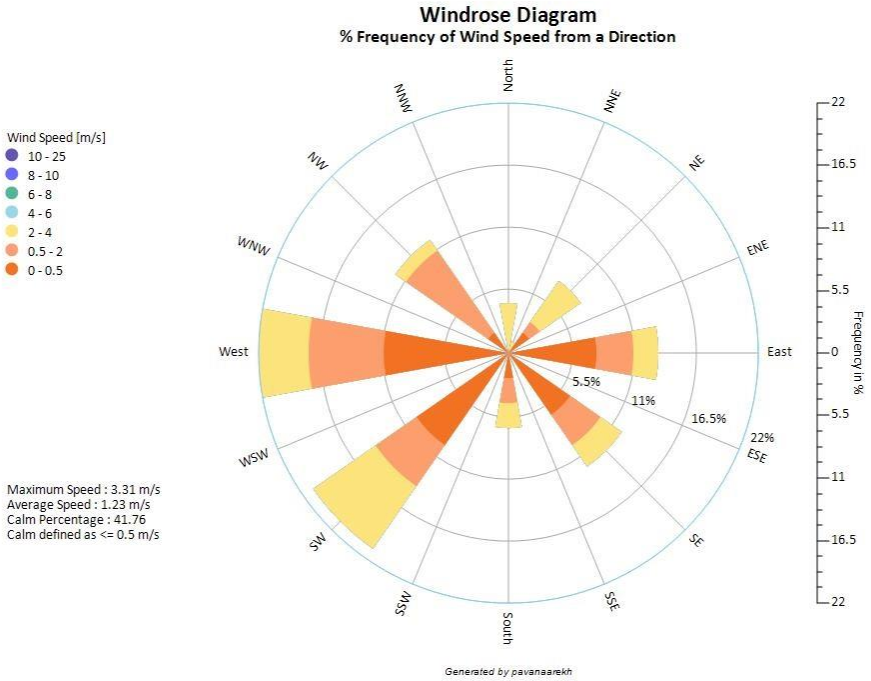


Figure 3.2: Wind-rose of the project site (December, 2019 to February, 2020)

3.5 AIR ENVIRONMENT

3.5.1 Ambient Air Quality

The Ambient Air Quality was monitored in the impact area as per MoEF&CC guidelines and as per approved ToR by SEIAA, Meghalaya. The study area represents mostly rural environment. The prime objective of the baseline air quality study was to assess the ambient air quality of the mining lease area.

3.5.2 Methodology Adopted for the Study

The baseline status of the ambient air quality has been assessed through a scientifically designed ambient air quality network. The design of monitoring network in the air quality surveillance programme has been based on the following consideration.

- Meteorological parameters covering upwind, downwind and cross wind direction
- Topography of the study area
- Representative of regional background air quality for obtaining baseline status
- Representative of likely impact areas.

Ambient Air Quality Monitoring (AAQM) stations were set up at 4 locations, one in core zone and the other four in the study area of 10 km with due consideration to the above mentioned points. AAQM locations were selected in downwind and upwind direction of the proposed mining lease area covering core and buffer zones. The details of the monitoring stations are given in **Figure 3.3** and shown in **Table-3.2**.

Ambient air quality monitoring was carried out twice a week with a frequency of 24 hours for 12 weeks during the study period. The common air pollutant namely Particulate Matter-10 (PM_{10}), Particulate Matter-2.5 ($PM_{2.5}$), Sulphur-dioxide (SO_2) and Nitrogen dioxide (NO_2) has been measured through a planned field monitoring. The baseline values of the air pollutants of concern are presented in **Tables 3.3 (a) to Tables 3.3 (e)** below statistical parameters like minimum, maximum, average and 98th percentiles have been computed from the observed field data for all sampling stations**.** These are compared with the standards prescribed by National Ambient Air Quality Standards 2009.

Table 3.2: Location of Ambient Air Quality Monitoring Stations

S. No.	Location Name	Direction	Distance from the project site (in km)
AAQ1	Project Site	-	0
AAQ2	Longukhuli	NW	4.3
AAQ3	Daka Pathar	W	6.0
AAQ4	Tamuli Kuchi	ENE	5.3
AAQ5	Soruteri	SE	4.4

Table-3.3 (a): Ambient Air Quality in the Study Area PM_{10}

Location		PM10 (µg/m^3)			
Code	Name of the Station	Min	Max	Average	98$^{\%}$ percentiles
AAQ-1	Project Site	54.7	79.6	64.8	77.5
AAQ-2	Longukhuli	63.2	82.4	71.6	81.3
AAQ-3	Daka Pathar	44.9	64.8	52.9	62.8
AAQ-4	Tamuli Kuchi	52.8	77.5	63.5	75.9
AAQ-5	Soruteri	64.7	85.6	75.8	83.2
NAAQ Standards	100 (24 hr)				

Table-3.3 (b): Ambient Air Quality in the Study Area $PM_{2.5}$

Location		PM2.5 (µg/m^3)			
Code	Name of the Station	Min	Max	Average	98th percentiles
AAQ-1	Project Site	24.6	32.7	28.9	30.2
AAQ-2	Longukhuli	26.8	35.4	31.2	33.6
AAQ-3	Daka Pathar	17.5	23.9	20.4	22.3
AAQ-4	Tamuli Kuchi	22.9	30.5	27.6	29.2
AAQ-5	Soruteri	25.3	37.8	29.4	35.9
NAAQ Standards	60 (24 hr)				

Table-3.3 (c): Ambient Air Quality in the Study Area SO_2

Location		SO2 (µg/m^3)			
Code	Name of the Station	Min	Max	Average	98th percentiles
AAQ-1	Project Site	6.4	8.9	7.3	8.1
AAQ-2	Longukhuli	8.8	12.5	10.6	11.6
AAQ-3	Daka Pathar	6.1	6.8	6.5	5.9
AAQ-4	Tamuli Kuchi	6.9	8.3	7.2	7.5
AAQ-5	Soruteri	8.4	13.2	10.3	12.5
NAAQ Standards	80 (24 hr)				

Table-3.3 (d): Ambient Air Quality in the Study Area NO_2

Location		NO2 (µg/m^3)			
Code	Name of the Station	Min	Max	Average	98th percentiles
AAQ-1	Project Site	13.4	16.7	15.2	15.9
AAQ-2	Longukhuli	15.6	23.4	19.7	22.1
AAQ-3	Daka Pathar	12.3	15.2	13.8	14.3
AAQ-4	Tamuli Kuchi	13.9	16.3	14.9	15.2
AAQ-5	Soruteri	15.3	22.6	18.2	20.8
NAAQ Standards	80 (24 hr)				

Table-3.3 (e): Ambient Air Quality in the Study Area CO

Location		NO2 (mg/m^3)			
Code	Name of the Station	Min	Max	Average	98th percentiles
AAQ-1	Project Site	0.450	0.680	0.570	0.610
AAQ-2	Longukhuli	0.730	0.950	0.810	0.870
AAQ-3	Daka Pathar	0.320	0.410	0.350	0.380
AAQ-4	Tamuli Kuchi	0.370	0.480	0.430	0.440
AAQ-5	Soruteri	0.530	0.870	640	0.790
NAAQ Standards	4 (24 hr)				

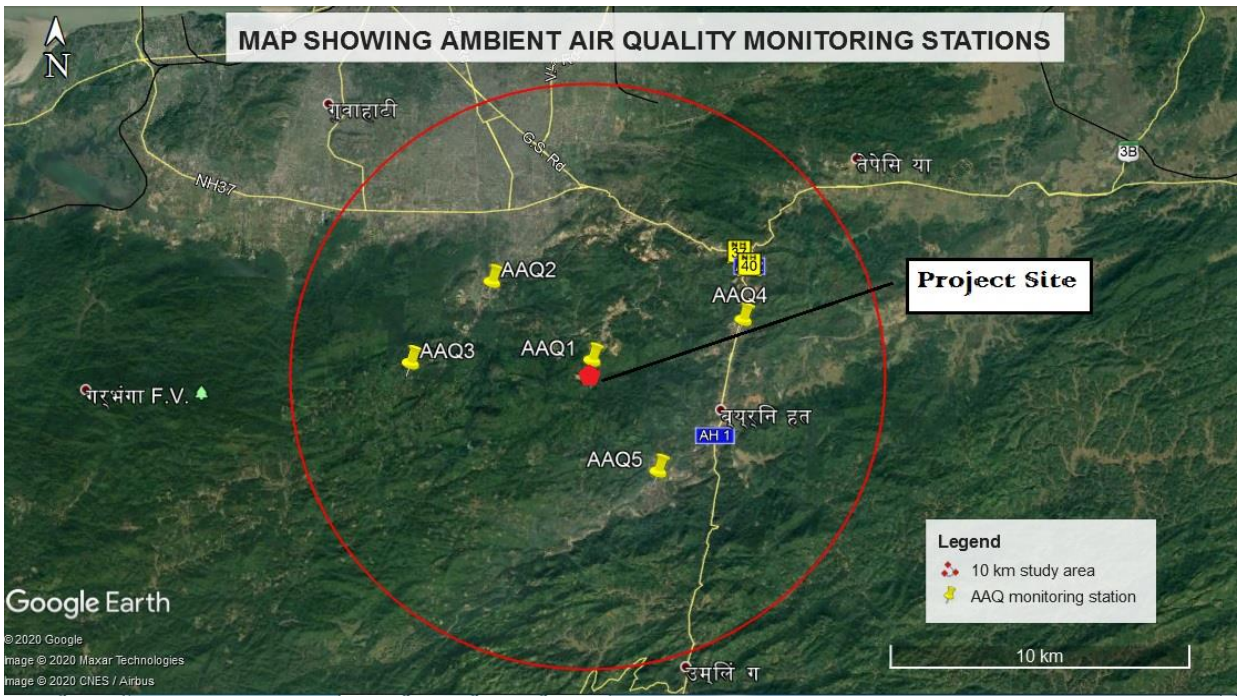


Figure 3.3 Ambient Air Quality Monitoring Stations

3.5.3 Baseline Scenario

a) Suspended Particulate Matter (PM10)

Suspended particulate matter in general terms is the particulate matter in suspension in ambient air. It includes dust, smoke etc. In general some of the important sources of suspended particulate matter are mines. The following sources of suspended particulate matter in the study area are identified:

- Emission due to vehicular movement
- Dust generation from mining operations

The minimum and maximum level of PM_{10} recorded within the study area was in the range of 44.9 µg/m^3 to 85.6 µg/m^3 with the 98th percentile ranging between 62.8 µg/m^3 to 83.2 µg/m^3.

The 24 hourly average values of PM_{10} were compared with the National Ambient Air Quality Standards (NAAQS) and found that all sampling stations recorded in the study area are within the applicable limits i.e., 100 µg/m^3 for PM_{10} in Industrial, Residential, Rural and other areas.

b) Particulate Matter (PM2.5)

Fine particulate matter in general terms is the particulate matter in suspension in ambient air. It includes dust, smoke etc. In general some of the important sources of suspended particulate matter are mines. The following sources of suspended particulate matter in the study area are identified:

- Emission due to vehicular movement

- Dust generation from mining operations

The minimum and maximum level of $PM_{2.5}$ recorded within the study area was in the range of 17.5 µg/m^3 to 37.8 µg/m^3 with the 98th percentile ranging between 22.3 µg/m^3 to 35.9 µg/m^3.

The 24 hourly average values of $PM_{2.5}$ were compared with the National Ambient Air Quality Standards (NAAQS) and found that all sampling stations recorded in the study area are within the applicable limits i.e., 60 µg/m^3 for $PM_{2.5}$ in Industrial, Residential, Rural and other areas.

c) Sulphur Dioxide (SO2)

Sulphur dioxide gas is an inorganic gaseous pollutant. Sulphur dioxide emissions are expected to be emitted wherever combustion of any fuel containing Sulphur takes place. The Sulphur in the fuel will combine with oxygen to form Sulphur dioxide. The following sources of Sulphur dioxide in the study area are identified:

- Emissions from domestic/consumption of fuel (coal, diesel, etc)

Sulphur dioxide in atmosphere is significant because of its toxicity; Sulphur dioxide is capable of producing illness and lung injury. Further it can combine with water in the air to form toxic acid aerosols that can corrode metal surfaces, fabrics and the leaves of plants. Sulphur dioxide is an irritant to the eyes and respiratory system. Excessive exposure to Sulphur dioxide causes bronchial asthma and other breathing related diseases as it affects the lungs.

The minimum and maximum concentration of SO2 recorded within the study area was 6.1 to 13.2 µg/m^3 with the 98th percentile ranging between 5.9 µg/m^3 to 12.5 µg/m^3.

The 24 hourly average values of SO2 were compared with the National Ambient Air Quality Standards (NAAQS) and it was found that all sampling stations recorded values are below the applicable limits 80 µg/m^3 for Industrial, Residential, Rural and other areas.

d) Nitrogen Dioxide (NO2)

The important sources of oxides of Nitrogen are from utilities and auto exhaust due to vehicular movement in mine lease area. The following sources of oxides of nitrogen in the study area are identified.

- Emissions from field burning of coal.
- Emissions from vehicular movements in the study area.

Oxides of Nitrogen in the presence of sunlight will undergo reactions with a number of organic compounds to produce all the effects associated with photochemical smog. The minimum and maximum level of NO2 recorded within the study area was in the range of was 12.3 µg/m^3 to 23.4 µg/m^3 with the 98th percentile ranging between 14.3 µg/m^3 to 22.1 µg/m^3.

The 24 hourly average values of NO2 were compared with the National Ambient Air Quality Standards (NAAQS) and it was found that all sampling stations recorded values are below the applicable limits 80 µg/m^3 for Industrial, Residential, Rural and other areas.

d) Carbon Oxide (CO)

The important sources of oxides of Carbon are from utilities and auto exhaust due to vehicular movement in mine lease area. The following sources of oxides of nitrogen in the study area are identified.

- Emissions from field burning of coal.
- Emissions from vehicular movements in the study area.

The minimum and maximum level of CO recorded within the study area was in the range of was 0.320 mg/m^3 to 0.950 mg/m^3 with the 98th percentile ranging between 0.380 µg/m^3 to 0.870 µg/m^3.

The 24 hourly average values of NO2 were compared with the National Ambient Air Quality Standards (NAAQS) and it was found that all sampling stations recorded values are below the applicable limits 4 µg/m^3 for Industrial, Residential, Rural and other areas.

3.6 NOISE ENVIRONMENT

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

3.6.1 Source of Noise

The main sources of noise in the study area are domestic activities, industrial activities and vehicular traffic. The main occupation of the villagers in the study area is agriculture and business.

3.6.2 Noise Level in the Study Area

The baseline noise levels have been monitored at 5 locations, one in core zone and four within the study zone during winter period, using a sound level meter and noise level measurement locations were identified for assessment of existing noise level status, keeping in view the land use pattern, industrial area, Silence Zone, residential areas in villages etc., if available within 10 km radius of the study area. The day levels have been monitored during 6.00 AM to 10.00 PM and night noise levels, during 10.00 PM to 6.00 AM. The noise monitoring stations are shown in **Figure 3.4** and represented in **Table 3.4**. The results are presented in **Table 3.5.**

Table 3.4: Noise Level Monitoring Stations in the Study Area

S. No.	Location Name	Direction	Distance from the project site (in km)
NQ1	Project Site	-	0
NQ2	Longukhuli	NW	4.3
NQ3	Daka Pathar	W	6.0
NQ4	Tamuli Kuchi	ENE	5.3

NQ5	Soruteri	SE	4.4

Table 3.5: Leq Noise Level in the Study Area (during day and Night) (January 2019)

Location Code	Noise levels dB(A), Day (Leq)	Noise levels dB(A) Night, (Leq)	Noise Limits in dB(A), Leq Day Time	Noise Limits in dB(A), Leq Night Time	Area
NQ1	52.8	37.2	**75**	**70**	Mine Site (Industrial)
NQ2	59.6	41.8	**65**	**55**	Commercial
NQ3	49.2	38.7	**55**	**45**	Residential
NQ4	58.5	41.5	**65**	**55**	Commercial
NQ5	57.3	40.4	**65**	**55**	Commercial

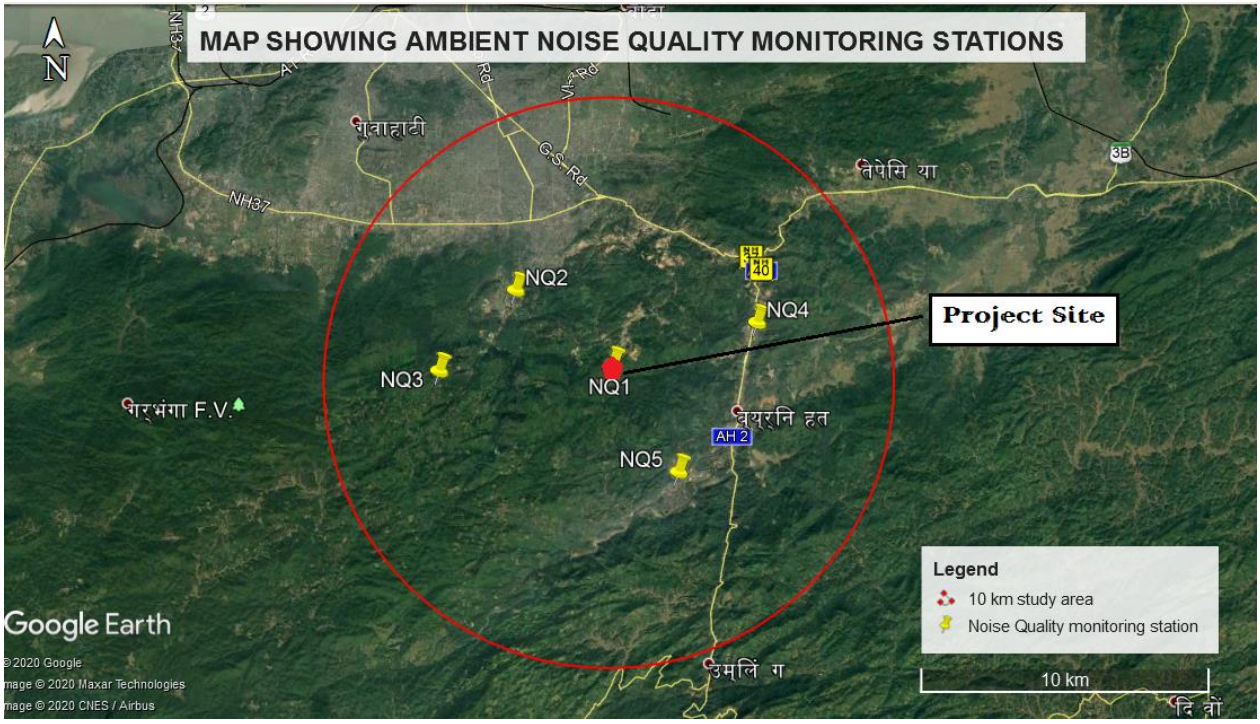


Figure 3.4: Ambient Noise Level Monitoring Locations

3.6.3 Ambient Noise Standards

Ministry of Environment, Forest and Climate Change (MoEF&CC) has notified the noise standards vide gazette notification dated February 14, 2000 for different zones under the Environment Protection Act (1986). These standards are given in **Table-3.6**

Table 3.6: Ambient Quality Standards in respect of Noise

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

Note:

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

3.6.4 Baseline Scenario

The values of noise observed in some of the areas are primarily owing to vehicular traffic and other anthropogenic activities. The noise level in day time lies between 49.2 dB(A) to 59.6 dB(A) and in night time between 37.2 dB(A) to 41.8 dB(A).

The status of noise quality within the 10 km zone of the study area is, therefore, within the MoEF&CC standards.

3.7 WATER ENVIRONMENT

3.7.1 Water Quality

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

The water quality within the study area was monitored during the study period. The water samples were collected once in month. The water sampling locations marked within the study are presented in **Table 3.7** and the result of the monitoring and analysis are presented in the **Table 3.8. Figure 3.5 shows** the Water Quality Monitoring Locations marked within the Study Area.

Table 3.7: Location of Water Sampling Sites

S. No.	Location Name	Direction	Distance from the project site (in km)
GW1	Pahamkmiedum	NE	1.0
GW2	Longukhuli	NW	4.3
GW3	Daka Pathar	W	6.0
GW4	Tamuli Kuchi	ENE	5.3
SW1	Soruteri	SE	4.5

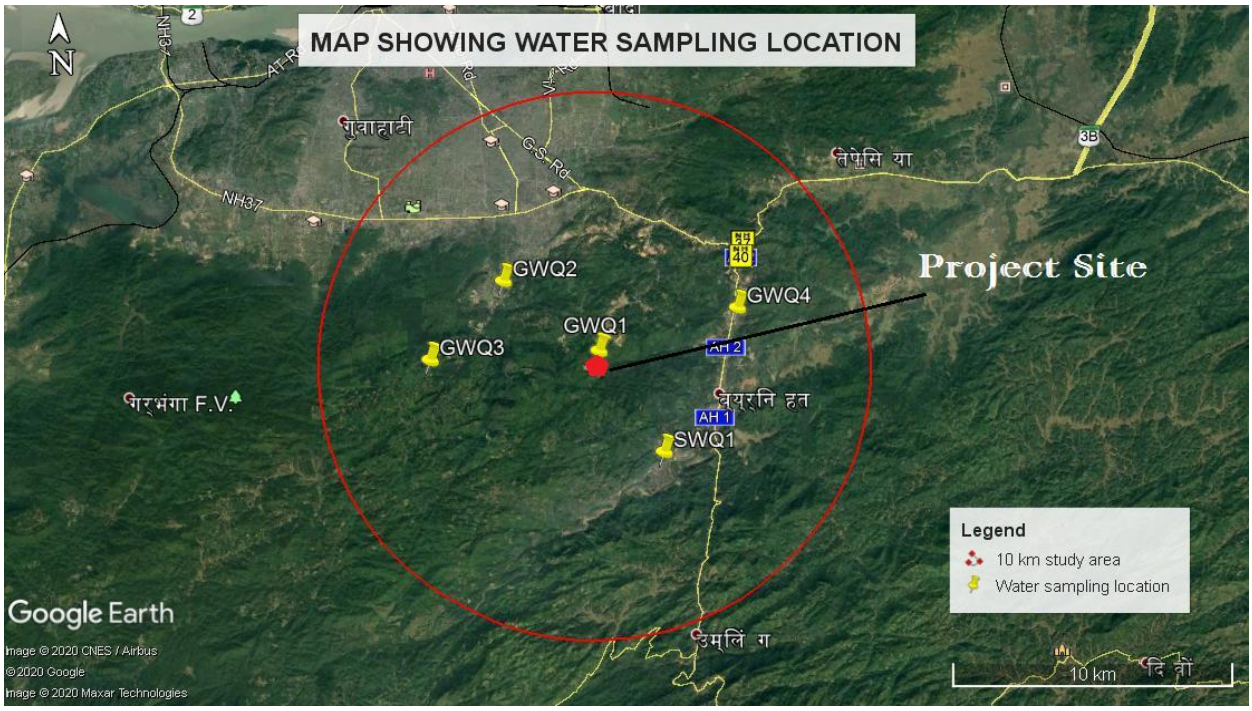


Figure 3.5: Location Map of Water Sampling Sites

Table 3.8: Water Quality during the month of January 2020

Sl. No.	Parameters	Unit	Limit (as per IS:10500-2012)		GW1 (Tap water)	GW2 (Tap water)	GW3 (Tap water)	GW4 (Tap water)	SW1 (River)
			Desirable Limit	Permissible Limit					
1.	pH	-	6.5-8.5	No Relaxation	7.90	7.68	8.10	7.75	7.51
2.	Colour	Hazen	5	25	<5	<5	<5	<5	<5
3	TSS	Mg/l	-	-	BDL	BDL	BDL	BDL	7.2
4	Dissolved Oxygen	% By Mass	5	10	5.9	5.1	6.2	5.7	6.5
5	BOD (at 27^0C 3-Days)	mg/l	-	-	BDL	BDL	BDL	BDL	6.3
6	COD	mg/l	-	-	BDL	BDL	BDL	BDL	23
7	TKN	mg/l	-	-	2.9	2.3	2.5	2.1	3.2
8	Total Hardness (as CaCO3)	mg/l	200	600	149.55	157.94	153.92	156.12	127.22
9.	Calcium (as Ca)	mg/l	75	200	42.6	45.3	43.2	44.9	35.8
10	Magnesium (as Mg)	mg/l	30	100	10.5	10.9	11.2	10.7	9.2
11	Ammonia (NH3)	mg/l			BDL	BDL	BDL	BDL	2.7
12	Electrical Conductivity	Microm /hos/c m	-		389.86	385.92	392.71	377.46	334.60
13	Chloride (as Cl)	mg/l	250	1000	49.8	43.2	40.5	47.3	43.6
14	Sulphate (as SO4)	mg/l	200	400	32.5	30.9	21.2	15.9	18.7
15	Phosphates	mg/l	-	-	<0.1	<1.0	<1.0	<1.0	<1.0
16	Nitrate (as NO3)	mg/l	45	No Relaxation	0.61	0.85	0.66	0.95	0.74
16	Fluoride (as F)	mg/l	1	1.5	0.27	0.21	0.25	0.29	0.18
17	Arsenic (As)	mg/l	-	-	BDL	BDL	BDL	BDL	BDL
18	Lead (as Pb)	mg/l	-	-	<0.01	<0.01	<0.01	<0.01	<0.01

19	Mercury(as Hg)	mg/l	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
20	Phenols	mg/l	-	-	<0.01	<0.01	<0.01	<0.01	<0.01
21	Cyanides	mg/l	-	-	BDL	BDL	BDL	BDL	BDL
22	TDS	mg/l	500	2000	253.41	250.85	255.26	245.35	216.84
23	Iron (as Fe)	mg/l	0.3	1.0	0.57	0.72	0.86	0.50	0.49
24	Alkalinity as (CaCO3)	mg/l	200	600	147	159	180	168	132
25	Sodium (as Na)	mg/l	-	-	23.6	20.9	24.2	22.3	25.9
26	Potassium (as K)	mg/l	-	-	5.6	3.4	6.3	2.5	3.7
Bacteriological Parameters									
1.	Faecal Coliform	MPN/1 00 ml	Shall Not be Detectable		Absent	Absent	Absent	Absent	240
2.	Total Coliform	MPN/1 00 ml	Shall Not be Detectable		Absent	Absent	Absent	Absent	1310

3.7.2 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&CC guidance. Hence quality of ground water was compared with IS: 10500: 1991 (Reaffirmed 1993 With Amendment No -3 July 2010) for drinking purposes. Surface water quality was monitored for parameters as per Methods of Monitoring & Analysis published by CPCB and it was rated according to the CPCB Water Quality Criteria against A, B, C, D & E class of water. Water samples were collected as Grab water sample from sampling location. The samples were analyzed as per standard procedure / method given in IS: 3025 (Revised Part) and standard method for examination of water and wastewater Ed.21st, published jointly APHA, AWWA and WPCF.

The surface water quality is compared with CPCB water quality criteria mentioned in **Table 3.9** below:

Table 3.9: Water Quality Criteria as per Central Pollution Control Board

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

3.7.3 Result & Conclusion:

- The pH limit fixed for drinking water samples as per IS-10500 Standards is 6.5 to 8.5 beyond this range the water will affect the mucus membrane or water supply system. During the study period, the pH was varying for ground water from 7.68 to 8.10. The pH values for all the samples collected in the study area during study period were found to be within the limits.
- The desirable limit for total dissolved solids as per IS-10500 Standards is 500 mg/l whereas the permissible limits in absence of alternate source is 2000 mg/l, beyond this palatability decreases and may cause gastro intestinal irritation. In ground water samples collected from the study area, the total dissolved solids in ground water are varying from 245.35 mg/l to 255.26 mg/l. The TDS of the samples were above the desirable limit but within the permissible limit of 2000 mg/l.
- The desirable limit for chlorides is 250 mg/l as per IS-10500 Standards whereas, permissible limit of the same is 1000 mg/l beyond this limit taste, corrosion and palatability are affected. The chloride level in the ground water samples collected in the study area were ranging from 40.5 mg/l to a maximum of 49.8 mg/l. The chloride samples are within the desirable limits.
- The desirable limit as per IS-10500 Standards for hardness is 200 mg/l whereas the permissible limit for the same is 600 mg/l beyond this limit encrustation in water supply structure and adverse effects on domestic use will be observed. In the ground water samples collected from the study area, the hardness is varying from 149.55 mg/l to 157.94 mg/l.

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

Comparing the values of pH, DO, BOD and total coliforms with 'Use based classification of surface waters' published by Central Pollution Control Board; it can be seen that all the analyzed surface waters can be compared with class 'B' and can be used as Outdoor bathing (Organized).

3.8 SOIL CHARACTERISTICS

The composite soil samples were collected from site and the study area and were analyzed for characterization. The locations of the monitoring sites are depicted in **Figure 3.6** and given in **Table 3.10** Showing Soil Sample Collection Points marked within the Study Area.

3.8.1 Methodology

The soil samples were collected in the month of **January 2020.** Soil samples were collected from 5 locations. The samples were filled in polythene bags, labeled in the field with number and site name and sent to laboratory for analysis. The test results are given in **Table-3.11**.

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

Table 3.10: Soil Sample Collection Points

S. No.	Location Name	Direction	Distance from the project site (in km)
SQ1	Project Site	-	0
SQ2	Longukhuli	NW	4.3
SQ3	Daka Pathar	W	6.0
SQ4	Tamuli Kuchi	ENE	5.3
SQ5	Soruteri	SE	4.4

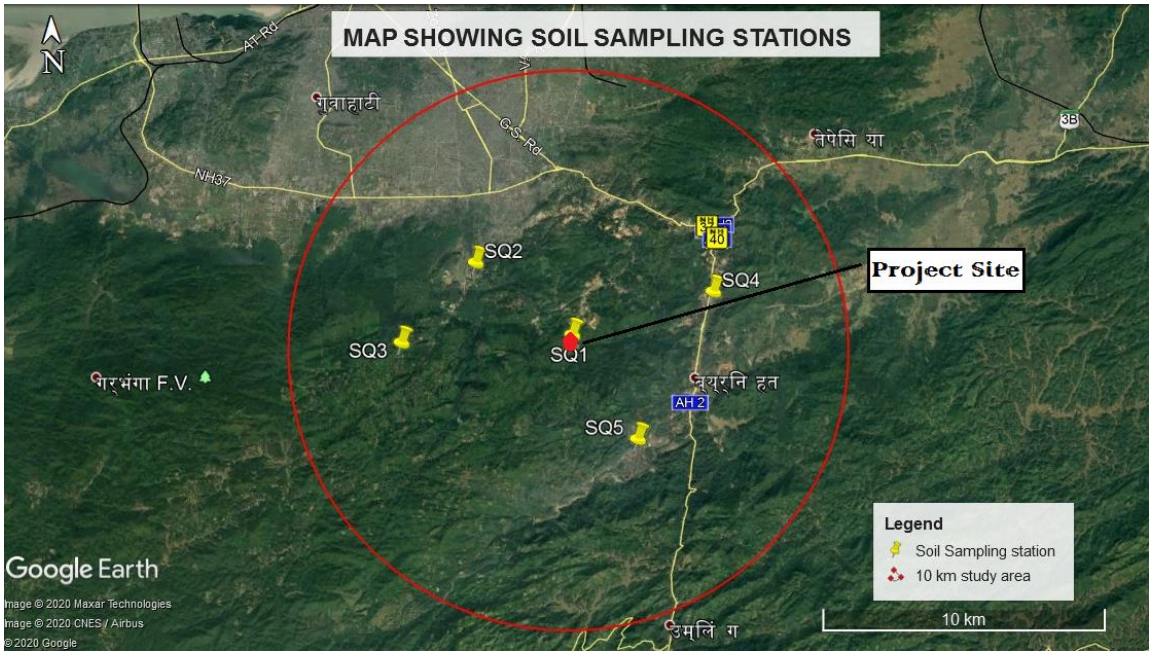


Figure 3.6: Location Map of Soil Sampling Sites

Table 3.11: Physiochemical Properties of Soil (January 2020)

Sr.No.	Parameters	Test Method	Unit	SQ1	SQ2	SQ3	SQ4	SQ5
1	pH	TS:2720	-	5.90	6.51	6.12	5.67	6.39
	Bulk Density	TS:2720	gm/cm3	1.12	1.56	1.34	1.62	1.74
	Conductivity	TS:2720	micro mhos/cm	364.8	342.5	319.3	358.9	386.2
	Moisture	TS:2720	%	8.9	10.7	7.3	12.4	11.6
2	Texture	TS:2720	-	Sandy Clay	Sandy Clay	Sandy Clay	Sandy Clay	Sandy Clay

3	Sand	TS:2720	%	51.8	49.6	50.6	53.4	52.7
4	Clay	TS:2720	%	35.6	33.8	34.2	36.4	32.8
5	Silt	TS:2720	%	12.6	16.6	15.2	10.2	14.5
6	Sodium sulphate	TS:2720	mg/kg	19.8	14.5	16.2	17.3	15.6
7	Potassium (as K)	TS:2720	mg/kg	122.6	114.9	132.7	110.2	102.5
8	CEC	TS:2720	meq/100gm	9.14	8.2	11.3	13.7	15.8
9	Nitrogen	TS:2720	% by mass	0.085	0.069	0.074	0.092	0.045
10	Organic Matter	TS:2720	%	3.2	4.8	3.6	2.9	4.3
11	Phosphorous	TS:2720	mg/Kg	13.8	12.6	14.8	10.6	15.36
12	Calcium	TS:2720	meq /100gm	3.57	3.82	4.69	4.18	5.71
13	SAR	TS:2720	-	3.42	3.16	3.87	3.46	3.29
14	Magnesium	TS:2720	mg/kg	27.6	32.8	23.1	30.3	25.4

3.8.2 Results of Analysis of the Soil

Physical characteristics of soil were characterized through specific parameters viz bulk density, porosity, water holding capacity, pH, electrical conductivity and texture. Soil pH plays an important role in the availability of nutrients. Soil microbial activity as well as solubility of metal ions is also dependent on pH. In the study area, variations in the pH of the soil were found to be slightly acidic (5.67 to 6.51). Electrical conductivity (EC) is a measure of the soluble salts and ionic activity in the soil. In the collected soil samples the conductivity ranged from 319.3 - 386.2 µmhos/cm.

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

3.9 LAND USE/LAND COVER MAPPING

- **Coordinates of the mine lease area**

Map with all corner coordinates of the mine lease area are super imposed on toposheet is shown in **Figure-3.7**.

To assess the land use pattern surrounding the 10 km radius of the site, a detailed study was carried out. The land use pattern study reveals that the 10 km environs is predominantly forest and agriculture area. The land use details are given in **Table-3.12.**

Table 3.12: Land use of the study area

Sr. No.	Particulars	Area (ha)	Percentage
1	Settlements	3920.7	12.49
2	Water bodies	513.2	1.63
3	Waste land	389.6	1.24
4	Crop land	2106	6.70
5	forest area	24470.5	77.94
	Total	**31400**	**100.00**

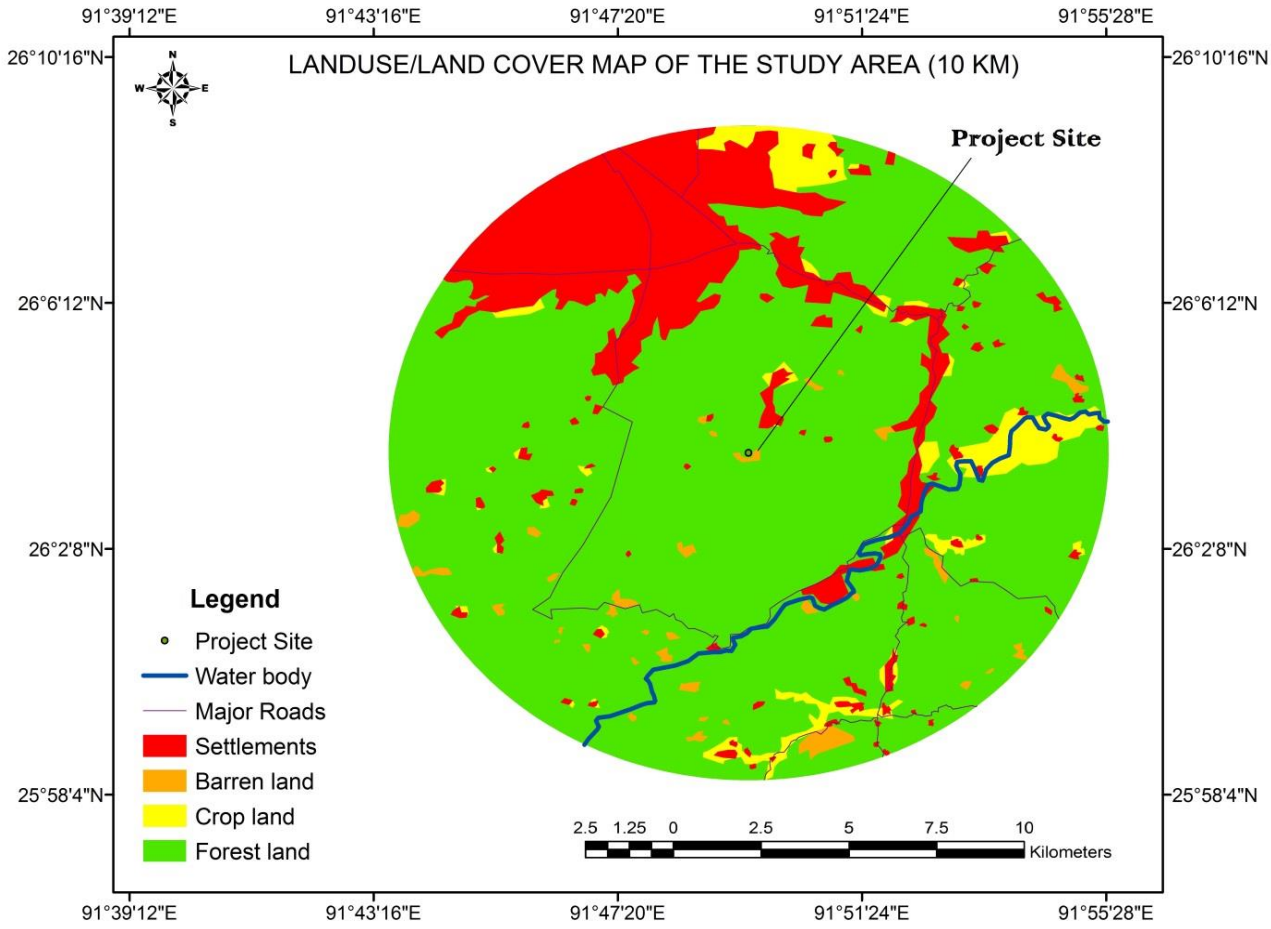


Figure 3.7 Land use delineation of 10 km radius area

3.10 TRAFFIC STUDY

Traffic study is carried out by understanding the existing carrying capacity of the road in the vicinity of site and flow towards National 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 existing volume of traffic and, the Level of Service are given in **Table-3.13 (i)** and shown in traffic density map as **Figure 3.8**.

Table 3.13 (i): Existing Traffic Scenario & LOS

Road	V (PCU/day)	C (PCU/day)	Existing V/C Ratio	LOS
NH-40	800	1400	0.57	B

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

During Mine operation

Total Capacity of mine : 2,80,260 TPA

No. of working days : 300 days

Total Capacity of mine/day : 2,80,260 /300 = 934 tonnes/day

Truck Capacity : 20 tonnes

No. of trucks deployed per day : 934/10 = 47 trucks per day

No. of trucks deployed/day to & fro : 47*2=94 trucks

Increase in PCU/day : 210

The addition to traffic by the proposed project during its operation is given table below**:**

Table 3.13 (ii): Additional Traffic Scenario & LOS due to proposed project

Road	V	C	Modified V/C Ratio	LOS
NH-40	1010	1400	0.72	B

From the above analysis it can be seen that the V/C ratio is likely to be changed to 0.72 on NH-40 with LOS remains "B" which is "Good" as per the classification. So the additional load on the carrying capacity of the concerned roads is not likely to have much significant adverse effect.

3.11 BIOLOGICAL ENVIRONMENT

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

Before starting any Environmental Impact Assessment study, it is necessary to identify the baseline of relevant environmental parameters which are likely to be affected as a result of operation of the proposed project. A similar approach has been adopted for conducting the study on Biological Environment for this Project. Both terrestrial and aquatic ecosystems have been studied to understand the biological environment.

3.11.1 Methodology for the study

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 season. The map showing the details of reserve forest within 10 km radius has been shown in **Figure 3.9.** The details are given as below:

Table 3.14: Mode of data collection & parameters considered during the survey

Aspect	Data	Mode of data collection	Parameters monitored
Terrestrial Ecology	Primary data collection	By conducting field survey	Floral and Faunal diversity
	Secondary data collection	From authentic sources like Range office and Forest Department of Meghalaya and available published literatures	Floral and Faunal diversity and study of vegetation, forest type, importance etc.
Aquatic Ecology	Primary data collection	By conducting field survey	Floral and Faunal diversity
	Secondary data collection	From authentic sources like Range office and Forest Department of Meghalaya and available published literatures	Floral and Faunal diversity and study of vegetation, forest type, importance etc.

3.11.2 Physical Environment of the study area:

The District lies between 90°55'15 to 91°16' latitude and 25°40' to 25°21' longitude. It is bounded on the north by Kamrup District and on the East by Jaintia Hills and Karbi Anglong District of Assam and on the West by West Khasi Hills District. There are three C and RD Blocks and one administrative unit at Patharkhmah, and the number of villages is 561. Ri Bhoi District covers an area of 2448 km².

Ecological Quality

3.11.3 Forestry

The district is covered by dense forests of tropical and deciduous types. Subtropical forests of pines are found only in the southern part of the district bordering East Khasi Hills Districts. The major forest produce of the district are teak, sal, bamboo, cane and broom. Bamboo is being exported to Assam to feed the paper mill of the Hindusthan Paper Corporation at Jagi Road, Marigaon district, Assam. Timbers are being supplied to feed the Ply Wood Factory of the district at Byrnihat.

There are two classes of forests in the district (1) State Reserved Forests and (2) Unclassed Forests. The number of State Reserved Forests in the district is two, (1) Nongkhyllem Reserved Forests with an area of 125.91 square kilometers and (2) Umsaw Reserved Forests with an area of 0.44 square kilometer. The Unclassed Forests are under the control of the Khasi Hills Autonomous District Council. So far no survey has been conducted either by the Forest Department or the Pre-Investment Forest Survey of India to determine the acreage of the

unclassed forests in the district. However, the total area of Meghalaya under these forests in the whole of Meghalaya had been estimated at 948 thousand hectares during 2008-09
(Source: Land use Statics, Ministry of Agriculture, GOI, 2008-09).

3.11.4 Flora and Fauna of the Study Area

The main flora in the lease area is shrubs and bushes, however in surrounding area the flora is Taru, Tej, Dieng, Sohphang, Dieng bai, Dieng kuwai are observed.

Some of the fauna found in the study area are Hollockgibbon, Chinese pangolin, Flying squirrel, Assamese Macaque, Capped languor, Slow Loris, Leopard, Elephant, Sāmbhar, Barking Deer, Gaur etc.

Notified eco sensitive zone (ESZ) boundary of Amchang Wildlife Sanctuary is 5.5 km away from the mine lease area hence there shall be no impact on wildlife sanctuary due to mining activities. The map showing distance of mine site from ESZ boundary of Amchang Wildlife Sanctuary is presented below.

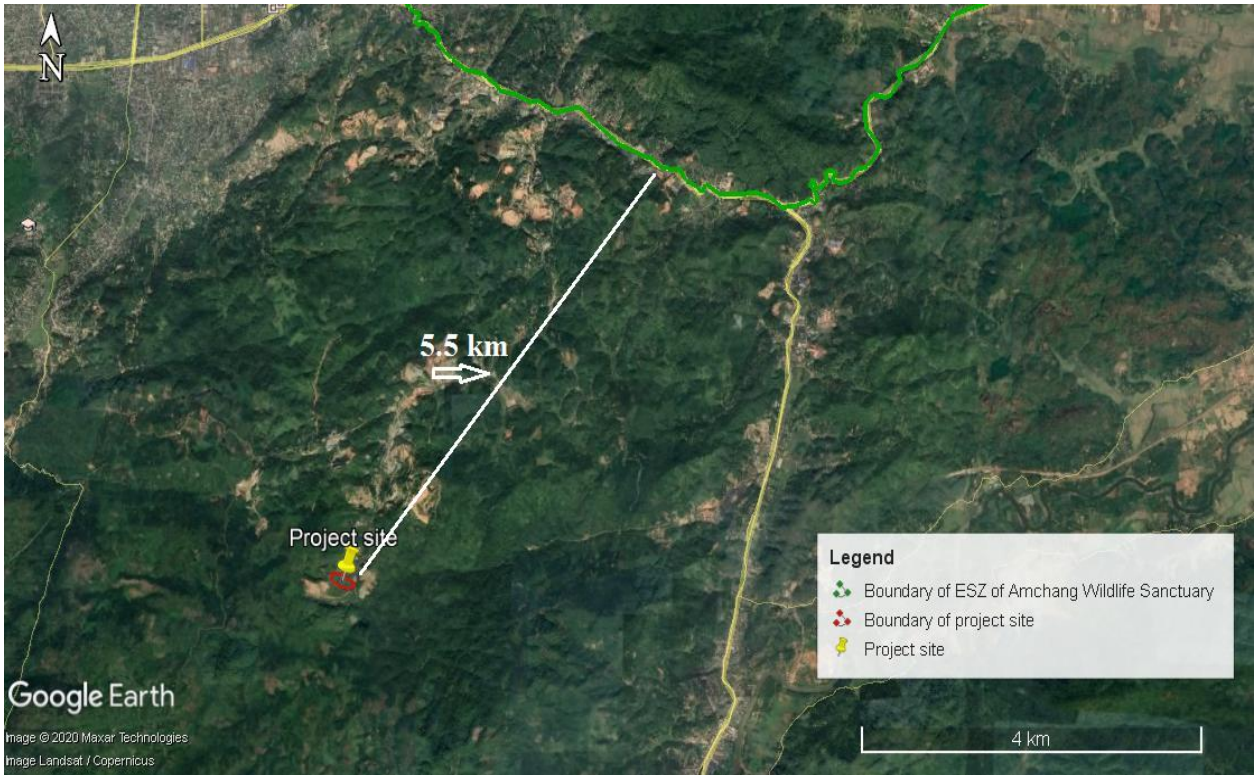


Figure 3.8: Map showing distance of mine site from ESZ boundary of Amchang Wildlife Sanctuary

3.12 SOCIO-ECONOMIC ENVIRONMENT

Socio-Economic status of the population is an indicator for the development of the region. Any development project of any magnitude will have a bearing on the living conditions and on the economic base of population in particular and the region as a whole. Similarly, the proposed activities will have its share of socio-economic influence in the study area. The section delineates the overall appraisal of society relevant attributes. The baseline data collection of project on socioeconomic aspects in the study area has been done through the analysis of secondary data

(Census 2011) available for the study area of 10 km radius around the project site. The information in the context was gathered on the following socio-economic parameters viz.

- Demographic profile
- Education levels
- Occupational Profile
- Cropping Pattern
- Other Socio-Economic Parameters.

3.12.1 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.

3.12.1.1 Steps taken to prepare the SEIA Report

Various steps taken to prepare the SEIA report were as follows

- Literature review
- Identification of habitations in the study area with the help of google earth and toposheet
- 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
- Scrutiny of filled-in-schedules
- Data processing and tabulation
- Data analysis and preparation of report.

3.12.1.2 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.

3.12.1.3 Objectives of SEIA

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.

3.12.1.4Scope

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) Facilitation of sustainability of positive impact by recommending community development initiatives in the study area.

g) Suggestion of mitigation measures in case of adverse impact.

3.12.2 Methodology

For composite Socio-Economic Impact Assessment of projects, the consultant 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. 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.

3.12.2.1 Census 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).

3.12.3 Ri Bhoi District (Project District)

Ri Bhoi is an administrative district in the state of Meghalaya in India. The district headquarters are located at Nongpoh. The district occupies an area of 2378 km². As of 2011 it is the second least populous district of Meghalaya (out of 7), after South Garo Hills. The headquarters of the District is at Nongpoh located at 53 km away from the state capital Shillong and 50 km from Guwahati. This District is characterized by rugged and irregular land surface. It includes a series of hill ranges which gradually sloped towards the north and finally joins the Brahmaputra Valley.

3.12.4 Population Profile

The description of the project district is presented in **Table 3.15**. According to the 2011 census of India, Ri Bhoi Hills has a population of 2,58,840.

Table 3.15: Demographic details of Project District and Tehsil

S.No.	District/Tehsil	Households	Population					
			Total	Male	%	Female	%	Sex ratio
1.	Ribhoi	46,872	2,58,840	1,32,531	51.20	1,26,309	48.80	953

Source: Census of India, 2011

3.12.5 Caste Wise Distribution of Population

Table 3.16 provides detailed information about the SC, ST population in Ri Bhoi district as well as on the Project area. The total SC population in Ri Bhoi district is 590 which is 0.23% of the total population, while ST population is 2,30,081 which is 88.89% of the total population.

Table 3.16: Caste wise distribution of population

Sl. No.	District/Project Area	Schedule Caste (SC)		Schedule Tribes (ST)	
		Total	% of SC	Total	% of ST
1	Ribhoi	590	0.23	2,30,081	88.89

Source: Census of India, 2011

3.12.6 Literacy Rate

District Ri Bhoi: The literate population in Ri Bhoi district is 1,55,859 out of which male & female are 80,977 and 74,882 respectively. The male literates represent 76.79 % while female represent 74.49% of the total population.

The details of literacy rate and literate people in tehsil and district are provided in **Table 3.17.**

Table 3.17: Literacy Rate of Project District and Project Area

S. No	District/Project Area	Number of Literate			Literacy Rate %	
		Total	Male	Female	Male	Female
1	Ri Bhoi	155,859	80,977	74,882	76.79	74.49

Source: Census of India, 2011

3.12.7 Religion and Culture

Ri Bhoi is Christian majority district with approximately 84.42% of district population as Christians. Hindu is second most popular religion in district with approximately 11.96 % following it. **Table 3.18** shows the Religious wise distribution of Population of Ri Bhoi District.

Table 3.18: Religion wise distribution of Population of Bageshwar District

Description	Total	Percentage
Hindu	30,945	11.96
Muslims	1,838	0.71
Christian	2,18,508	84.42
Sikh	166	0.06
Buddhist	428	0.17
Jain	49	0.02
Others	6,308	2.44
Not Stated	598	0.23

Source: Census of India, 2011

3.12.8 Economic Structure

The economy of the district is predominantly based on agriculture, as maximum per cent of the population resides in rural areas and their main occupation is agriculture. Kharif and Rabi are the two principal harvests grown in the district.

The **Table 3.19** given below describes two sections of workers main and marginal with a third category which is non-worker; the total number of workers at district level is 1,06,473 which is 41.13 percent of total population out of which main workers are 35.11 percent and marginal workers have a share of 6.03 percent while rest nearly 58.87 percent workers are non-workers.

Table 3.19: Main Workers, Marginal Workers and Non-workers of Project District and Project Area

Sl. No.	District/ Project Area	Total workers	Total worker %	Main workers	Main workers %	Marginal workers	Marginal workers %	Non-workers	Non-workers %
1.	Ri Bhoi	106,473	41.13	90,875	35.11	15,598	6.03	152,367	58.87

Source: Census of India, 2011

3.13 SOCIO-ECONOMIC IMPACT ASSESSMENT

3.13.1 Impact on Population Composition

No impact is envisaged on the population composition of the study area as there will be no in-migration or out-migration of villagers. Those who will be engaged in mining will be recruited locally.

3.13.2 Impact on Employment

For extraction of boulder stone the project proponent has ensured that only local people will be recruited for the operation of the upcoming mine. The exact number of people to be recruited will depend upon quantity of the minerals to be extracted over a period of time. In the initial period the number of such people will be less but gradually it will go up when the production will increase in a

phased manner. The project proponent has planned to recruit 17 local peoples for the operation of the upcoming mine. Though marginally, the dependency rate in the study area will decline by one percent with the commencement of the above mine. This is a positive impact of the project.

3.13.3 Impact on Approach Roads

Movement of trucks and other vehicles to and fro the quarry site is expected to increase substantially, when the operation of the mine will commence. The existing roads connecting the quarry with the national and state highways are mud roads and they are narrow. There will be mud slide and traffic bottle neck if these roads are not widened and their conditions are not improved by making them paved roads. Hence, there is a wide scope for road development in the area. This is a positive impact of the upcoming mining project.

3.13.4 Impact on Law & Order

Since the workers will attend to their duties from their residence and return to their homes after the day's work is over there will be no law & order problem as such. On the other hand, if the workers are migrants and live in shanties closed to the mining area it may create law & order problem and ethnic issues. To meet any untoward incident one police post may be set up close to the project area.

3.13.5 Impact on Vulnerable Groups of People

No impact is envisaged on vulnerable groups of people that include hospital patients, children, pregnant women and elderly persons. There will be no re-habilitation and resettlement issues that may adversely affect the people living adjoining the mine lease area. The social welfare activities to be taken up by the mine owner will definitely make positive impact on the living conditions of people including those who fall under vulnerable groups.

3.13.6 Income to Government

The proposed mining will bring income for the state government in the form of royalty, dead rent and taxes. This is a positive impact of the project.

Extraction of boulder stone may pose health risks if it is not handled carefully Hence, preventive measures should be taken to protect oneself from the exposure, while working in mine. The project proponent will undertake the following preventive measures, in order to protect the workers from the exposure:

1) Consult to Physician

A physician will be consulted if anyone develops any sign or symptom caused due to exposure to mineral.

2) Regular medical surveillances

Regular medical surveillances of the workers will be made. In case anyone get adversely affected due to mining the miner will be medically examined and

provided medical assistances regularly. They will also be medically checked annually.

3) Provision of First Aid at mining site

To meet any emergency during extraction of the minerals from the mining site and subsequent loading in the transport vehicles, provision for First Aid will be made by the project proponent. Before the affected person is removed to a doctor or health institution for necessary medical aid, the miner will be provided with First Aid.

4) Tie up with the nearest PHC for medical help

At present there are no adequate health facilities available in the mining village. To meet the medical needs of the mine workers, tie-ups with nearest hospital or Primary Health Center (PHC) will be made. Few beds will exclusively be reserved for the mine workers in the above health institutions. This will ensure timely medical aid to the affected persons.

5) Supply of Masks and Gloves

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

6) Health Camps

Health Camps will be organized at regular intervals preferably in every quarter. Further, free medical facilities will be made available to the workers and their family members.

7) Administration of Anti-venom injections

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

8) Special telephone number

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

9) Special Group Insurance Scheme

All the mine workers will be covered under a Group Insurance Scheme of LIC or any other Insurance company.

3.14 CONCLUSION

The implementation of the mining project near village Umbuda, Raid Marwet, District Ri Bhoi, Meghalaya, will generate both direct and indirect employment. It will also promote legally valid mining in the area and bring income to the state exchequer. At present agriculture & horticulture are the main occupation of the people. With the implementation of the proposed mining project the occupational pattern of the people in the area may change making more people engaged in industrial and business activities rather in agriculture. Thus there will be a gradual shifting of population from agricultural sector to mining and industry. Due to industrialization of the area, employment opportunities will further increase.

The study area is still lacking in infrastructure. It is expected that the same will improve to a great extent due to proposed mining project and associated industrial and business activities. It is therefore suggested that the commencement of the mining operation may be taken up on priority basis as employment opportunists are intended for the local aspirant.

CHAPTER 4: ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

4.1 DETAILS OF THE INVESTIGATED ENVIRONMENTAL IMPACTS

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

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

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

4.1.1 Impact on Drainage

Drainage in the lease area is almost easterly. General drainage outside the area is easterly to northeast easterly by non perennial nallah. The area is hilly and stony. Area broken by nallahs in the five kilometers periphery.

The general ground level near the lease area (outside the lease area) is around 260 mRL. The level of ground water table is around 40 m below from the general ground level of 260 mRL of the study area of 5 km periphery. Thus, during dry season the level of ground water table is 220 mRL. Proposed working are far above to this level of ground water table, thus ground water table will not intersect in workings in any stage.

4.2 IMPACT ON WATER ENVIRONMENT

The mining process will not divert and utilize the surface & ground water. Quantity of water will remain the same. The existing background level of water quality as indicated by the baseline data revealed that impact on water environment will be insignificant in this project.

4.2.1 Anticipated Impacts

Because of the open Cast & semi mechanization method in the mining activity, the impact of mining operations on water quality is also expected to be insignificant. There would be no

impact on the quality/quantity of ground water as existing ground water level in study area is deep. Surface water is also not diverted or disturbed. Therefore, there would not be any impact on surface water and ground water quality. The lease area is Hilly and Stony where only direct precipitation flows down the slope during rains. The water comes across in the workings during monsoon. The water will fill in the working pits. Some water will flow by joints and cracks and rest water has to dewater during and after the monsoon. The monsoon water which directly precipitates over the working will fill in the pit and rest water which precipitates outside the pit will flow down towards lower altitude side by slope of the area.

The rubble stone walls are constructed towards lower side of the dumps to check the wash off during monsoon. During rains the rainwater flow on natural slope of the surface, which flows during rains only in north west direction.

Since the mining process is totally dry, no effluent will be generated hence no adverse impact on water is anticipated. During the entire lease period, the deposit will be worked from the top surface to above ground water table, whichever comes first neither water table (aquifer) will be intersected by the mining activities. Hence there will not be any adverse impact either on the quality or quantity of ground water. There is a sufficient gap between proposed workings up to conceptual and level of ground water table, thus ground water will not be encountered in the workings at any stage.

Domestic Effluent

No domestic effluent is generated at the mine site due to absence of any settlement in the mining area. Hence the question of contamination of ground water does not arise. Any adverse impact on the ground water regime is not expected from the domestic effluent.

Surface Run-Off

The land of the study area is semi-arid and the Landscape is hilly and stony. The threat of pollution of due to surface run-off is also not possible as because entire study area does have any natural surface water course.

Mitigation Measures

There is a sufficient gap between proposed workings up to conceptual and level of ground water table, thus ground water will not be encountered in the workings at any stage.

4.3 IMPACT ON LAND USE

- **Land use Pattern in Core Zone**

Mining is essentially an excavation of mineral. The land environment is greatly affected by it. Specially, in case of mining which is being carried out by opencast method / semi- mechanized, it is expected to affect the land environment essentially. Impact assessment study on land environment can be done by considering land use pattern/ land cover, Topography, Drainage pattern and geological features of the mine site as well as the study area.

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

Impact on land use & land cover

The land is totally stony and has stone boulders in large amount. This land is good for mining. There is no forest land or agriculture in the mine lease area. Land use pattern for preoperational, operational & conceptual stage of the mining as per mine plan for the proposed mine site is given below in Table 4.1:

Table 4.1: Land use pattern

S. No	Item	As on date	End of 5th year	End of lease
1	Area to be excavated	0.00	2.04	2.04
2	Storage of top soil	0.00	0.01	0.00
3	Overburden dump	0.00	0.02	0.02
4	Mineral/Sub-grade stack	0.00	0.00	0.00
5	Infrastructure	0.00	0.01	0.01
6	Roads	0.00	0.02	0.02
7	Green belt	0.00	0.10	0.20
8	Others	0.00	0.00	0.00
	Total Disturbed land	0.00	2.20	2.30

Source: Mine plan

The existing land use / land cover pattern within the study area (10 Km, Buffer including core Area) as studied through Site survey & satellite imagery is given as follows.

Table 4.2: Existing Landuse of the 10 KM Study Area

Sr. No.	Particulars	Area (ha)	Percentage
1	Settlements	3920.7	12.49
2	Water bodies	513.2	1.63
3	Waste land	389.6	1.24
4	Crop land	2106	6.70
5	forest area	24470.5	77.94
	Total	**31400**	**100.00**

As per the mine plan reclamation will be done by mine rejects, spreading of topsoil and plantation will be done. It is also proposed to convert the pit into a water reservoir. The soil come across during mining will be scraped and stacked separately in 0.01 ha area. The soil will be used for plantation in each monsoon.

4.4 IMPACT ON AIR ENVIRONMENT

4.4.1 Change in Ambient air and GLC

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.

4.4.1.1 Dust Dispersion Modeling for Excavation Operation

In the present study, United States Environmental Protection Agency (USEPA–42 series) approved mathematical equations have been used to predict concentrations for different operations in project including the material transportation. To predict the particulate emissions, Envitrans AERMODCloud. (Air Dispersion Modeling Software) an interface based on ISCST3 – was used to predict changes in air quality i.e., maximum ground level concentration (GLC's) of Particulate Matter. Short term model options were opted for uniform emissions rates. The concentration of other gaseous pollutants i.e. SO2 and Nox was found to be much lower than the threshold limit (80 µg/m3), the air modeling was restricted to determination of PM10 and PM2.5 in the present case. The emission factors adopted for various project operations are mentioned below:

Emission Factor for Excavation and Material Loading/unloading

For excavation and material handling the emission factor for PM_{10} has been adopted as per USEPA – 42 series.

For Dozing Operation:

$EFPM_{10}$ (kg/hr) = 0.34 X s1.5(%) / M1.4(%)

Where,

$EFPM_{10}$ (kg/hr) = emission factor in kg/hr

S = silt contents in percentage by weight

M = moisture content in percentage by weight

For Material Loading/unloading:

$EFPM_{10}$ (kg/hr) = 0.34 [0.119 / M0.9]

Where,

$EFPM_{10}$ (kg/hr) = emission factor in kg/ton
M = moisture content in percentage by weight.
Emission Factor for Material Haulage within Project:
The emission rate is dependent on several factors which include soil properties, climatic conditions, vehicular traffic, wind forces and machinery operation. The Empirical equation for calculation of emission rate is as under.
E= k*(1.7) *(s/12) *(S/48) *(W/2.7)0.7*(W/2.7)0.7 (w/4)0.5 * (365-p/365) g/VKT
Where,
E=Emission Rate
K = Particle size multiplier
s=Silt Content of the Road surface material
S= Mean Vehicle Speed (km/hr)
W=Mean Vehicle Weight (tons)
w=Mean number of wheels
p= Number of days with at least 0.254mm of precipitation per year

Note: The emission factor for PM2.5 has been considered 60% of PM10.
The Isopleths developed are shown in **Figure 4.1 (a)** and **Figure 4.1 (b) for PM_{10}** and **$PM_{2.5}$ respectively.** The maximum GLC due to excavation, loading & unloading activities for PM_{10} and $PM_{2.5}$ was found to be 7.8 and 4.2 µg/m3 respectively and has been shown in **Table 4.3**.

Table 4.3: Maximum Concentration at receptors

Location	Pollutants	N-Cord.	E-Cord.	GLC (µg/m^3)
Project site	PM $_{10}$	26° 3'43.17"N	91°49'29.31"E	7.8
Project site	PM $_{2.5}$	26° 3'43.17"N	91°49'29.31"E	4.2

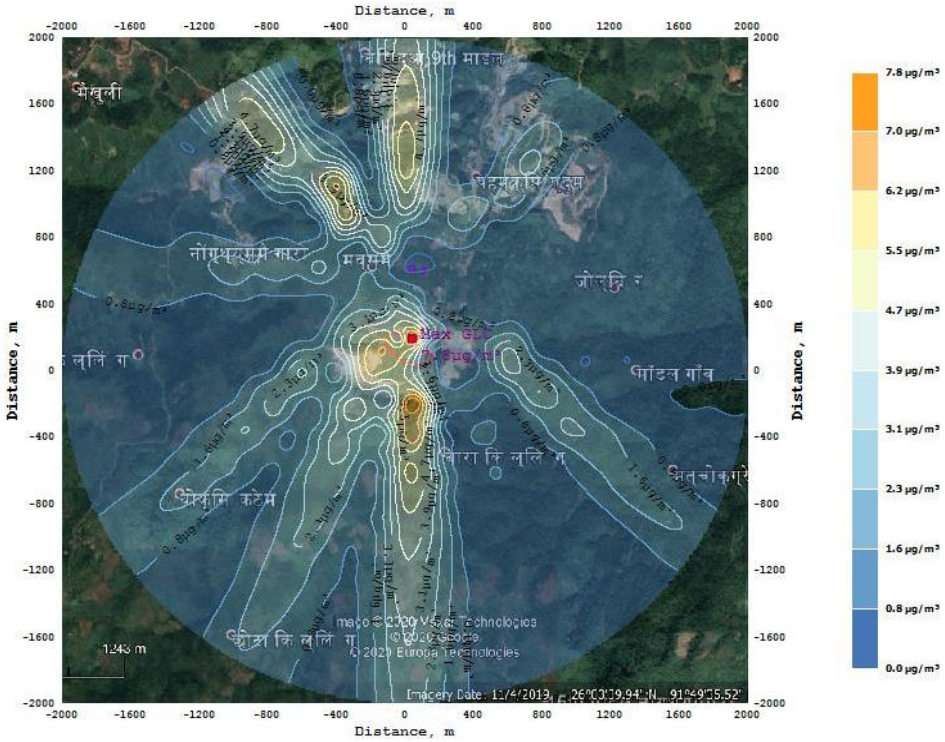


Figure 4.1 (a): Isopleth of Maximum Predicted 24 hourly Ground – Level Concentrations for PM_{10}

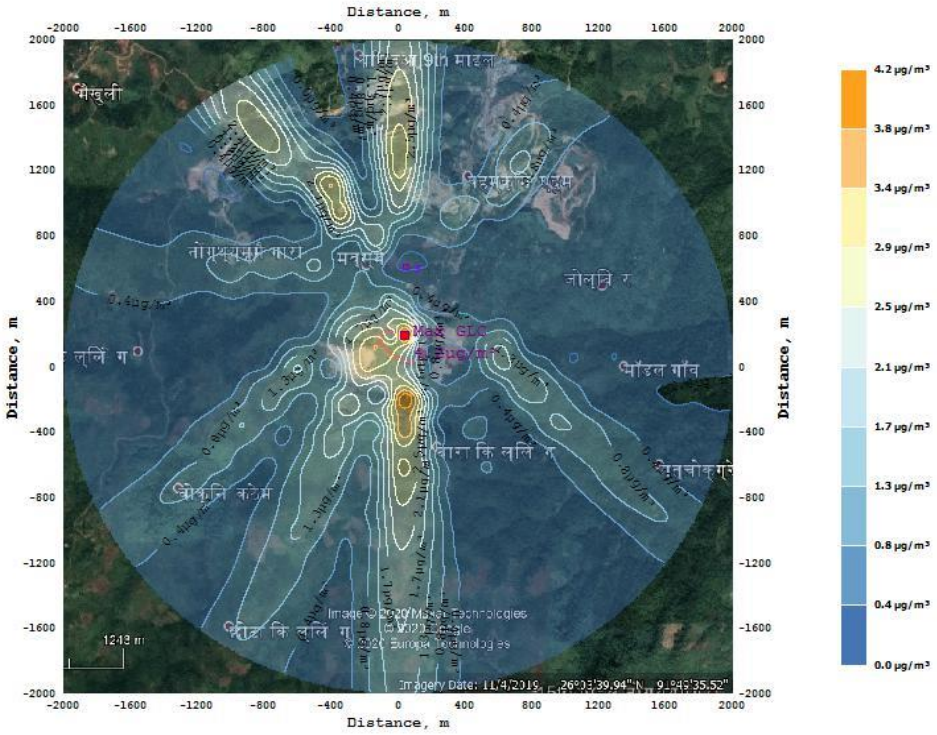


Figure 4.1 (b): Isopleth of Maximum Predicted 24 hourly Ground – Level Concentrations for PM $_{2.5}$

4.4.1.2 Resultant Impact

The resultant impact due to construction activities (excavation and crushing) on the ambient air quality for PM_{10} and $PM_{2.5}$ at monitoring station project site respectively is presented in **Table 4.4** which shows that, the resultant concentration level is within the NAAQS.

Table 4.4: Resultant levels due to excavation

Station Name	Pollutants	Sampling Station	Max. Conc. (µg/m3)	Predicted GLC (µg/m3)	Resultant concentration (µg/m3)	NAAQS (µg/m3)
Project site	PM10	AAQ 1	79.6	7.8	87.4	100
Project site	PM2.5	AAQ 1	32.7	4.2	36.9	60

4.5 PROPOSED MITIGATION MEASURES

Control of Fugitive Emissions

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

- Development of green belt/plantation around the lease boundary, roads, dumps etc.

Prevention and control of Gaseous Pollution

- Open cast manual method will be adopted in this case. The main source of gaseous emissions would be transportation.
- Approx 934 tons of boulder stone 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.

The sources of pollutants from mining activities are given in **Table-4.5**.

Table 4.5: Sources of Pollutants

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

4.6 NOISE ENVIRONMENT

4.6.1 Noise Impact on Working Environment

As mining will be done by semi-mechanized means, noise will only be generated due evacuation, transportation activities. The noise generated by the mining activity dissipates within the mine. There is no major impact of the mining activity on the nearby villages. However, pronounced effect of above noise levels is felt only near the active working area.
The impact of noise on the villages is negligible as the villages are far located from the mine workings. Since there is no involvement of major machinery, the impact of noise levels will be minimal.

4.6.2 Noise Abatement and Control

In this mine the noise level will be upto tolerable limit (90 dbA) and the noise level can be reduced by:

- Proper maintenance, oiling and greasing of transport vehicles at regular intervals will be done to reduce the generation of noise.
- Adequate silencers will be provided in all the diesel engines.

- Plantation along the sides of approach roads, around office building and mine area will be done to minimize the propagation of noise.
- Personal Protective Equipments (PPE) like earmuffs/earplugs will be provided to all operators and employees working near mining machineries or at higher noise zone.
- Periodical noise level monitoring will be done.

Frequency levels and associated mental and physical response of humans are given in **Table-4.6.**

Table 4.6: Noise Exposure Levels & Its Effects

Noise Levels dB (A)	Exposure Time	Effects
85	Continuous	Safe
85-90	Continuous	Annoyance and irritation
90-100	Short term	Temporary shift in hearing threshold, generally with complete recovery
Above 100	Continuous	Permanent loss of hearing
	Short term	Permanent hearing loss can be avoided
100-110	Several years	Permanent deafness
110-120	Few months	Permanent deafness
120	Short term	Extreme discomfort
140	Short term	Discomfort with actual pain
150 and above	Single exposure	Mechanical damage to the ear

Source: Hand Book of EIA, Rao & Wooten

4.7 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 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.

Greenbelt Development in ML area

100 nos. of trees will be planted on 0.10 ha and 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 afforested area, to protect from grazing animals and proper manuring.

4.8 BIOLOGICAL ENVIRONMENT

The baseline flora and fauna has been depicted in Section-3.11 of Chapter-3. Eco sensitive zone (ESZ) boundary of Amchang Wildlife Sanctuary is 5.5 km from the boundary of mine. However, most of the area surrounding to project site are covered with forest land. No loss of forest resource is envisaged due to the project.

4.8.1 Impact on Biodiversity

Present data have been collected through direct inventory as well as various Government Departments such as forests, agriculture, fisheries, animal husbandry and various offices to establish the pre-project biological environmental conditions. Eco sensitive zone (ESZ) boundary of Amchang Wildlife Sanctuary is 5.5 km from the boundary of mine. Save the flora/fauna around the project area, is one of the basic objective of present project. For this, mine owner agency planted a good roadside plantation along both side of the mine road.

The mitigative measures proposed are:

- Prior to mining, short awareness program will be conducted for labors to make them aware for way of working.
- No tree cutting, chopping, lumbering, uprooting of shrubs and herbs will be allowed.
- No track or new road for movement of labors or vehicles be laid in adjoining area, this will prevent fragmentation, encroachment and human – animal encounter.

4.9 SOCIO - ECONOMIC ENVIRONMENT

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

The impact of mining activity in the area is positive on the socio-economic environment of the region. The proposed mine will be providing employment to local population and it will be give preference to the local people whenever there is requirement of man power.

Probable Impact Assessment

Impact on population composition

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

Impact on employment generation

The proposed mining project is expected to provide Direct and Indirect employment opportunities to local people of different skills and trades. It is a positive impact that needs to be encouraged. It has been estimated that 54 workers of various categories will be employed directly.

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

Impact on Health

Mining damages water supply as also a health hazard. Scarring of the lungs are the most frequently reported impacts of contact with polluted water and breathing problem due to mining dust.

Impact on consumption pattern

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

Impact on road development

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

Impact on law & Order

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

4.10 OCCUPATIONAL HAZARDS AND SAFETY

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

4.11 PUBLIC HEATH IMPLICATIONS

With the mitigation measures in relation to air pollution, water pollution, soil contamination and noise pollution proposed to be adopted at the mine along with green belt plantation along the periphery of Mining Lease boundary, it is expected that there will be no impact of mining on the population in the impact zone. However, the following measures shall be adopted: Health check of all villagers in the immediate vicinity of the mine shall be carried out periodically. In case any person or a group of persons is found to be suffering from any ailment, directly related to bauxite mining, their medical treatment will be carried out free of cost.
Surface water management shall be adopted to ensure that run-off from the mining are does not adversely affect natural water streams or other water bodies.
All water bodies sources in the vicinity of the mine, shall be periodically tested for any pollution related to mining operations and remedial action taken, if warranted.
Operators of all transport vehicles shall be instructed not to honk unnecessarily while passing through villages or near schools.

4.12 CORPORATE ENVIRONMENTAL RESPONSIBILITY

Corporate Environmental Responsibility (CER) refers to responsibility of a company to ensure positive impact on environment, consumers, employees, communities, stakeholders and all other members of public sphere. The CER activities are increasingly being taken up by the project proponents not only as fulfilling of mandatory provisions but also for the formation and or enhancement of brand image. Besides the above, CER is seen more as a responsibility towards society rather than a business promotion activity.

The activities to be undertaken for the local people under CER have already been identified. It is expected that this will improve the socio-economic status of the local people and at the same time the popularity of the mining project will enhance. It is proposed to spend 2 percent of the total cost of the project for the benefits of the local community under CER activities. The total cost of the project is around Rs. 24.50 Lacs and the amount for CER activities has been worked out to Rs. 0.49 Lac. Funds for the various activities proposed to be taken up under CER programme has been shown in **Table 4.7**.

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

a) Health Camps

b) Drinking Water Facilities

c) Maintenance of foot track

d) Donation for Temple Construction

e) Donation for cultural activities in the surrounding areas

f) Plantation of trees.

Table 4.7: Funds for the various activities proposed to be taken up under CER programme

S. No.	Activities	Allocation of Fund (Rs.)
1	Health Camps	14,000
2	Drinking Water Facilities	10,000
3	Maintenance of foot track	15,000
4	Donation for Temple Construction	5,000
5	Donation for cultural activities in the surrounding areas	5,000
Total		**49,000**

4.13 IMPACT ON TRAFFIC

Traffic study is carried out by understanding the existing carrying capacity of the road in the vicinity of site and flow towards National 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 existing volume of traffic and, the Level of Service are below.

Table 4.8: Existing Traffic Scenario & LOS

Road	V (PCU/day)	C (PCU/day)	Existing V/C Ratio	LOS
NH-40	800	1400	0.57	B

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

During Mine operation

Total Capacity of mine : 2,80,260 TPA

No. of working days : 300 days

Total Capacity of mine/day : 2,80,260 /300 = 934 tonnes/day

Truck Capacity : 20 tonnes

No. of trucks deployed per day : 934/10 = 47 trucks per day

No. of trucks deployed/day to & fro : 47*2=94 trucks

Increase in PCU/day : 210

The addition to traffic by the proposed project during its operation is given table below**:**

Additional Traffic Scenario & LOS due to proposed project

Road	V	C	Modified V/C Ratio	LOS
NH-40	1010	1400	0.72	B

From the above analysis it can be seen that the V/C ratio is likely to be changed to 0.72 on NH-40 with LOS remains “B” which is “Good” as per the classification. So the additional load on the carrying capacity of the concerned roads is not likely to have much significant adverse effect.

CHAPTER 5: ANALYSIS OF ALTERNATIVES (TECHNOLOGY & SITE)

5.1 SITE ALTERNATIVES UNDER CONSIDERATION

The boulder stone mine has been identified based on the result of geological investigations and exploration carried out during prospective mining.

The mining projects are site specific as such alternate sites were not considered.

5.2 ANALYSIS OF ALTERNATIVE TECHNOLOGY

5.2.1 Choice of Method of Mining

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

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

The open cast mining method will be adopted because of the following reasons:

- The opencast mining operations ensure higher mineral conservation.

The method used for mining is efficient for boulder stone mining, so no alternative mining method is proposed.

CHAPTER 6: ENVIRONMENTAL MONITORING PROGRAMME

6.1 INTRODUCTION

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

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

6.2 IMPLEMENTATION SCHEDULE OF MITIGATION MEASURES

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

Table 6.1 Implementation Schedule

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

6.2.1 Administrative Aspects & Environmental Monitoring Program

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

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

6.2.2 Institutional Arrangements for Environment Protection and Conservation

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

The organizational structure for Environment Cell for mining operations is shown in **Figure-6.1**. This Environment Cell is responsible for the management and implementation of the environmental control measures. Basically, this department will supervise the reclamation planning & management, air & water pollution control management, Liasoning with State & Central Statutory agency & Committee.

In case the monitored results of environmental pollution are found to exceed the 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.

Figure-6.1 Organization Structure for Environment Management

6.3 ENVIRONMENT MONITORING PROGRAMME

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

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

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

The details of post project monitoring are presented in **Table 6.2.**

6.4 REPORTING SCHEDULES

Post project monitoring will be carried out as per conditions stipulated in environmental clearance letter issued by MoEF&CC, consent issued by SPCB as well as according to CPCB guidelines. The project site is considered as core zone and the area lying within 10 km radius from the mine site is considered as buffer zone, where some impacts may be observed on physical and biological environment. In the buffer zone, slight impact may be observed and that too is occasional, table below showing the details of Post Project Monitoring programme.

Table-6.2 Post Project Monitoring Programme

Attributes	Sampling		Measurement Method	Test Procedure
	Network	Frequency		
A. Air Environment				
Meteorological • Wind direction • Relative humidity • Rainfall	Minimum 1 site in the project impact area	Regularly in one season by Weather Monitoring Station	Mechanical/automatic weather station	-
Pollutants PM10, PM2.5	5 locations in the project impact area (Minimum 2 locations in upwind side, 2 sites in downwind side / impact zone and 1 in core zone)	Once in a season.	Gravimetric method	-
			Gravimetric method	-
SO2			EPA Modified West & Geake method	Absorption in Potassium Tetra Chloromercurate followed by Colorimetric estimation using P-Rosaniline hydrochloride and Formaldehyde (IS: 5182 Part - II).
NO2			Arsenite modified Jacob & Hochheiser	Absorption in dil. NaOH and then estimated colorimetrically with sulphanilamide and N (I Nepthyle) Ethylene diamine Dihydrochloride and Hydrogen Peroxide (CPCB Method).
B. Water Environment				

pH, Turbidity, Colour, Odour, Taste, TDS, Total Hardness, Calcium, Magnesium, Chloride, Fluoride, Sulphate, Sodium, Potassium Nitrates, Alkalinity, Iron, Copper, Manganese, Mercury,	Set of grab Samples during pre and post-monsoon for ground and surface Water in the vicinity.	Diurnal and Season wise	As per IS 10500	Samples for water quality should be collected and analyzed as per : IS : 2488 (Part 1-5) methods for sampling and testing of Industrial effluents Standard methods for examination of water and wastewater analysis published by American Public Health Association
Arsenic, Cyanide, Lead, Zinc, Chromium, Aluminum, Boron, Phenolic Compounds				.
C. Noise				
Noise levels at Day & night time - Leq dB (A)	Mine Boundary, High noise generating areas within the lease.	Quarterly / Half yearly	As per CPCB norms	As per CPCB norms
D. Soil				
pH, Bulk Density, Soil texture, Nitrogen, Available Phosphorus, Potassium, Calcium, Magnesium, Sodium, Electrical Conductivity, Organic Matter, Chloride	5 locations in the project impact area	Yearly/half yearly	As per USDA Method	As per USDA Method
E. Socioeconomic				
• Demographic structure	Socioeconomic survey is based on proportionate, stratified and random	Minimum for two phases of the project	Primary data collection through Questionnaire	Secondary data from census records, statistical hard books, topo sheets, health

• Infrastructure resource base • Economic resource base • Health status: Morbidity pattern • Cultural and Aesthetic attributes • Education	sampling method			Records and relevant official records available with Govt. agencies

CHAPTER 7: ADDITIONAL STUDIES

7.1 PUBLIC HEARING

In consonance with the EIA notification dated 14th September 2006, vide section 1 (a) related to Public Hearing, the draft EIA/EMP report shall be submitted to the Meghalaya State Pollution Control Board (MSPCB) for public hearing**.**

7.2 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

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

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

7.2.1 Blasting

Blasting will be done by short or long holes with the permission of DGMS.

7.2.2 Overburden & Interburden

The overburden (soil) dumps may cause landslides. High overburden dumps created at the quarry edge may cause sliding of the overburden 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 dump.

7.2.3 Machinery

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

7.2.4 Water Logging

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

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

Natural resource conservation

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

7.2.5 Earthquake Management Plan

No landslide and inundation like disaster were come across in this area and nearby the area in past. The workings are proposed from top to bottom by forming proper benching. The proposed workings will be by opencast mining method. Underground mining is not proposed. Face height will maintain safe. No tailing dam is proposed.

Flood Management Plan

- The site is not close by to a water body so water bodies in the area will not be disturbed.

Natural resource conservation

- A green belt will be developed so that minimum soil erosion takes place.
- The excavated soil will be spread over the backfilled mined out area in order to minimize the impact on environment.
- In any case the natural habitats of the existing flora and fauna will not be disturbed.

- Use of traditional knowledge in all aspects of conservation shall be utilized.
- Water conservation techniques will be employed.
- Time to time analysis of the soil, water resources etc will be done in order to analyze the negative impacts of mining activities on the environment.
- To prepare management plans for village landscapes, villages to be seen as landscapes of diverse elements such as forests, scrub, grassland, streams/river, ponds etc. The dynamics of the village as an ecosystem to be assessed, corridors to be devised between major natural landscape elements, so as to facilitate movement of species.

7.2.6 Safety Measures

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.

7.3 DISASTER MANAGEMENT PLAN

7.3.1 Objectives of Disaster Management Plan

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

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

- Effect the rescue and medical treatment of casualties;
- Safeguard other people;
- Minimize damage to property and the environment;

- Initially contain and ultimately bring the incident under control;
- Secure the safe rehabilitation of affected area; and

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

Fire Fighting Facilities

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

Emergency Medical Facilities

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

CHAPTER 8: PROJECT BENEFITS

8.1 IMPROVEMENT IN THE PHYSICAL INFRASTRUCTURE

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

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

8.2 IMPROVEMENT IN THE SOCIAL INFRASTRUCTURE

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

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

- There will be significant change in the socio-economic scenario of the area.
- The proposed project will enhance the prospects of employment. Recruitment for the unskilled and semiskilled workers for the proposed project will be from the nearby villages.
- The development of the basic amenities viz. roads, transportation, electricity, drinking water, proper sanitation, educational institutions, medical facilities, entertainment, etc. will be developed as far as possible.
- Overall the proposed project will change living standards of the people and improve the socio-economic conditions of the area.

8.3 EMPLOYMENT POTENTIAL

Future production planning does not indicate some change from present, in the employment. The number of unskilled labour may increase depending on the quantum of overburden removal and mineral excavation. The mine will provide employment to about 54 workers. 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 54 persons and persons will be mainly sourced from local as well as other community in and around mining project and few technical persons will be employed during operational phase from local and also

from outside area. In addition to the above, contractual labour and indirect employment opportunities will also be getting benefited after installation of mining project.

8.4 POLICY AND ACTION PLAN ON CORPORATE ENVIRONMENTAL RESPONSIBILITY

Corporate Environmental Responsibility (CER)

Corporate Environmental Responsibility (CER) refers to responsibility of a company to ensure positive impact on environment, consumers, employees, communities, stakeholders and all other members of public sphere. The CER activities are increasingly being taken up by the project proponents not only as fulfilling of mandatory provisions but also for the formation and or enhancement of brand image. Besides the above, CER is seen more as a responsibility towards society rather than a business promotion activity.

The year wise allocation of funds for the various activities proposed to be taken up under CER programme has been shown in **Table 8.1**.

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

a) Health Camps

b) Drinking Water Facilities

c) Maintenance of foot track

d) Donation for Temple Construction

e) Donation for cultural activities in the surrounding areas

f) Plantation of trees.

Table 8.1: Year wise allocation of funds for the various activities proposed to be taken up under CER programme

S. No.	Activities	Allocation of Fund (Rs.)
1	Health Camps	14,000
2	Drinking Water Facilities	10,000
3	Maintenance of foot track	15,000
4	Donation for Temple Construction	5,000
5	Donation for cultural activities in the surrounding areas	5,000
Total		**49,000**

CHAPTER 9: ENVIRONMENT MANAGEMENT PLAN

9.1 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 SEIAA, Meghalaya, for obtaining environmental clearance for the project, in accordance with Environment Impact Assessment (EIA) Notification No. 1533 dt.14.09.2006. The approved Environment Management Plan will be implemented throughout the life of the project and half-yearly monitoring report showing the compliance status of conditions stipulated in Environmental Clearance letter will be submitted to MoEF&CC in every six months. An Environmental monitoring programme has been prepared for the proposed project for periodical assessment of effectiveness of implementation of Environment Management Planned to take corrective measures in case of any degradation in the surrounding environment.

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

The aims of Environment Management Plan are:

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

9.2 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.

9.3 ENVIRONMENTAL MONITORING

For assessing the prevailing quality of air, water, noise, soil etc., regular monitoring of parameters are 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 & Meghalaya State 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.

9.4 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:

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) Measurement of water level fluctuations in the nearby surface resources and bore wells.
d) Measurement of noise levels at mine site, stationary and mobile sources, and adjacent villages will be done in every quarter of the year.
e) Monitoring Ground Vibrations: Ground vibrations studies or monitoring is not required as there is no proposal of drilling/blasting for scooping operations.

9.4.1 Environment Management Cell

No cell is proposed to form; the plan will be implemented through outsourcing suitable and accredited consultants and experts.
Environmental Monitoring will be directly coordinated by the Supervisor/Owner.

Competent outsourced certified organization/lab personnel will conduct the monitoring operations. A full-fledged laboratory is not essential; part of the work will be given to competent consultants to undertake these jobs.
Regular semi-skilled manpower will be required for supervision, assistance in reclamation works followed by trained unskilled labourers to carry out other necessary operations.

9.4.1.1 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 equipment and transport vehicles.

9.5 AIR QUALITY MANAGEMENT

The main pollutant in air is suspended particulate matter (SPM), which is generated during various activities of mining such as, removal of overburden, drilling, blasting and movement of transport vehicles. The ambient air quality with respect to the study zone of 10 km radius around the mine site forms the baseline information. The various sources of air pollution in the region are dust rising from unpaved roads, domestic fuel burning and vehicular traffic. The prime objective of baseline air quality monitoring is to assess existing air quality of the area. This will also be useful in assessing the conformity to standards of the ambient air quality during the mining operations.

9.5.1 Control of Fugitive Emissions

- Use of Personal Protection Equipment (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.

9.5.2 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.
Only 934 tonnes of mineral 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.

9.6 NOISE POLLUTION CONTROL

9.6.1 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 earmuffs/earplugs will be provided to all operators and employees working near mining machineries or at higher noise zone.
- Periodical noise level monitoring will be done.

9.7 WATER QUALITY MANAGEMENT

Total water requirement estimated is about 5 cu.m for domestic uses will be sourced from nearby villages.

Measures for Minimizing Adverse Impacts

- The non-working pits will be used for rainwater harvesting and conservation. The pit after exhaustion of mineral will also be used for rainwater harvesting and conservation.
- Thus, by using the old pit and mineral, exhausted pit as water reservoir the water table will be recharged.
- The excavated pit is proposed as water reservoir at the end of the mine after securing the side walls.
- No toxic mineral substance is present in the area thus ground water quality will not be disturbed.

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

Ground Water Pollution

The domestic sewage from the canteen and toilets will be routed to septic tanks. Regular monitoring of water levels and quality in the existing water body 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

The land will be affected by excavation of mineral and dumping of waste. Land use planning is suggested for minimizing the adverse impact of mining activities on environment and also helps in economy of the project as well as effective restoration and enhancement of land surface with the help of plantation through proper and planned green belt development around the area and upper benches. The waste will be sold out and thus no impact will be anticipated by dumping of waste. The excavated land will be used as water reservoir and this reservoir will great helpful for future plantation, livestock and for irrigation of crops etc. The excavated land i.e. water reservoir will be properly fenced.

9.8 WASTE MANAGEMENT

It is a Boulder stone mine and whole excavated material will be sold out. No waste dump will leave at site. No separate soil is observed in the lease area. The soil which may come across is scraped and stacked separately to be used for plantation during monsoon. In case overburden have to be dumped in the area it will be stabilized by retaining walls of rubble stone to arrest the rolling downs. The drain with parapet wall will also provide to check the dust during monsoon.

Top Soil Management: No separate soil is observed in the lease area. The soil may come across in cavities. The soil which may come across will be scraped and stacked separately and it will be used for plantation in each monsoon.

9.9 GREENBELT AND PLANTATION

The main aim of plantation in the mined out areas is to stabilize the land to protect it from rain and wind erosion. 100 nos. of trees will be planted on 0.10 ha and plantation will be done on the periphery of the reclaimed. Precautionary measures will be taken for care of the forestation made by regular watering in the afforested area, to protect from grazing animals and proper manuring.

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

- They should be fast growing and tall trees.
- They should be perennial and evergreen.
- They should have thick canopy cover.
- Plantation should be done in appropriate alternate rows around the proposed site to prevent lateral pollution dispersion.
- The trees should maintain regional ecological balance and conform to soil and hydrological conditions. Indigenous species should be preferred.

9.10 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.

9.10.1 Greenbelt Development Plan

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

- Afforestation on degraded forest area, forest protection / conservation will be carried out every year by the mine owner.
- This activity will promote the emergence of the primary succession species; hence it will be a silvicultural operation, extremely important for maintaining ecology and environmental health of the area.
- This helps in regeneration & establishment of pioneer plant species saving expose land & land cutting.

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

The scheme of plantation around the project site is given as follows:
Afforestation will be put under a protective regulatory framework to ensure that it is not degraded or disturbed. No ecologically disruptive activity will be allowed in this zone.

The suggestive measures under EMP are given in **Table 9.1.**

Table 9.1: Key suggestive measures under EMP

Impact Predicted	Suggestive measure
Disturbance of free movement / living of wild fauna	• Awareness camps will be conducted for labours to make them aware about sensitivity/importance of forest life. • No tract or new road for movement of labours or

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

9.11 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 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.

9.12 ENVIRONMENTAL POLICY

The Owner of proposed 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.

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

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

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

9.13 BUDGET ALLOCATION FOR EMP IMPLEMENTATION

It is necessary to include the environmental cost as a part of the budgetary cost component. The project authorities propose to undertake the following environmental works to achieve the environmental quality as desired. The proposed yearly budget for EMP implementation has been shown in **Table 9.2.**

Table 9.2: Budget for Environmental Management Plan

S. No.	Measures	Cost (In Rs.)
1.	Air Pollution (dust suppression along road water sprinklers)	2.00
2.	Plantation & Maintenance	0.16
3.	Environment Monitoring (Air, Water, Noise & Soil Monitoring)	0.15
4.	Construction & Maintenance of Settling Tank, Garland Drains etc.	0.50
5.	Personal Protective Equipment (Helmets, Safety Shoes, Dust Masks, Ear Plugs etc.)	0.69
6.	Provision of fencing around mine pit	0.10
7.	CSR activity in nearby villages	1.225
8.	CER activity as prescribed by SEAC	0.49
Total		**5.315**

9.14 CORPORATE ENVIRONMENTAL RESPONSIBILITY (CER)

The cost towards Corporate Environmental Responsibility (CER) has been shown in **Table 9.3.**

Table 9.3: Budget for Corporate Environmental Responsibility (CER) (per year)

S. No.	Activities	Allocation of Fund (Rs.)
1	Health Camps	14,000
2	Drinking Water Facilities	10,000
3	Maintenance of foot track	15,000
4	Donation for Temple Construction	5,000
5	Donation for cultural activities in the surrounding areas	5,000
Total		**49,000**

9.15 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 Mine.

CHAPTER 10: SUMMARY AND CONCLUSIONS

10.0 INTRODUCTION

10.1 PURPOSE OF THE REPORT

The project is being proposed by Smt Falguni Warisa. The proponent has applied for environmental clearance for mining lease over an area of 2.61 ha near village Umbuda, Raid Marwet, District Ri Bhoi, Meghalaya. The SEAC in its meeting examined the proposal. After through discussion and deliberation, it has been conveyed by SEAC that draft EIA/EMP report shall be prepared as per approved ToR and after public hearing through Meghalaya State Pollution Control Board the final EIA/EMP report shall be submitted after incorporating Public Hearing details to SEIAA, Meghalaya for Environmental Clearance.

10.2 IDENTIFICATION OF PROJECT & PROJECT PROPONENT

10.2.1 Identification of Project

The proponent has applied for environmental clearance for mining lease over an area of 2.61 ha near village Umbuda, Raid Marwet, District Ri Bhoi, Meghalaya. The maximum production rate is of 2,80,260 TPA of production.

The cost of the project is Rs. 24.5 lakhs.

10.2.2 Project Proponent

The project is being proposed by Smt Falguni Warisa. The address of the proponent is given below:

34, Lachumiere Hills

Shillong, East Khasi Hills District,

Meghalaya

The proponent has applied for environmental clearance for mining lease over an area of 2.61 ha near village Umbuda, Raid Marwet, District Ri Bhoi, Meghalaya.

10.3 BRIEF DESCRIPTION OF PROJECT

10.3.1 Nature of the Project

The proposed mining is an opencast mining project where the entire activity will be done in a semi-mechanized way.

10.3.2 Size of the Project

The proponent has applied for environmental clearance for mining lease over an area of 2.61 ha near village Umbuda, Raid Marwet, District Ri Bhoi, Meghalaya. The maximum production rate is of 2,80,260 TPA of production.

10.3.3 Anticipated Life of Project and Cost of the Project

The lease period is for 30 years. The cost of the project is about Rs. 24.50 lakhs.

10.3.4 Location of the Project

The proposed lease of boulder stone Mine is situated near village Umbuda, Raid Marwet, District Ri Bhoi, Meghalaya.

10.4 PROJECT DESCRIPTION

10.4.1 Salient Features of Mine Lease

The salient features of mine lease are given in **Table 10.1** below:

Table 10.1: Salient Features of mine lease area

<table>
<tr><th>Sr. No.</th><th>Particular</th><th>Details</th></tr>
<tr><td>A.</td><td>Nature of the Project</td><td>Boulder stone Mining Project.</td></tr>
<tr><td>B.</td><td>Size of the Project</td><td></td></tr>
<tr><td>1.</td><td>ML Area</td><td>2.61 Hectare (Non forest Land).</td></tr>
<tr><td>2.</td><td>Proposed Production Capacity</td><td>Total production in 5 years will be 12,72,900 MT and peak production will be 2,80,260 MT/annum.</td></tr>
<tr><td>3.</td><td>Lease Period of Mine</td><td>Lease was granted for a period of 30 Years.</td></tr>
<tr><td>C.</td><td>Method of Mining</td><td></td></tr>
<tr><td>1.</td><td>Method</td><td>Open-Cast Manual Mining</td></tr>
<tr><td>2.</td><td>Blasting / Drilling</td><td>Blasting will be done by short or long holes with the permission of DGMS</td></tr>
<tr><td>D.</td><td>Project Location</td><td></td></tr>
<tr><td>1.</td><td>Location</td><td>Village Umbuda, Raid Marwet, District Ri Bhoi, Meghalaya</td></tr>
<tr><td>2.</td><td>Toposheet No.</td><td>78N/16</td></tr>
<tr><td>3.</td><td>Lease Area Coordinates</td><td><table><tr><th>S.No.</th><th>Latitude</th></tr><tr><td>1</td><td>26°03'42.69"N</td></tr><tr><td>2</td><td>26°03'40.75"N</td></tr><tr><td>3</td><td>26°03'40.65"N</td></tr><tr><td>4</td><td>26°03'41.53"N</td></tr><tr><td>5</td><td>26°03'44.02"N</td></tr><tr><td>6</td><td>26°03'46.18"N</td></tr><tr><td>7</td><td>26°03'45.57"N</td></tr><tr><td>8</td><td>26°03'44.14"N</td></tr><tr><td>9</td><td>26°03'43.06"N</td></tr></table></td></tr>
<tr><td>E.</td><td>Cost Details</td><td></td></tr>
<tr><td>1.</td><td>Project Cost</td><td>Rs. 24.50 Lakhs</td></tr>
<tr><td>F.</td><td>Water Demand</td><td></td></tr>
</table>

1.	Requirement	5 cum
2.	Source of water	Nearby villages
G.	Man Power Requirement	54
H.	Environmental Setting	
1.	Nearest Village	Umbuda, 2.0 km
2.	Nearest Town	Guwahati, 6.0 Km.
3.	Nearest National / State Highway	NH 40, 4.5 Km
4.	Nearest Railway Station	Guwahati Railway Station, 15.1 Km
5.	Nearest Airport	Lokpriya Gopinath Bordoloi Airport, 24.1 Km
6.	Ecological Sensitive Areas (National Park, Wild Life Sanctuaries, Biosphere Reserve etc.) within 10 km radius	Eco Sensitive Zone boundary of Amchang Wildlife Sanctuary is 5.5 km from the project site.
7.	Water bodies within 10 km radius of the mine site.	A stream is flowing approx. 4 km SE of the Mine.
8.	Archaeological Important Place	None
9.	Seismic Zone	V

10.4.2 Mine Development and Production

The opencast method of mining with semi mechanization is proposed to excavate the mineral and waste and for other mining activities. Bench height and width are proposed 6 meters each considering semi mechanization.

Year wise Production details are given in **Table 10.2** below.

Table 10.2: Proposed Year-wise Production

Year	Tentative excavation in tones (ROM)	Waste / sub-grade of tone in tones	Mineral Stone in tones
I	26400	52800	211200
II	290400	58080	232320
III	343200	68640	274560
IV	343200	68640	274560
V	350330	70070	280260
Total	**1591130**	**318230**	**1272900**

10.4.3 Method of Mining

The opencast method of mining with semi mechanization is proposed to excavate the mineral and waste and for other mining activities. Bench height and width are proposed 6 meters each considering semi mechanization. Approach roads will be provided up to the benches time to time.

Blasting will be done by short or long holes with the permission of DGMS. The pneumatic breaker and hydraulic breakers will be used for excavation of mineral. The fencing around the pit/ excavation will be provided to check the inadvertent entry of human and livestock in the working zone. The soil if comes across during mining in small layer or cavity will be scraped and stacked separately to be used for plantation during each monsoon

10.5 IMPACT ON LAND USE, RECLAMATION OF MINED OUT AREAS AND AFFORESTATION PROGRAMME

Mining is essentially an excavation of mineral. The land environment is greatly affected by it. Specially, in case of mining which is being carried out by opencast method / semi-mechanized, it is expected to affect the land environment essentially. Impact assessment study on land environment can be done by considering land use pattern/ land cover, Topography, Drainage pattern and geological features of the mine site as well as the study area.

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

Impact on land use & land cover

The land is totally stony and has stone boulders in large amount. This land is good for mining. There is no forest land or agriculture in the mine lease area. Land use pattern for preoperational, operational & conceptual stage of the mining as per mine plan for the proposed mine site is given below in Table 10-3:

Table 10.3: Land use pattern

S. No	Item	As on date	End of 5th year	End of lease
1	Area to be excavated	0.00	2.04	2.04
2	Storage of top soil	0.00	0.01	0.00
3	Overburden dump	0.00	0.02	0.02
4	Mineral/Sub-grade stack	0.00	0.00	0.00
5	Infrastructure	0.00	0.01	0.01
6	Roads	0.00	0.02	0.02
7	Green belt	0.00	0.10	0.20
8	Others	0.00	0.00	0.00
	Total Disturbed land	0.00	2.11	2.30

Source: Mine plan

The existing land use / land cover pattern within the study area (10 Km, Buffer including core Area) as studied through Site survey & satellite imagery is given as follows.

Table 4.4: Existing Land use of the 10 KM Study Area

Sr. No.	Particulars	Area (ha)	Percentage
1	Settlements	3920.7	12.49
2	Water bodies	513.2	1.63
3	Waste land	389.6	1.24
4	Crop land	2106	6.70
5	forest area	24470.5	77.94
	Total	**31400**	**100.00**

As per the mine plan reclamation will be done by mine rejects, spreading of topsoil and plantation will be done. It is also proposed to convert the pit into a water reservoir. The soil come across during mining will be scraped and stacked separately in 0.01 ha area. The soil will be used for plantation in each monsoon.

10.6 LAND USE PATTERN

Presently (pre-mining), the land covered under the mine lease area is non-forest land.

10.7 BASELINE ENVIRONMENTAL STATUS

10.7.1 Soil Quality

Five soil samples were collected in and around the mine lease area to assess the present soil quality of the region. Soil pH plays an important role in the availability of nutrients. Soil microbial activity as well as solubility of metal ions is also dependent on pH. In the study area, variations in the pH of the soil were found to be slightly acidic (5.67 to 6.51). Electrical conductivity (EC) is a measure of the soluble salts and ionic activity in the soil. In the collected soil samples the conductivity ranged from 319.3 - 386.2 µmhos/cm.

10.7.2 Meteorology

Meteorological data at the site was monitored during 1st December 2019 to 29th February 2020 representing winter season.

10.7.3 Ambient Air Quality

Ambient Air Quality Monitoring (AAQM) has been carried out at five locations during winter season from December, 2019 to February, 2020. The minimum and maximum level of PM10 recorded within the study area was in the range of 44.9 µg/m3 to 85.6 µg/m3 with the 98th percentile ranging between 62.8 µg/m3 to 83.2 µg/m3. The minimum and maximum level of PM2.5 recorded within the

study area was in the range of 17.5 µg/m3 to 37.8 µg/m3 with the 98th percentile ranging between 22.3 µg/m3 to 35.9 µg/m3. The minimum and maximum concentration of SO2 recorded within the study area was 6.1 to 13.2 µg/m3 with the 98th percentile ranging between 5.9 µg/m3 to 12.5 µg/m3.

The minimum and maximum level of NO2 recorded within the study area was in the range of was 12.3 µg/m3 to 23.4 µg/m3 with the 98th percentile ranging between 14.3 µg/m3 to 22.1 µg/m3. The minimum and maximum level of CO recorded within the study area was in the range of was 0.320 mg/m3 to 0.950 mg/m3 with the 98th percentile ranging between 0.380 µg/m3 to 0.870 µg/m3.

The results thus obtained indicate that the concentrations of PM10, PM2.5, SO2 and NO2 in the Ambient Air are well within the National Ambient Air Quality (NAAQ) standards for Industrial, Residential, Rural and other areas.

10.7.4 Water Quality

To assess the physical and chemical properties of water in the region, water samples from 5 locations were collected from various water sources around the mine lease area. During the study period, in ground water the pH was varying from 7.68 to 8.10, the total dissolved solids varying from 245.35 mg/l to 255.26 mg/l, chloride level were ranging from 40.5 mg/l to a maximum of 49.8 mg/l and the hardness is varying from 149.55 mg/l to 157.94 mg/l.

The results indicate groundwater is generally in conformity with the drinking water standards (IS: 10500) and surface water is in conformity with IS-2296 standards.

10.7.5 Noise Levels

Ambient noise levels were measured at Five locations around the proposed mine site. The noise level in day time lies between 49.2 dB(A) to 59.6 dB(A) and in night time between 37.2 dB(A) to 41.8 dB(A). The status of noise quality within the 10 km zone of the study area is within the MoEF&CC standards.

10.7.6 Ecological Environment

Based on the field studies and review of published literature, Eco sensitive zone (ESZ) boundary of Amchang Wildlife Sanctuary is 5.5 km from the boundary of mine.

10.7.7 Social Environment

According to the 2011 census of India, Ri Bhoi district has a population of 2,58,840. The total SC population in Ri Bhoi district is 590 which is 0.23% of the total population, while ST population is 2,30,081 which is 88.89% of the total population. The literate population in Ri Bhoi district is 1,55,859 out of which male & female are 80,977 and 74,882 respectively. The male literates represent 76.79 % while female represent 74.49% of the total population.

10.8 ANTICIPATED ENVIRONMENTAL IMPACTS

10.8.1 Impact on Air Quality

The main pollutant in air is suspended particulate matter (SPM), which is generated during various activities of mining such as, removal of overburden, drilling, blasting and movement of transport vehicles. The ambient air quality with respect to the study zone of 10 km radius around the mine site forms the baseline information. The various sources of air pollution in the region are dust rising

from unpaved roads, domestic fuel burning and vehicular traffic. The prime objective of baseline air quality monitoring is to assess existing air quality of the area. This will also be useful in assessing the conformity to standards of the ambient air quality during the mining operations.

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

i. Loading and unloading of mineral

ii. Transportation on the haul road

10.8.2 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 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 be disturbing the percolating water.

10.8.3 Impact on Water Quality

The impact on water quality will be confined to increased suspended solids during rain. The dumps will be secured with toe walls and rainy water will not carry significant suspended material.

10.8.4 Impact on Noise Levels and Ground Vibrations

With the mining operations, due to the deployment of machinery, operation for mine development, excavation and transportation of boulder stone and men, it is imperative that noise levels would increase. The noise level in day time lies between 49.2 dB(A) to 59.6 dB(A) and in night time between 37.2 dB(A) to 41.8 dB(A). The status of noise quality within the 10 km zone of the study area is within the MoEF&CC standards.

10.8.5 Impact on Soil

The environmental impacts of the mining activities on topsoil are based on the quantity of removal of topsoil and its dumping. In the present project as it is proposed to temporarily store the topsoil and use it for plantation schemes, no impact of dozing of topsoil is envisaged.

The soil erosion from overburden dumps is not envisaged in the present project, as sufficient measures as detailed in the EMP would be undertaken.

10.8.6 Impact on Flora and Fauna

There is no forest area in the core zone area of the lease. As the mining activity is restricted to core zone, no significant impact on the flora of the buffer zone due to the proposed mining is anticipated.

The incremental dust generations due to the mining operations, at the boundary of the mine lease are insignificant and it is also expected that with the adoption of mitigatory measures as suggested in EMP, the impact due to operation of the mine will be minimal on the terrestrial ecosystem and also on the adjacent forest area.

The impact on the fauna of the buffer zone due to the mining activity will be marginal. The proposed progressive plantation over a period of time will reduce the impact, if any, on the fauna.

10.8.7 Impact on Land Use Pattern

The land will be affected by excavation of mineral and dumping of waste. Land use planning is suggested for minimizing the adverse impact of mining activities on environment and also helps in economy of the project as well as effective restoration and enhancement of land surface with the help of plantation through proper and planned green belt development around the area and upper benches.

10.8.8 Impact on Socio - Economic Aspects

The mine area does not cover any habitation. Hence the mining activity does not involve any displacement of human settlement. No public buildings, places, monuments etc exist within the lease area or in the vicinity. The mining operation will not disturb/ relocate any village or need resettlement. Thus no adverse impact is anticipated.

The impact of mining activity in the area is positive on the socio-economic environment of the region. The proposed Mine will be providing employment to local population and it will be give preference to the local people whenever there is requirement of man power.

10.9 ENVIRONMENTAL MANAGEMENT PLAN

The summary of environmental mitigation measures are given in **Table-10.5**.

Table-10.5: Proposed Environmental Mitigation Measures

Impact Predicted	Suggestive measure
Disturbance of free movement / living of wild fauna	• Awareness camps will be conducted for labours to make them aware about sensitivity/importance of forest life. • No tract or new road for movement of labours or vehicles be laid in reserve forest area, this will prevent forest fragmentation, encroachment and human – animal encounter. • Care will be taken that noise produced during vehicles movement for carrying ore materials are within the permissible noise level. Higher noise level in the forest

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

10.10 ANALYSIS OF ALTERNATIVES

The boulder stone has been identified based on the result of geological investigations and exploration carried out by the Geological Survey of India (GSI). The mining projects are site specific as such alternate sites were not considered.

The mine is operated by opencast semi-mechanized method of mining. No other alternative technologies can be used because of the hard nature of the ore. Proposed mine is using eco-friendly measures to minimize the impact of mining on the surrounding environment.

10.11 COST ESTIMATES

The proposed yearly budget for EMP implementation and the budget for Corporate Environmental Responsibility (CER) have been given in **Table 10.6**, **Table 10.7** respectively**.**

Table-10.6: Budget for Environmental Management Plan

S. No.	Measures	Cost (In Rs.)
1.	Air Pollution (dust suppression along road water sprinklers)	2.00
2.	Plantation & Maintenance	0.16
3.	Environment Monitoring	0.15

	(Air, Water, Noise & Soil Monitoring)	
4.	Construction & Maintenance of Settling Tank, Garland Drains etc.	0.50
5.	Personal Protective Equipment (Helmets, Safety Shoes, Dust Masks, Ear Plugs etc.)	0.69
6.	Provision of fencing around mine pit	0.10
7.	CSR activity in nearby villages	1.225
8.	CER activity as prescribed by SEAC	0.49
Total		**5.315**

Table 10.7: Budget for Corporate Environmental Responsibility (CER) (per year)

S. No.	Activities	Allocation of Fund (Rs.)
1	Health Camps	14,000
2	Drinking Water Facilities	10,000
3	Maintenance of foot track	15,000
4	Donation for Temple Construction	5,000
5	Donation for cultural activities in the surrounding areas	5,000
Total		**49,000**

10.12 ADDITIONAL STUDIES

10.12.1 Risk Assessment and Disaster Management Plan

The complete mining operation will be carried out under the management control and direction of a qualified mine manager holding Mines Manager's Certificate of Competency. Moreover, mining staff will be sent to refresher courses from time to time to keep them updated.

10.12.2 Disaster Management Plan

Emergency preparedness is an important aspect in the planning of Disaster Management. Personnel would be trained suitably and prepared mentally and physically in emergency response through carefully planned, simulated procedures. Similarly, the key personnel and essential personnel shall be trained in the operations.

10.13 PUBLIC CONSULTATION

10.13.1 Public Hearing

In consonance with the EIA notification dated 14th September 2006, vide section 1 (a) related to Public Hearing, the draft EIA/EMP report shall be submitted to the Meghalaya State Pollution Control Board (MSPCB) for public hearing.

10.14 PROJECT BENEFITS

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

- 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.
  The employment of local people in primary and secondary sectors of project will upgrade the prosperity of the region.

10.15 CONCLUSIONS

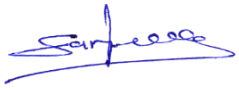
- The mining operations will meet the compliance requirements of MoEF&CC;
- Community impacts will be beneficial, as the project will generate significant economic benefits for the region;
- Adoption of Best Available Technology and Best Management Practices with more environmental friendly process; and
- With the effective implementation of the Environment Management Plan (EMP) during the mining activities, the proposed project can proceed without any significant negative impact on environment.

Chapter 11: DISCLOSURE OF CONSULTANT ENGAGED

Declaration by Experts contributing to the EIA: Mining of boulder stone from Lease Area (2.61 Ha.) near village Umbuda, Raid Marwet, District Ri Bhoi, Meghalaya. I, Sanjeev Sharma hereby certify that I was a part of the EIA team in the following capacity that developed the above EIA.

EIA coordinator

Name: Sanjeev Sharma

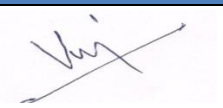
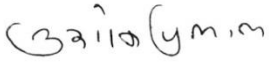
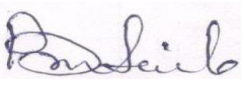


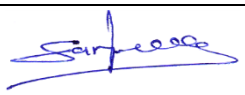
Signature and Date: 11-03-2020

Period of Involvement: December, 2019 to till date

Contact Information: sksv02@gmail.com

Functional area experts:

S. No.	Functional Areas	Name of the experts	Involvement (period and task)	Signature and date
1.	AP	Vijay Sharma	December, 2019 to Till date	
2.	WP	Anoop Kishore Mishra	December, 2019 to Till date	
3.	SHW	Sanjeev Sharma	December, 2019 to Till date	
4.	SE	Ashok Suyal	December, 2019 to Till date	
5.	EB	Kashmir Pal Singh	December, 2019 to Till date	
6.	HG	R.K. Mishra	December, 2019 to Till date	
7.	GEO	B. M. Sinha	December, 2019 to Till date	
8.	SC	Vijay Sharma	December, 2019 to Till date	
9.	AQ	Sanjeev Sharma	December, 2019 to Till date	

10.	NV	Sanjeev Sharma	December, 2019 to Till date	
11.	LU	Ashok Bijalwan	December, 2019 to Till date	
12.	RH	Anoop Kishore Mishra	December, 2019 to Till date	
Functional Area Associate (FAA)				
1.	AP	Deepak Pandey	December, 2019 to Till date	

Declaration of association in the EIA

Declaration by the Head of the accredited consultant organization/ authorized person

I, ML Sharma hereby, confirm that the above-mentioned experts prepared the EIA of Mining of boulder stone from Lease Area (2.61 Ha) near village Umbuda, Raid Marwet, District Ri Bhoi, Meghalaya. I also confirm that the consultant organization shall be fully accountable for any mis-leading information mentioned in this statement.

Signature: 

Name: ML Sharma

Designation: Director

Name of the EIA consultant organization: Enviro Infra Solutions Pvt. Ltd.

NABET Certificate No. & Issue Date: NABET/EIA/1922/RA 0157 dated March 16 2020

STATE ENVIRONMENT IMPACT ASSESSMENT AUTHORITY::
MEGHALAYA ::

'Silviculture Building' (Adjacent Sylvan House), Lower Lachumiere, Shillong - 793 001
Email :ms.seiaamegh@gmail.com.

No. ML/SEIAA/MIN/RiBhoi/P-4/2020/1188 **Dated, Shillong, the 23rd June, 2020.**

From : The Member Secretary,
State Environment Impact Assessment Authority
Meghalaya.

To Smt. Falguni Warisa,
Proprietor : M/s Falguni WarisaBoulderstone Mine, at Umduba, RiBhoi.
R/o- 34- Lower Lachumiere Hills, Shillong-

Subject : *Grant of TOR to* Proposal No SIA/ML/MIN/49825/2020 for mining of boulder- stone,(area of 2.61 hectare) at Umduba village,Raid Marwet, District- Ri- Bhoi, Meghalaya,by Smt. FalguniWarisa.

Madam,

This has a reference to your TOR application applied online, vide proposal no. SIA/ ML/ MIN/ 49825/2020 dated 17 Jan 2020 for Term of Reference for boulder-stone mining for an area of 2.61 hectare at Umduba, Raid Marwet District- Ri- Bhoi, Meghalaya.

The PP submitted a Non Forest Land Certificate issued by the Divisional Forest Officer, East Khasi Hills &RiBhoi Territorial Division, Shillong vide letter No.KH/9/ NOC/ Stone/41/ Pt.V/514, dated Shillong, the 02 nd May 2019. It is under toposheet Survey of India No 78N/16 and as per the Non Forest Land Clearance Certificate, the approved Mining Plan, the Kml file and duly examined by SEAC, the site is within the following GPS Coordinates :

Pillar No	Latitude	Longitude
1	26°03'42.69"N	91°49'34.94"E
2	26°03'40.75"N	91°49'34.13"E
3	26°03'40.65"N	91°49'31.20"E
4	26°03'41.53"N	91°49'28.15"E
5	26°03'44.02"N	91°49'25.30"E
6	26°03'46.18"N	91°49'26.37"E
7	26°03'45.57"N	91°49'30.23"E
8	26°03'44.14"N	91°49'31.26"E
9	26°03'43.06"N	91°49'33.30"E

The proposal is for mining of boulder stone use for construction purposes. PP submitted that the total geological reserve 36,55,260 MT and total production in 5 years 12,72,900 MT and peak

production of 2,80,260 MT/annum. The mineable reserves of boulder stone are of the order of 1655400 tons with the production period as per mining plan will be around 1272900 tons in 5 years. The balance reserve 1655400-1272900 = 382500 tons with production target of 280260 tons. The balance reserves will sufficient for 382500/280260 = 1.36 years. Thus the total life of the mine is 5+1.36 = 6.36 years with a project cost of Rs.24,50,000.00

The project proponent has obtained a Cluster certificate from the office of the Director, Directorate of Mineral Resources, Government of Meghalaya, vide letter No.DMR/MM/45/2019/1122 dated Shillong, the 24th September 2019 where it mentioned that 9(nine) approved mining plan of different project proponents located within 500 metres radius of this project. Hence this proposal falls under cluster category with a total cluster area of 24.99 ha. i.e. more than 5 ha. Therefore, as per Ministry of Environment, Forest and Climate Change MoEF& CC vide O.M. No.L-11011/175/2018-IA-II(M) dated 12.12.2018, relating to compliance to Hon'ble National Green Tribunal Order dated 13th September 2018 in O.A. No. 186 of 2016 (SatendraPandeyVs Ministry of Environment, Forest & Climate Change &Anr. and read with Notification No.S.O.3977(E) dated New Delhi, the 14th August 2018, Term of Reference (TOR) is required for this project

The TOR proposal above was deliberated by the State Expert Appraisal Committee in its meeting held from 26th to 28th May, 2020. The Minutes of the SEAC's Meeting was uploaded on 05th June, 2020 and as per the Agenda No. 3.1, the SEAC recommended a TOR in standard format to this project.

The State Environment Impact Assessment Authority, Meghalaya, in its meeting held on 09th June, 2020 noted the recommendation in the above said SEAC's Minutes relating to this project and accepted the recommendation of the SEAC. Then the SEIAA in the said meeting, unanimously approved Standard Terms of Reference (sTOR) as recommended by the SEAC as a TOR to the project, as follows :-

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.
2. A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.
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.
4. All corner coordinates of the mine lease area, superimposed on a High Resolution Imagery/ Topo-sheet, 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).

5. Information should be provided in Survey of India Topo-sheet 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.

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.

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 to bring into focus any infringement/deviation/ violation of the environmental or forest norms/ conditions? The hierarchical system or administrative order of the Company to deal with the environmental issues and for ensuring compliance with the EC conditions may also be given. The system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the Company and/or shareholders or stakeholders at large,may also be detailed in the EIA Report.

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.

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.

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.

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.

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.

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.
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.
15. 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.
16. 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 Wildlifeand copy furnished.
17. 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.
18. 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 sectoralprogrammes 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.

19. One season (non-monsoon) [i.e. March-May (Summer Season); October-December (post monsoon season) ; December-February (winter season)]primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and EMP Report. Sitespecific 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.

20. 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.

21. 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.

22. Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.

23. 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.

24. 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.

25. 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.

26. 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.

27. 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.

28. 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.

29. 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.

30. Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.

31. 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.

32. 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.

33. 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.

34. 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.

35. 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.

36. 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.

37. Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.

38. The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.

39. A Disaster management Plan shall be prepared and included in the EIA/EMP Report.

40. 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.

41. The Action Plan on the compliance of the recommendations of the CAG as per Ministry's circular No. J-11013/71/2016-IA. I (M) dated 25.10.2017 need to be submitted at the time of appraisal of the project and included in the EIA/EMP Report.

42. Compliance of the Ministry's Office Notification No. GSR-94(E) dated 25.01.2018 – mandatory implementation of Dust mitigation measures for construction and demolishing activities.

43. The activities and budget earmarked for Corporate Environmental Responsibility (CER) shall be as per Ministry's O.M. No.22-65/2017-IA.II (M) dated 01.05.2018 and the action plan on the activities proposed under CER shall be submitted at the time of the project included in the EIA/EMP Report.

44. Compliance of the Ministry's Office Memorandum No.F: 3-50/2017-IA.III (Pt), dated 30.05.2018 on the Judgement of Hon'ble Supreme Court, dated the 2nd August,2017 in Writ Petition (Civil) No.114 of 2014 in the matter of Common Cause versus Union of India needs to be submitted and included in the EIA/EMP Report.

45. Besides the above, the below mentioned general points are also to be followed:-

(i) All documents to be properly referenced with index and continuous page numbering.

(ii) Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources should be indicated.

(iii) Project Proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the Mo EF & CC/NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the Project.

(iv) Where the documents provided are in a language other than English, an English translation should be provided.

(v) The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted.

(vi) While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF 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.

(vii) 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 the SEIAA, Meghalaya 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.

(viii) 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.

(ix) 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.

The PP should submit the EIA/EMP report as per the generic structure prescribed in Appendix-III of the EIA Notification, 2006, after incorporating the details of public hearing already conducted and covering the above mentioned issues, to take further necessary action for obtaining environmental clearance in accordance with the procedures prescribed under EIA Notification, 2006 and its subsequent amendments.

The prescribed TOR shall be valid for a period of 4(four) years from the date of issue, for submission of the EIA/EMP reports, as per S.O. 751(E) dated 17.02.2020.

Member Secretary,
State Environment Impact Assessment Authority
Meghalaya, Shillong

Memo.No. ML/SEIAA/MIN/Ri Bhoi/P-4/2020/ Dated, Shillong, the June, 2020.

Copy to :-

1. The Principal Chief Conservator of Forests and HoFF, Meghalaya, Shillong for information.
2. The Principal Secretary to the Govt. of Meghalaya, Forests & Environment Department, Shillong for information.
3. The Principal Chief Conservator of Forests, Territorial, Forests & Environment Department, Meghalaya for information.
4. The Jt. Secretary, IA Division, MoEF&CC, ParyavaranBhavan, CGO Complex, LodhiRoad, New Delhi – 110 003 for information.
5. The Dy. Director General of Forests (C), Regional Office,N.E.Z, Ministry of Environment, Forests & Climate Change (Mo EF & CC), Law-u-sib, Lumbatngen, Sawlad, Near M.T.C. workshop, Shillong- 793 021, for information.
6. The Secretary to the Govt. of Meghalaya, Mining and Geology Department, Shillong for information.
7. The Deputy Commissioner, RiBhoi District, Nongpoh, Meghalaya for information.

8. The Divisional Forest Officer, East KhasiHills&RiBhoi Territorial Division, Shillongfor information and necessary action with reference to letter No.KH/9/ NOC/ Stone/41/ Pt.V/514, dated Shillong, the 02nd May 2019.
9. The Member Secretary, State Expert Appraisal Committee, Meghalaya for information.
10. The Director, Mineral Resources, Govt. Meghalaya, Shillong for information& necessary action, with reference to letter No. DMR/MM /45/2019/1122 dated Shillong, the 24th September 2019.
11. The Member Secretary, Meghalaya State Pollution Control Board, 'Arden', Lumpyngngad, Shillong – 793 014 for information and necessary action.
12. Guard File.

Member Secretary
SEIAA, Meghalaya

GOVERNMENT OF MEGHALAYA
THE DEPARTMENT OF FORESTS AND ENVIRONMENT
OFFICE OF
THE DIVISIONAL FOREST OFFICER:: EAST KHASI HILLS & RI-BHOI (T) DIVISION::
SHILLONG

No.KH/8/ML/Stone/69/ 560, Dated Shillong, the 21/5/2019.

To,

Smti. Falguni Warisa.
34, Lachumiere Hills,
Shillong,
East Khasi Hills District.

Subj: *Letter Of Intent (LOI) for granting of mining lease under Meghalaya Minor Mineral Concession Rules, 2016 for Bouder stone at Umduba Village, Raid Marwet, Mylliem Syiemship, Ri Bhoi District.*

Ref: Your application dated 02.05.2019.

Sir,

With reference to the above mentioned subject, I do hereby issue Letter of Intent (LOI) for granting mining lease under Meghalaya Minor Mineral Concession Rules 2016 for Boulder stone mining on area of 2.61 hectares at Umduba village, Raid Marwet, Mylliem Syiemship, Ri Bhoi District. On receipt of this Letter of Intent, you shall within a period of six months furnish the following documents for grant of mining lease :

1) Mining Plan duly approved by Director of Mineral Resources.
2) Environmental clearance under the Environmental (Protection) Act, 1986.
3) Consent to establish under the Water (Prevention & Control of Pollution) Act, 1974 and Air (Prevention & Control of Pollution)Act, 1981.
4) Clearance from Revenue and Disaster Management Department.
5) Clearance from Labour Department for occupational Health and Labour Laws including Child Labour.
6) NOC from Khasi Hills Autonomous District Council, (KHADC).

This is for your information and necessary action.

Yours faithfully,

(Shri. T. Wanniang, I.F.S)
Divisional Forest Officer,
East Khasi Hills
&
Ri Bhoi (T) Division,
Shillong.

Forest Management Building, Lower Lachumiere, Shillong-793001
Phone No. 0364-2226375 email- dfokhasihills@gmail.com

GOVERNMENT OF MEGHALAYA
THE DEPARTMENT OF FORESTS AND ENVIRONMENT
OFFICE OF
THE DIVISIONAL FOREST OFFICER:: EAST KHASI HILLS & RI-BHOI (T) DIVISION::
SHILLONG

No.KH/8/ML/stone/69/ 5091, Dated Shillong, the 13 NOV 2019.

To,

Smti. Falguni Warisa,
34, Lachumiere Hills,
Shillong,
East Khasi Hills District.

Subj: *Letter Of Intent (LOI) for granting of mining lease under Meghalaya Minor Mineral Concession Rules, 2016 for Boulderstone mining at Umduba village, Raid Marwet, Mylliem Syiemship, Ri Bhoi District.*

Ref: i) Your application dated 12.11.2019
ii) No.KH/8/ML/stone/69/560 dated Shillong, the 02.05.2019.

Sir,

With reference to the above mentioned subject and letters, the validity of Letter of Intent (LOI) issued by this office vide above mentioned letters is hereby renewed for 4 (Four) months with effect from the date of issue of this letter.

OFFICE OF THE DIVISIONAL FOREST OFFICER ★ KHASI HILLS DIVISION, SHILLONG ★ INDIA

Yours faithfully,

(Shri. T. Wanniang, I.F.S)
Divisional Forest Officer,
East Khasi Hills
&
Ri Bhoi (T) Division
Shillong.

Forest Management Building, Lower Lachumiere, Shillong-793001
Phone No. 0364-2226375 email- dfokhasihills@gmail.com

GOVERNMENT OF MEGHALAYA
THE DEPARTMENT OF FORESTS AND ENVIRONMENT
OFFICE OF
THE DIVISIONAL FOREST OFFICER:: EAST KHASI HILLS & RI-BHOI (T) DIVISION::
SHILLONG

NO.KH/9/NOC/STONE/41/Pt.V/ 514 Dated Shillong, the 02, 1May/2019.

To,

Smti. Falguni Warisa.
34, Lachumiere Hills
Shillong
East Khasi Hills District.

Subj: Non Forest land certificate for stone quarry located at Umduba Village, Raid Marwet, Mylliem Syiemship, Ri Bhoi District in respect of Smti. Falguni Warisa.

Ref: Your letter No.dated, 05.03.2019.

Sir,

With reference to the above, I am to inform you that the land measuring 2.61 hectares at Umduba, Raid Marwet, Mylliem Syiemship Ri Bhoi District is not part of RF/PF under this office and it is not a Forest land as defined under the Meghalaya Forest Regulation (Ammendment) Act, 2012. Hence, this office issue Non- Forest land certificate for stone quarrying subject to the following conditions :-

1. That you shall obtain Mining lease / quarry permit under Meghalaya Minor Mineral Concession Rules, 2016.

2. That your Stone Quarry is subjected to inspection by the staff/official of this office.

3. This Non Forest Land Certificate is liable for cancellation for violating any Act and Rules of the State Government and District Council.

4. That you should submit NOC from Khasi Hills Autonomous District Council (KHADC) within 2 (two) months.

5. The G.P.S Co-ordinates of Stone Quarry is :
   1. N 26° 03' 42.69" E 91° 49' 34.94"
   2. N 26° 03' 40.75" E 91° 49' 34.13"
   3. N 26° 03' 40.65" E 91° 49' 31.20"
   4. N 26° 03' 41.53" E 91° 49' 28.15"
   5. N 26° 03' 44.02" E 91° 49' 25.30"
   6. N 26° 03' 46.18" E 91° 49' 26.37"
   7. N 26° 03' 45.57" E 91° 49' 30.23"
   8. N 26° 03' 44.14" E 91° 49' 31.26"
   9. N 26° 03' 43.06" E 91° 49' 33.30"

Yours faithfully,

(Shri. T. Wanniang, I.F.S)
Divisional Forest Officer,
East Khasi Hills & Ri Bhoi (T) Division,
Shillong.

OFFICE OF THE DIVISIONAL FOREST OFFICER ★ KHASI HILLS DIVISION SHILLONG

Memo NO.KH/9/NOC/STONE/41/Pt.V/ Dated Shillong, the _____/_____/2019.

Copy to :

1. The Conservator of Forests (T) Khasi & Jaintia Hills, Shillong, Meghalaya or information.
2. The Member Secretary, State Environmental Impact Assessment Authority, Meghalaya for information.
3. The Member Secretary, Meghalaya State Pollution Control Board for information.

CATEGORY B

MINING PLAN

WITH

PROGRESSIVE MINE CLOSURE PLAN

For

BOULDERSTONE MINE

NEAR VILLAGE- UMDUBA, RAID MARWET
DISTRICT- RI BHOI
MEGHALAYA
(AREA 2.61 HECTARES)

(Prepared and submitted as per the Guide Lines of Indian Bureau of Mines, TMP Division, Ministry of Mines, Govt. Of India, vide their notification No.296/7/2000/MRC, dated 16 May 2011)

And

Rule 10(a) and Rule 19 of Meghalaya Minor Mineral Concession Rules, 2016

GOVERNMENT OF MEGHALAYA

APPROVED

Lessee: -

SMT FALGUNI WARISA

34, LACHUMIERE HILLS
SHILLONG
DISTRICT- EAST KHASI HILLS
STATE- MEGHALAYA

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

PREPARED BY:-

JAIPAL SINGH
RQP/AJM/378/2015/A
OFFICE: 44, UPPER LACHUMIERE, SHILLONG, EAST KHASI HILLS, MEGHALAYA
HOME: C-47, RAGHU MARG, HANUMAN NAGAR, JAIPUR, RAJASTHAN
TELEPHONE: 91 9485112301, 91 8955956927

SMT FALGUNI WARISA

Boulder Stone Mine

(AREA 2.61 HECTARES)

Home: 34, Lachumiere Hills, Shillong, District- East Khasi Hills, Meghalaya.
Site: Near Village- Umduba, Raid Marwet, District- East Khasi Hills, Meghalaya.

PILLAR UNDERTAKING

APPROVED

I, the applicant of Boulder Stone Mine over an area of 2.61 Hectares located near village- Umduba, Raid Marwet, District- Ri Bhoi, Meghalaya do hereby undertake that the boundary pillars of the proposed grant area will be maintained properly.

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

Falguni Warisa

Smt Falguni Warisa
34, Lachumiere Hills
Shillong
District- East Khasi Hills
State- Meghalaya.

JAIPAL SINGH
RQP/AJM/378/2015/A

Smt Falguni Warisa
34, Lachumiere Hills
Shillong
East Khasi Hills
Meghalaya
Pin Code: 793001

AUTHORIZATION LETTER
UNDERTAKING/CERTIFICATE FROM THE LESSEE

01. The Mining Plan with PMCP in respect of Umduba Boulder Stone Mine, over an area of 2.61 ha, in village- Umduba, Raid Marwet, Ri- Bhoi, Meghalaya, under MMMCR 2016 has been prepared by RQP Shri Jaipal Singh (RQP/AJM/378/2015/A).

This is to request the Department of Mining and Geology, Meghalaya, to make any further correspondence regarding any correction of the Mining Plan with PMCP with the said recognized person at his address below:

Shri Jaipal Singh
RQP/AJM/378/2015/A
Qualified person as per rule 19(2) of MMMCR 2016
Validity upto 5.8.2025.
C-47, Raghu Marg,
Hanuman Nagar
P.O. Vaishali Nagar,
Jaipur, Pin 302021
e-mail: jaipal1965@gmail.com

APPROVED
Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

I hereby undertake that all modification/ updating as made in the Mining Plan with PMCP by the said recognized person be deemed to have been made with our knowledge and consent and shall be acceptable on us and binding in all respects.

02. It is certified that the CCOM Circular no 2/2010 will be implemented and complied with when an authorized agency is approved by the State Government.

03. It is certified that the progressive Mine Closure Plan of Boulder Stone Mine of Smt Falguni Warisa over an area of 2.61 ha complies with all statuary rules, regulations, Orders made by Central or State Government, Statuary organization, Court etc which have been taken into consideration and wherever any specific permission is required the lessee will approach the concerned authorities.

The information furnished in the Progressive Mine Closure Plan is true and correct to the best of our kind knowledge and records.

04 "The provisions of Mines Act, Rules and Regulations made there under have been observed in the Mining Plan with PMCP over an area of 2.61 ha in village - Umduba, Raid Marwet, Ri-Bhoi District, State Meghalaya, belonging to Stone Mine and where specific permissions are required, the applicant will approach the DGMS. Further, standards prescribed by D.G.M.S. in respect of miner's health will be strictly implemented."

Place- Shillong
Date- May 20, 2019

JAIPAL SINGH
RQP/AJM/378/2015/A

Falguni Warisa
Smt Falguni Warisa
Applicant/ Lessee

JAIPAL SINGH

RQP/AJM/378/2015/A
Qualified person as per rule 19(2) of MMMCR 2016
Validity up to 5.8.2025.
C-47, Raghu Marg, Hanuman Nagar
P.O. Vaishali Nagar, Jaipur, Pin 302021
e-mail: jaipal1965@gmail.com
mobile: 91 9485112301, 91 8955956927

GOVERNMENT OF MEGHALAYA

CERTIFICATE

APPROVED

The provisions of MMMCR 2016 (Meghalaya Minor Mineral Concession Rules 2016) have been observed in the preparation of the Mining Plan with PMCP for Boulder Stone Mine, over an area of 2.61 ha of Smt Falguni Warisa in village-Umduba, Raid Marwet, Ri-Bhoi, State Meghalaya, and whenever specific permission are required, the lessee will approach the concerned authorities of the government of Meghalaya.

The information furnished in the Mining Plan with PMCP is true and correct to the best of my knowledge.

JAIPAL SINGH
RQP/AJM/378/2015/A

Place- Shillong
Dated- May 20, 2019

Jaipal Singh
Qualified Person under rule 19(2)
Of MMMCR 2016
Valid up to August 5, 2025

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

APPROVED

List of Chapters

JAIPAL SINGH
RQP/AJM/378/2015/A

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

List of Annexure

APPROVED

Annexure No	Title
1	Land document.
2	Forest NOC
3	Letter of Intent
4	RQP Registration certificate

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

JAIPAL SINGH
RQP/AJM/378/2015/A

List of Plates

APPROVED

Number	TITLE
1	LOCATION PLAN
2	KEY PLAN
3	ENVIRONMENT PLAN
4	SURFACE GEOLOGICAL PLAN & SECTIONS
5	COMPOSIT PLAN & YEARWISE SECTIONS
6	CONCEPTUAL PLAN

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

JAIPAL SINGH
RQP/AJM/378/2015/A

1.0 GENERAL INTRODUCTION

Lessee:-

Smt Falguni Warisa Lessee/applicant of this mining lease for Boulder Stone Mine area 2.61 hectares is interested to involve in mining with this mining lease located near village- Umduba, Raid Marwet, District: Ri- Bhoi, Meghalaya, India.

APPROVED

Lease details:-

The lease is for Stone

Lessee	Smt Falguni Warisa
Mining Lease Number	M.L.
Area of Lease	2.61 hectares
LOI issued	May 2, 2019
Lease period required	For 30 years as per rule 17 of MMMCR 2016
Lease will be sanctioned under rule	10 (a) of MMMCR 2016
Reason for submission of mining Plan	As the LOI issued for sanctioned of the mining lease, thus as per LOI for sanction of the lease this mining plan is prepared and submitted for approval.

For preparation of the Mining plan with PMCP the lessee approached the RQP and authorized the RQP for preparation of Mining plan with Progressive Mine Closure Plan.

The survey work was conducted in May 2019 and the plan with progressive mine closure plan has been prepared. This mining plan with Progressive Mine Closure Plan has been prepared as per the new guide lines provided by the approving authorities and circulars issued time to time.

Approach

Mine Site	Tar Road	2.0 Kms	KR
Mine Site	NH, Baridua	10 Kms	KR, TR
Mine Site	Guwahati	20 kms	KR, TR, NH
Mine Site	Guwahati Air Port (International)	47 kms	KR, TR, NH, SH
Mine Site	Shillong	96 Kms	KR, TR, SH, NH
Mine Site	Guwahati Railway Station	22 kms	KR, TR, NH,

JAIPAL SINGH
RQP/AJM/378/2015/A

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

1.1 **GENERAL**

a) **Name and address of lessee**
Name:
Smt Falguni Warisa
34, Lachumiere Hills
Shillong
District: East Khasi Hills
Meghalaya.
Pin Code: 793001

b) **Status of Lessee:**

Private Individual

c) **Mineral which are included in prospecting license:**

Not applicable.

APPROVED

d) **Mineral which are included in the letter of Intent/ lease deed**

Boulder Stone

e) **Mineral which lessee intends to mine**

Boulder Stone

f) **Name of Recognized Person under MMMCR 2016**
Who prepared the mining plan/ scheme
Name:
Jaipal Singh
RQP/AJM/378/2015/A
C-47, Raghu Marg,
Hanuman Nagar
P.O. Vaishali Nagar,
Jaipur,
Pin 302021
Telephone: 91-9485112301
Registration Number (under rule 22B of MCR 1960)
RQP/AJM/378/2015/A
Date of Grant- 6.08.2015
Valid up to - 5.08.2025.

JAIPAL SINGH
RQP/AJM/378/2015/A

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

2.0 LOCATION AND ACCESSIBILITY

a) **Lease details**

Name of the mine:
Umduba Boulder Stone Mine
Umduba Village
Raid Marwet,
District: Ri Bhoi
State: Meghalaya
Pin Code: 781015

b) **Name of Lessee:**
Smt Falguni Warisa
34, Lachumiere Hills
Shillong
District: East Khasi Hills
Meghalaya
Pin Code: 793001

APPROVED

c) **Details of lease area with location plan**
Location plan is enclosed as Plate-1.

Forest		Non-Forest	
Nil	**Nil**	**2.61 hectares (Private land) occupied by the lessee/ applicant**	**Lease area is required for 30 years**

Whether the area falls under coastal Regulation Zone (CRZ)
No

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

JAIPAL SINGH
RQP/AJM/378/2015/A

Existence of public road/ railway line

Mine Site	Tar Road	2.0 Kms	KR
Mine Site	NH, Baridua	10 Kms	KR, TR
Mine Site	Guwahati	20 kms	KR, TR, NH
Mine Site	Guwahati Air Port (International)	47 kms	KR, TR, NH, SH
Mine Site	Shillong	96 Kms	KR, TR, SH, NH
Mine Site	Guwahati Railway Station	22 kms	KR, TR, NH,
KR- Kacha Rasta, SH- State Highway, NH- National Highway			
The lease area is near the road and connected by kacha rasta			
Nearest village is Umduba around 2 kms from the lease area.			
Nearest Secondary School, Market, PHC as hospital, Rest House, Circuit house, College etc are at Guwahati around 20 kilometers away.			
Water supply by tube wells as available at Umduba from there it will be brought by tankers etc.			
Electric power is available along the tar road			
Nearest National Highway is around 10.0 kilometers away towards north northwestern side.			
Bangladesh Border is around 102 kilometers S side by aerial distance.			

b) The Location Plan (not to scale) is enclosed (plate-1) showing the access routes with a Key plan (Plate-2).

APPROVED

c) **Pillars of the lease area:**

Pillar	Latitude	Longitude	From	To	Bearing	Distance meters
P-1	26°03'42.69"	91°49'34.94"	P-1	P-2	199°00'	065
P-2	26°03'40.75"	91°49'34.13"	P-2	P-3	267°00'	083
P-3	26°03'40.65"	91°49'31.20"	P-3	P-4	288°00'	093
P-4	26°03'41.53"	91°49'28.15"	P-4	P-5	314°00'	117
P-5	26°03'44.02"	91°49'25.30"	P-5	P-6	024°00'	074
P-6	26°03'46.18"	91°49'26.37"	P-6	P-7	101°00'	116
P-7	26°03'45.57"	91°49'30.23"	P-7	P-8	147°00'	054
P-8	26°03'44.14"	91°49'31.26"	P-8	P-9	120°00'	068
P-9	26°03'43.06"	91°49'33.30"	P-9	P-1	105°00'	048

Lease area is 2.61 hectares.

JAIPAL SINGH
RQP/AJM/378/2015/A

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

3.0 DETAILS OF APPROVED MINING PLAN/SCHEME OF MINING

3.1	**Date and reference of earlier approved mining plan/ scheme** It will be a fresh area and thus this chapter is not applicable
3.2	**Details of last modification if any (for the previous approved period) of approved mining plan/ scheme indicating date of approval, reason for modification.** Not applicable.
3.3	**Give review of earlier approved proposals (if any) in respect of exploration, excavation and reclamation etc.** **Prospecting:** Not applicable. **Waste Disposal** Not applicable. **Plantation** Not applicable.
3.5	**Indicate and give details of any suspension / closure/ prohibitory order issued by any Government agency under any rule or court of law** Not applicable.
3.6	**In case the MP/SOM submitted under rules 10 (a) or under rule 19 of MMMCR 2016 for approval of modification, specify reason and justification under these rules.** Not applicable

APPROVED

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

JAIPAL SINGH
RQP/AJM/378/2015/A

PART-A

4.0 GEOLOGY AND RESERVES

a) The elevation range within the lease area is 390 mRL to 310 mRL. The mineral is exposed in the whole lease area.
Drainage in the lease area is almost easterly. General drainage outside the area is Easterly to northeast easterly by non perennial nalah. The area is hilly and stony. Area broken by nalahs in the five kilometers periphery is illustrated on plate-2. No habitation located in and near the lease area. Nearest habitation is located in village Umduba. The deposit is in private land. The forestland not located in the area. No PWD road passes through the area.

b) **Regional Geology**

APPROVED

Regional Stratigraphic Succession
General Stratigraphic Sequence of the Formation of Meghalaya Plate.

Geological Age	Group Name	Formation Name	Rock Type
Recent	Newer Alluvium	Unclassified	Sand, Silt and Clay
----------UNCONFIRMITY----------			
Pliestocene	Older Alluvium	Unclassified	Sand, Clay, Pebble, Gravel and boulder deposits
----------UNCONFIRMITY----------			
Mio- Pliocene	Dupitula Group	Unclassified	Mottled Clays, Feldspathic sandstone and conglomerate.
----------UNCONFIRMITY----------			
Oligo- Miocene	Garo Group	Chengopara Formation Baghmara Formation Simsang Formation	Sand, Siltstone, Clay, Mart Feldspathic Sandstone, Pebble, Conglomerate, Clay, Silty Clay. Shale, Sandstone, Mart
Eocene	Jaintia Group	Kopili Formation Shella Formation Langpar Formation	Siltstone-sandstone altemations, sand Altemation of sandstone- lime stone Calcareous Shale, Sandstone, Limestone
Upper Cretaceous	Khasi Group	Mahadek Formation Bottom Conglomerate Formation Jadukata Formation	Arkose(glauconitic) Conglomerate, Arkose Sandstone-Conglomerate altemation
----------UNCONFIRMITY----------			

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

JAIPAL SINGH
ROP/AJM/378/2015/A

Jurassic	Sylhet Trap	-	Basalt, alkali Basalt, Rhyolite acid tuff.
----------UNCONFIRMITY----------			
Pre- Cambrian	-	Intrusives (acid and basic) Shillong Group	Ponphyrithic and coarse granites, aplite, quartz vein,epidiorite, dolerite, basalt Quartzite, Phyllite, Conglomerate
----------UNCONFIRMITY----------			
Archaean	-	Gneissic Complex	Biotite- gneiss, Biotite- Hornblend gneiss, granitic gneiss, Migmatite, mica-schist, silllimanite-quartz schist, biotite-granulite-amphibolites, pynoxene-granulite etc.

Local Geology:

Succession of rocks in the lease area (Local Geology) (Source GSI)

APPROVED

Geological Age	Group Name	Formation Name	Rock Type
Recent	Newer Alluvium	Unclassified	Sand, Silt and Clay
----------UNCONFIRMITY----------			
Pre- Cambrian	-	Shillong Group	Quartzite

c) **DETAILED DESCRIPTION OF GEOLOGY**

Lithology:

The boulder stone is exposed in the whole lease area on surface and in working pits. No other rocks presently exposed in the lease area.

Structure

The stone has strike almost east- west and dip seems vertical in absence of workings.
No fault, fold and geological disturbances are observed in the area.

Nature of Mineralization:

The stone of this area belongs to Shillong Group of Pre Cambrian. The mineral is exposed in whole lease area. The soil is not observed. It comes across in small patches.

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

JAIPAL SINGH
RQP/AJM/378/2015/A

Effect of Weathering

The cracks and joints at surface are due to weathering effect.

Nature of Wall Rocks

No wall rock is exposed in the area.

Geological Sections

The Geological sections are prepared at 50 meters interval across the strike and one longitudinal section is also drawn.

Recovery

Recovery of the building Stone seems 80% in this deposit. Rest 20% is lower grade, intrusive and can be used as low grade or as other purpose. The recovery may increase or decrease as per the availability of lime stone compactness.

Physical and Chemical Characteristics

Physically the stone is of light brownish to off white in colour. As the rock is medium hard and compact the bulk density is 2.2 tones per cu. Meter of rock.

d) Name of prospecting agency

No prospecting agency was involved.

APPROVED

e) Details of prospecting/ exploration already carried out:

No workings are observed in the area. Small excavation observed. Boulder stone is observed in the lease area.

f) Surface cum surface Geological Plan is provided as plate-4.

g) Surface Geological Plan is provided as plate-4.

h) Geological sections are provided on plate-4.

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

i) Future program of exploration:

The prospecting is not required as maximum area will be excavated during the mining of next five years.

j) Method of Estimation of Reserves:

Reserves and Resources as per recent survey in May 2019
The reserves are estimated by following formula:
Volume of mineral =Area of section X Sectional influence length
Mineral in tonnes = Volume of mineral × Recovery percentage x Bulk density 2.2 tonnes per cu. Metre).
The reserves are computed for proved, probable and possible categories.
The details are as follows:
The sections are prepared at 40 meters interval.

JAIPAL SINGH
RQP/AJM/378/2015/A

Proved category:

The mineral is exposed up to 310mRL in the area and in depth near the area towards southeastern side and is continuing in sides and in depth. The mineral is also exposed surrounding the lease area. Thus, proved category reserves are computed up to 310mRL i.e. equivalent to lowest exposure, as shown on Surface Geological Plan. The surface limits are shown on plan and sections.

Probable category:

The mineral is exposed in the area and in pit and is continuing in depth and in sides. Thus, considering the continuity in depth the probable category reserves are computed for 30 meters thickness as per the continuity of minerals in depth. Thus, probable category reserves are computed between 310mRL and 280mRL. The other limits are considered same as considered for proved category.

Possible category:

APPROVED

Considering the possibility of continuing the deposit beyond the probable category limit in depth the possible category reserves are considered for 10 meters in depth vertically beyond the probable category reserves limit. Considering these aspects, the possible category reserves are computed between 280mRL and 270mRL. The other limits are considered same as considered for proved category reserves.

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

JAIPAL SINGH
RQP/AJM/378/2015/A

k) **Reserve Calculations**

Proved Category

Section	Area of section M^2	Sectional Influence length M	Volume of Mineral M^3	Volume of Useable Mineral 80% M3	Mineral in tons V x 2.2
AA'	8520	40	340800	272640	599808
BB'	9180	40	367200	293760	646272
CC'	6210	50	310500	248400	546480
Total					1792560
Reserves in nearest tens					17,92,560

Probable Category

Section	Area of section M^2	Sectional Influence length M	Volume of Mineral M^3	Volume of Useable Mineral 80% M3	Mineral in tones V x 2.2
AA'	4260	40	170400	136320	299904
BB'	6960	40	278400	222720	489984
CC'	6900	50	345000	276000	607200
Total					13,97,090
Reserves in nearest tens					13,97,090

APPROVED

Possible Category

Section	Area of section M^2	Sectional Influence length M	Volume of Mineral M^3	Volume of Useable Mineral 80% M3	Mineral in tons V x 2.2
AA'	1420	40	56800	45440	99968
BB'	2320	40	92800	74240	163328
CC'	2300	50	115000	92000	202400
Total					465596
Reserves in nearest tens					4,65,610

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

JAIPAL SINGH
RQP/AJM/378/2015/A

l) Mineral Reserves/ Resources: Mineable

Quantity is in tons

A) Total Mineral Reserves	Stone
Proved Mineral Reserves	11,65,000
Probable Mineral Reserves	4,90,400
B) Total Remaining Resources	
Feasibility Mineral Resources	6,27,560
Pre-feasible Mineral resources	9,06,690
Inferred mineral resources	4,65,600

Total mineable reserves= 16,55,400 tons

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MINEABLE RESERVES AND ANTICIPATED LIFE OF THE MINE

The mineable reserves of boulder stone are of the order of 16,55,400 tons
The production in the period of this mining plan will be around 12,72,900 tons in 5 years.
Balance reserves: 16,55,400 – 12,72,900 = 3,82,500 tons
Production target is 2,80,260 tons.
The balance reserves will sufficient for 3,82,500 / 2,80,260 = 1.36 years
Thus, total life of the mine is 5 + 1.36 = 6.36 years.

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5. MINING

a) Briefly describe the existing and proposed method for excavation:

Existing Mining:
It is a fresh mining lease and workings have to start in the lease area. One pit is observed in the area.

Proposed Mining:
The opencast method of mining with semi mechanization is proposed to excavate the mineral and waste and for other mining activities. Bench height and width are proposed 6 meters each considering semi mechanization.
Approach roads are available in the lease area and will be provided in future as required time to time. Blasting will be done by short or long holes with the permission of DGMS. The pneumatic breaker and hydraulic breakers will be used for excavation of mineral.

The fencing around the pit/ excavation will be provided to check the inadvertent entry of human and livestock in the working zone.

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The soil if comes across during mining in small layer or cavity will be scraped and stacked separately to be used for plantation during each monsoon.

Drinking water is being brought from tube wells supply available at nearby village and stored in water pitchers at site office and near the working sites for drinking purpose and in cement tanks near the site office for other purpose.
The following works are proposed:

1. The barbed wire fencing will be provided around the proposed and existing workings to check the inadvertent entry of human and livestock in mining zone.
2. The soil which may come across during mining in patches or in cavities will be scraped and stacked separately to be used for plantation in monsoon.
3. The proper plantation will be done in the lease area and nearby the lease area in each monsoon and will report to the department with photographs.
4. Garland drains with parapet walls will be provided around the pit to check the entry of monsoon flowing water towards working pit.
5. Drinking water of tube wells supply will brought from nearby village and stored in water pitchers for drinking purpose and in cement tanks for other purpose
6. The workings will be done by maintaining the proper benches.
7. The waste will be dumped at one place towards SE side in the lease area. Some waste will be dumped outside the lease area in lessee's land. It is also proposed to dump some waste within the lease area in 0.07 ha area.
8. The site services, site office, water tanks, workshops, kitchen, bathrooms etc will be provided in or near the lease area (outside the lease area).

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b) The Development year wise is proposed for first five years.

In the period of this mining plan the lessee will develop seventeen benches i.e. From Bench levels 382mRL (top bench), 376mRL 370mRL, 364mRL, 358mRL, 352mRL, 346mRL, 340mRL, 334mRL, 328mRL, 322mRL, 316mRL, 310mRL, 304mRL, 298mRL, 292mRL and 286mRL (lowest bench).

The approach roads up to faces will be provided time to time for movement of vehicles. The bench height and width are proposed 6 meters but the lessee may take permission from DGMS for bench height more than 6 meters.
The bench slope will be providing 85°. The loading will be from pits or from stocks.
The lessee will work as per proper benches and develop the benches as required but, in the manner, as proposed and as shown on plate-6. The length and width of workings are as per the situation at field.

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Year	Bench number mRL	Area in Sq. Meter	Average Depth of bench in meter	Total volume in Cu. Meter	Waste in M^3	Mineral in M^3
I	382	2250	6	13500	2700	10800
	376	3200	6	19200	3840	15360
	370	4000	6	24000	4800	19200
	364	5600	6	33600	6720	26880
	358	4950	6	29700	5940	23760
II	358	1850	6	11100	2220	8880
	352	8100	6	48600	9720	38880
	346	9780	6	58680	11740	46940
	340	2270	6	13620	2720	10900
III	340	7330	6	43980	8800	35180
	334	9600	6	57600	11520	46080
	328	9070	6	54420	10880	43540
IV	328	730	6	4380	880	3500
	322	9600	6	57600	11520	46080
	316	10200	6	61200	12240	48960
	310	5470	6	32820	6560	26260
V	310	4990	6	29940	5990	23950
	304	8500	6	51000	10200	40800
	298	6800	6	40800	8160	32640
	292	4050	6	24300	4860	19440
	286	2200	6	13200	2640	10560

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Year wise development in tones

Year	Tentative excavation in tones (ROM)	Waste / sub-grade of tone in tones	Mineral Stone in tones
I	2,64,000	52,800	2,11,200
II	2,90,400	58,080	2,32,320
III	3,43,200	68,640	2,74,560
IV	3,43,200	68,640	2,74,560
V	3,50,330	70,070	2,80,260
Total	15,91,130	3,18,230	12,72,900

Dump re-handling (for the purpose of recovery of mineral)

No recovery will be carried out from the dumps.

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c) Enclose development plans and sections

The development plan and sections are enclosed as composite plan and sections.

d) Describe briefly giving salient features of the proposed method of workings indicating Category of Mine.

--Blasting

The blasting is needed to excavate the lime stone. The safe blasting is proposed by adopting all the safety measures as per Mines Act' and with the permission of DGMS.

i) Broad blasting parameters

-Deep Hole Blasting

Deep Hole Drill road	6 meters effective length
Deep Hole Drill machine	Down the hole drill
Burden	3 meter
Spacing	4 meter
Hole Diameter	4 inch (100mm)

-Short Hole

Drill road	1.5 meters effective length
Drill machine	Jack Hammer
Burden	0.8 meter
Spacing	1.0 meter
Hole Diameter	32 mm

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ii) Explosive Used

Blasting will be done by various types of explosives. Generally, the following conventional types of explosives are used in the mine.
Slurry explosive (AN based) viz. power gel, Acquadyne, Superdyne etc. are proposed as primer. Blasting agent is proposed as ammonium nitrate fuel oil (ANFO) mixture.

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The ANFO mixture will be readily produced at site by mixing ammonium nitrate (94.5%) with diesel oil (5.5%). If ANFO is not allowed the other slurry explosive may be used.
Initiation is proposed by half second delay detonators.

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iii) Powder Factor

Deep Hole:
Charges per hole is 0.125 kg of primer, 5.5 kg per meters of blasting agent and One detonator (as inquired by Mines Manager).

$$\text{Powder Factor} = \frac{\text{Effective Depth of hole X Burden X Spacing X Bulk Density}}{\text{Total charge in Kg}}$$

$$\text{Powder factor} = \frac{6 \times 3 \times 4 \times 2.2}{0.125 + 33}$$

$$= 158.4/33.125 = 4.78 \text{ tons of rock/kg of explosive}$$

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Short Hole:
Charges per hole is 0.125 kg of primer, 0.45 kg of blasting agent and One detonator.

$$\text{Powder Factor} = \frac{\text{Effective Depth of hole X Burden X Spacing X Bulk Density}}{\text{Total charge in Kg}}$$

$$\text{Powder factor} = \frac{1.5 \times 0.8 \times 1 \times 2.2}{0.125 + 0.45}$$

$$= 2.64/0.575$$
$$= 4.59 \text{ tonnes of rock/kg of explosive}$$

iv) Secondary Blasting

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Secondary blasting will not be needed

v) Storage of explosive

Considering the consumption of explosive, a 200-kg portable magazine is proposed for storing the explosive.
ANFO mixing shed is proposed for manufacture of ANFO. A room will provide for storage of Ammonium Nitrate.
It is advised to lessee that he should apply for explosive magazine for 200 kg capacity to the competent authority and for ANFO mixing shed to the competent authority. It is expected that the lessee should try to get the license within six months.

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--Loading of Mineral and Material

Loading of mineral and waste in trucks/tippers and tractor trolleys is by hydraulic loaders.

--Transportation of Material

Transportation of waste material from workings to dump site is by trucks/tippers/ tractor trolleys. Stone from face to consumers will be transported in hired trucks/ tractor trolleys.

--Dewatering

The monsoon water will collect in the mine in deep cuttings if observed during mining. The water will be dewatered through a sump made in the bottom of the mine to check the silt. From sump, the dewatering will be done in a surface tank/siltation tank and will be used for plantation. The garland drain with parapet wall will be provided around the pit to check the entry of monsoon water in the working pit.

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--Beneficiation

No beneficiation will take place at site. The ROM mineral will be dispatched to the consumers.

--Extent of Mechanization

Requirement of Machinery (During 5 years of proposed period)

Assumptions:

Excavation target of per year	3,50,330 ROM
Number of working days per year	300 days
Average excavation per day	1167.76 or say 1168 tones (approx.)

Drilling Pattern:

Burden	3 meters
Spacing	4 meters
Depth	6 meters
Diameter of hole	100 mm
Tonnes per hole	180 tonnes (3 X 4 X 6 X 2.2=158.4 tonnes)
Number of holes required per day	1168/158.4 = 7.37 or 8 holes per day
Total drilling length in meter/day	8 X 6.5 = 52 meters/day including 0.5 m subgrade drilling.

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Equipment requirements:

- Drill Machine Requirements

Type of drill	Wagon drill (Tyre/Crawler mounted)
Drill Diameter	100 mm
Drilling rate/hour	8 meters per hour
Number of shifts per day	1
Operating hours per day	6
Total drilling per machine per day in meters	6 X 8 = 48 meters
Number of drill machines required	52/48 = 1.08 or 2 drill machines

- Excavator Requirements

Output excavator per day (Only 1 shift)	600-700 tonnes
Average output	650 tonnes
Total excavation	1168 tonnes per day
Total Excavator required	1168/650 =1.79 or 2 excavators

- Jack hammers are for small hole drilling as required at different places.
- For operating two jack hammers at different places, 2 mobile compressors are proposed.
- Two water tanks are proposed for supply of water at different places and for spray water on approach roads.
- One tipper can handle 200 tones of rocks per shift, thus 6 tippers are proposed.

The following machineries are proposed (as per MMMCR 2016):

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Item	Quantity
Compressor of 120 psi	Two mobile/ tractor mounted
Jack hammer	Two Jack hammers
Hydraulic excavator with rock breaker arrangement	Two
Long hole drill machine	Two
Tractor with water tank	One
Tippers 10 to 20 ton capacity	Six
Other machineries	As needed

e) Conceptual Plan

i) Ultimate Extent & Size Of The Pit

The ultimate extent and size of the workings will be as follows:
Dimensions of workings are given below

Dimension	Deposit
Length	255 meters average
Width	53 to 125 meters average
Depth	Up to 286 mRL, or 110 meters maximum

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ii) The Final Slope Angle Adopted

Considering the stability of rocks the final slope angle or says ultimate pit slope is proposed 45° from vertical. This slope angle will remain quite safe for these deposits.

iii) Ultimate Capacity of Dumps

Total waste will be of 3,18,230 tones. Maximum waste will be used in construction and maintenance of approach roads, construction of site services and rest will be dumped outside the area and a part of inside the lease area. In the area towards south eastern side in the area in 0.02 ha area for 8 meters in height in two terrace of 4 meters height each. Some waste will be dumped outside the area in own land of lessee that will be sold after due permission. The waste dump outside as well as inside lease area will be stabilized by retaining walls of rubble stone. Parapet wall and drain will also be constructed towards lower altitude side to check the wash off during monsoon. The drains will be connected to siltation tank to arrest the silt.

iv) Stabilization of Dumps

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The waste dump is proposed to stabilize by retaining wall of rubble stones. The wall is proposed towards lower altitude side. The plantation is also proposed over the matured dumps for stabilization.

v) Ultimate Pit Limit

The section has been prepared and ultimate slope is drawn over the sections from end bottom point of possible reserves with ultimate slope (refer plate-4). The upper points of these slopes have been projected over the plan. By joining these points, the ultimate pit limit has been drawn, which is shown on Conceptual Plan.

vi) Reclamation

No reclamation is proposed during the period of this mining plan, as reserves will remain alive in the lease at the end of mining plan period. However, if reserve will be exhausted during the lease period, the exhausted benches will be reclaimed by mine rejects, spreading of topsoil and plantation will be done. It is also proposed to convert the pit into a water reservoir.

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vii) **Land Use pattern**

S. No	Item	As on date	End of 5th year	End of lease
1	Area to be excavated	0.00	2.04	2.04
2	Storage of top soil	0.00	0.01	0.01
3	Overburden dump	0.00	0.02	0.02
4	Mineral/Sub-grade stack	0.00	0.00	0.00
5	Infrastructure	0.00	0.01	0.01
6	Roads	0.00	0.02	0.02
7	Green belt	0.00	0.10	0.20
8	Others	0.00	0.00	0.00
	Total Disturbed land	0.00	2.20	2.30

Reclamation	By Plantation on benches	1.00 ha
	By Plantation on overburden	0.02 ha
	By Water reservoir	1.04 ha
	Total Reclaimed area	2.06 ha

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6.0 MINE DRAINAGE

a) Minimum and Maximum depth of water table based on observations from nearby wells and water bodies:

In five kms periphery:
General ground level within 5 kms periphery is 260 mRL towards eastern side.
Minimum depth of water table is 40 mbgl (meter below ground level) i.e. at 220 mRL (as per tube well in nearby area)

b) Indicate minimum and maximum depth of workings

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Minimum depth of workings- 286 mRL
Maximum depth of workings- 286 mRL up to probable category reserves

c) Quality and quantity of water likely to be encountered, the pumping arrangements and places where the mine water is finally proposed to be discharged

There is a sufficient gap between proposed workings up to conceptual and level of ground water table, thus ground water will not be encountered in the workings at any stage.

d) Describe regional and local drainage pattern with annuli rain fall, catchment area, and likely quantity of rain water to flow through the lease area, arrangement to arresting the solid wash off etc.

Local drainage: Drainage in the lease area is almost easterly.

Regional drainage: General drainage outside the area is Easterly to northeast. The area is hilly and stony. Area broken by nalahs in the five kilometers periphery is illustrated on plate-2.

Natural drainage: The water comes across in the workings during monsoon. The water will fill in the working pits. Some water will flow by joints and cracks and rest water has to dewater during and after the monsoon.

The deep cuttings will observe in fifth year. The dewatering will be done by a siltation tank at surface.
The drains will be provided along the lease boundary from top to bottom side and the drains will connect from siltation tank. The silt will settle in the tank.

The rainfall remains around 1000 mm to 1200 mm per year towards maximum. The water accumulate in the working pit is being dewatered by 10 HP diesel operated pumps and this practice will be continued in future. The water will fill in the non-working pits for use for plantation and also dewatered through siltation tank in nearby nalahs. The rubble stone walls are constructed towards lower side of the dumps to check the wash off during monsoon.

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7.0 STACKING OF MINERL REJECTS/ SUB GRADE MATERIAL AND DISPOSAL OF WASTE

a) Indicate briefly the nature and quantity of top soil, overburden/waste and mineral rejects to be disposed off.

The soil may come across in small patches and in cavities on the proposed mining site and the soil which come across will be scraped and stacked separately in 0.01 ha area. The soil will be used for plantation in each monsoon. No mineral rejects come across during mining.
The waste dump management is discussed in the mining chapter in conceptual plan.

b) The proposed dumping ground within the lease area be proved for presence or absence of mineral and be outside the UPL unless simultaneous backfilling is proposed or purely temporary dumping for a short period is proposed in mineralized area with technical constraints and justification

The details are given in Conceptual Mining Plan.

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c) Attach a note indicating the manner of disposal of waste, configuration and sequence of year wise build up of dumps along with the proposals for protective measures

The waste is proposed to dump towards south eastern side in 0.02 ha area for 8 meters height. The dumps are shown on enclosed plate. The stone walls will be provided time to time towards lower altitude side of the dumps to arrest the solid wash off. Plantation will also provide along both side of the dump. The drains will be connected to the siltation tank.

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8.0 USE OF MINERAL AND MINERAL REJECTS

a) **Describe briefly the requirement of end use industry specially in terms of physical and chemical compositions;**

The Stone is used for construction and masonry work. This Stone will be supplied to the consumers of construction works and to the grit plants.

b) **Give brief requirement of intermediate industries involved in upgradation of mineral before end use.**

Not required.

c) **Give details requirement for other industries, captive consumption export associated industrial use**

Not applicable

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d) **Indicated precious physical and chemical specification stipulated by buyers**

The stone is to be used for masonry work so no specific grade is required by purchasers.

e) **Give details of processes adopted to upgrade the ROM to suit the user requirement**

The lessee will dispatch the mineral in ROM form.

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9.0 PROCESSING OF ROM AND MINERAL REJECTS

No process takes place at mine site and none is required. The ROM mineral is being dispatched to the consumers.

a) **If processing/ beneficiation of the ROM or Mineral Rejects is planned to be conducted, briefly describe nature of processing/ beneficiation.**

Not Applicable.

b) **Give a material balance chart with a flow sheet or schematic diagram of the processing procedure indicating feed, product, recovery and its grade at each stage of processing**

Not applicable.

c) **Explain the disposal method for tailings or reject from the processing plant**

Not applicable

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d) **Quantity and quality of tailing/ rejects proposed to be disposed**

Not applicable.

e) **Specify quantity and type of chemicals if any to be used in the processing plant**

Not applicable

f) **Specify quantity and type of chemicals to be stored**

Not applicable

g) **Indicate quantity (Cu. M per day) of water required for mining and processing and sources of supply of water, disposal of water and extent of recycling.**

Around 5 Cu. M. water required for mining for drinking and other purpose. The water will be brought from nearby village from water supply.

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10.0 OTHERS

a) Site services

The site office, workshop, rest shelters, kitchen etc are available near the lease area as shown on plate-3.

b) Employment Potential

The following employment is proposed from nearby villages:

Highly Skilled: 4
Skilled: 15
Semi Skilled: 15
Un Skilled: 30

The following supervisory personnel are proposed with management chart:

Mining Engineer (Degree Holder) + Geologist
|
Mines Manager (Certificate Holder)
|
Mining Mate | clerk | Watchman
|
Mine laborers

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c) Personal Protective Equipment

1. **Safety Helmet-** Used for the safety of head
2. **Safety Goggles-** Used for the safety of Eyes from sun, welding and other flying rock particles.
3. **Dust Respirators**: Used for dust free air at dusty areas in the mine.
4. **Ear Plugs**: Used for protection of air from unwanted sound i.e. noise pollution.
5. **Safety Belts with Rope-** For safety of body which may fall from high faces.
6. **Hand Gloves-** For protection of hand during welding or other hot things/ articles.
7. **Safety Boots-** For protection of foot from fall of stone and for safety from injury.

d) Other requisite requirements for laborers:

1. WC (Latrines and Urinals) one for each and up to 50 laborers. Separate for Male and Females (Section 20 Mines Act, 33 of Mines Rules).
2. Rest Shelter for laborers for taking rest during off hours (Rule 62 of Mines Rules).
3. Water hut for storing of cold water for laborers (at least 2 liters for each labor for drinking purpose) (Section 19 Mines Act, 30 of Mines Rules).
4. First Aid Boxes in sufficient numbers (Section 21 of Mines Act).

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11.0 ENVIRONMENT ASSESSMENT AND ENVIRONMENT MANAGEMENT PLAN

11.1 MEASURE TAKEN AND TO BE TAKEN FOR PROTECTION OF ENVIRONMENT IN AND AROUND THE LEASE AREA

Existing: Presently the lease is not sanctioned. Thus the aesthetic environment beauty of the area is good.

Proposed: Due to mining operations pits, dumps, roads etc will be developed. No tree will destroy by proposed mining activities. For protection of environment and improving the aesthetic beauty of the area following measures will be provided:

The mining will be systematic and scientific in supervision of technical staff.

The dump, stack will be at proper place as suggested and fully stabilized as proposed.

The plantation between tar road and mine site and along the lease area will improve the environment. Good scenario will develop by plantation for the people who travel on the road.

The land use by mining is as follows:

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All figures in hectares

S. No	Item	As on date	End of 5th year	End of lease
1	Area to be excavated	0.00	2.04	2.04
2	Storage of top soil	0.00	0.01	0.00
3	Overburden dump	0.00	0.02	0.02
4	Mineral/Sub-grade stack	0.00	0.00	0.00
5	Infrastructure	0.00	0.01	0.01
6	Roads	0.00	0.02	0.02
7	Green belt	0.00	0.10	0.20
8	Others	0.00	0.00	0.00
	Total Disturbed land	0.00	2.20	2.30

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Reclamation	By Plantation on benches	1.00 ha
	By plantation on overburden	0.02 ha
	By water reservoir	1.04 ha
	Total Reclaimed area	2.06 ha

Flora and Fauna

The main flora in the lease area is shrubs and bushes, however in surrounding area the flora is Taru, Tej Patta, Dieng sohphang, Dieng bai, Dieng kuwai and observed.

The fauna found as livestock and the rarely appearance of wild animals like Monkeys, squirrel and birds etc., which will be not affected by mining activities.

The flora of the area will improve by proposed plantation.

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The barbed wire fencing will be provided around the excavation to check the inadvertent entry of human and live stock and fauna. In absence of wild fauna, no adverse impact will encounter thus no measures are called for. No adverse impact will be anticipated.

Climatic Conditions

Climate of the area is semi arid zone type. The average rain fall remains around 1000mm per year to 1200mm per year. The maximum, mean and lowest temperature remain around 34°C, 24°C and 4°C. Maximum precipitation takes place during month of July and August. The hottest months are May and June and coldest are of December and January.

Public buildings, Places of Worship and Monuments

No such things are observed in and near the lease area thus no measures are called for.
The roads, highway observed in 5 kilometers periphery of the applied lease area are illustrated on plate-2

Human Settlements

No human settlement observed in the lease area. Nearest village is Umduba. The main vocation of the habitants is agriculture. The habitants also have jobs at nearby mines and nearby towns.

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11.2 MEASURE TAKEN AND TO BE TAKEN FOR DUMPING OVERBURDEN, STACKING OF TOP SOIL AND UTILISATION OF TOP SOIL

In Boulder stone mine the maximum quantity of excavated rock is saleable in the form of lump, grit and powder.

Waste dump and stabilization:
As per the mining plan around 3,18,230 tonnes of waste will come across during the period of the mining plan. The waste will be used in construction and maintenance of approach roads, construction of site services. The waste will also be lifted by local habitants for constructing the walls along the agriculture field.

In the area towards western side in the area in 0.02 ha area for 8 meters in height in two terrace of 4 meters height each. Some waste will be dumped outside the area in own land of lessee. The waste dump will be stabilized by retaining walls of rubble stone. Parapet wall and drain will also construct towards lower altitude side to check the wash off during monsoon. The drains will be connected to the siltation tank to arrest the silt.

Top soil
No separate soil is observed in the applied lease area.
The soil may come across in thin layer somewhere at surface.
The soil will be scraped and stacked separately to be used for plantation during the monsoon.
Thus, there will be no permanent stack of soil.

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11.3 MEASURE TAKEN AND TO BE TAKEN FOR CONTROL OF WATER, NOISE AND AIR POLLUTION

Water:

The general ground level near the lease area (outside the lease area) is around 260 mRL (refer plate-2).

The level of ground water table is around 40 meters below from the general ground level of260mRL in study area of 5 kms periphery. Thus, during dry season the level of ground water table is 220 mRL.
Proposed workings are far above to this level of ground water table; thus ground water table will not intersect in workings at any stage.

Dewatering:

During monsoon, the rain water of direct precipitation will collect in the working pits. The monsoon water of upper altitude side may also collect in the pit.

A drain will be provided towards higher altitude side of the pit to divert the rain water away from the pit.

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The dewatering will be done through a sump made in the bottom of the pit and through a water tank/siltation tank at surface. Thus, the silt will be checked and not allow to spread in the nearby area of lower altitude side and in agriculture lands.

The drinking water will be analyzed twice in one year for quality. The source of drinking water is tube well and hand pumps, which are away from the area and thus not get any adverse effect from mining.

Air:

Present air is fresh and healthy as no mining activity is in existence.

The **magnitude of air pollution** in a mine varies with method of mining, type of mineral, level of mechanization and beneficiation of mineral. The gaseous pollution in the mine is due to emissions from diesel engines, transport vehicles as well as during blasting. The dust pollution is due to movement of mine machineries etc. drilling, blasting and vehicular movement. The dust once allowed to go into atmosphere cannot be controlled. Hence, it is necessary to suppress and minimize the dust at its generating point/source.

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Measures proposed:

Water pollution

1. Outmost precaution will be taken that workings should not intersect the water table.
2. In case of intersection with ground water table, the lessee will immediately inform to the concerned authorities.
3. Before monsoon arrival, all drains, siltation tank must be cleaned for proper flow of water.
4. Regular cleaning of sump and surface tank for proper deawatering.
5. Proper maintenance of dewatering pump.
6. The drinking water will be analyzed twice in one year for quality i.e. the source of drinking water will be tube well and hand pumps.

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Dust pollution

1. Sharp drill bits are used and the drilling machine is kept leakage proof. Dust extractor will be provided in drill machine.
2. Controlled blasting is proposed only on hire requirement after taking permission from DGMS and other local authorities. Water Sprinklers provided over haul road to control the fly of dust.
3. All the haul roads will be kept wide, leveled and compact. Regular water sprinkling should be done on road from site to tar road once or twice in a day especially during dry season to check the generation of dust during vehicular movement.
4. The green belt as shown on plate 6 in and near the lease area will minimize dispersion of dust in nearby area. The proposed plantation is illustrated on the plan.
5. The proposed plantation along both sides of haul road from tar road and between tar road and mine site will also check the spread of dust in nearby area.
6. Monitoring in six months is proposed for assessment of impact for generation of dust due to vehicular movement, drilling, blasting and loading etc. and measures should be adopted to minimize the gaseous pollution

Gaseous Pollution

1. The emissions from diesel engines will be minimized by proper maintenance of all diesel operated mine machineries like diesel engines, D.G sets and transport vehicles
2. The gaseous pollution due to blasting is for a short duration. The gases are diluted by wind in a short period in opencast mining
3. All the machineries like compressor, trucks should be operated by trained operators
4. Gaseous pollution from diesel engines is proposed to minimize by using good quality of silencers.
5. Monitoring in one year is proposed for assessment of impact due to vehicular movement and measures should be adopted to minimize the gaseous pollution

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Meghalaya, Shillong

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Noise Pollution

The noise will generate due to movement of vehicles, operation of diesel operated machineries and drilling and blasting.

The following protective measures will be provided to control the noise pollution:

S. No.	Measures
1	The adequate silencers will be provided in diesel operated mine Machineries and trucks and tractors.
2	Compact and leveled haul road are proposed for smooth running of transport vehicles.
3	The transport vehicles should be filled up to rated capacity of the vehicle to minimize the noise.
4	The shrubs and bushes located in the area and proposed plantation will check the propagation of noise.
5	The bumps on haul/ approach roads are proposed to remove time to time. The voids on haul roads are proposed to fill by waste and leveled time to time.
6	Drilling with sharp bits and control blasting will minimize the noise pollution.

Personal protective equipment:

The safety helmet, safety shoes, safety belts will be provided to the laborers. Ear plugs will be provided to the workers who will work near the noise creating machines.

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11.4 CONTRIBUTION REGARDING THE SOCIAL DEVELOPMENT OF THE NEARBY RESIDENTS

There is no impact of mining on local residents of the area as habitation is away from the applied lease area. The maximum persons will be employed from nearby villages. There is no source of employment in nearby area and thus the employment will develop by the proposed mining activity in nearby area. The villagers may use the waste free of cost. The applicant after become lessee will help in maintenance of village kacha roads with request of local bodies. The lessee will provide maximum assistant to local body on their request. The lessee will develop the plantation along the roads. The lessee will contribute some fund from the income and the fund will be used only for the social development of the people in the field of Education and medical,

11.5 DETAILS OF HEALTH CHECKUP AND INSURANCE OF ALL THE EMPLOYED PERSONS (FOR EXISTING LEASE)

Periodic health checks up will be provided as per rules. The labor insurance will be provided as per rules.

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12.0 PROGRESSIVE MINE CLOSURE PLAN UNDER RULE 19 (1) (g) OF MMMCR 2016

12.1 Environment Base Line Information

The lease area is non-forest land. The lease area is of 2.61 hectares. The area is fresh. The present degradation of land is as follows:

All figures in hectares

S. No	Item	As on date
1	Area to be excavated	0.00
2	Storage of top soil	0.00
3	Overburden dump	0.00
4	Mineral/Sub-grade stack	0.00
5	Infrastructure	0.00
6	Roads	0.00
7	Green belt	0.00
8	Reclamation	0.00
9	Others	0.00
	Total Disturbed land	0.00

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a) Water Regime:

No water reservoir or perennial stream etc observed in the lease area and around 500 meters periphery of the lease area. The local water reservoir observed in five kilometers periphery as shown on plate-2.

b) Quality of air:

The lease area is away from the habitation. Presently in absence of workings the air pollution is within limits.

c) Ambient Noise Level:

The noise level in the lease area is within the prescribed limit as there is no working in the area.

d) Flora and fauna:

The main flora in the lease area is shrubs and bushes, however is surrounding area the flora is Taru, Tej Patta, Dieng sohphang, Dieng kuwai observed.
The fauna found as livestock and the rarely appearance of wild animals like Monkeys, squirrels etc, which will be not affected by mining activities.

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e) **Climatic Conditions:**

Climate of the area is semi arid zone type. The average rain fall remains around 1000mm per year to 1200mm per year. The maximum, mean and lowest temperature remain around 34°C, 14°C and 4°C. Maximum precipitation takes place during month of July and August. The hottest months are May and June and coldest are of December and January.

f) **Human Settlement:**

No human settlement observed in the lease area. Nearest village is Umduba. The main vocation of the habitants is agriculture. The habitants also have job at nearby mines and nearby towns.

g) **Public building, place of worship and monuments**

No such things are observed in and around the lease area. The other things observed in five kilometers periphery is illustrated on plate-2

i) **Indicate any sanctuary is located in the vicinity of leasehold**

No any sanctuary etc observed in the vicinity of the lease area.

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12.2 **Impact Assessment:**

The land of the lease area will degrade by excavation, dumps and roads.

i) The infrastructure, waste dump, roads, workings etc will be come across during the period of the mining plan. Thus, the fresh area will degrade by proposed workings.
The land use at the end of five years will be as follows:

All figures in hectares

S. No	Item	As on date	End of 5th year
1	Area to be excavated	0.00	2.04
2	Storage of top soil	0.00	0.01
3	Overburden dump	0.00	0.02
4	Mineral/Sub-grade stack	0.00	0.00
5	Infrastructure	0.00	0.01
6	Roads	0.00	0.02
7	Green belt	0.00	0.10
8	Reclamation	0.00	0.0
9	Others	0.00	0.00
	Total Disturbed land	0.00	2.20

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ii) **Air Quality**:
The quality of air is likely to be effected by drilling and transportation of mineral and waste. The drilling will be by wet process. The lessees will use rock breakers and pneumatic breakers for excavation of mineral and waste. Water spray will be used over the haul/ approach roads time to time and this practice is proposed to continue in future.

iii) **Water Quality**:
The quality of water is affected by mining if ground water comes across in mining.
There is a high gap between the level of ground water and the depth of proposed deepest workings thus ground water will not intersect the workings at any stage.
If ground water will intersect the lessee will get necessary permission.

iv) **Noise Level**
The diesel operated machineries and blasting will create noise in the mining. The following measures are proposed:
The high-quality silencers will be provided to the diesel operated machineries uses for excavation and loading of mineral and waste and water pump etc. The approach roads will be provided smooth and wide.

v) **Vibration level (due to Blasting)**
Blasting will be done in the area. The vibrations come across on small scale. The area is in interior, thus the impact will not very much significant.

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vi) **Water Regime:**
No perennial water regime is observed in and near the lease area in 500 meters periphery.
Thus, water regime will not be disturbed by proposed mining activities.

vii) **Acid Mine Drainage**
Not applicable in this mine.

viii) **Surface subsidence**
It is an opencast mining and no such subsidence will come across in past by mining and none is expected by future mining.

ix) **Socio- Economic**
The socio-economic conditions of the area will improve by having economic activity near by the habitation. The local habitants will get permanent extra income from the source of employment near the villages.

x) **Historical Monuments etc**
In absence of such monuments in and around the lease area no impact will be anticipated.

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12.3 PROGRESSIVE RECLAMATION PLAN

The mining is from top to bottom side. The reserves will not exhaust during the period of this mining plan; as reserves will remain alive in the lease at the end of mining plan period. However, if reserve will be exhausted during the lease period, the exhausted benches will be reclaimed by mine rejects, spreading of topsoil and plantation will be done. It is also proposed to convert the pit into a water reservoir.

12.3.1 MINED OUT LAND

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All figures in hectares

S. No	Item	As on date	End of 5th year	End of lease
1	Area to be excavated	0.00	2.04	2.04
2	Storage of top soil	0.00	0.01	0.00
3	Overburden dump	0.00	0.02	0.02
4	Mineral/Sub-grade stack	0.00	0.00	0.00
5	Infrastructure	0.00	0.01	0.01
6	Roads	0.00	0.02	0.02
7	Green belt	0.00	0.10	0.20
8	Others	0.00	0.00	0.00
	Total Disturbed land	0.00	2.20	2.30

Reclamation	By plantation on benches	1.00 ha
	By plantation on overburden	0.02 ha
	By water reservoir	1.04 ha
	Total Reclaimed area	2.06 ha

12.3.2 TOP SOIL MANAGEMENT

The soil come across during mining will be scraped and stacked separately in 0.01 ha area as shown on plate-5. The soil will be used for plantation in each monsoon.

12.3.3 TAILING DAM MANAGEMENT

In absence of such tailing dams in the lease area and nearby no measures are called for.

12.3.4 ACID MINE DRAINAGE

In absence of acid mine drainage, no management will be anticipated.

12.3.5 SURFACE SUBSIDENCE

Surface subsidence mitigation are not proposed in this progressive mine closure plan.

The cost required for plantation (with watering, fencing and survival) and waste dump management etc is given below.

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ITEM	DETAILS	AREA (HECT)	QUANTITY	EXPENDITURE	REMARKS
(A) RECLAMATION AND REHABILITATION OF MINES OUT LAND/AREA	(i) Backfilling	Nil	NA	NA	'Nil' & 'NA" because during the 5 years Plan period, the reserve remains alive.
	(ii)afforestation on backfilled area	Nil	NA	NA	
	(iii) Others (please Specify)eg. Afforestation on exhausted benches	Nil	NA	NA	
	(iv) Pisciculture	Nil	NA	NA	
	(v) converting into water reservoir	Nil	NA	NA	
	(vi)Picnic Spot	Nil	NA	NA	
(B) STABILIZATION & REHABILITATION OF DUMPS (Within Lease)	(i)Terracing	One	-	-	Part of dumping
	(ii) Construction of parapet wall /retaining wall at toe of dump	10 running metre/year	10 running metre/year	Rs 2000/-	Toe of dump
	(iii)Construction of settling ponds (Garland drains etc)	140 running metre/year	140 running metre/year	Rs 50000/-	Periphery of Mine
	(iv)Afforestation on dumps	Nil	NA	NA	Continuous Dumping
(C) REHABILITATION OF BARREND AREA (Within Lease)	(i)Afforestation (Greenbelt building)	0.02 ha Per year	30 trees	16000/-	Along lease boundary and along road
	(ii)Others(Please Specify) Wire Fencing	40metre Per year	40 running metre/year	10000/-	Around the excavation
(D) ENVIRONMENTAL MONITORING (Core Zone & Buffer Zone separately)	(i)Ambient air quality	Lease area	2 samples per year	6000/-	From lease area
	(ii)Water quality	Well	2 samples per year	5000/-	From nearby well
	(iii) Noise Level Survey	Lease area	2 measurements per year	4000/-	Near working pits and hydraulic machineries
	Total	0.02 ha per year. Total 0.10 ha	50 meters parapet wall; 700 meters garland drain; 150 trees; 200 meters wire fencing; 30 samples of air, water and noise (10 each)	93,000/- per year (Total for 5 years 4,65,000/-)	

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12.4 DISASTER MANAGEMENT PLAN

No landslide and inundation like disaster were come across in this area and nearby the area in past. The workings are proposed from top to bottom by forming proper benching. The proposed workings will be by opencast mining method. Underground mining is not proposed. Face height will be maintained safely. No tailing dam is proposed. Thus high -risk accidents like land slide, subsidence, flood, inundation, fire, seismic activities etc. not come across. Small accidents like fire, explosion in explosive, accident and fall of face like disaster may come across. A fire fighting station (sand filled buckets) is proposed at site in the supervision of mines manager and mate. After receiving the

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information, the officials will reach up to site and will remove men and machineries from the site. Magazine approved is proposed for storing the explosive and approved boxes are proposed for handling the explosive from magazine to site. Any person, who notices any explosion or accident, should immediately take steps to give warning by suitable mean and at the same time take necessary action for withdrawal of men from the site. He shall also inform the mines manager and other officials without any delay. The persons should be trained properly to handle the situation. Detailed warning system, implementation procedure, emergency control center, shall be maintained at the mine with names of trained persons. Proper arrangements should be made for treatment of injured persons. Fire fighting arrangements should be provided at all the prone sites. All the safety equipments should be available at mine site. A vehicle should always remain at site. The lessee is capable to meet any type of risk. The fire stations are available at Guwahati around 20 kms away. Dispensary is available at nearby Umduba village and other prominent villages.

The responsible person is as follows:
Smt Falguni Warisa, Lessee and Manager of the mine

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12.5 MINE CLOSURE:

Care and Maintenance During Temporary Discontinuance:

No mining operation is proposed for temporary discontinuance during the period of this progressive mine closure plan. During any discontinuance, the mining workings will be in the watch of a watchman. Before re-opening of the mine, maintenance will be provided to all the machineries deployed at mine. Before the laborers enter the mine, the workings are proposed to be inspected by manager for safety purposes as per Mines Act.

12.6 ENVIRONMENTAL SAFEGUARD:

The systematic workings are proposed keeping in view the conservation of mineral, Protection of Environment and safety of human and machineries.

No natural water courses are observed in and near the lease area and no such thing will be obstructed by proposed mining activities. The workings will be far above the level of ground water table and thus ground water will not intersect at any stage in workings. Although no separate soil observed at proposed mining site, however, if any soil come across in thin layer or in cavities; will be scraped and temporarily stacked separately at proposed site. The soil will be used for plantation during each monsoon. The waste generated during mining will be used in construction and maintenance of approach roads, construction of site services. The lessee will also sell the waste by permit from the concerning department. Rest waste will be dumped at proposed site as per the planning.

The regular water sprinkling will be provided over the approach road and all other dust creating points and places to minimize the dust during mining and other operations. The safe blasting as per Mines Act will be conducted by certified blaster by implementing all measures to arrest of Fly rock and minimize the ground vibrations. The nearby structures should not be disturbed by blasting. Drilling will be either wet process or by using dust extractors. In case of deep hole blasting the lessee will take permission from DGMS. For the safety of the laborers the personal protective devices will be provided and proper training will be provided for environment and safety. The height and width of the benches and face slope are proposed as per Metalliferous Mines Regulation 1961. Regular health checkups will be provided with periodically organized occupational health surveillance program for the workers. Insurance/

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Group insurance will be provided for all laborers as per rules. Vehicular emissions will be checked by adopting good quality of silencers and by maintaining wide and smooth roads. The noise level/pollution will be maintained within the permissible limit. Plantation as per approved planning will be provided in the lease area to increase the aesthetic environment of the lease area and nearby the lease area. The lessee will also follow the conditions imposed in the Environment Clearance for environment protection measures, ESR, CSR etc.

12.7 FINANCIAL ASSURANCE

The financial assurance as security deposit of Rs 30,000/- (Rupees Thirty thousand only) for an area of 2.61 ha is to be provided to the concerned department as per Meghalaya Minor Mineral Concession Rules 2016.

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Falguni Warisa
Smt Falguni Warisa
Lessee

Jaipal Singh
RQP/AJM/ 378/2015/A

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Meghalaya, Shillong

Admissible under act XVI of 1908 correctly Stamp exempted from Stamp duty under the Assam Stamp Act adopted by the State of Meghalaya Schedule 1 No. 5

Sd/H.K Thabah
Sub Registrar
Nongpoh
7/2/19

076269

APPROVED

LEASE AGREEMENT

THIS LEASE AGREEMENT is made on this 7 day of Feb 2019 at Nongpoh, District-RI-Bhoi (Meghalaya).

-BETWEEN-

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

MR. KONEL SANGMA AGE 65 S/O(L) G MOMIN Resident of Umduba village, Raid Marwet Mylliem Syiem Ship Ribhoi District Meghalaya herein after called as the "LESSOR" (Which term shall mean and include, wherever the context so requires and permits, his/her heirs, successors, attorneys, representatives, executors, etc.) of the ONE PART;

- AND -

MRS. FALGUNI WARISA, daughter of late P.K. Warisa, resident of 34, lachumiere Hills, Shillong, in the district of East Khasi hills, Meghalaya, a Schedule Tribe of Meghalaya belonging to Dimasa Kachari tribe, hereinafter called as the " LESSEE" (Which term shall mean and include, wherever the context so requires and permits, her heirs, successors, authorized signatory, attorneys, executors, administrators and assigns, etc.) of the SECOND PART)

WHEREAS, the LESSOR is the absolute owner in possession and enjoyment of the vacant land measuring 2.81,076.99SQ. FT.APPOX ( ). having a STONE QUARRY situated at Umduba Village, Raid Marwet Mylliem Syeim Ship in the district of

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Sub-Registrar
Nongpoh
7/2/19

Sl. No. 2 Date 22/11/16
Sold To..........................
Stamp Vendor C. Lyngdoh
D.C. Office Shillong

GOVERNMENT OF MEGHALAYA

Presented for Registration at _____ AM / PM.
On the _______ day of _________ 20____
at Nongpoh Sub Registry Office by_______
____
The Executant / Attery __________
_____________ Under /Power No.________
for 20___ and register / Authenticate by the
Sub - Registrar of____________________
Signature of Fresemant.

Sub Registrar
Nongpoh
7/2/19

APPROVED

SUB - REGISTRAR RI - BHOI DISTRICT : NONGPOH

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

Execution admitted by Smti. Falguni Warisa
Son of Late P.K. Warisa
of Laitumkhrah Hills Thana______
District East Khasi Hills by Cast Diwasa Kachari
by Profession ____________
Signature of Executent ____________
Who is Identified by ____________
Son of ____________ Thana______
of____________ by Cast______
District____________
by Profession ____________
Signature of Identified____________

Sub - Registrar
Nongpoh
7/2/19

Ri-Bhoi (Meghalaya) within the Sub-Registrar, Ri-Bhoi District, Nongpoh and the property was confirmed by the Village Headman/Secretary, Raid Marwet Dated- 22/01/2019 with other officials and subsequently the Syiem,Riad Marwet and his officials and has also issued "Dulir Khyndew (Deed)" vide Dag 005107 herein after referred to as the "Hereinafter referred to as the **"PREMISES"**.

AND WHEREAS the LESSOR has offered to grant the lease to the LESSEE and the LESSEE has accepted to take on lease the Premises for the purpose of STONE MINING PURPOSE TO TOGETHER WITH RIGHT TO SALE STONE OUT FROM THE STONE QUARRY OR ANY OTHER PURPOSE AS DESIRED BY THE LESSEE, SETTING OF A STONE CRUSHER ON THE VACANT LAND.

AND WHEREAS as LESSOR, assures that the PREMISES in which it is situated is and are not subject to matter of any pending litigation, mortgage, lien charge, acquisition proceedings or any other proceeding/restriction or whatsoever, by reason wherof, Further, there is no bar on LESSOR which prohibits to lease the same to the LESSEE for the aforesaid purposes. The LESSOR has in principle agreed to lease PREMISES to the LESSEE. The LESSEE has agreed to take on lease of the said PREMISES.

AND WHEREAS the parties have hereby agreed to reduce the terms by way of this AGREEMENT between them into writing as follows:-

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GOVERNMENT OF MEGHALAYA

Falguni Marwein

NOW IT IS AGREED BETWEEN THE PARTIES, HERE TO AS FOLLOWS:-

1. **SCOPE:**

The LESSOR has agreed to grant the lease for the PREMISES to the LESSEE and LESSEE has agreed to acquire the PREMISES on lease basic. The LESSOR has provided the LESSEE with copies of documents to confirm documents as may be required to confirm its title to the PREMISES and it is evidently between the parties that this Agreement is subject to the LESSOR's title to the PREMISES.

2. **LEASE AREA:**

The LESSOR shall grant the lease for the PREMISES i.e. vacant Land measuring 281076-99 Sq. Ft. APPROX, and Stone Quarry together with right to sale out from the stone quarry, and together with all the rights to the LESSEE, their Employees, customers and any other persons authorized by them to make use of the PREMIESES and all other portions authorized by the LESSOR viz. land leading to and from the PREMISES for the purpose of ingress there to and egress therefrom.

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

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Sub-Registrar,
Nongpoh.
7/2/19

3. **LEASE PERIOD:**

The lease to use the PREMISE shall commence from 16 Novembor2018 day of the 30(THIRTY) Years. The Lease period as mentioned herein , hereinafter referred as "LEASE PERIOD". And after expiry of said lease period, this agreement shall be automatically renewad for another 2 (two) tenure terms i.e. 60 (sixty) years, and no fresh lease Agreement or any other documents is required to be executed.

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4. **LEASE RENT:**

The yearly rent of the premises is fixed at an amount of Rs. 300000/- (Three Lakh) only subject to deduction of TDS or other taxes as applicable from to time. The rent shall be in one month's advance of every succeeding English calendar year by the Lessee to the Lessor and further it is agreed that, the rent shall be increased @ 10% after expiry of every 10 (tem) years.

5. **SECURITY DEPOSIT:**

The LESSEE shall pay the LESSOR an amount **of Rs.** 50,000/- Interest Free Refundable Security Deposit and the LESSOR acknowledge the receipt of the said security deposit to be paid by the LESSEE.

6. **COVENANTS OF THE LESSEE:**

a) The LESSEE covenants with LESSOR that the LESSEE shall pay the electricity consumption charges that is payable in connection with the Premises to the authorities concerned from date of commencement of lease.

b) The LESSEE shall use the PREMISES for STONE MINING PURPOSE TOGETER WITH RIGHT TO SALE OUT FROM THE QUARRY AND ANY OTHER PURPOSE AS DESIRED BY THE LESSEE. The Lessor further give all the mining rights and the right to LESSEE to apply for mining plan in the government department viz the Director of Mineral Resource, Forest Deputy Commissioner or any other department in the name of the Lessee.

c) Not carry on offensive trade or prohibited business in the PREMISES.

d) Lessee is entitled to construct any permanent or temporary shed in the premises.To setup a Stone Crusher in the vacant land.

7. **COVENANTS OF THE LESSOR:**

a) The LESSEE paying the rent hereby reserved and performing and observing the covenants herein to be performed and observed by the LESSEE shall and may hold and enjoy the PREMISES during the said terms without any interruption by the LESSOR or any other person whatsoever.

b) The LESSEE shall have unlimited access to the PREMISES in the 7 days of week, for the conduct of its business.

c) During the term of the Lease, the LESSOR will pay all ground rents, charges or assessments, rates, property and water tax whether direct or indirect and all out going imposed or payable in respect of the PREMISES except electricity, and Maintenance Charges shall be payable by the LESSEE.

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d) The LESSOR hereby warrant and represent that the LESSOR being the absolute owner of the PREMISES and being fully entitled to execute this Lease Agreement, it will hold the LESSEE free and harmless of any demands, claims actions or proceeding by the any authorities, local body or interference from any other person with the LESSEE'S possession and enjoyment of the PREMISES.

8. **SIGNAGE:**

The LESSEE shall be entitled to install at their cost such dimension and at such places as may be appropriate for the business needs of the LESSEE and the PREMISES at no additional cost.

9. **CAR PARKING & FORECOURT:**

The LESSOR permits the LESSEE to use the space available for parking for Lessee vehicles and also for the vehicle(s) for the loading and unloading the goods of the Lessee.

10. **RENEWAL:**

The Lease period shall be automatically renewed for another 2(Two) tenure terms i.e. 60(Sixty) years after expiry **30(THIRTY) YEARS** which commenced from ..... and no fresh Lease Agreement or any other documents is required to be executed.

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

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11. **MODIFICATION OR ALTERATION:**

Any modification or alteration to the terms and condition contains herein may be made by way of a written communication by the party proposing such modification I alteration and the same shall come into effect upon the acknowledgement and acceptance by the other party.

12. **MORTGAGE / LOAN:**

That the Lessee shall be entitled create mortgage in respect of premises and also in respect of the pant and its machineries from any financial institutions bank (s).

13. **NOTICE:**

Any notice to be served upon the LESSOR or the LESSEE shall be deemed to be properly served if sent by registered post to their respective address, mentioned herein above.

14. **SUPERSEDES:**

This Agreement for Lease constitutes the entire agreement between the parties and revokes and supersedes all previous discussion, correspondences and agreements between the parties, expressly or implied.

15. **ARBITRATION:**

All disputes and differences between the parties hereto regarding the interpretation scope or effect of any of the terms and condition herein contained or in any way touching or concerning presents shall be referred to a sole Arbitrator appointed jointly by LESSEE and the same shall be deemed to be a reference within the meaning of the Arbitration and Conciliation Act, 1996 or

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any other statutory reenactment or modification thereto for the being in force. The venue of such Arbitration shall be mutually agreed by the parties. The courts in NONGPOH shall have exclusive jurisdiction to entertain and try all actions suits and proceedings arising out of these presents.

GOVERNMENT OF MEGHALAYA

SCHEDULE OF THE PREMISES

All that a vacant land admeasuring 281076.99 **SQ. FT. APPROX. and STONE QUARRY** situated at Umduba Village , Raid Marwet, Mylliem Syiem, in the district of Ri-Bhoi (Meghalaya) within the Sub- Registrar, Ri-Bhoi District, Nongpoh and the property eras confirmed by the **Village Headrnan/ Serretary** ..... With other officials and subsequently the **Syiem, Raid Marwet** and his officials and has also issued **"Dulir Khyndew (Deed)"**, vide **Dag/ Registration No.** ....00507.....

North : ...LAND OF BONA SANGMA ..... = 909.83 ft.

South : ....LAND OF KEN MOMIN, PILOT & DIL SANGMA ..... = 922.58 ft

East : .....RN.D ROAD & ATHOS G MOMIN ..... = 212.25 ft.

West : .....LAND of RAM DAS SANGMA & BOB HARAK = 252.50 ft.

In witness whereof the parties have hereto set and subscribe their respective hands and seals the day and year first hereinabove written.

WITNESS:

APPROVED

Signature of Lessor

1 Grelding Momin

2 Rillie Momin

Signature of Lessee

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

Certified to be true copy

Sub-Registrar
Nongpoh
7/8/19

8/28

25/01/2019

100 Rs

NON JUDICIAL

२०० रु. ₹ 100

भारत INDIA

एक सौ रुपये ONE HUNDRED RUPEES

GOVERNMENT OF MEGHALAYA

Admissible under ... of 1898 correctly stamped ... exempted from Stamp duty Under the Assam Stamp Act adopted by Meghalaya Schedule ____ No. 5

Sd/- ... Sub Registrar Nongpoh

DEED OF DECLARATION

APPROVED

THIS DEED OF DECLARATION made at Nongpoh this the 25 day of January 2019 by me SHRI. KONEL SANGMA, aged about 64 years old, s/o Late B.MOMIN, resident of Umduba, P.S. Khanapara, Raid Marwet, Ri-Bhoi District, Meghalaya.

WHEREAS I do hereby declare and affirm that I have a plot of land situated at village **Umduba, Raid Marwet,** P.S. Khanapara, Ri-Bhoi District, Meghalaya which is owned and possessed by me as the actual and legal owner which is morefully described and mentioned in the scheduled below.

WHEREAS I am the actual and legal owner over the said plot of land which was confirmed by the Syiem, Raid Marwet and his officials and has also issued "Ka Dulir Khyndew" vide Dag/Registration No. 005107 dated 22-01-2019 and simultaneously issued N.O.C. for registration vide NOC No. 1898 dated 22-01-2019 in my favour. That further the Office of the Village Dorbar, Umduba has also issued confirmation of my ownership over the said plot of land and having No-objection for registration in my favour.

F - 12.00
R - 18.00
C/C - 54.00
25/1/19

Certified to be true copy
Sub-Registrar.
Nongpoh
25/1/19

WHEREAS the confirmation document along with the No-objection certificate issued by the Syiem, Raid Marwet, his officials and also the No-objection Certificate from the Village Dorbar, Umduba as the actual and legal owner having rights, title, interest and possession thereon will form a part of this DEED OF DECLARATION.

That the attested photocopy of all the said documents are enclosed herewith for recording the same in the office of the Sub-Registrar, Ri-Bhoi District, Nongpoh for future reference.

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

Certified to be true copy.

GOVERNMENT OF MEGHALAYA
THE DEPARTMENT OF FORESTS AND ENVIRONMENT
OFFICE OF
THE DIVISIONAL FOREST OFFICER:: EAST KHASI HILLS & RI-BHOI (T) DIVISION::
SHILLONG

NO.KH/9/NOC/STONE/41/Pt.V/ 514

Dated Shillong, the 02. /May/2019.

To,

Smti. Falguni Warisa.
34, Lachumiere Hills
Shillong
East Khasi Hills District.

Subj: Non Forest land certificate for stone quarry located at Umduba Village, Raid Marwet, Mylliem Syiemship, Ri Bhoi District in respect of Smti. Falguni Warisa.

Ref: Your letter No.dated, 05.03.2019.

APPROVED

Sir,

With reference to the above, I am to inform you that the land measuring 2.61 hectares at Umduba, Raid Marwet, Mylliem Syiemship Ri Bhoi District is not part of RF/PF under this office and it is not a Forest land as defined under the Meghalaya Forest Regulation (Ammendment) Act, 2012. Hence, this office issue Non- Forest land certificate for stone quarrying subject to the following conditions :-

1. That you shall obtain Mining lease / quarry permit under Meghalaya Minor Mineral Concession Rules, 2016.
2. That your Stone Quarry is subjected to inspection by the staff/official of this office.
3. This Non Forest Land Certificate is liable for cancellation for violating any Act and Rules of the State Government and District Council.
4. That you should submit NOC from Khasi Hills Autonomous District Council (KHADC) within 2 (two) months.
5. The G.P.S Co-ordinates of Stone Quarry is :

1.	N 26° 03' 42.69"	E 91° 49' 34.94"
2.	N 26° 03' 40.75"	E 91° 49' 34.13"
3.	N 26° 03' 40.65"	E 91° 49' 31.20"
4.	N 26° 03' 41.53"	E 91° 49' 28.15"
5.	N 26° 03' 44.02"	E 91° 49' 25.30"
6.	N 26° 03' 46.18"	E 91° 49' 26.37"
7.	N 26° 03' 45.57"	E 91° 49' 30.23"
8.	N 26° 03' 44.14"	E 91° 49' 31.26"
9.	N 26° 03' 43.06"	E 91° 49' 33.30"

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong.

Yours faithfully,

(Shri. T. Wanniang, I.F.S)
Divisional Forest Officer,
East Khasi Hills & Ri Bhoi (T) Division,
Shillong.

OFFICE OF THE DIVISIONAL FOREST OFFICER * KHASI HILLS DIVISION SHILLONG * INDIA

Memo NO.KH/9/NOC/STONE/41/Pt.V/ Dated Shillong, the _____/_____/2019.

Copy to :

1. The Conservator of Forests (T) Khasi & Jaintia Hills, Shillong, Meghalaya or information.
2. The Member Secretary, State Environmental Impact Assessment Authority, Meghalaya for information.
3. The Member Secretary, Meghalaya State Pollution Control Board for information.

GOVERNMENT OF MEGHALAYA
THE DEPARTMENT OF FORESTS AND ENVIRONMENT
OFFICE OF
THE DIVISIONAL FOREST OFFICER:: EAST KHASI HILLS & RI-BHOI (T) DIVISION::
SHILLONG

No.KH/8/ML/Stone/69/ 560, Dated Shillong, the 22/5/2019.

To,

Smti. Falguni Warisa.
34, Lachumiere Hills,
Shillong,
East Khasi Hills District.

Subj: *Letter Of Intent (LOI) for granting of mining lease under Meghalaya Minor Mineral Concession Rules, 2016 for Bouder stone at Umduba Village, Raid Marwet, Mylliem Syiemship, Ri Bhoi District.*

Ref: Your application dated 02.05.2019.

APPROVED

Sir,

With reference to the above mentioned subject, I do hereby issue Letter of Intent (LOI) for granting mining lease under Meghalaya Minor Mineral Concession Rules 2016 for Boulder stone mining on area of 2.61 hectares at Umduba village, Raid Marwet, Mylliem Syiemship, Ri Bhoi District. On receipt of this Letter of Intent, you shall within a period of six months furnish the following documents for grant of mining lease :

1) Mining Plan duly approved by Director of Mineral Resources.
2) Environmental clearance under the Environmental (Protection) Act, 1986.
3) Consent to establish under the Water (Prevention & Control of Pollution) Act, 1974 and Air (Prevention & Control of Pollution)Act, 1981.
4) Clearance from Revenue and Disaster Management Department.
5) Clearance from Labour Department for occupational Health and Labour Laws including Child Labour.
6) NOC from Khasi Hills Autonomous District Council, (KHADC).

This is for your information and necessary action.

Yours faithfully,

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

(Shri. T. Wanniang, I.F.S)
Divisional Forest Officer,
East Khasi Hills
&
Ri Bhoi (T) Division,
Shillong.

Forest Management Building, Lower Lachumiere, Shillong-793001
Phone No. 0364-2226375 email- dfokhasihills@gmail.com

भारत सरकार /GOVERNMENT OF INDIA
खान मंत्रालय/MINISTRY OF MINES
भारतीय खान ब्यूरो /INDIAN BUREAU OF M

अर्हताप्राप्त व्यक्ति के रूप में मान्यता प्रमाण पत्र

(खनिज रियायत नियमावली, 1960 के नियम 22सी के तहत)

APPROVED

CERTIFICATE OF RECOGNITION AS QUALIFIED PERSON

(Under Rule 22C of Mineral Concession Rules, 1960)

श्री जयपाल सिंह पुत्र स्व. श्री गोरूराम निवासी सी–47, रघु मार्ग, हनुमान नगर, पोस्ट– वैशाली नगर, जयपुर – 302021 (राजस्थान), जिनका फोटो और हस्ताक्षर ऊपर दिया हुआ है, तथा जिन्होंने अपनी अर्हता और अनुभव का संतोषजनक साक्ष्य दिया है, को खनन योजना तैयार करने हेतु खनिज रियायत नियमावली 1960 के नियम 22सी के तहत अर्हताप्राप्त व्यक्ति के रूप में मान्यता प्रदान की जाती है।

Shri Jaipal Singh S/o Late Shri Goru Ram R/o C-47, Raghu Marg, Hanuman Nagar, P.O- Vaishali Nagar jaipur-302 021 (Rajasthan), **whose Photograph and signature is affixed herein above, having given satisfactory evidence of his qualifications & experience is hereby *RECOGNISED* under Rule 22C of the Mineral Concession Rules, 1960 as a Qualified Person to prepare Mining Plans.**

उनकी पंजीयन संख्या है

His registration number is **RQP/AJM/378/2015/A**

यह मान्यता दस वर्षों की अवधि के लिए मान्य है जो दिनांक 05.08.2025 को समाप्त होगी ।

This recognition is valid for a period of ten years ending on .

उनके द्वारा प्रस्तुत खनन योजना में गलत जानकारी/दस्तावेज पाए जाने की स्थिती में यह प्रमाण पत्र वापस लिया जाएगा/निरस्त किया जाएगा ।

This certificate will liable to be withdrawn/cancelled in the event of furnishing the wrong information/documents in the Mining Plan submitted by him.

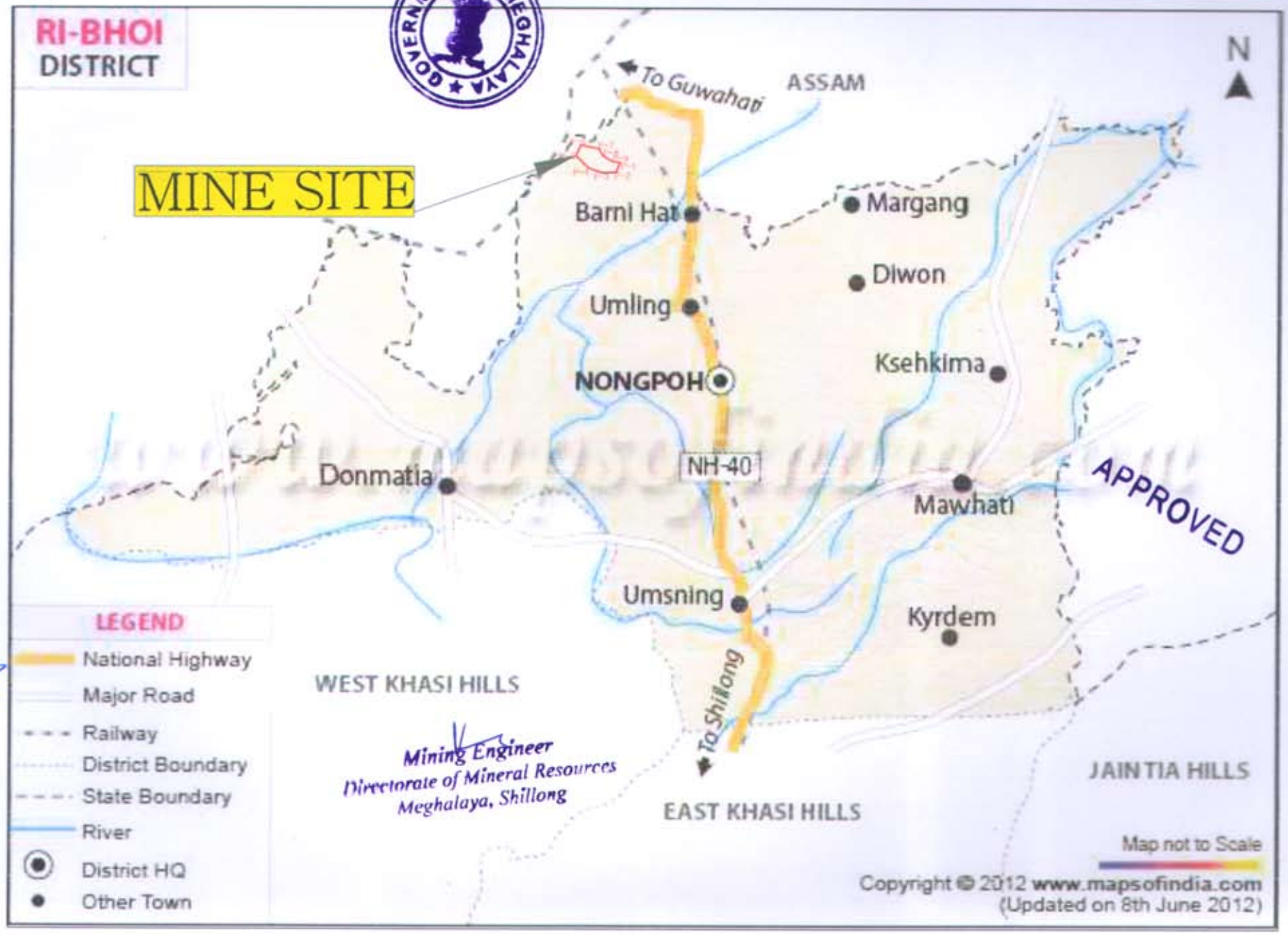
स्थान /Place : Ajmer
दिनांक /Date : 6.8.2015

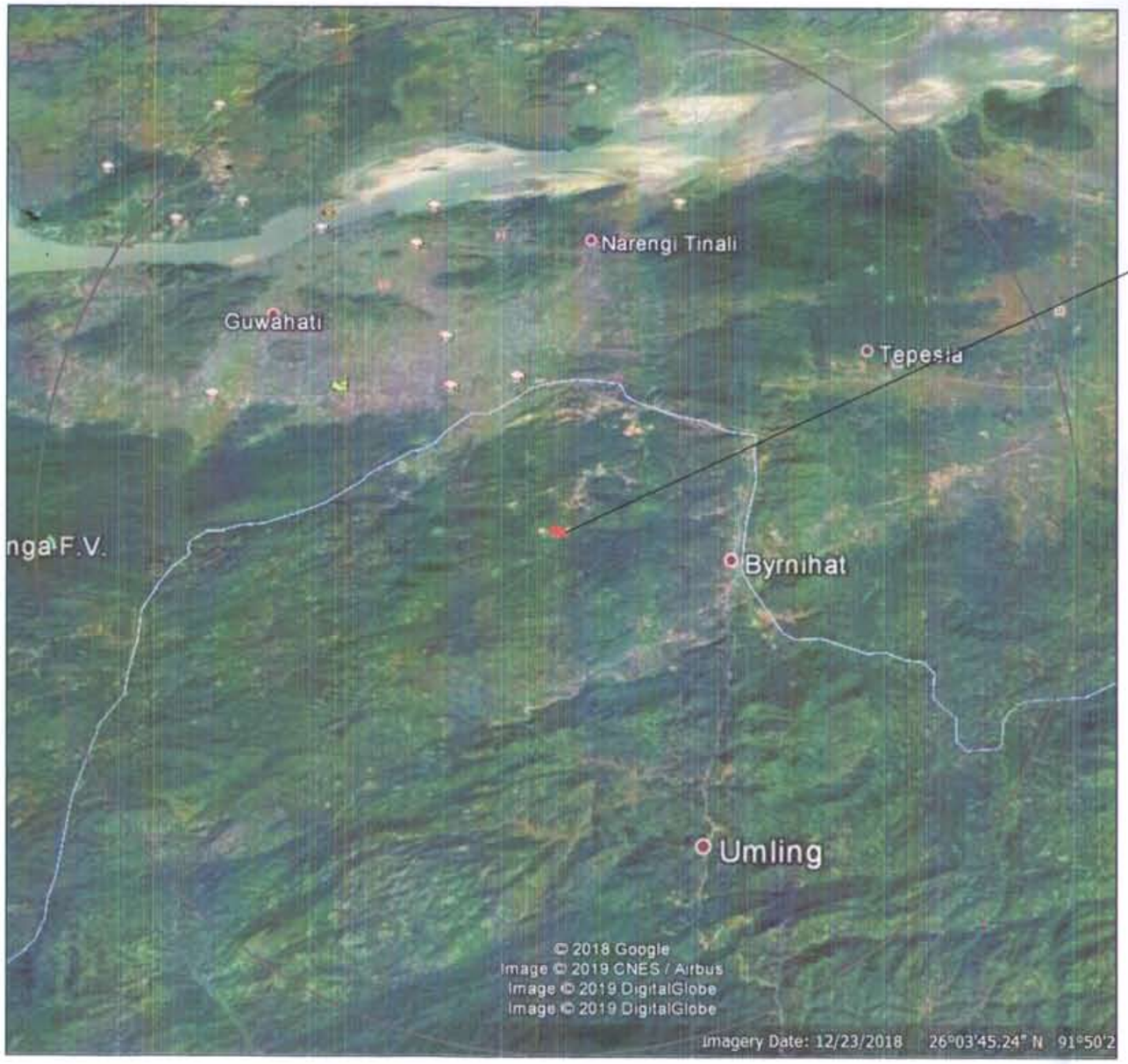
क्षेत्रीय खान नियंत्रक / Regional Controller of Mines
भारतीय खान ब्यूरो /Indian Bureau of Mines
अजमेर क्षेत्र /Ajmer Region

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

क्षेत्रीय खान नियंत्रक
Regional Controller of Mines
भारतीय खान ब्यूरो
Indian Bureau of Mines
अजमेर AJMER

LOCATION MAP
PLATE NO.- 1





GOVERNMENT OF MEGHALAYA

Pillar	Latitude	Longitude
P-1	26°03'42.69"	91°49'34.94"
P-2	26°03'40.75"	91°49'34.13"
P-3	26°03'40.65"	91°49'31.20"
P-4	26°03'41.53"	91°49'28.15"
P-5	26°03'44.02"	91°49'25.30"
P-6	26°03'46.18"	91°49'26.37"
P-7	26°03'45.57"	91°49'30.23"
P-8	26°03'44.14"	91°49'31.26"
P-9	26°03'43.06"	91°49'33.30"

APPROVED

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

S.NO	PARTICULARS	REFER
1.	LEASE AREA	
2.	NALAH	
3.	VILLAGE	
4.	ROAD, KACHA ROAD	
5.	TEMPLE CHATRI	

1000 500 0 1 2 3 4 5 6 7 8 9 10 KMS.
1 2 4 6 8 10 12 14 16 18 20 CMS.

Scale- 1cm = 500m(R.F. 1:50,000)
2cms =1 km

KEY PLAN
OF UMDUBA BOULDER STONE MINE
NEAR VILLAGE- UMDUBA, RAID MARWET,
DISTRICT- RI-BHOI (MEGHALAYA)

PLATE No 2

MINERAL : BOULDER STONE

LESSEE : **SMT FALGUNI WARISA**

AREA : 2.61 Hect.

LOCATION

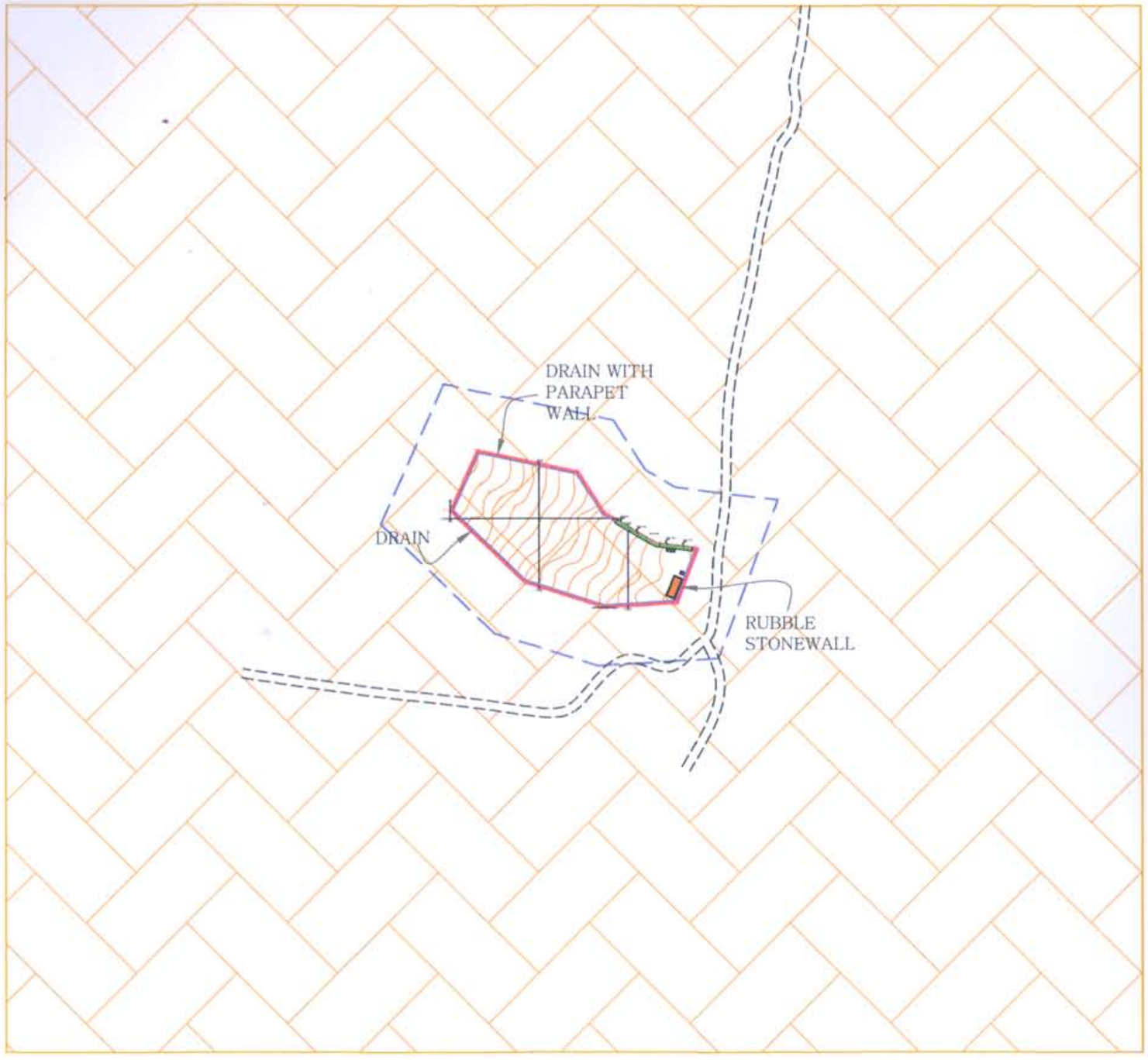
NEAR VILL. : UMDUBA, RAID MARWET
DISTRICT : RI-BHOI
STATE : MEGHALAYA

PREPARED BY :

JAIPAL SINGH
RQP/AJM/378/2015/A

Falguni Warisa

LESSEE



GOVERNMENT OF MEGHALAYA

APPROVED

S.NO.	PARTICULARS	SYMBOL
1.	LEASE BOUNDARY	
2.	CONTOUR	385
3.	RASTA	
4.	SOIL STACK	
5.	DUMP	
6.	PLANTATION	
7.	PRIVATE LAND	
8.	65 M. BARRIER LINE	
9.	500 M. BARRIER LINE	

1 0 1 2 3 4 5 10 15 20 25
50 0 50 100 150 200 250 500 750 1000 1250

Scale- 1cm = 50m(1:5000)

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

ENVIRONMENT PLAN
OF UMDUBA BOULDER STONE MINE
NEAR VILLAGE- UMDUBA, RAID MARWET, DISTRICT- RI-BHOI (MEGHALAYA)

PLATE No 3

MINERAL : BOULDER STONE

LESSEE : **SMT FALGUNI WARISA**

AREA : 2.61 Hect.

LOCATION

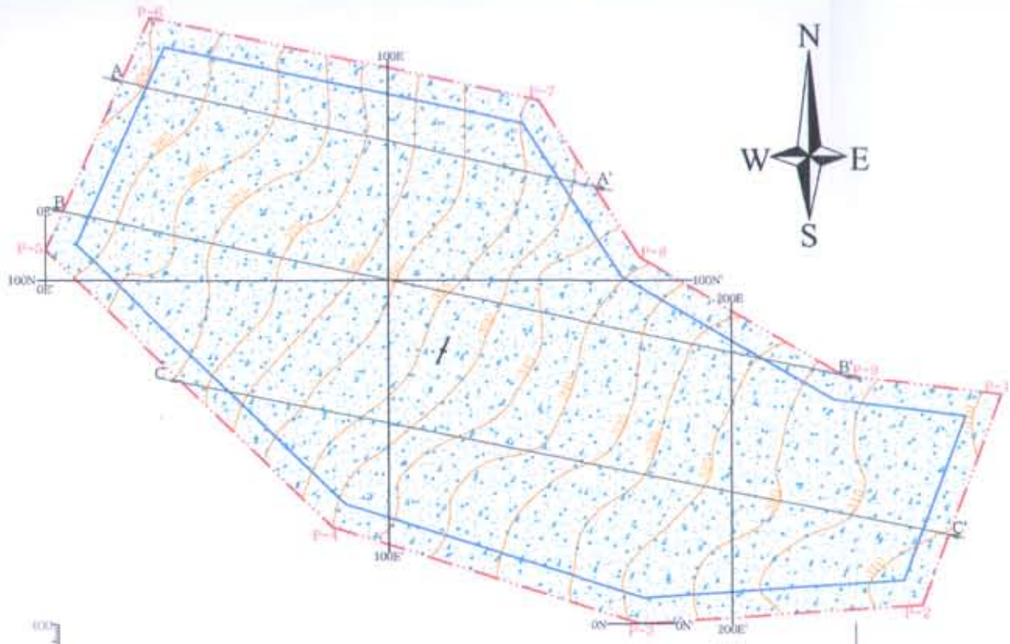
NEAR VILL. : UMDUBA, RAID MARWET
DISTRICT : RI-BHOI
STATE : MEGHALAYA

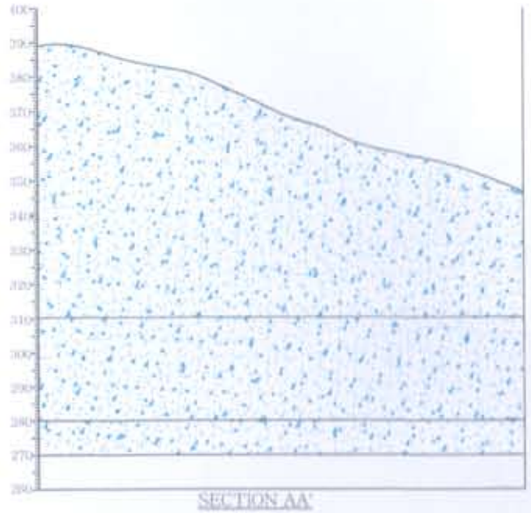
PREPARED BY :

JAIPAL SINGH
RQP/AJM/378/2015/A

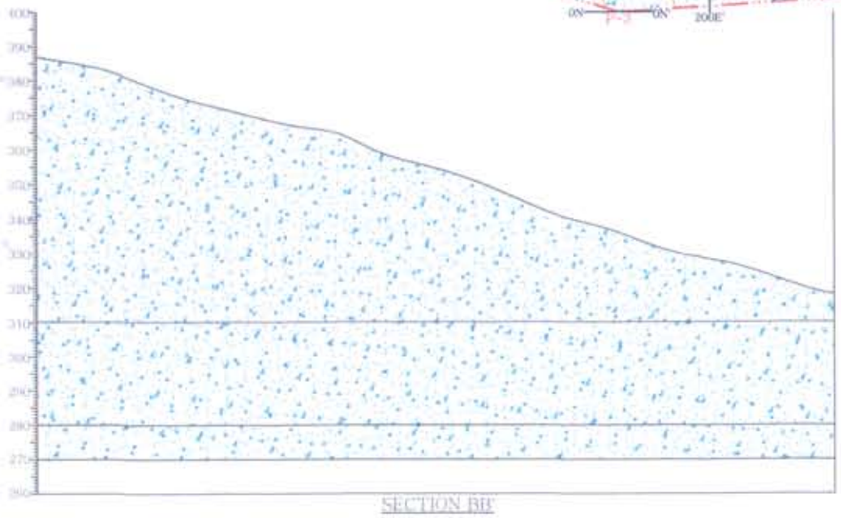
Falguni Warisa

LESSEE

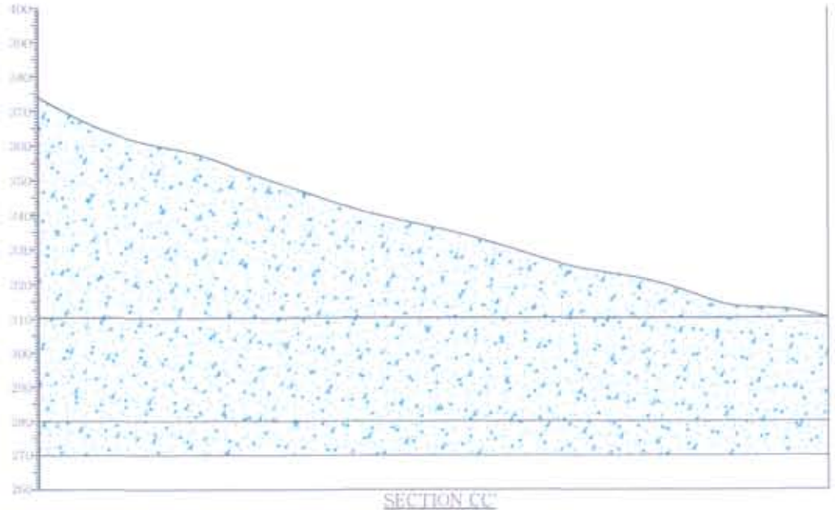




SECTION AA'



SECTION BB'



SECTION CC'

Scale- 1cm = 10m(1:1000)

S.NO.	PARTICULARS	SYMBOL
1.	LEASE BOUNDARY	
2.	CONTOUR	
3.	ROAD	
4.	DIP & STRIKE	
5.	ULTIMATE PIT LIMIT	
6.	BOULDER STONE	

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

SURFACE GEOLOGICAL PLAN & SECTIONS — PLATE No 4
OF UMDUBA BOULDER STONE MINE
NEAR VILLAGE- UMDUBA, RAID MARWET,
DISTRICT- RI-BHOI (MEGHALAYA)

MINERAL : BOULDER STONE

LESSEE : **SMT FALGUNI WARISA**

AREA : 2.61 Hect.

LOCATION
NEAR VILL. : UMDUBA, RAID MARWET
DISTRICT : RI-BHOI
STATE : MEGHALAYA

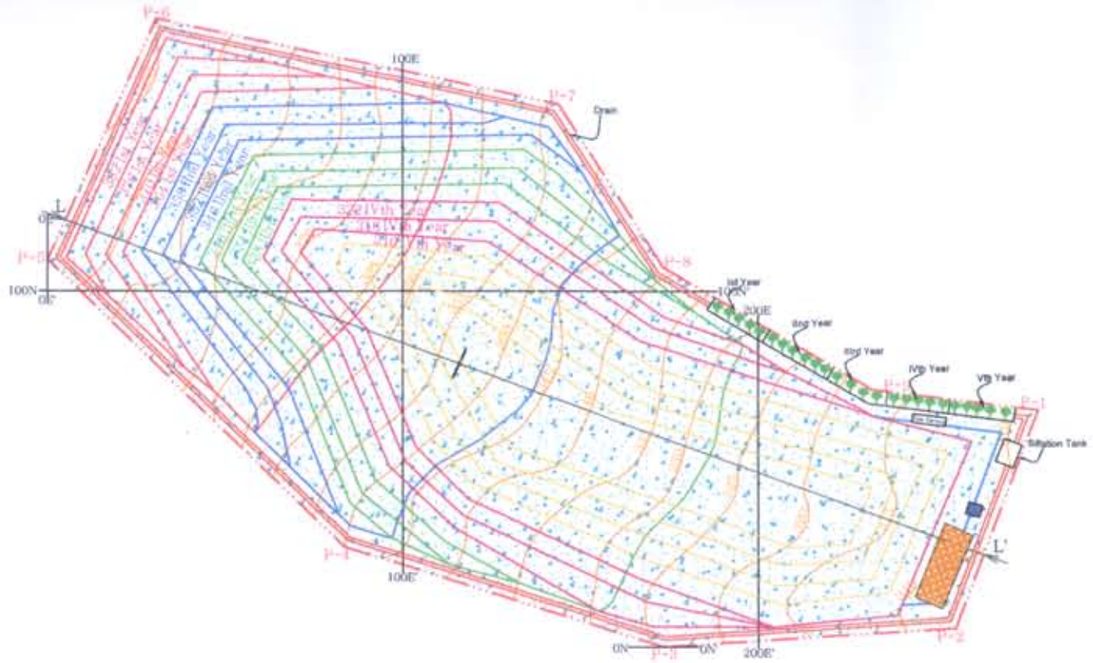
PREPARED BY :

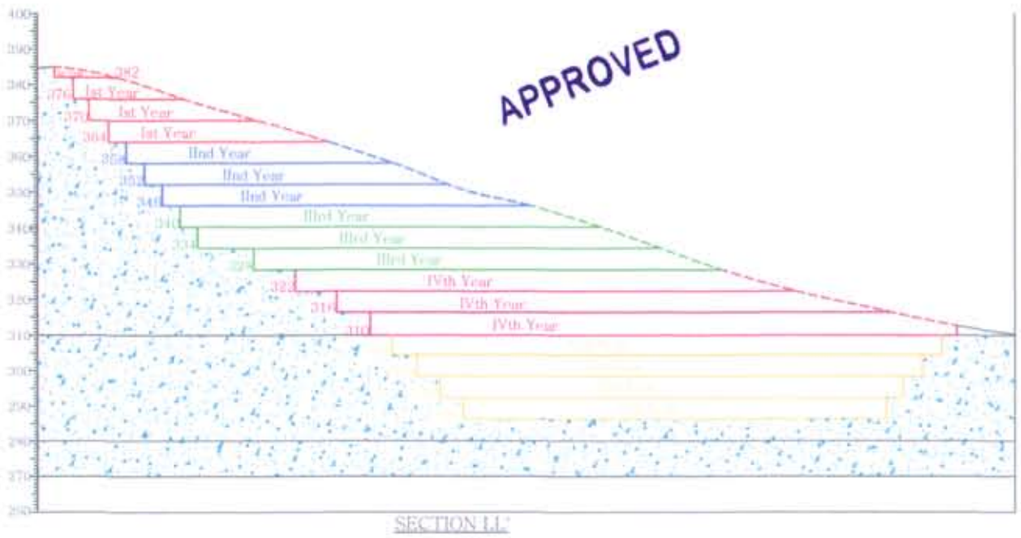
JAIPAL SINGH
RQP/AJM/378/2015/A

Falguni Warisa
LESSEE

GOVERNMENT OF MEGHALAYA

APPROVED





SECTION LL'

APPROVED

S.NO.	PARTICULARS	SYMBOL
1.	LEASE BOUNDARY	
2.	CONTOUR	
3.	ROAD	
4.	DIP & STRIKE	
5.	ULTIMATE PIT LIMIT	
6.	SOIL STACK	
7.	BOULDER STONE	
8.	PROPOSED WASTE DUMP	
9.	PROPOSED PLANTATION	
10.	SILTATION TANK	
11.	DRAIN	

Scale- 1cm = 10m(1:1000)

N
W E
S

GOVERNMENT OF MEGHALAYA

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

COMPOSITE PLAN & YEARWISE SECTIONS — PLATE No 5
OF UMDUBA BOULDER STONE MINE
NEAR VILLAGE- UMDUBA, RAID MARWET,
DISTRICT- RI-BHOI (MEGHALAYA)

MINERAL : BOULDER STONE

LESSEE : **SMT FALGUNI WARISA**

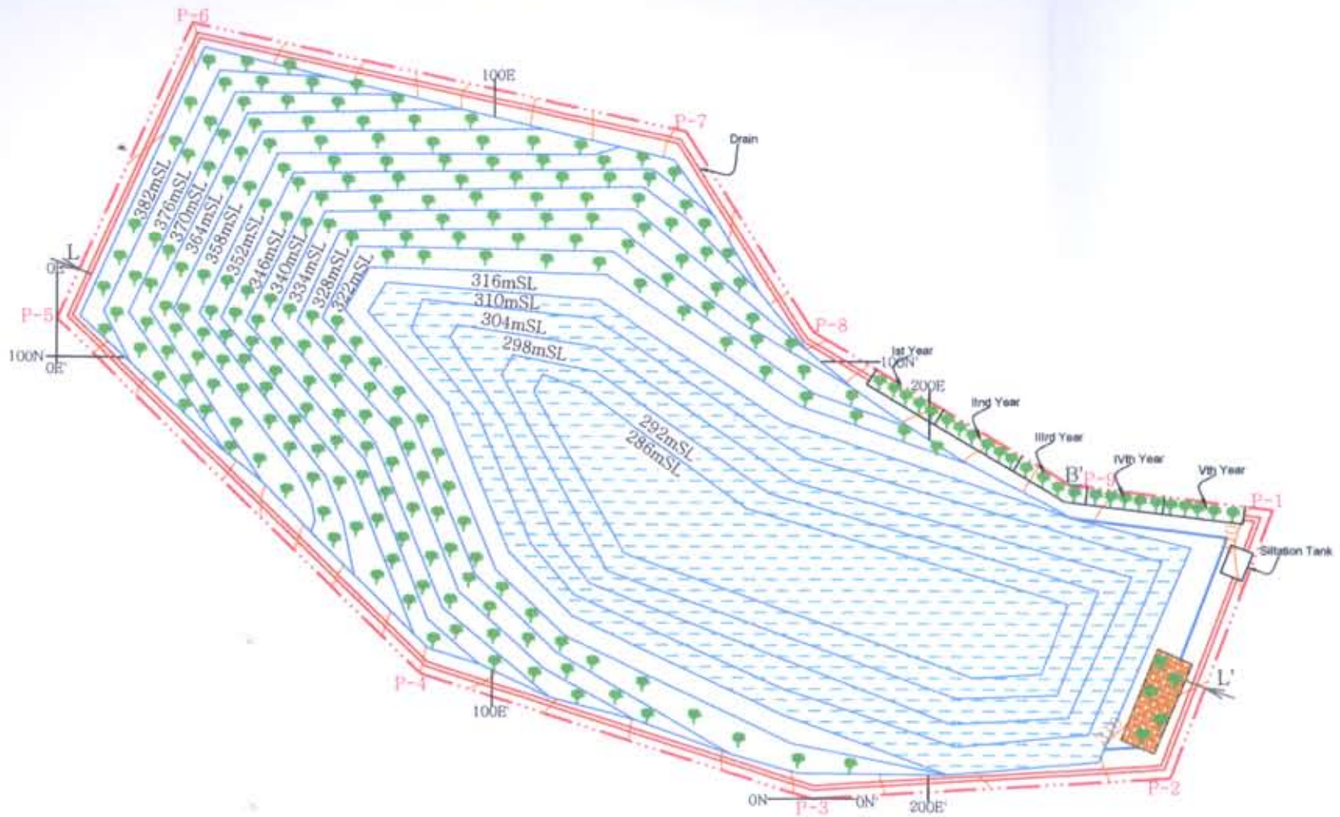
AREA : 2.61 Hect.

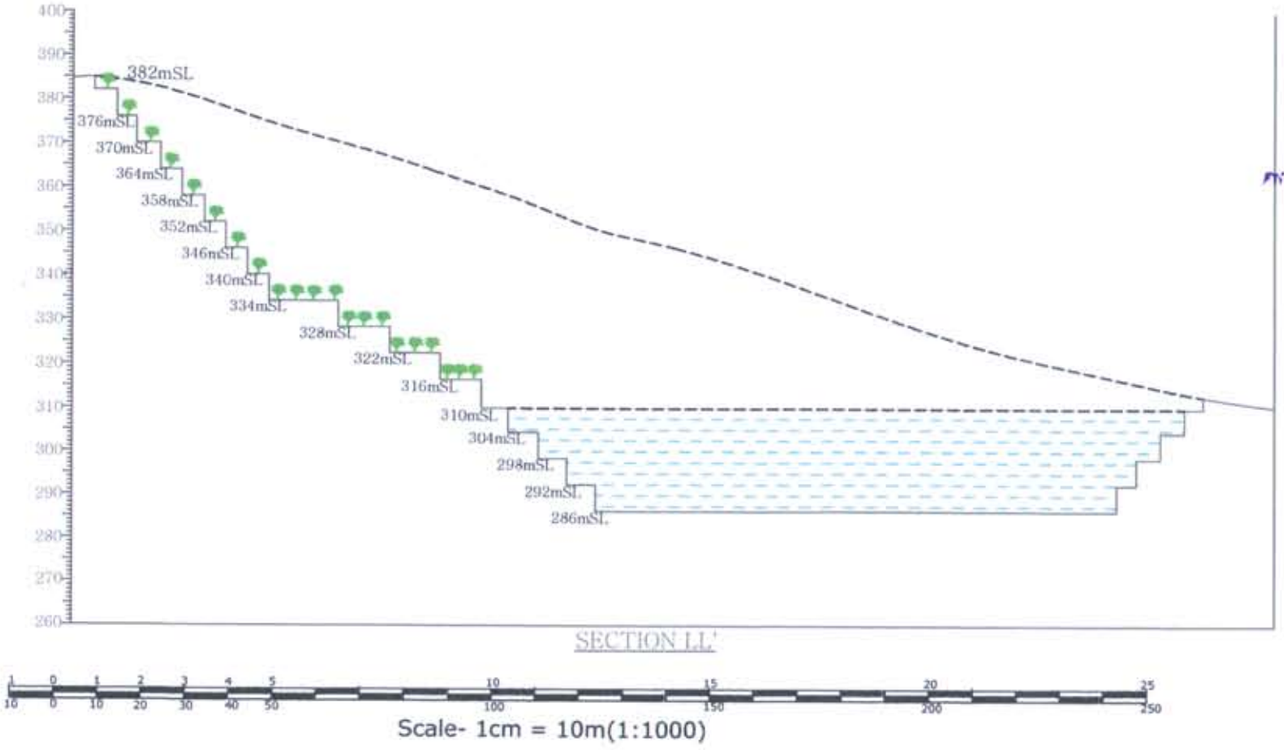
LOCATION
NEAR VILL. : UMDUBA, RAID MARWET
DISTRICT : RI-BHOI
STATE : MEGHALAYA

PREPARED BY :

JAIPAL SINGH
RQP/AJM/378/2015/A

Falguni Warisa





SECTION LL'

Scale- 1cm = 10m(1:1000)

GOVERNMENT OF MEGHALAYA

APPROVED

S.NO.	PARTICULARS	SYMBOL
1.	LEASE BOUNDARY	
2.	SPOT LEVEL	286mSL
3.	CONTOUR	380
4.	ROAD	
5.	ULTIMATE PIT LIMIT	
6.	WATER RESERVOIR	
7.	PLANTATION ON DUMP	
8.	PROPOSED PLANTATION	
9.	SILTATION TANK	
10.	DRAIN	

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

CONCEPTUAL PLAN
OF UMDUBA BOULDER STONE MINE
NEAR VILLAGE- UMDUBA, RAID MARWET,
DISTRICT- RI-BHOI (MEGHALAYA)

PLATE No 6

MINERAL : BOULDER STONE

LESSEE : **SMT FALGUNI WARISA**

AREA : 2.61 Hect.

LOCATION
NEAR VILL. : UMDUBA, RAID MARWET
DISTRICT : RI-BHOI
STATE : MEGHALAYA

PREPARED BY :

JAIPAL SINGH
RQP/AJM/378/2015/A

Falguni Warisa

LESSEE

GOVERNMENT OF MEGHALAYA

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

APPROVED

S.NO.	PARTICULARS	SYMBOL
1.	LEASE BOUNDARY	
2.	CONTOUR	385
3.	ROAD	
4.	DIP & STRIKE	
5.	ULTIMATE PIT LIMIT	
6.	SOIL STACK	
7.	PROPOSED WASTE DUMP	
8.	PROPOSED PLANTATION	
9.	SILTATION TANK	
10.	DRAIN	

Scale- 1cm = 10m(1:1000)

PROGRESSIVE MINE CLOSURE PLAN — PLATE No 7

OF UMDUBA BOULDER STONE MINE
IN VILLAGE- UMDUBA, RAID MARWET,
DISTRICT- RI-BHOI (MEGHALAYA)

MINERAL : BOULDER STONE

LESSEE : **SMT FALGUNI WARISA**

AREA : 2.61 Hect.

LOCATION
NEAR VILL. : UMDUBA, RAID MARWET
DISTRICT : RI-BHOI
STATE : MEGHALAYA

PREPARED BY :

JAIPAL SINGH
RQP/AJM/378/2015/A

Falguni Warisa

LESSEE

GOVERNMENT OF MEGHALAYA
DIRECTORATE OF MINERAL RESOURCES
SHILLONG

No. DMR/MM/45/2019/ 1122 **Dated Shillong, the** ~~17th~~ 24 **September 2019**

TO WHOM IT MAY CONCERN

It is hereby certified that as on date, the approved mining plans indicated below are located within a distance of 500 meters from the periphery of the approved mining plan on Boulderstone over an area 2.61 hectares located at Umduba Village, Raid Marwet, Mylliem Syiemship, Distrit- Ri-Bhoi, Meghalaya, of Smt Falguni Warisa, r/o 34, Lachumiere Hills, Shillong, District- East Khasi Hills, Meghalaya:

S. No.	Approved mining plan	Area (hectares)	Mineral	Distance from the approved mining plan of Smt Falguni Warisa (metres)
1	Shri Samuel Jahrin	1.10	Boulderstone	77
2	Shri Saphamon Bareh	1.5	Boulderstone	130
3	Smt Norlia Marak	0.90	Boulderstone	200
4	Smt Chameli Lyndem	4.5	Boulderstone	235
5	Shri Ivan Lyngdoh	3.72	Boulderstone	106
6	Shri Ken Momin	2.22	Boulderstone	147
7	Smt Mitti Nongrum	1.25	Boulderstone	242
8	Shri Ngaitlang Dhar	4.5	Boulderstone	109
9	Shri Jamda Sangma	2.69	Boulderstone	202

Yours faithfully,

(P. Ch. Marak)
Mining Engineer,
Directorate of Mineral Resources
Meghalaya:::Shillong