DRAFT ENVIRONMENTAL IMPACT ASSESSMENT
AND
DRAFT ENVIRONMENTAL MANAGEMENT PLAN

FOR

PROPOSED DHAPGURI STONE MINE

AT

DHAPGURI, P.O ZIKABARI, DISTRICT WEST GARO HILLS, MEGHALAYA,

AREA: 1.26 HA, PROPOSED CAPACITY: 40513 TPA (MAXIMUM)

PROJECT PROPONENT

Smt. Fridina D. Shira
Village: Burney Hills, P.O.- Dakopgiri, Tura ,
West Garo 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. Fridina D. Shira. The address of the proponent is given below:

R/o- Village: Burney Hills, P.O.- Dakopgiri, Tura, West Garo Hills District, Meghalaya.

The proponent has applied for environmental clearance for mining lease over an area of 1.26 ha at Dhapguri, P.O Zikabari, District West Garo Hills, 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 1.26 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 at Dhapguri, P.O Zikabari, District West Garo Hills, 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>1.26 Hectare (Non forest Land).</td></tr>
<tr><td>2.</td><td>Proposed Production Capacity</td><td>Total production in 5 years will be 201169 T and peak production will be 40513 T/annum.</td></tr>
<tr><td>3.</td><td>Lease Period of Mine</td><td>Lease was granted for a period of 10 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 semi-mechanized 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>Dhapguri, P.O Zikabari , District West Garo Hills, Meghalaya</td></tr>
<tr><td>2.</td><td>Toposheet No.</td><td>78K/2</td></tr>
<tr><td>3.</td><td>Lease Area Coordinates</td><td><table><tr><td>Pillar</td><td>Latitude</td><td>Longitude</td></tr><tr><td>1</td><td>25°38'12.61"N</td><td>90°00'52.99"N</td></tr><tr><td>2</td><td>25°38'14.04"N</td><td>90°00'54.10"N</td></tr><tr><td>3</td><td>25°38'10.73"N</td><td>90°00'59.48"N</td></tr><tr><td>4</td><td>25°38'09.36"N</td><td>90°00'58.54"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. 7.96 Lakhs</td></tr>
<tr><td>F.</td><td>Water Demand</td><td></td></tr>
<tr><td>1.</td><td>Requirement</td><td>5 KLD</td></tr>
<tr><td>2.</td><td>Source of water</td><td>Natural Springs (nalah)</td></tr>
<tr><td>G.</td><td>Man Power Requirement</td><td>30</td></tr>
<tr><td>H.</td><td>Environmental Setting</td><td></td></tr>
<tr><td>1.</td><td>Nearest Village</td><td>Dhapguri</td></tr>
<tr><td>2.</td><td>Nearest Town</td><td>Zikabari, 1.5 Km.</td></tr>
<tr><td>3.</td><td>Nearest National / State Highway</td><td>SH 2, 2 Km</td></tr>
<tr><td>4.</td><td>Nearest Railway Station</td><td>Dewanganj Railway Station, 60 Km</td></tr>
<tr><td>5.</td><td>Nearest Airport</td><td>Guwahati Airport, 236 Km</td></tr>
<tr><td>6.</td><td>Ecological Sensitive Areas (National Park, Wild Life Sanctuaries, Biosphere Reserve etc.) within 10 km radius</td><td>None</td></tr>
<tr><td>7.</td><td>Water bodies within 10 km radius of the mine site.</td><td>A stream is flowing approx. 3 km SW of the Mine.</td></tr>
<tr><td>8.</td><td>Archaeological Important Place</td><td>None</td></tr>
</table>

9.	Seismic Zone	V

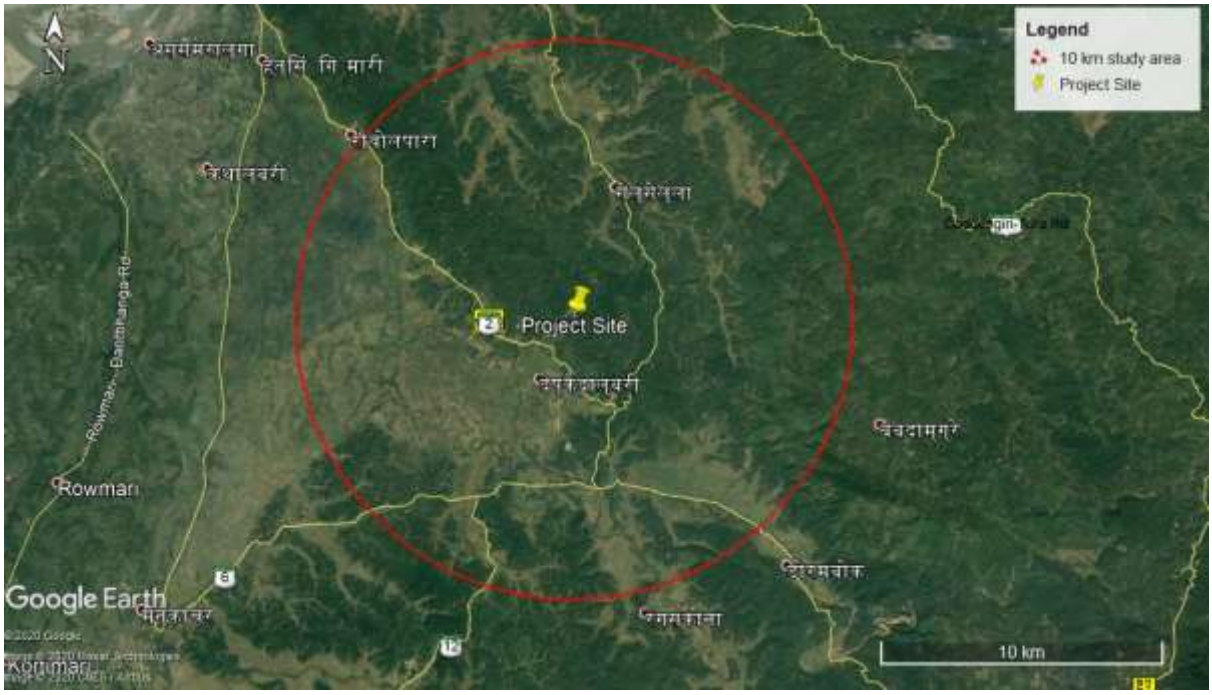


Figure 1.1: Location Map of the mine lease area in google earth

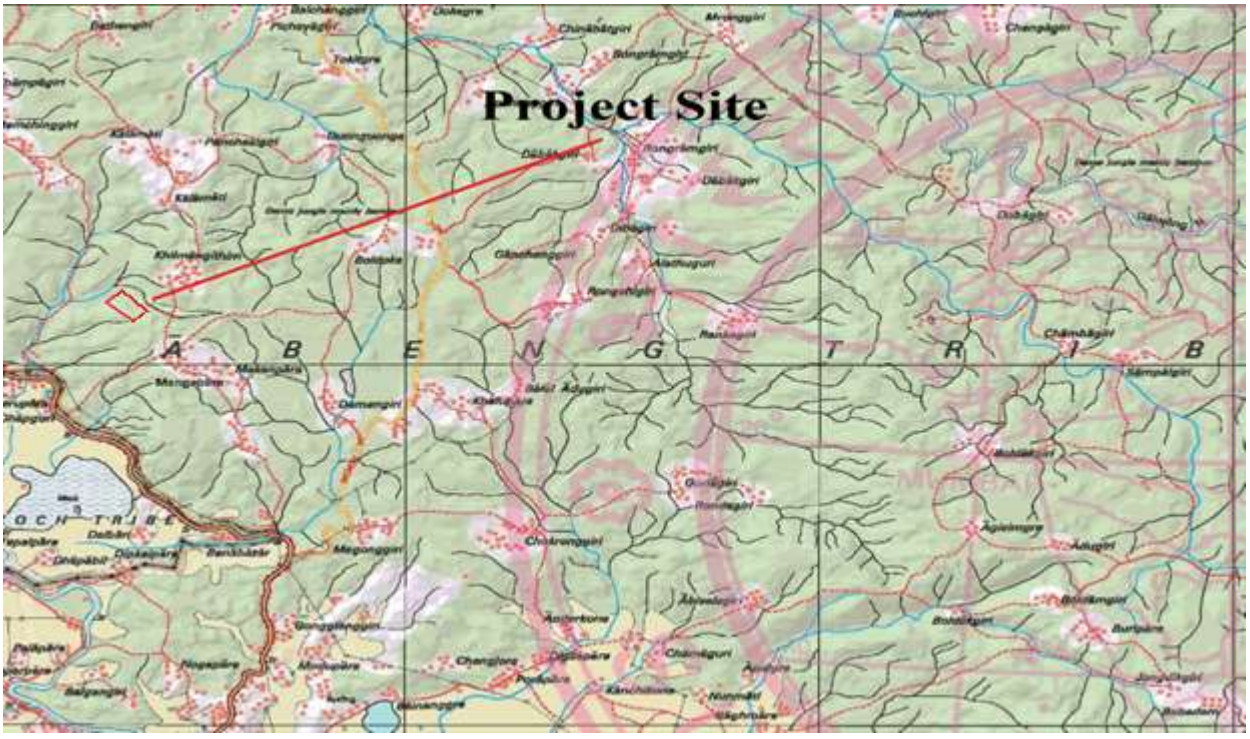


Figure 1.2: SOI Topo sheet showing Location Map of the mine lease area

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 21st December, 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 State 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 in compliance with the ToR No. ML/SEIAA/MIN/WGH/P-106/2020/4/1613 dated 29th January 2021 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 stone 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 letter of intent issued by Government of Meghalaya vide letter no. B/16/VII/213 dated 28.01.2019 is attached as **Annexure II**.
3.	All documents including approved mine plan, EIA and public Hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management, mining technology etc. and should be in the name of the lessee.	The EIA report including approved mining plan is compatible with one another in all respect including production levels, waste generation and its management, mining technology etc.
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	The study area map has been shown in Figure 1.1 and 1.2 at page no. 3 of Chapter 1.

	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 l: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.	SOI Topo sheet showing Location of the mine lease area is shown in Figure 1.2 at page no. 3 of Chapter 1. The land use map of the proposed project covering 10 km study area w.r.t project site has been prepared and shown in Figure 3.7 at page no. 21 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 land proposed for mining activities is non forest land. The land use details have been have been described in Section 4.3 at page no. 2 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.	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 at page no. 2 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.	The method of mining is opencast semi mechanized mining. All the issues relating to mine safety are detailed in EIA report. Kindly refer Risk assessment in section 7.2 at page no. 1 in Chapter 7 & Disaster Management Plan in section 7.3 at page no. 4 in Chapter 7.
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.	The study area map has been shown in Figure 1.1 and 1.2 at page no. 3 of Chapter 1. In Boulder stone mine the maximum quantity of excavated rock is saleable in the form of lump, grit and powder. As per the mining plan around 5,898 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.
10.	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.	The land use map of the proposed project covering 10 km study area w.r.t project site has been prepared and shown in Figure 3.7 at page no. 21 of Chapter 3.
11.	Details of the land for any over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R & R issues, if any, should be given.	As per the mining plan around 5,898 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. Details are covered in section 2.7 of Chapter 2.
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.	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
14.	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	No wildlife Sanctuary/National Park is situated within 10 km radius from the proposed mine.

	and accordingly, detailed mitigative measures required, should be worked out with cost implications and submitted.	
15.	Location of National Parks, sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/ Elephant Reserves/(existing as well as proposed), if any, within 10 km of the mine lease should be clearly indicated, supported by a location map duly authenticated by chief wildlife warden. Necessary clearance, as may be applicable to such projects due to .proximity of the ecologically sensitive areas as mentioned above, should be obtained from the Standing Committee of National Board of Wildlife and copy furnished.	No wildlife Sanctuary/National Park is situated within 10 km radius from the proposed mine.
16.	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 from page no. 22 to 27 of Chapter 3.
17.	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 Required.
18.	one season (non-monsoon) [i.e. March-May (summer Season); October-December (post	The baseline data for one Season (winter season) was collected from

	monsoon season); December-February (winter season)] primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and EMP Report. Site specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the predominant downwind direction. The mineralogical composition of PM10, particularly for free silica, should be given.	December 2020 to February 2021. The details of Ambient Air Quality have been described in section 3.5 of Chapter 3. The Baseline data on other parameters are given in Chapter 3.
19.	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 carried out for the project and has been described in section 4.4 of Chapter 4.
20.	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.	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 details of Water requirement for the project have been described in section 2.8 at page no. 11 of Chapter 2.
21.	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.	Not required.
22.	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.
23.	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 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. Mining shall be done keeping all the safety procedures in mind. Anticipated impact on the water quality both surface and ground water assessed and mitigation measures are suggested & provided in section 4.2 of Chapter 4.
24.	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 applicable as ground water intersects is not possible.
25.	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.
26.	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 elevation range within the project site is 116 mRL to 136 mRL. The working depth is from Bench levels 134mRL (Top bench) to 116mRL (lowest bench). The groundwater table depth in project district varies from 1.09 mbgl to 6.12 mbgl during study period. The details have been described in section 2.7 of Chapter 2.
27.	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	305 nos. of trees will be planted on 0.19 ha of land 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. The Greenbelt Development Plan has been described in section 9.9 at page no. 5 of Chapter 9.

	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.	
28.	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 proposed increase in traffic density will not cause significant impact on the traffic since the connecting road is capable of handling this increase in traffic density. The impact on Traffic has been mentioned in section 4.13 at page no. 13 of chapter 4.
29.	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 and included in EIA.
30.	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.	Extensive plantation will be done in the entire lease area as per ultimate plan. The details have been described in section 4.3 of Chapter 4.
31.	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.	Occupational safety and health is very closely related to productivity and good employer-employee relationship. The factors of occupational health in mining project are mainly dust and land degradation. Safety of employees during operation and maintenance etc. shall be as per Mines rules and regulations. The details have been described in section 4.10 at page no. 11 of Chapter 4.
32.	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.	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. Details are provided in section 4.11 at page no. 11 of Chapter 4.
33.	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	The mine area does not cover any habitation. Hence the mining activity does not involve any displacement of human settlement. The mining

	possible, quantitative dimensions may be given with time frames for implementation.	operation will not disturb/ relocate any village or need resettlement. Thus no adverse impact is anticipated. The details have been described in section 4.9 at page no. 10 of Chapter 4.
34.	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.	Detailed EMP is prepared including all the administrative aspects of ensuring that mitigative measures are effectively monitored, after approval of the EIA. The detailed Environmental Management Plan (EMP) has been described in Chapter 9.
35.	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.
36.	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.
37.	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 project cost is Rs. 7.96 Lakhs and EMP Capital cost is Rs. 2.66 Lakhs. 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.
38.	A Disaster management Plan shall be prepared and included in the EIA/EMP Report.	The Disaster Management Plan is aimed to ensure safety of life, protection of environment, protection of installation and restoration of production. The detailed Disaster management Plan has been described in section 7.3 at page no. 4 of Chapter 7.
39.	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 proposed project will create employment and improvement in the social and physical infrastructure The detailed project benefits have been described in Chapter 8.
40.	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	The compliance of recommendation has been done in various chapters of this EIA and EMP report.

41.	Compliance of the Ministry's Office Notification No. GSR-94 (E) dated 25.01.20I8 - mandatory implementation of Dust mitigation measures for construction and demolishing activities	Compliance of the Ministry's Office Notification No. GSR-94 (E) dated 25.01.2OI8 - mandatory implementation of Dust mitigation measures for construction activities has been included in the section 4.14 of Chapter 4 of EIA/EMP report.
42.	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.	The total cost of the project is Rs. 7.96 Lacs and the amount for CER activities has been worked out to Rs. 0.50 Lac. The year wise allocation of funds for the various activities proposed to be taken up under CER programme has been presented in Table 9.3 at page no. 9 of Chapter 9.
43.	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, 20l7 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.	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, 20l7 in Writ Petition (Civil) No.114 of 2014 has been included in the section 4.14 of Chapter 4 of EIA/EMP report.
44.	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	Documents have been provided in English language.
(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 available on the website of this Ministry, should be followed	Complied
(vii)	Changes, if any made in the basic scope and project parameters (as submitted in	Noted

	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-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.	N.A
(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 approved mining plan has been attached as **Annexure IV.**
45.	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 and its subsequent amendments and circulars/OMs issued by the ministry from time to time.	EIA/EMP report has been prepared as per the generic structure prescribed in Appendix-Ill of the EIA Notification, 2006, after incorporating the details of public hearing.

CHAPTER 2: PROJECT DESCRIPTION

2.1 TYPE OF PROJECT

The project is proposed for the excavation of boulder stone over an area of 1.26 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 boulder stone 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 at Dhapguri, P.O Zikabari, District West Garo Hills, Meghalaya. The lease co-ordinates and connectivity details are listed below in table **2.1.**

Table 2.1: Coordinates of the project site

Pillar	Latitude	Longitude
1	25°38'12.61"N	90°00'52.99"N
2	25°38'14.04"N	90°00'54.10"N
3	25°38'10.73"N	90°00'59.48"N
4	25°38'09.36"N	90°00'58.54"N

The lease is well connected to Singimari Garobada Tura road which is at a distance of approx. 2.0 km from the mine lease area.

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

2.3.1 Lease Hold Area

The lease has been intended to allot vide Letter of intent (LoI) no. B/16/VII/213 dated 28.01.2019. 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	1.26 hectares occupied by lesse/applicant	**1.26**
Total	**Nil**	**Total**	**1.26**

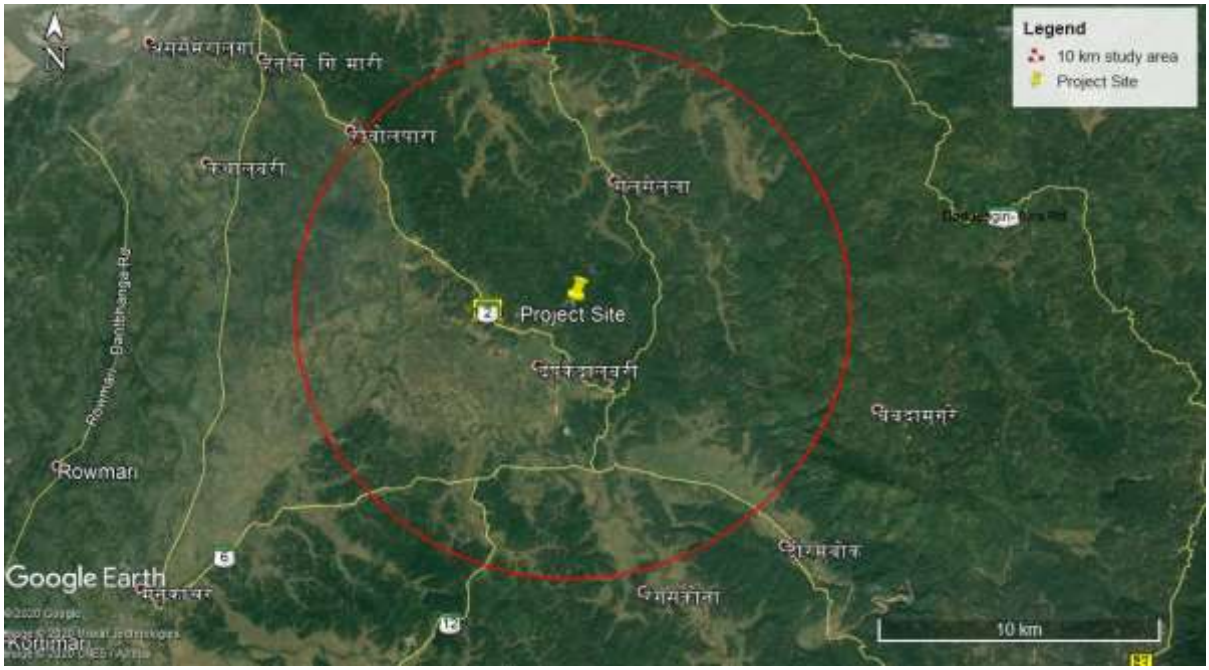


Figure 2.1: Map of the project site

Figure 2.2: Photographs of the project site

2.4 TOPOGRAPHY & GEOLOGY

Topography

The West Garo Hills district is mostly hilly with plains fringing the northern, western and the south-western borders. There are three important mountain ranges in the districts of Garo Hills.

Tura Range: This is one of the most important mountain ranges in the West Garo Hills. The Tura range is about 50 km long and extends in the east-west direction from Tura to Siju in the South Garo Hills district. The mountain peaks that are located in this range are Tura Peak, Nokrek Peak, Meminram Peak, Nengminjok Peak, Chitmang Peak The highest peak of this range is the Nokrek (1412 m.) lying 13 kms.south-east of Tura. To the west of the Tura range low hill ranges run from north to south, and to the north of the Tura range hill ranges run parallel to it, gradually increasing in height till they meet in the south.

Now the entire Tura range comes under the management of Nokrek National Park. These high ranges are strictly protected as Catchment areas right from the time of British Administration in Garo Hills. There is no human habitation in the heart of these ranges which has now became an ideal home to various flora and fauna.

Arbella Range: Arbella Peak is 999 metres high. It lies on the northern side of Asananggre village on the Tura Guwahati road. Most of the peaks in this mountain range fall in the East Garo

Hills district: Ranggira Range: This mountain range lies on the western fringe of the district and ends in Hallidayganj village. The height of this peak is 673 metres.

Geology

The West Garo Hills is situated in the western part of the Meghalaya Plateau which is supposed to be the continuation of Indian Peninsular Shield. Three distinct groups of rocks are observed in the Garo Hills. The basement consisting of gneisses, granitoids and related rocks, which from the Precambrian Gneissic Complex. The AMGC of the Proterozoic age occupies almost the entirety of the West Garo Hills district and is represented by migmatite/banded gneiss, augen gneiss biotite gneiss and unclassified gneiss.

The elevation range within the lease area is 136 mRL to 116 mRL. South eastern part of the area is entirely plain land covered with alluvium brought by the river Brahmaputra and its tributaries. Along the foothills of Garobadha, there are several depressions filled by stagnant water forming the so called bills (swampy area) in the area. The mineral is exposed in the whole lease area. The area is hilly and stony. No habitation located in and near the lease area. The deposit is in private land. No PWD road passes through the area. Summarized Regional Geology setup of the area is presented in table 2.2.

Table 2.2: Stratigraphic Sequence

Age	Group	Formation	Member	Rock types
Quaternary to recent		Alluvium		Pebbles, lloses soil, sand and clay
Mid Miocene to Oligocene	Garo	Chengapara Baghmara		Loose, poorly cemented micaceous S St, siltstone and clay
Palaeocene to Eocene	Jaintia	Kopili Shella Langpar	Sylhet L.St Sylhet S.St	Argillaceous sediments Dominantly limestone Ferruginous sandstone Coarse S.St sandy L.St Calc shale
Jurasssic	Unconformity Basaltic flow, Lamprophyre and dolente dykes and skills Non Conformity			
Late Carboniferous to Permain	Lower Gondwana	Karhar Bari		Gritty to pebbly, coarse to very coarse grained sandstone alternating with medium to fine grained sandstone. Carbonaceous shale and coal stringers
		Talchir		Medium to fine grained

				sandstone, light greenish grey siltstone and shale, conglomerates with greenish matrix.
Proterozoic & Archaean (?)	Assam Meghalaya Gneissic Complex			Pegmatites, aplites and quartz veins, granitoids (Porphyritic and grey) granite Gneiss, biotite Gneiss and hornblende gneiss/migmatites older metasedimentaries

Source: Approved Mining plan

2.5 SURFACE DRAINAGE PATTERN

The Tura range form watersheds in the West Garo Hills district, from which the rivers flows towards Bangladesh plains in the south and the Brahmaputra valley in the north and the west. The important rivers of the north group are the Kalu, Ringgi and the Didak. The important rivers of the southern group are the Bhogai, Dareng etc. The Tura range is also the source of the Simsang (Someswari), one of the major rivers of Meghalaya, whose valley is of the most important feature in the South Garo Hills.

Someswari: This is the largest and the second longest river in the whole district. The river is locally known as Simsang. It starts from Nokrek mountains and runs towards the east, passing through Rongrenggre, Williamnagar the headquarters of East Garo Hills district, Nongalbibra, Siju, Rewak and lastly Baghmara the headquarters of South Garo Hills district.

The upper course of this river is not navigable due to the high number of cataracts and numerous huge stones. However the lower course has many deep pools and falls. They are Mirik, Matma, Kan´chru Suk, Jamiseng, Warisik, Bobra, Goka etc. The chief tributaries are Chibok, Rongdik, Rompa and Ringdi rivers

Jinjiram: It starts from Derek village and its main tributary starts from Upot Lake. It runs towards the east connecting with Gagua river, then runs through the border of Goalpara towards Phulbari and reaches Hallidayganj where it enters the Goalpara district. It is the longest river in the Garo Hills districts.

Kalu: Locally this river is called Ganol. Its sources start from Tura peak and runs towards the west through Damalgre, Garobadha and Rangapani before it enters Goalpara district. Its chief tributaries are Dilni and Rongram rivers

Didak: It stars from Anogre village and runs through Garo Hills district before it enters into Goalpara district.

Bogai: Locally known as Bugi. Its source starts from the southern side of Nokrek mountains and runs through Dalu village and enters into Mymensingh district in Bangladesh.
Rongai: Starts from Arabela peak and runs through Ringgegre village and then falls into Jinjiram river. Locally known as Ringge river.

Dareng or Nitai: The source is on the southern side of Nokrek Mountain. It runs southwards through Silkigre and enters into Bangladesh. It has many famous deep pools like Warima, Rong´ang, Bamon etc. where Bamon is the deepest. The chief tributaries are Kakija, Daji and Rompa.

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

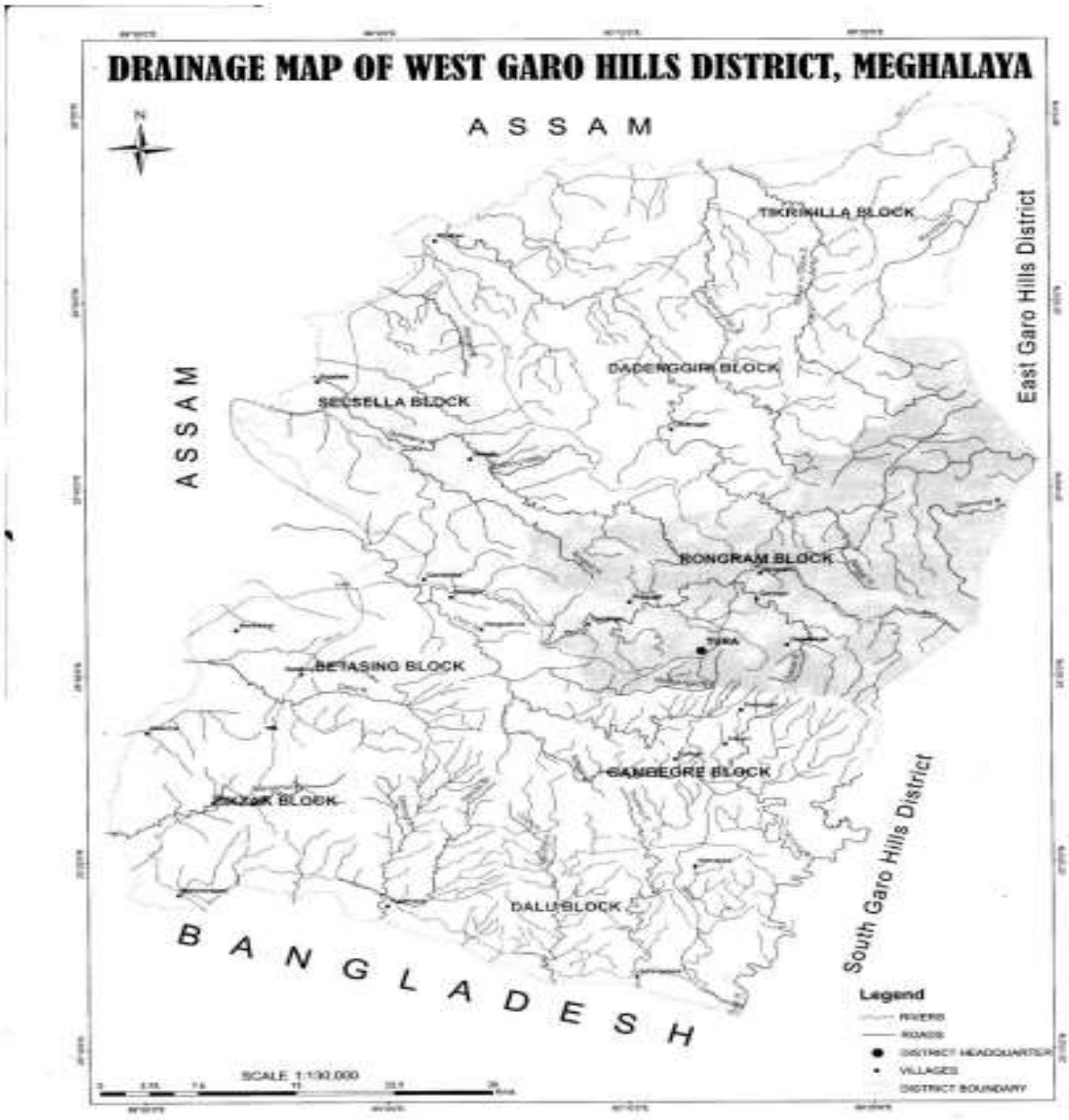


Figure 2.3: Surface Drainage Map

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 0.12 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)

Resources have been dived into two categories such as proved reserves and probable reserve.

Up to an average depth of 25 m (from ground level) has been taken as proved reserve category on the basis of granite rock exposed in the quarry face of the nearby mines and also from exposure hill top and slope as well as from the nala cutting section around the applied area and further upto a depth of 5 m has been taken as probable reserve category.

Mineable reserve is based on the mineable part of the reserve. Mineable minerals (boulder stone) reserve has been calculated from geological reserve in the area considering the stone which is to be left out and maintained as safety barrier within ML boundary and in consideration of ultimate pit limit as calculated from Geological plan and sections. Details of mineral

resources and summary of total mineable reserve has been presented in Table 2.3 and Table 2.4 respectively.

Table 2.3: Details of Mineral Resources

Category	Recoverable Reserves (Tonnes)
Measures mineral resources	886222
Indicated mineral resources	175560
Blocked measured mineral resources in safety barrier and UPL	483213
Blocked indicated mineral resources in safety barrier and UPL	169008

Table 2.4: Summary of Total Mineable Reserve

Category	Recoverable Reserves (Tonnes)
Proved category	403010
Probable category	6552
Total	**409562**

Total mineable reserves: 4,09,562 tonnes

Production

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 are as per the situation at field. Proposed Year-wise Production is give below in table 2.5.

Table 2.5: Proposed Year-wise Production

Year	Production of boulder stone in tonnes	Production of soil in tonnes
I	40121	1518
II	40040	1518
III	40130	1932
IV	40365	00
V	40513	930
Total	**201169**	**5898**

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 30 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 2.6** along with the breakup.

Table 2.6: Details of Manpower requirement

Employees	Future
Manager	1
Supervisor	1
Junior Supervisor	1
Blaster	1
Blaster Helper	1
Storekeeper	1
Attendance clerk – cum register Keeper	1
Excavator Operator	1
Compressor Operator	1
Jackhammer Drill Operator	2
Tipper Driver	1
Rock Breaker operator	1
Water Tanker Driver	1
Semi-skilled Miners	12
Unskilled	4
Total	**30**

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 5898 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.

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.**

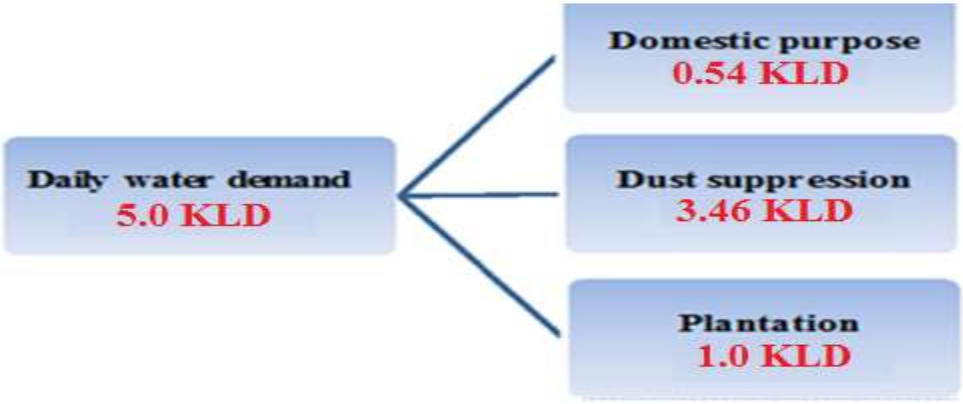


Figure 2.4: Details of water requirement

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 2020 to February 2021 (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.**

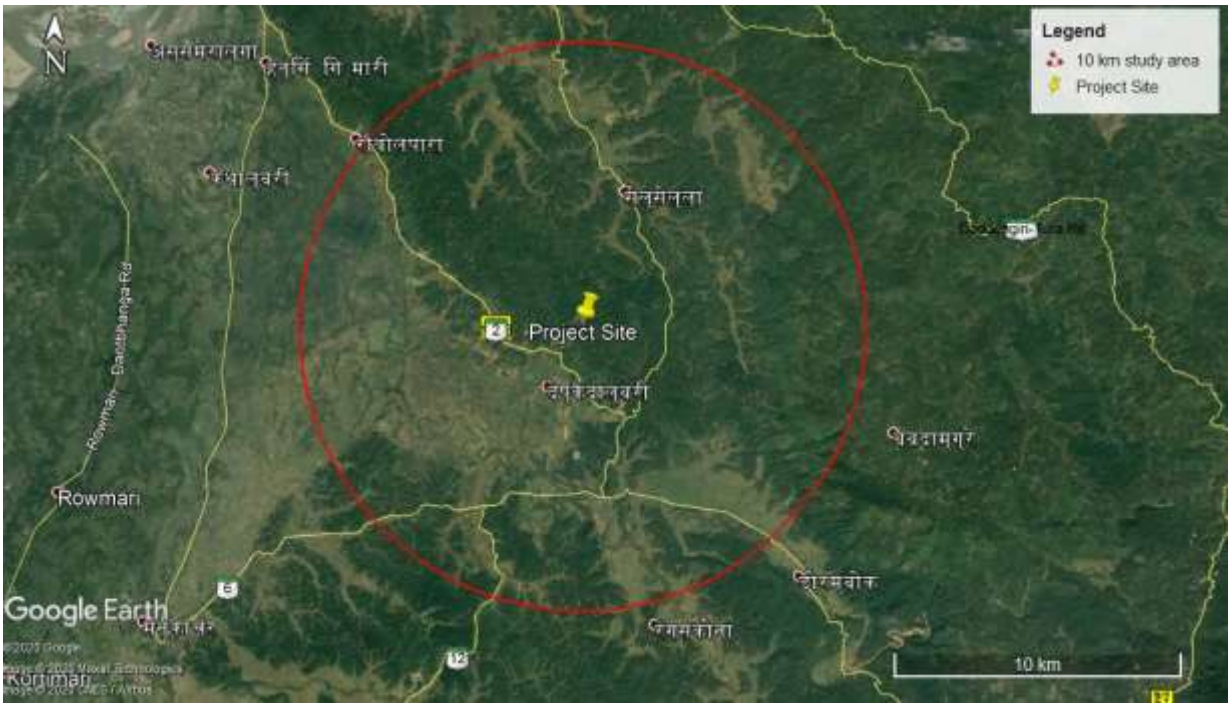


Figure 3.1: Study Area Map (10 km radius)

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 2020 to February 2021) 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

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 remains around 34^0C, 24^0C and 4^0C. Maximum precipitation takes place during month of July and August. The hottest months are May and June and coldest are of December and January.

The climate of the district is largely controlled by South-West monsoon and seasonal winds. The West Garo Hills district being relatively lower in altitude to the rest of Meghalaya, experiences a fairly high temperature for most part of the year. The average rainfall is 330 cms. of which more than two-thirds occur during the monsoon, winter being practically dry. The district has mostly dense tropical mixed forest, and a small patch of temperate forest in the higher parts of the Tura range.

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 west direction in project site and the average wind speed is 5.9 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, 2020 to February, 2021.

Table-3.1 (a): Meteorological Data Parameters at Project site for the months of December, 2020 to February, 2021

Date	Temperature, deg C			Humidity, %			Pressure, hPa			Wind Speed, km/Hr	Predominant Wind Direction From	Rainfall mm
	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Avg		
December	2.6	26.2	18.7	59	78	66.7	839.2	841.9	842.8	5.4	NE	12.7
January	3.1	28.5	21.6	57	73	64.9	838.5	841.2	841.7	6.1	NW	13.5
February	3.5	29.9	22.9	53	69	60.5	837.8	840.7	840.9	6.3	W	18.6

Source: Weather station

Table-3.1 (b): Meteorological Data Parameters at Shillong district (Nearest IMD from the proposed project) for the months of December, 2020 to February, 2021

Date	Temperature, deg C			Humidity, %			Pressure, hPa			Wind Speed, km/Hr	Predominant Wind Direction From	Rainfall mm
	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Avg		
December	3.7	19.2	12.7	61	88	75.3	841.5	843.6	842.8	3.5	SE	12.5
January	2.6	18.3	10.3	62	86	73.5	840.7	842.5	841.6	3.6	SW	13.9
February	3.5	20.6	13.5	59	77	66.2	839.9	841.6	840.4	5.5	W	19.4

Source: IMD

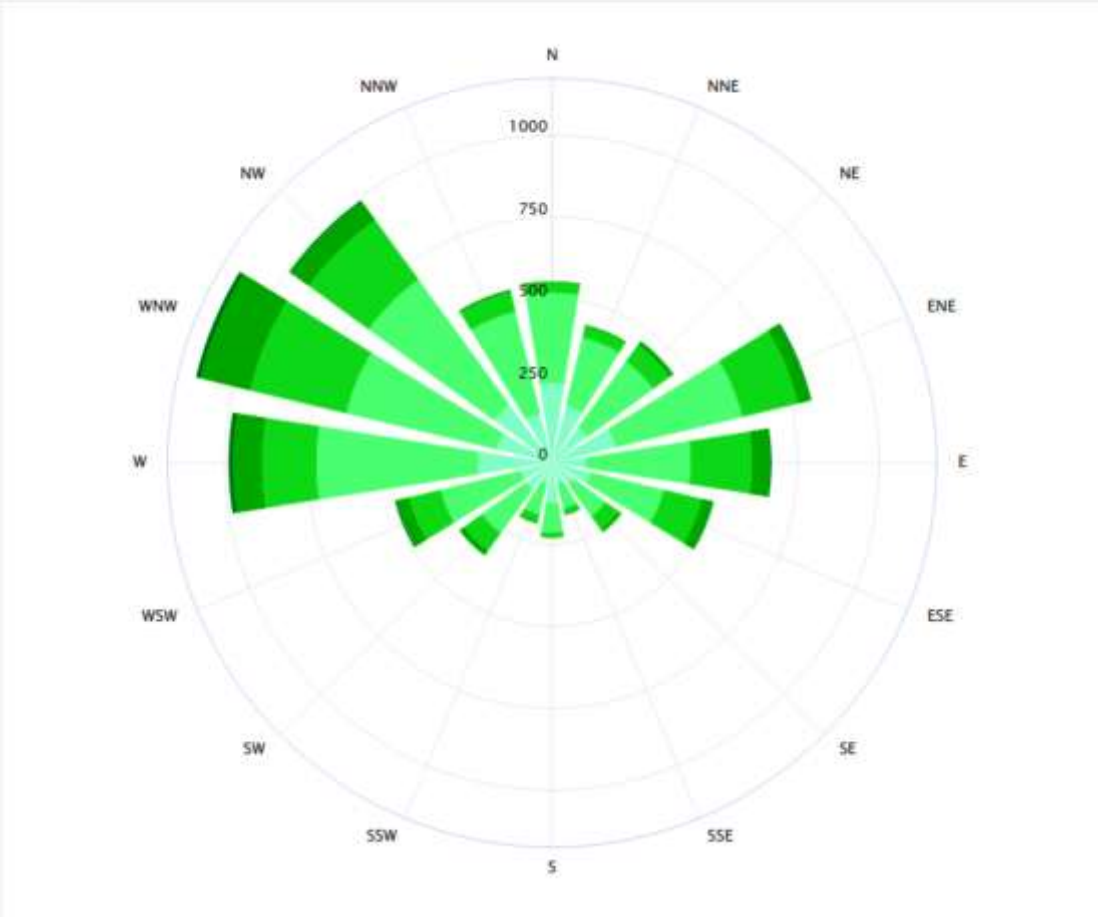


Figure 3.2: Wind-rose of the project site (December, 2020 to February, 2021)

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 5 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), Nitrogen dioxide (NO_2) and free Silica 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 98^{th} 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	Shalibharin	W	4.9
AAQ3	Benabazar	E	3.5
AAQ4	Manggapara	SE	3.3
AAQ5	Garobadha	S	5.8

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	46.2	71.7	62.5	70.2
AAQ-2	Shalibharin	43.4	60.2	56.9	59.3
AAQ-3	Benabazar	45.6	63.9	58.4	62.5
AAQ-4	Manggapara	44.9	61.8	57.2	60.6
AAQ-5	Garobadha	47.5	72.5	64.6	71.4
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	21.6	29.4	24.5	28.2
AAQ-2	Shalibharin	18.2	24.3	21.7	23.2
AAQ-3	Benabazar	19.4	27.5	22.9	26.4
AAQ-4	Manggapara	18.5	26.7	21.2	25.2
AAQ-5	Garobadha	23.9	31.2	26.3	30.4
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	6.1	7.4	6.3	6.8
AAQ-2	Shalibharin	5.9	7.0	6.1	6.3
AAQ-3	Benabazar	6.4	7.9	6.8	7.4
AAQ-4	Manggapara	6.1	7.5	6.5	6.9
AAQ-5	Garobadha	6.6	8.1	7.2	7.7
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	8.9	16.9	13.7	15.7
AAQ-2	Shalibharin	7.8	15.3	13.5	14.2
AAQ-3	Benabazar	8.6	16.6	13.9	15.5
AAQ-4	Manggapara	8.4	16.2	12.8	15.1
AAQ-5	Garobadha	10.9	19.4	14.3	18.2
NAAQ Standards	80 (24 hr)				

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

Location		CO (mg/m^3)			
Code	Name of the Station	Min	Max	Average	98th percentiles
AAQ-1	Project Site	0.260	0.370	0.320	0.340
AAQ-2	Shalibharin	0.280	0.390	0.340	0.350
AAQ-3	Benabazar	0.300	0.450	0.370	0.410
AAQ-4	Manggapara	0.270	0.410	0.320	0.370
AAQ-5	Garobadha	0.350	0.590	0.460	0.560
NAAQ Standards	4 (24 hr)				

Table-3.3 (f): Ambient Air Quality in the Study Area (Free Silica)

Location		Free Silica (µg/m^3)			
Code	Name of the Station	Min	Max	Average	98$^{\%}$ percentiles
AAQ-1	Project Site	0.55	1.34	0.98	1.25
AAQ-2	Shalibharin	0.46	1.42	0.92	1.33
AAQ-3	Benabazar	0.54	1.47	1.13	1.36
AAQ-4	Manggapara	0.49	1.43	0.94	1.31
AAQ-5	Garobadha	0.65	1.58	1.16	1.45

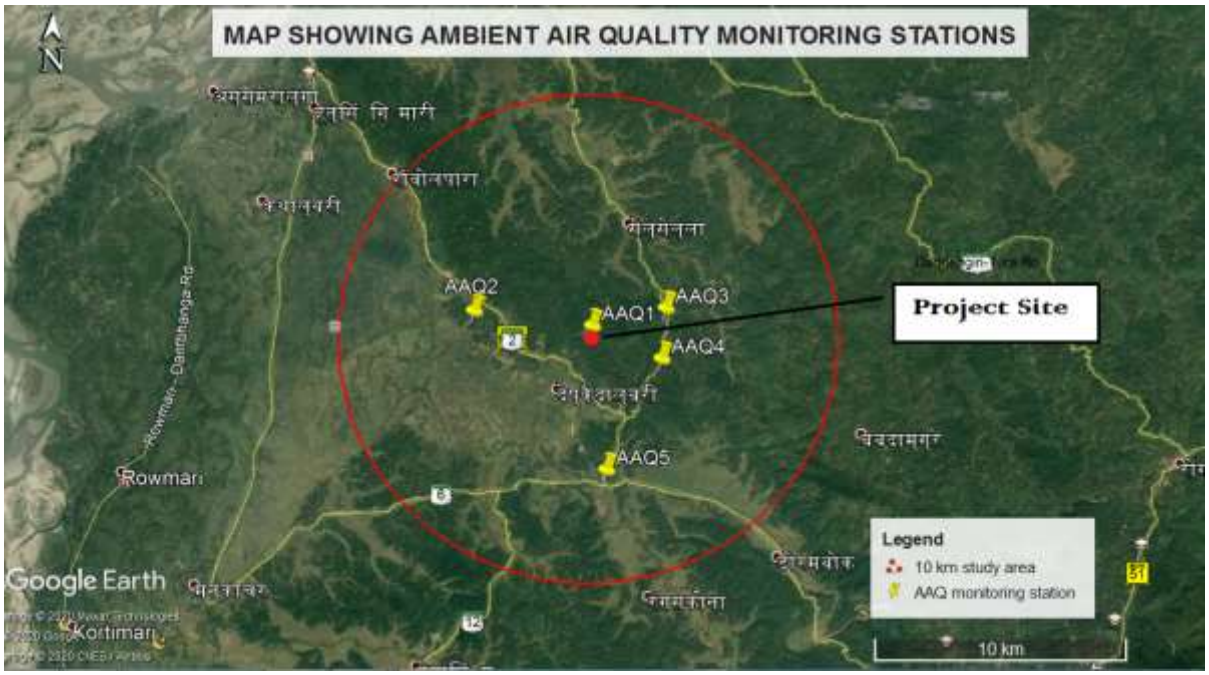


Figure 3.3 Ambient Air Quality Monitoring Stations

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 43.4 µg/m^3 to 72.5 µg/m^3 with the 98th percentile ranging between 59.3 µg/m^3 to 71.4 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 18.2 µg/m^3 to 31.2 µg/m^3 with the 98th percentile ranging between 23.2 µg/m^3 to 30.4 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 SO_2 recorded within the study area was 5.9 to 8.1 µg/m^3 with the 98th percentile ranging between 6.3 µg/m^3 to 7.7 µg/m^3.

The 24 hourly average values of SO_2 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 (NO_2)

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 NO_2 recorded within the study area was in the range of was 7.8 µg/m^3 to 19.4 µg/m^3 with the 98th percentile ranging between 14.2 µg/m^3 to 18.3 µg/m^3.

The 24 hourly average values of NO_2 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.

e) 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 0.260 mg/m^3 to 0.590 mg/m^3 with the 98th percentile ranging between 0.340 µg/m^3 to 0.550 µg/m^3.

The 24 hourly average values of CO 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.

f) Free Silica

The minimum and maximum level of free silica recorded within the study area was in the range of was 0.46 µg/m3 to 1.58 µg/m3. The minimum concentration was recorded at Shalibharin (AAQ2) and the maximum concentration was recorded at Garobadha (AAQ5).

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	Shalibharin	W	4.9
NQ3	Benabazar	E	3.5
NQ4	Manggapara	SE	3.3
NQ5	Garobadha	S	5.8

Table 3.5: Leq Noise Level in the Study Area (during day and Night) (January 2021)

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	49.2	37.3	**75**	**70**	Mine Site (Industrial)
NQ2	49.7	38.2	**55**	**45**	Residential
NQ3	49.0	39.7	**55**	**45**	Residential
NQ4	52.4	40.9	**55**	**45**	Residential
NQ5	58.2	42.8	**65**	**55**	Commercial

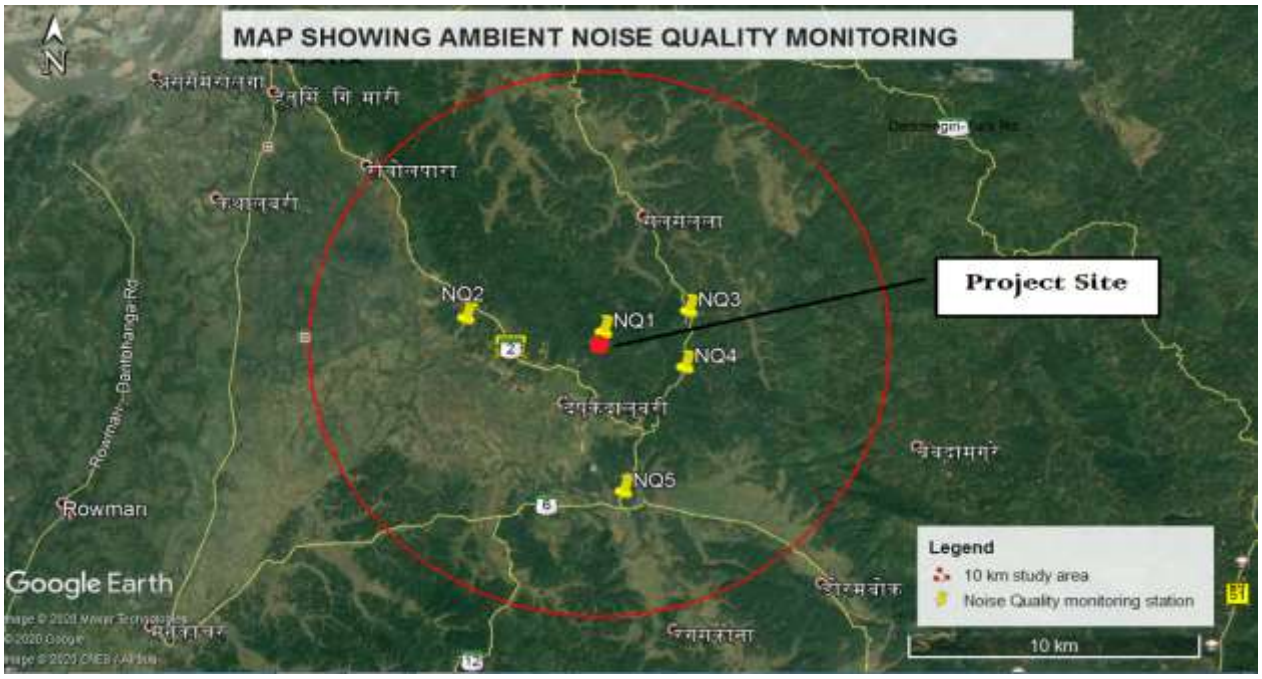


Figure 3.4: Ambient Noise Level Monitoring Locations

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. Maximum noise level recorded at day time is 58.2 dB (A) and at night time is 42.8 dB (A). The status of noise quality within the 10 km zone of the study area is 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 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)
GWQ1	Near project site	NE	0.690
GWQ2	Shalibharin	W	4.9
GWQ3	Benabazar	E	3.5
GWQ4	Manggapara	SE	3.3
SWQ1	Garobadha	S	6.7

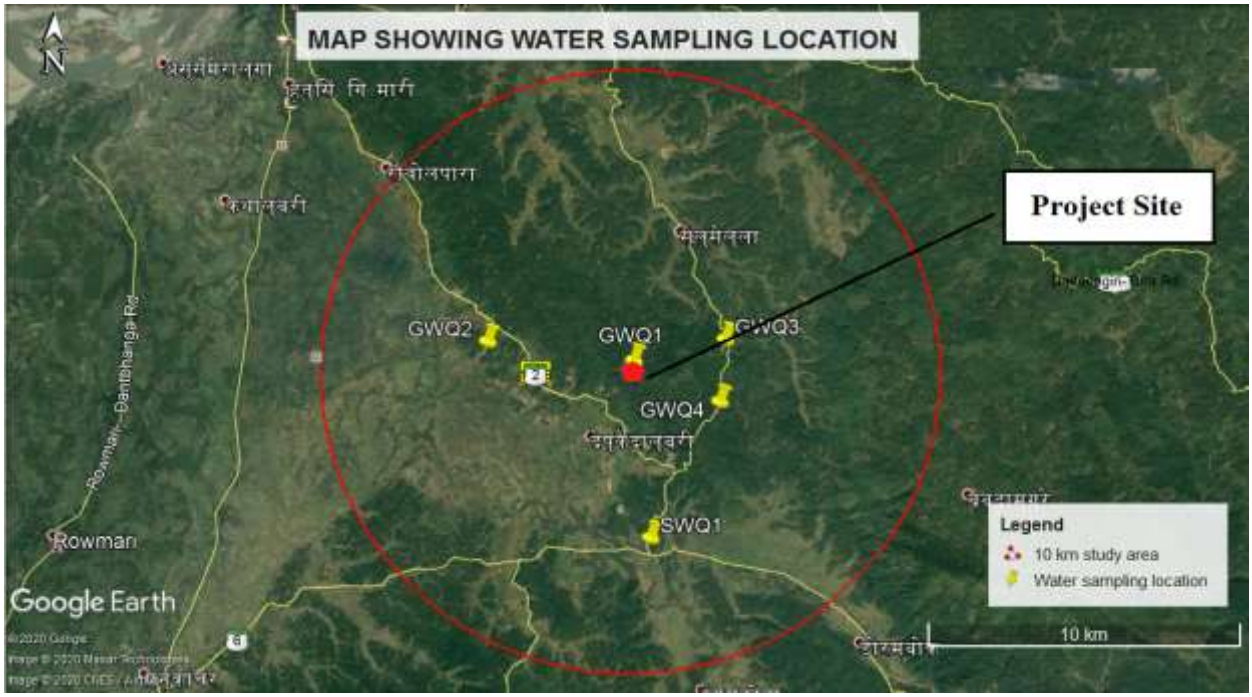


Figure 3.5: Location Map of Water Sampling Sites

Table 3.8: Water Quality during the month of January 2021

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	7.17	7.41	7.14	7.36	6.95
2.	Colour	Hazen	5	25	<5	<5	<5	<5	<5
3	TSS	Mg/l	-	-	BDL	BDL	BDL	BDL	BDL
4	Dissolved Oxygen	% By Mass	5	10	6.7	7.3	5.8	5.6	6.9
5	BOD (at 27^0C 3-Days)	mg/l	-	-	BDL	BDL	BDL	BDL	3.4
6	COD	mg/l	-	-	BDL	BDL	BDL	BDL	12.9
7	TKN	mg/l	-	-	3.3	2.5	2.4	2.1	3.2
8	Total Hardness (as CaCO3)	mg/l	200	600	167.25	177.36	183.50	187.75	132.20
9.	Calcium (as Ca)	mg/l	75	200	49.20	51.8	53.3	55.1	33.4
10	Magnesium (as Mg)	mg/l	30	100	11.14	12.6	13.0	12.9	9.7
11	Ammonia (NH3)	mg/l	-	-	BDL	BDL	BDL	BDL	BDL
12	Electrical Conductivity	Microm /hos/c m	-	-	472.19	434.50	437.42	445.62	302.84
13	Chloride (as Cl)	mg/l	250	1000	53.4	48.5	40.1	52.8	33.6
14	Sulphate (as SO4)	mg/l	200	400	34.5	38.6	30.2	38.5	24.91
15	Phosphates	mg/l	-	-	<0.1	<1.0	<1.0	<1.0	<1.0
16	Nitrate (as NO3)	mg/l	45	No Relaxation	0.81	0.95	0.79	0.86	0.96
16	Fluoride (as F)	mg/l	1	1.5	0.20	0.25	0.19	0.21	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	308.45	283.51	285.74	290.82	197.6
23	Iron (as Fe)	mg/l	0.3	1.0	0.25	0.20	0.17	0.19	0.26
24	Alkalinity as (CaCO3)	mg/l	200	600	189	176	193	178	124
25	Sodium (as Na)	mg/l	-	-	37.6	22.3	26.2	19.7	18.1
26	Potassium (as K)	mg/l	-	-	10.9	8.8	9.5	7.4	6.2
Bacteriological Parameters									
1.	Faecal Coliform	MPN/1 00 ml	Shall Not be Detectable		Absent	Absent	Absent	Absent	140
2.	Total Coliform	MPN/1 00 ml	Shall Not be Detectable		Absent	Absent	Absent	Absent	320

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 6.95 to 7.14. 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 283.51 mg/l to 308.45 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 40.1 mg/l to a maximum of 53.4 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 167.25 mg/l to 187.75 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.

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 2021.** 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	Shalibharin	W	4.9
SQ3	Benabazar	E	3.5
SQ4	Manggapara	SE	3.3
SQ5	Garobadha	S	5.8

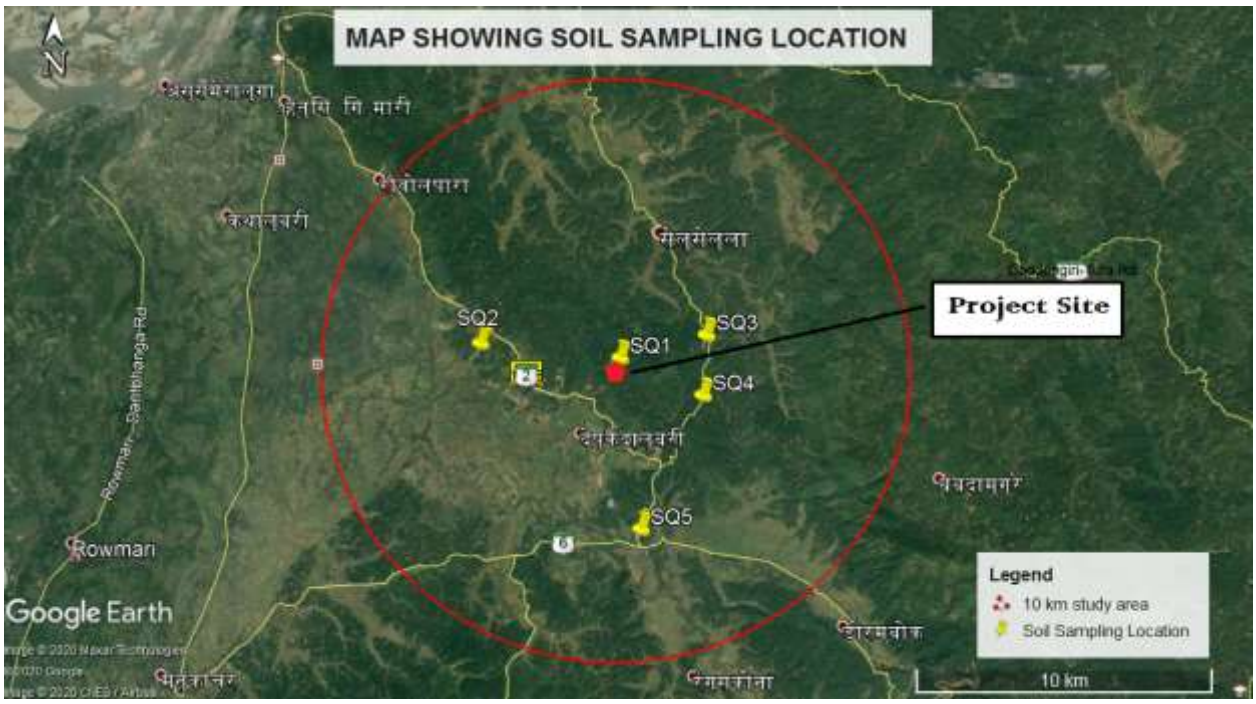


Figure 3.6: Location Map of Soil Sampling Sites

Table 3.11: Physiochemical Properties of Soil (January 2021)

Sr.No.	Parameters	Test Method	Unit	SQ1	SQ2	SQ3	SQ4	SQ5
1	pH	TS:2720	-	6.47	6.23	6.37	7.10	6.65
	Bulk Density	TS:2720	gm/cm3	1.19	1.65	1.82	1.63	1.74
	Conductivity	TS:2720	micro mhos/cm	322.6	358.4	314.6	350.2	378.3
	Moisture	TS:2720	%	6.6	6.5	6.2	5.8	6.3
2	Texture	TS:2720	-	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam
3	Sand	TS:2720	%	49.2	51.3	48.3	51.7	47.5
4	Clay	TS:2720	%	36.5	33.6	34.8	36.4	37.2
5	Silt	TS:2720	%	14.3	15.1	16.9	11.9	15.3
6	Sodium sulphate	TS:2720	mg/kg	17.4	14.6	13.8	13.2	16.2
7	Potassium (as K)	TS:2720	mg/kg	110.5	114.8	128.4	120.6	121.8
8	CEC	TS:2720	meq/100gm	6.52	6.87	10.57	15.32	14.60
9	Nitrogen	TS:2720	mg/100gm	29.6	27.5	23.8	24.2	30.8
10	Organic Matter	TS:2720	%	1.68	1.92	1.53	1.85	1.46
11	Phosphorous	TS:2720	mg/100gm	1.32	1.85	0.92	0.97	1.15
12	Calcium	TS:2720	meq /100gm	2.76	2.92	4.12	4.96	4.10
13	SAR	TS:2720	meq /100gm	0.61	0.78	0.85	0.96	0.62
14	Magnesium	TS:2720	meq /100gm	4.92	4.78	4.23	4.52	4.60

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 (6.23 to 7.10). 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 314.6 – 378.3 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**

Land use delineation of 10 km radius area w.r.t project site 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	346	1.10
2	Water bodies	524	1.66
3	Waste land	412	1.44
4	Crop land	10864	34.5
5	forest area	19254	61.3
	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 State highway in the area. Then depending on the capacity of the mine, the number of trucks that will be added to the present scenario will be compared to the carrying capacity as recommended by Indian Road Congress (IRC). The existing volume of traffic and, the Level of Service are given in **Table-3.13 (i).**

Table 3.13 (i): Existing Traffic Scenario & LOS

Road	V (PCU/day)	C (PCU/day)	Existing V/C Ratio	LOS
Singimari Garobada Tura road	550	1200	0.46	B

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

During Mine operation

Total Capacity of mine : 40513 TPA

No. of working days : 300 days

Total Capacity of mine/day : 40513 /300 = 135.04 tonnes/day

Truck Capacity : 10 tonnes

No. of trucks deployed per day : 135/10 = 13.5 say 14 trucks per day

No. of trucks deployed/day to & fro : 14*2=28 trucks

Increase in PCU/day : 62

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
Singimari Garobada Tura road	612	1200	0.51	B

From the above analysis it can be seen that the V/C ratio is likely to be changed to 0.51 on Singimari Garobada Tura road 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 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:

West Garo Hills district is located at the westernmost part of Meghalaya. The district is bounded by East Garo Hills district on the east, by South Garo Hills district on the south-east, Goalpara district of Assam state on the north and north-west and Bangladesh on the south.

3.11.3 Floral Community

S. No.	Forest Type	Distribution
1.		**Tropical Forests**
	Tropical Wet Evergreen Forests	Distributed in high rainfall areas and near catchments areas. Trees exhibit clear zonation with dense, impenetrable herbaceous undergrowth

	Tropical Semi-evergreen Forests	These forests occupy the northeastern and northern slopes of the state, typically up to elevations of 1200m and annual rainfall of 150 – 200 cm with a comparatively cooler winter. The number of species here is less than the evergreen zone. There are also a few deciduous species in these forests such as Dillenia pentagyna and Callicarpa arborea. There is clear stratification of the trees in these forests.
	Tropical moist and dry deciduous Forests	Below 150 cm and at low elevations. Represented by only sub-climax or man-made forests. Characterized by seasonal leaf shedding. Recurrent forest fires are a common phenomenon here. Deciduous forests are extensively distributed across the state.
	Bamboo tracts	Bamboo tracts appear in jhum fallows of 10 – 15 years. These forests at places form pure strands. The common bamboo species in Meghalaya are Dendrocalamus giganteus, Bambusa bambos, Cephalostychum latifolium, Melocanna bambusoides, etc.
	Grasslands and Savannas	Grasslands are only a result of removal of original forest cover. The rolling grasslands covering large areas are distributed throughout the Shillong plateau, around Riangdo, Ranikor, Weiloi, Mawphlang, Mawsynram, Cherrapunjee, Shillong, Jowai, Jarain and Sutnga in the Khasi and Jaintia hills and major parts of West Garo hills.
2.		**Subtropical Forests**
	Subtropical Forests	Occur between 1000m and 1350m amsl and in deep valleys along the river banks. They are composed mainly of evergreen forests and show abundant growth of mosses and epiphytes. The upper canopy of the forest is occupied by Alcimandra cathecartii, Betula almoides, Castanopsis sp., Lithocarpus elegans, Manglietia insignis, etc. and the lower layer is composed of Adina cardifolia, Daphne involucrate, Ethretia acuminata, Garuga pinnpata, Milletia prainii, Syzygium macrocarpus etc.
	Subtropical Pine Forests	These forests are confined to higher reaches of the Shillong plateau and upper slopes of Khasi and Jaintia hills, in a narrow belt showing an east – west direction. Pinus kesiya is the principal species, often forming pure strands. These forests have developed on shifting cultivation sites and replacement of broad-leaved tree species like Eaeocarpus lancifolius, Erythrina arborescens, Quercus griffithii, Schema wallichii, S. khasiana etc.
3.	**Sal Forests**: These forests have sal contributing to more than 20 % of the stand.	
	Alluvial Sal	This type conforms to type North Indian Tropical Moist Deciduous Kamrup Alluvial Sal Forests (3C/C2 d (iv)).

	Foothill and Plateau Sal	This type conforms to the type North India Tropical Moist Deciduous Eastern Hill Sal Forests (3c/C1a).
	Very Moist Sal	Khasi Hills Sal (3C/C1 a (ii)).
	Bearing Forests	
	Temperate Forests	Occur at about 1000 m, mostly along the southern slope of Khasi and Jaintia Hills and areas of high rainfall (200 – 500 cm per year) with a severe winter during November – March. Ground frost is also common during December – January. These climatic climax forests are usually found in isolated pockets along valleys, slopes, rivers and streams. The tree species in general show bushy and stunted habit. They form a dense canopy. At lower elevation an intermixing of tropical and sub-tropical elements namely Castanopsis kurzii, C. armata, Elaeocarpus prunifolius, Ficus nemoralis, Myrica esculenta, Manglietia insignis, Schima wallichi, Eurya japonica etc. are observed in these forests.

Table 3.15: Flora of the Study Area

S.No.	Botanical Name	Common name	Family Name
1.	*Vanda*	Vanda Orchid	Orchid
2.	*Podocarpus neriifolia*	Brown Pine	Podocarpaceae
3.	*Cyathea gigantean*	Tree fern	Cyatheaceae
4.	*Ilex khasiana*	-	Aquifoliaceae
5.	*Balanophora dioca*	East-Himalayan Balanophora	Balanophoraceae
6.	*Galeola falconeri*	Falconer's	Orchidaceae
7.	*Epipogium roseum*	Rosy Ghost Orchid	Orchidaceae
8.	*Eulophia sanguinea*	corduroy orchids	Orchidaceae
9.	*Cyathea gigantea*	Tree fern	Cyatheaceae
10.	*Styrax hookerii*	snowbell	Styracaceae
11.	*Fissistigma verrucosum*	hedvekuli	Annonaceae
12.	*Bergenia ligulata*	Pakhanbheda	Saxifragaceae

13.	*Diplazium esculentum*	pucuk paku	Athyriaceae
14.	*Pteris sp.*	Brake Fern	Pteridaceae
15.	*Mussaenda roxburghii*	-	Rubiaceae
16.	*Vaccinium donianum*	Bilberry	Ericaceae
17.	*Thunbergia grandiflora*	Bengal clockvine	Acanthaceae

Table 3.16: Fauna of the Study Area

S.No.	Species	Common name	Family Name
1.	*Mustela kathiah*	Yellow bellied weasel	Mustelidae
2.	*Melogale personata nipalensis*	Burmese Ferret Badger	Mustelidae
3.	*Arctonyx collaris*	Hog-Badger	Mustelidae
4.	*Lutra lutra monticola*	Common Otter	Mustelidae
5.	*Aonyx cinereus concolor*	Oriental small-clawed Otter	Mustelidae
6.	*Viverra zibetha zibetha*	Large Indian Civet	Viverridae
7.	*Viverricula indica*	Small Indian Civet	Viverridae
8.	*Paradoxurus hermaphrodites*	common Palm Civet	Viverridae
9.	*Paguma larvata neglecta*	Masked Palm Civet	Viverridae

Table 3.17: Ungulates found in the Study Area

S.No.	Species	Common name	Family
1.	*Tetracerus quadricornis*	four horned antelope	Bovidae
2.	*Muntiacus muntjak*	barking deer	Cervidae
3.	*Sus scrofa*	wild pig	Suidae
4.	*Manis pentadactyla*	Chinese Pangolin	Manidae

Table 3.18: Other Commonly Found Species (Birds, Reptiles and Amphibians)

S. No	Scientific Name	Common name	Family Name
Avifauna			
1.	*Cairina scutulata*	White-winged duck	Anatidae
2.	*Aquila clanga*	Greater spotted eagle	Accipitridae
3.	*Gallinago nemoricola*	Wood snipe	Scolopacidae
Reptiles			
1.	*Typhlops tenuicollis*	Worm snake	Typhlopidae
2.	*Calamaria pavimentata*	Collared reed snake	Colubridae
3.	*Orthriophis hodgsonii*	Rat snakes	Colubridae
Amphibians			
1.	*Pseudozenodon macropus*	Large-eyed bamboo snake	Colubridae
2.	*Rhacophorus bipunctatus*	Himalaya Flying Frog	Rhacophoridae

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 draft 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.

3.12.1.4 Scope

The Scope of the study is as follows:

a) Collection of baseline data of the study area.

b) Collation of data, analyses and generation of tables.

c) Comprehension of socio-economic status of the people living in the study area.

d) Identification and inventory of probable impacts of the project on social and economic aspects in the study area.

e) Assessment of the probable impacts of the project on the people living in the study area.

f) 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 West Garo Hills District (Project District)

West Garo Hills is an administrative district in Garo Hills of the state of Meghalaya in India. Tura town is the administrative headquarters of the district. The district occupies an area of 3714 km². In 2011 its population was 6,43,291. As of 2011 it is the second most populous district of Meghalaya (out of 7), after East Khasi Hills. West Garo Hills district is located at the westernmost part of Meghalaya. The district is bounded by East Garo Hills district on the east, by South Garo Hills district on the south-east, Goalpara district of Assam state on the north and north-west and Bangladesh on the south.

3.12.4 Population Profile

The description of the project district is presented in **Table 3.19**. According to the 2011 census of India, West Garo Hills has a population of 6,43,291.

Table 3.19: Demographic details of Project District and Tehsil

S.No.	District/Tehsil	Households	Population					
			Total	Male	%	Female	%	Sex ratio
1.	West Garo Hills	1,23,352	6,43,291	3,24,159	50.41	3,19,132	49.61	984

Source: Census of India, 2011

3.12.5 Caste Wise Distribution of Population

Table 3.20 provides detailed information about the SC, ST population in West Garo Hills district as well as on the Project area. The total SC population in West Garo Hills district is 8,810 which is 1.37% of the total population, while ST population is 4,74,009, which is 73.69% of the total population.

Table 3.20: Caste wise distribution of population

Sl. No.	District/Project Area	Schedule Caste (SC)		Schedule Tribes (ST)	
		Total	% of SC	Total	% of ST
1	West Garo Hills	8,810	1.37	4,74,009	73.69

Source: Census of India, 2011

3.12.6 Literacy Rate

District West Garo Hills: The literate population in West Garo Hills district is 3,58,702, out of which male & female are 193,438 and 165,264 respectively. The male literates represent 72.39 % while female represent 62.70% of the total population.

The details of literacy rate and literate people in West Garo Hills tehsil and district are provided in **Table 3.21.**

Table 3.21: Literacy Rate of Project District

S. No	District/Project Area	Number of Literate			Literacy Rate %	
		Total	Male	Female	Male	Female
1	West Garo Hills	3,58,702	193,438	165,264	72.39	62.70

Source: Census of India, 2011

3.12.7 Religion and Culture

West Garo Hills is Christian majority city with approximately 60.62% of district population. Hindu is second most popular religion in district with approximately 19.11 % following it. In West Garo Hills district, Muslim religion is followed by 16.60 %. **Table 3.22** shows the Religious wise distribution of Population of West Garo Hills District.

Table 3.22: Religion wise distribution of Population of West Garo Hills District

Description	Total	Percentage
Hindu	1,22,936	19.11
Muslims	1,06,788	16.60
Christian	3,89,956	60.62
Sikh	209	0.03
Buddhist	3,392	0.53
Jain	144	0.02
Others	16,950	2.63
Not Stated	2,916	0.45

Source: Census of India, 2011

3.12.8 Economic Structure

Table 3.23 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 2,55,693 which is 39.75 percent of total population out of which main workers are 29.28 percent and marginal workers have a share of 10.47 percent while rest nearly 60.25 percent workers are non-workers.

Table 3.23: Main Workers, Marginal Workers and Non-workers of Project District

Sl. No.	District/ Project Area	Total workers	Total worker %	Main workers	Main workers %	Marginal workers	Marginal workers %	Non-workers	Non-workers %
1.	West Garo Hills	2,55,693	39.75	188,371	29.28	67,322	10.47	387,598	60.25

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 30 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.

3.13.4 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.

3.13.5 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.

3.13.6 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.

3.13.7 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 cause health risks if it is not handled carefully. Hence, preventive measures should be taken to protect oneself, while working in a mine. This is a negative impact of mining. The project proponent will undertake the following preventive measures, in order to protect the workers from the exposure of mineral:

1) Consult to Physician

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

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 at Dhapguri, P.O Zikabari, District West Garo Hills, 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. 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

The elevation range within the lease area is 136 mRL to 116 mRL. South eastern part of the area is entirely plain land covered with alluvium brought by the river Brahmaputra and its tributaries. Along the foothills of Garobadha, there are several depressions filled by stagnant water forming the so called bills (swampy area) in the area. The mineral is exposed in the whole lease area. The area is hilly and stony. Proposed working area is far above to the 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 rainfall remains around 1000 mm to 1200 mm per year towards maximum.

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

Existing Land Use Pattern

Category	Area in Hectares
Quarry	0.00
Road	0.01
Total area in use	**0.01**
Balanced unused Area	1.25
Total Applied Lease Area	**1.26**

Land use Pattern after first five years plan period

Category	Area in Hectares
Quarry including road	0.76
Dump with parapet wall and garland drain	0.12
Green belt within safety Barrier	0.19
Total Area in use	**1.07**
Balanced unused Area	0.19
Total Applied Lease Area	**1.26**

Land use Pattern after life of the mine

Category	Area in Hectares
Quarry including reclamation	0.88
Green belt within safety Barrier	0.38
Total Area in use	**1.26**
Balanced unused Area	0.00
Total Applied Lease Area	**1.26**

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	346	1.10
2	Water bodies	524	1.66
3	Waste land	412	1.44
4	Crop land	10864	34.5

5	forest area	19254	61.3
	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. 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 8.2 and 3.9 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}	25°38'15.36"N	90° 0'59.77"E	8.2
Project site	$PM_{2.5}$	25°38'15.36"N	90° 0'59.77"E	3.9

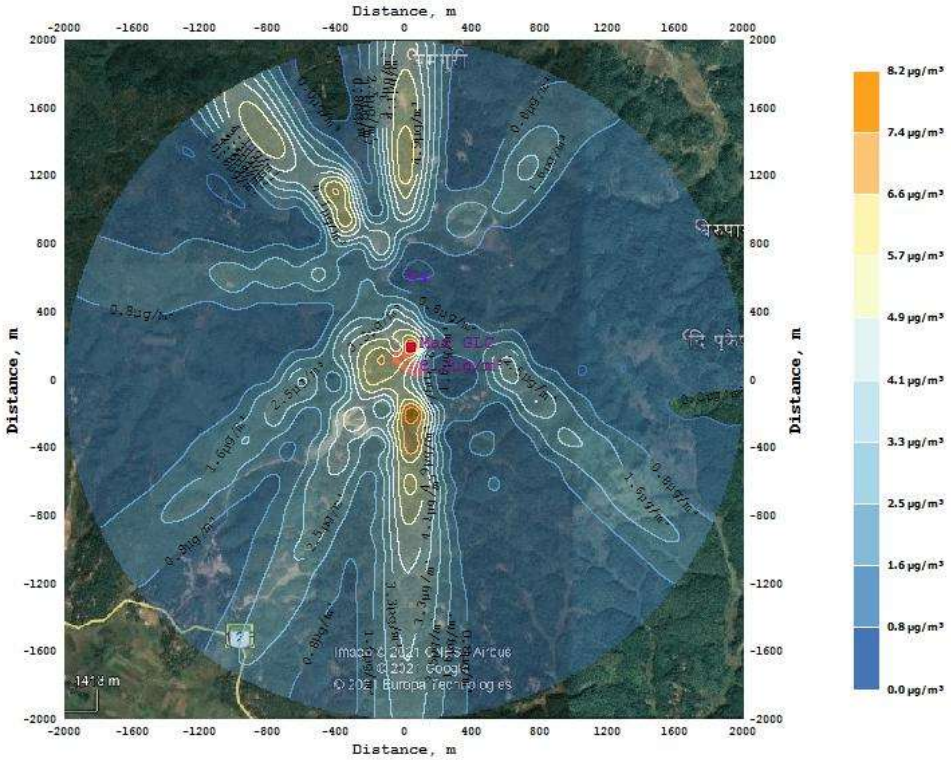


Figure 4.1 (a): Isopleth of Maximum Predicted 24 hourly Ground – Level Concentrations for PM_{10}

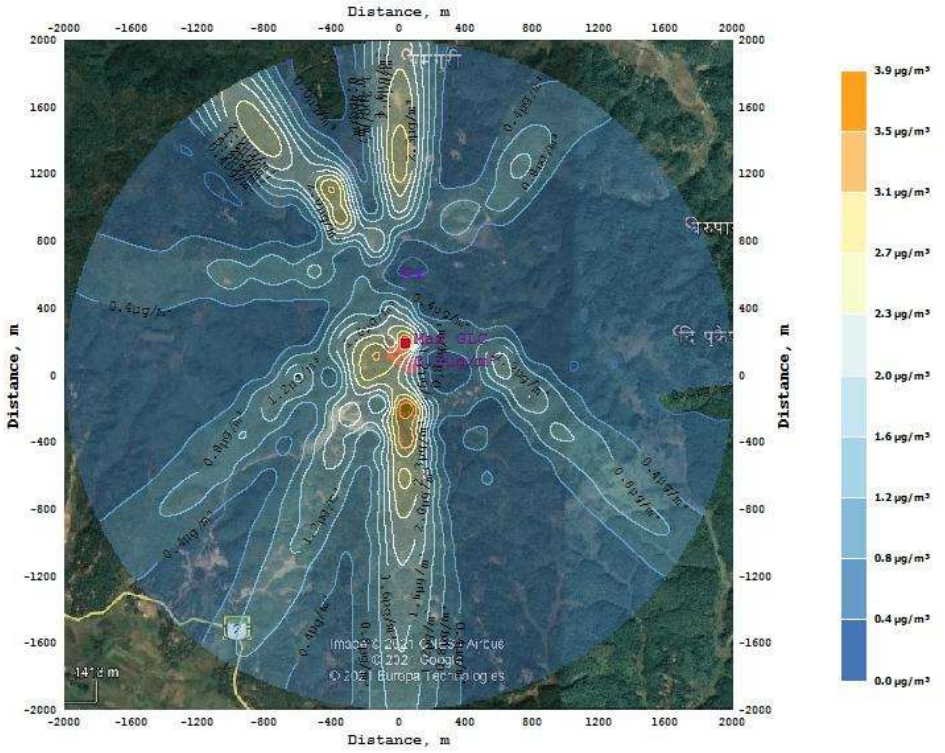


Figure 4.1 (b): Isopleth of Maximum Predicted 24 hourly Ground – Level Concentrations for $PM_{2.5}$

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	71.7	8.2	79.9	100
Project site	PM2.5	AAQ 1	29.4	3.9	33.3	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 135 tonnes 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

305 nos. of trees will be planted on 0.19 ha of land 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. There is no National Parks, Sanctuary, Breeding, roosting places or ecologically sensitive areas within the 10 km periphery of the mine lease area. However, most of the area surrounding to project site are covered with forest land. There no wildlife corridors in 10-km radius area.

No loss of forest resource is envisaged due to the project. No medicinal plants exist in the area.

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. There are no wildlife sanctuary, wildlife corridors, faunal migratory routes or eco-sensitive area near the whole study area. Save the flora/fauna around the project area, is one of the basic objective of present project. For this, mine owner agency 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 boulder stone 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 30 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 dust. These negative impacts of mining needs to be viewed seriously.

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 0.50 lakhs for the benefits of the local community under CER activities. It is proposed to spend the above amount during the first five years of the commissioning of the mining project. The five year allocation of 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) Provision of solar panel in nearby village

e) Donation for cultural activities in the surrounding areas

Table 4.7: Various activities proposed to be taken up under CER programme

S. No.	Activities	Allocation of Fund (Rs.)
1	Health Camps	15,000
2	Drinking Water Facilities	10,000
3	Maintenance of foot track	15,000
4	Provision of solar panel in nearby village	5,000
5	Donation for cultural activities in the surrounding areas	5,000
Total		**50,000**

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 State highway in the area. Then depending on the capacity of the mine, the number of trucks that will be added to the present scenario will be compared to the carrying capacity as recommended by Indian Road Congress (IRC). The existing volume of traffic and, the Level of Service are given below.

Existing Traffic Scenario & LOS

Road	V (PCU/day)	C (PCU/day)	Existing V/C Ratio	LOS
Singimari Garobada Tura road	550	1200	0.46	B

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

During Mine operation

Total Capacity of mine : 40513 TPA

No. of working days : 300 days

Total Capacity of mine/day : 40513 /300 = 135.04 tonnes/day

Truck Capacity : 10 tonnes

No. of trucks deployed per day : 135/10 = 13.5 say 14 trucks per day

No. of trucks deployed/day to & fro : 14*2=28 trucks

Increase in PCU/day : 62

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
Singimari Garobada Tura road	612	1200	0.51	B

From the above analysis it can be seen that the V/C ratio is likely to be changed to 0.51 on Singimari Garobada Tura road 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.

4.14 UNDERTAKINGS

4.14.1 Compliance with the Ministry's Office Memorandum

As a project proponent, I hereby undertake to comply with 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, 20l7 in Writ Petition (Civil) No.114 of 2014 in the matter of Common Cause versus Union of India.

4.14.2 Compliance of the Recommendations of the CAG

As a project proponent, I hereby undertake to comply the recommendations of the CAG as per Ministry's circular No. J-11013/71/2016-IA. I (M) dated 25.10.2017.

4.14.3 Compliance of the Ministry's Office Notification

As a project proponent, I hereby undertake to comply with the Ministry's Office Notification No. GSR-94 (E) dated 25.01.20I8 - Mandatory implementation of Dust mitigation measures for construction activities.

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

7.2.1 Blasting

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

7.2.2 Overburden

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 30 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 30 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 funds allocation 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) Provision of solar panel in nearby village

e) Donation for cultural activities in the surrounding areas

Table 8.1: Funds for the various activities proposed to be taken up under CER programme

S. No.	Activities	Allocation of Fund (Rs.)
1	Health Camps	15,000
2	Drinking Water Facilities	10,000
3	Maintenance of foot track	15,000
4	Provision of solar panel in nearby village	5,000
5	Donation for cultural activities in the surrounding areas	5,000
Total		**50,000**

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 135 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 kld 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. 305 nos. of trees will be planted on 0.19 ha and plantation will be done on the periphery of the reclaimed area and nearby van panchayat 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.

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 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.	Soil dump Management	Rs 30,000/-
2.	Plantation & green belt development	Rs 61,000/-
3.	Air, Noise and water Quality monitoring	Rs 75,000/-
4.	Settling tank & garland drain	Rs 40,000/-
5.	Settling tank cleaning	Rs 60,000/-
Total		**Rs 2,66,000/-**

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	15,000
2	Drinking Water Facilities	10,000
3	Maintenance of foot track	15,000
4	Provision of solar panel in nearby village	5,000
5	Donation for cultural activities in the surrounding areas	5,000
Total		**50,000**

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. Fridina D. Shira. The proponent has applied for environmental clearance for mining lease over an area of 1.26 ha at Dhapguri, P.O Zikabari, District West Garo Hills, Meghalaya. The SEAC in its meeting during December, 2020 examined the proposal. After 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 Proposed Dhapguri Stone Mine will be executed over an area of 1.26 ha at Dhapguri, P.O Zikabari, District West Garo Hills, Meghalaya. The maximum production rate is of 40, 513 TPA of Boulder Stone.

The cost of the project is Rs. 7.96 lakhs.

10.2.2 Project Proponent

M/s. **Dhapguri Stone Mine** is a private company. The proposed mine extends over an area of 1.26 Ha.

Address of the applicant
Proprietor: Smt. Fridina D. Shira,
R/o- Village: Burney Hills, P.O.- Dakopgiri, Tura, West Garo Hills District, 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 proposed boulder stone mining project extends over an area of 1.26 ha with the target maximum production capacity of mine is about 40, 513 TPA (maximum).

10.3.3 Anticipated Life of Project and Cost of the Project

The lease period is for 10 years. The cost of the project is about Rs. 7.96 lakhs.

10.3.4 Location of the Project

The proposed lease of boulder stone Mine is situated at Dhapguri, P.O Zikabari, District West Garo Hills, 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

Sr. No.	Particular	Details
A.	**Nature of the Project**	**Boulder stone Mining Project.**
B.	Size of the Project	
1.	ML Area	1.26 hectare (Non forest Land).
2.	Proposed Production Capacity	Total production in 5 years will be 2,01,169 MT and peak production will be 40, 513 MT/annum.
3.	Lease Period of Mine	Lease was granted for a period of 10 Years.
C.	Method of Mining	
1.	Method	Opencast semi mechanized method
2.	Blasting / Drilling	Blasting will be done by short or long holes with the permission of DGMS
D.	Project Location	
1.	Location	Dhapguri, P.O Zikabari, District West Garo Hills, Meghalaya
2.	Toposheet No.	78K/2
3.	Lease Area Coordinates	Pillar 1: 25°38'12.61"N, 90°00'52.99"N Pillar 2: 25°38'14.04"N, 90°00'54.10"N Pillar 3: 25°38'10.73"N, 90°00'59.48"N Pillar 4: 25°38'09.36"N, 90°00'58.54"N
E.	Cost Details	
1.	Project Cost	Rs. 7.96 Lakhs
F.	Water Demand	
1.	Requirement	5 KLD
2.	Source of water	Natural Springs (nalah)
G.	Man Power Requirement	30
H.	Environmental Setting	
1.	Nearest Village	Dhapguri
2.	Nearest Town	Zikabari, 1.5 Km.

3.	Nearest National / State Highway	SH 2, 2 Km
4.	Nearest Railway Station	Dewanganj Railway Station, 60 Km
5.	Nearest Airport	Guwahati Airport, 236 Km
6.	Ecological Sensitive Areas (National Park, Wild Life Sanctuaries, Biosphere Reserve etc.) within 10 km radius	None
7.	Water bodies within 10 km radius of the mine site.	A stream is flowing approx. 3 km SW 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	Production of boulder stone in tonnes	Production of soil in tonnes
I	40121	1518
II	40040	1518
III	40130	1932
IV	40365	00
V	40513	930
Total	**201169**	**5898**

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 4.2:

Table 10.3: Land use pattern

Existing Land Use Pattern

Category	Area in Hectares
Quarry	0.00
Road	0.01
Total area in use	**0.01**
Balanced unused Area	1.25
Total Applied Lease Area	**1.26**

Land use Pattern after first five years plan period

Category	Area in Hectares
Quarry including road	0.76
Dump with parapet wall and garland drain	0.12
Green belt within safety Barrier	0.19
Total Area in use	**1.07**
Balanced unused Area	0.19
Total Applied Lease Area	**1.26**

Land use Pattern after life of the mine

Category	Area in Hectares
Quarry including reclamation	0.88
Green belt within safety Barrier	0.38
Total Area in use	**1.26**
Balanced unused Area	0.00
Total Applied Lease Area	**1.26**

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 10.4: Existing Land use of the 10 KM Study Area

Sr. No.	Particulars	Area (ha)	Percentage
1	Settlements	346	1.10
2	Water bodies	524	1.66
3	Waste land	412	1.44
4	Crop land	10864	34.5
5	Forest area	19254	61.3
	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. 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 (6.23 to 7.10). 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 314.6 – 378.3 µmhos/cm.

10.7.2 Meteorology

Meteorological data at the site was monitored during 1st December 2020 to 28th February 2021 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, 2020 to February, 2021. The minimum and maximum level of PM_{10} recorded within the study area was in the range of 43.4 µg/m^3 to 72.5 µg/m^3 with the 98th percentile ranging between 59.3 µg/m^3 to 71.4 µg/m^3. The minimum and maximum level of $PM_{2.5}$ recorded within the study area was in the range of 18.2 µg/m^3 to 31.2 µg/m^3 with the 98th percentile ranging between 23.2 µg/m^3 to 30.4 µg/m^3. The minimum and maximum concentration of SO_2 recorded within the study area was 5.9 to 8.1 µg/m^3 with the 98th percentile ranging between 6.3 µg/m^3 to 7.7 µg/m^3. The minimum and

maximum level of NO_2 recorded within the study area was in the range of was 7.8 µg/m^3 to 19.4 µg/m^3 with the 98th percentile ranging between 14.2 µg/m^3 to 18.3 µg/m^3. The minimum and maximum level of CO recorded within the study area was in the range of 0.260 mg/m^3 to 0.590 mg/m^3 with the 98th percentile ranging between 0.340 µg/m^3 to 0.550 µg/m^3. The minimum and maximum level of free silica recorded within the study area was in the range of was 0.46 µg/m^3 to 1.58 µg/m^3.

The results thus obtained indicate that the concentrations of PM_{10}, $PM_{2.5}$, SO_2 and NO_2 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, the pH was varying for ground water from 6.95 to 7.14, total dissolved solids in ground water are varying from 283.51 mg/l to 308.45 mg/l, chloride level in the ground water samples collected in the study area were ranging from 40.1 mg/l to a maximum of 53.4 mg/l and hardness is varying from 167.25 mg/l to 187.75 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. . Maximum noise level recorded at day time is 58.2 dB (A) and at night time is 42.8 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, there are no wildlife sanctuaries and National Parks within the study area of 10-km radius.

10.7.7 Social Environment

According to the 2011 census of India, West Garo Hills has a population of 6,43,291. The total SC population in West Garo Hills district is 8,810 which is 1.37% of the total population, while ST population is 4,74,009, which is 73.69% of the total population. The literate population in West Garo Hills district is 3,58,702, out of which male & female are 193,438 and 165,264 respectively. The male literates represent 72.39 % while female represent 62.70% 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. Maximum noise level recorded at day time is 58.2 dB (A) and at night time is 42.8 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 details of the cost to for the Environmental Management plan for 5 years 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.	Soil dump Management	Rs 30,000/-
2.	Plantation & green belt development	Rs 61,000/-
3.	Air, Noise and water Quality monitoring	Rs 75,000/-
4.	Settling tank & garland drain	Rs 40,000/-
5.	Settling tank cleaning	Rs 60,000/-
Total		**Rs 2,66,000/-**

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

S. No.	Activities	Allocation of Fund (Rs.)
1	Health Camps	15,000
2	Drinking Water Facilities	10,000
3	Maintenance of foot track	15,000
4	Provision of solar panel in nearby village	5,000
5	Donation for cultural activities in the surrounding areas	5,000
Total		**50,000**

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 (1.26 ha.) at Dhapguri, P.O Zikabari, District West Garo Hills, 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

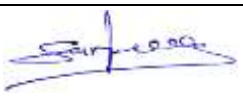
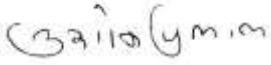
Name: Sanjeev Sharma

Signature and Date: 08-03-2021

Period of Involvement: December, 2020 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, 2020 to Till date	
2.	WP	Anoop Kishore Mishra	December, 2020 to Till date	
3.	SHW	Sanjeev Sharma	December, 2020 to Till date	
4.	SE	Ashok Suyal	December, 2020 to Till date	
5.	EB	Kashmir Pal Singh	December, 2020 to Till date	
6.	HG	R.K. Mishra	December, 2020 to Till date	
7.	GEO	B. M. Sinha	December, 2020 to Till date	
8.	SC	Vijay Sharma	December, 2020 to Till date	
9.	AQ	Sanjeev Sharma	December, 2020 to Till date	

10.	NV	Sanjeev Sharma	December, 2020 to Till date	
11.	LU	Ashok Bijalwan	December, 2020 to Till date	
12.	RH	Anoop Kishore Mishra	December, 2020 to Till date	
Functional Area Associate (FAA)				
1.	AP	Deepak Pandey	December, 2020 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 (1.26 ha) at Dhapguri, P.O Zikabari, District West Garo Hills, 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

ANNEXURE I: COPY OF APPROVED TERMS OF REFERENCE (TOR)

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/WGH/P-106/2020/4 1613 **Dated, Shillong, the** 29th **Jan.,2021.**

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

To Smt. Fridina D. Shira,
Village- Burney Hills, P.O.- Dakopgiri,Tura,West Garo Hills.

Subject : ***Grant of TOR*** to *Proposal No.SIA/ML/MIN/57763/2020 submitted by Smt. Fridina D. Shira for Dhapguri Stone Mine, area of 1.26 ha. located at Dhapguri, P.O. Zikabari, West Garo Hills District, Meghalaya.*

Madam,

This has a reference to your online proposal above for grant of Terms of Reference for Stone Mining for an area of 1.26 ha. located at Dhapguri, P.O. Zikabari, West Garo Hills District, Meghalaya.

The proposed land is on lease for a period of 20 years which was executed on the 27th March 2017 registered at D.C. Office, Tura, District Registrar.

The applied area is a Non Forest Land, vide Divisional Forest Officer, West, South & South West Garo Hills Territorial Division, Tura, letter No.B/16/VII/NOC/MMMCR/1493-499, dated Tura, the 20th June, 2017.

The Cluster certificate issued by the Divisional Mining Officer, East Garo Hills, Williamnagar vide letter No.DMO-W/MP/15/2019/116 dated Williamnagar, the 15th October, 2020, stated that there are three approved mining plan lying within 500 metres from the applied mining lease area. Hence the applied mining area falls under cluster category since the total area of total nine mines is summed up to 9.98 hectares.

The Mining Plan with Progressive Mine Closure Plan approved by the Divisional Mining Officer, East Garo Hills, Williamnagar.

The proposal is for mining of boulder stone to be used for construction purposes. The project falls under Schedule I(a) of category 82 of EIA Notification 2006. The mining lease area is located Dhapguri, P.O. Zikabari, West Garo Hills District, Meghalaya and toposheet Survey of India No.78K/2 within the following GPS Coordinates:

Pillar No	GPS co-ordinates	
	Latitude	Longitude
1	25° 38'12.61"N	90° 00'52.99"E
2	25° 38'14.04"N	90° 00'54.10"E
3	25° 38'10.73"N	90° 00'59.48"E
4	25° 38'09.36"N	90° 00'58.54"E

After due screening and examination of all the documents submitted by the Project Proponent and site cross checking and deliberation by using kml file through Google earth, the SEAC in its meeting held on 21/12/2020, vide Agenda 5 unanimously recommended for grant standard Term of Reference to this project.

The State Environment Impact Assessment Authority, Meghalaya, in its meeting held on 19th Jan., 2021 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 resolved to grant Term of Reference (TOR) to this project.

Hence on recommendation of the SEAC and as per the EIA Notification- 2006 and its subsequent amendments, the SEIAA in the meeting unanimously grant Term of Reference (TOR) in standard format to this 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/ Toposheet, Topographic sheet, Geomorphology and Geology of the area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).
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. 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.

14. 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.

15. 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.

16. 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.

17. R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need based sample survey, family-wise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the State Government. It may be clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to shifting of village(s) including their R&R and socio-economic aspects should be discussed in the Report.

18. 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. Site specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the pre-dominant downwind direction. The mineralogical composition of PM10, particularly for free silica, should be given.

19. 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.

20. 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.

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

22. 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.

23. 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.

24. 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.

25. 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.

26. 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.

27. 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.

28. 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.

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

30. 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.

31. 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.

32. 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.

33. 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.

34. 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.

35. 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.

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

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

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

39. 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.

40. 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.

41. 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.

42. 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.

43. 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.

44. 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 procedure prescribed under EIA Notification, 2006 and its subsequent amendments and circulars/OMs issued by the Ministry from time to time.

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/WGH/P-106/2020/ **Dated, Shillong, the Jan., 2021.**

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, Paryavaran Bhavan, CGO Complex, Lodhi Road, 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 Deputy Commissioner, West Garo Hills,Tura, Meghalaya for information.
7. The Divisional Forest Officer, West & South-West Garo Hills Territorial Division, Tura, for information and necessary action.
8. The Member Secretary, State Expert Appraisal Committee, Meghalaya for information.
9. The Divisional Mining Officer, Directorate of Mineral Resources, East Garo Hills, Williamnagar for information.
10. The Member Secretary, Meghalaya State Pollution Control Board, 'Arden', Lumpyngngad, Shillong – 793 014 for information and necessary action.
11. Guard File.

Member Secretary
SEIAA, Meghalaya

ANNEXURE II: COPY OF LETTER OF INTENT (LOI)

Government of Meghalaya
Forests & Environment Department
West, South & South-West
Garo Hills (Territorial) Division, Tura
Email- garohillsdiv@gmail.com
Fax No. 03651-223850

Shri. Sachin Gavade, IFS
Divisional Forest Officer

Memo No. **Dated Tura, the Jan., 2019.**

From: The Divisional Forest Officer,
West, South & South-West
Garo Hills (T) Division, Tura.

To: Smt. Fridina D. Shira,
Village:Burny Hills,
P.O. Dakopgiri & P.S. Tura,
West Garo Hills, Meghalaya.

Sub: Letter of Intent (LoI) under the Meghalaya Minor Mineral Concession Rules, 2016 for Issue of Mining Lease based on your application dated 26-06-2017.

Sir/Madam,

With reference to the subject cited above and in pursuance to Rule 10 of the Meghalaya Minor Mineral Concession Rules, 2016 and in continuation to earlier issued LoI vide order No. B/16/VII/3182 dated 3rd Nov., 2017, this letter of Intent (LoI) is being issued for the purpose of the grant of mining lease in respect of the proposed mining site of **1.26 Ha** area located at ***Dhapguri, P.O. Zikabari, West Garo Hills, Meghalaya*** with the GPS co-ordinates as follows:

Point	Latitude	Longitude	Point	Latitude	Longitude
1	N.25°38'12.61"	E.90°00'52.99"	3	N.25°38'10.73"	E.90°00'59.48"
2	N.25°38'14.04"	E.90°00'54.10"	4	N.25°38'0936"	E.90°00'58.54"

in favour of ***Smt. Fridina D. Shira, of Village: Burny Hills, P.O. Dakopgiri & P.S. Tura, West Garo Hills, Meghalaya***, based on the Enquiry Report submitted by the Beat Forest Officer, I/C Tura Beat (State) vide letter No. T/26/17/120 dated Tura, the 10th July., 2017 from the office of the undersigned, subject to the following terms and conditions.

Terms and Conditions

1. This letter of intent and subsequent grant of aforementioned mining lease shall be subject to the provisions of the Meghalaya Minor Mineral Concession Rules, 2016 as amended from time to time.
2. Smt. Fridina D. Shira, *of Village:* Burny Hills, P.O. Dakopgiri & P.S. Tura, *West Garo Hills, Meghalaya,* shall be granted mining lease in respect of the proposed site with the above mentioned GPS co-ordinates located at *Dhapguri, P.O. Zikabari, West Garo Hills, Meghalaya,* only upon satisfactory fulfilment of the requirements as stipulated in the said rules, which among others includes submission of the following documents to the office of the undersigned within a period of 6 (six) months from the date of issue of this letter of intent (LoI), failing which this letter of intent shall deemed to be cancelled:

- Mining Plan duly approved by the Director of Mineral Resources, Meghalaya. The Mining Plan shall be prepared by a person empanelled with the Meghalaya State Government or other State Governments or the Central Government with the qualification and experience as laid down in Rule 19(2) of the Meghalaya Minor Mineral Concession Rules, 2016.
- Environmental Clearance under the Environmental (Protection) Act, 1986 from the District Environment Impact Assessment Authority (DEIAA) or State Environment Impact Assessment Authority (SEIAA), as per extant rules and regulations.
- Consent to Establish under the Water (Prevention & Control of Pollution) Act, 1974 and Air (Prevention & Control of Pollution) Act, 1981 from the Meghalaya State Pollution Control Board, Shillong.
- Clearance from Revenue and Disaster Management Department, and
- Clearance from Labour Department for occupational health and labour laws including child labour.

This is for the favour of your kind information and necessary action.

Yours faithfully,

Divisional Forest Officer,
West, South & South-West
Garo Hills (T) Division, Tura

Contd-2-

No. A/16/VII/ **Dated Tura, the Jan., 2019.**

Copy to: The Conservator of Forests (WL&T), Garo Hills Circle, Tura, for the favour of kind information.

Divisional Forest Officer,
West, South & South-West
Garo Hills (T) Division, Tura

No. B/16/VII/ 214 - 216 **Dated Tura, the 28 Jan., 2019.**

Copy to:

1. The Member Secretary, State Pollution Control Board, Meghalaya, Shillong, for the favour of kind information and necessary action.
2. The Member Secretary, State Environment Impact Assessment Authority (SEIAA), Meghalaya, Shillong, for the favour of kind information and necessary action.
3. The Range Forest Officer, I/C Tura Beat (State) for the favour of kind information.

Divisional Forest Officer,
West, South & South-West
Garo Hills (T) Division, Tura.

ANNEXURE III: NON FOREST LAND CERTIFICATE

GOVERNMENT OF MEGHALAYA
OFFICE OF THE DIVISIONAL FOREST OFFICER:
WEST, SOUTH & SOUTH-WEST GARO HILLS (T) DIVISION: TURA

STATUS OF LAND CERTIFICATE

In pursuance to Rule 6 (d)/Rule 23 (b) read with Rule 4(2)(b) of the Meghalaya Minor Mineral Concession Rules, 2016 and based on the inspection report submitted by Range Forest Officer, I/c Tura Beat Office(State), Tura dated **13-06-2017**, in respect of the land located at **Dhapguri, P.O. Zikabari, West Garo Hills, Meghalaya** having the following GPS Co-ordinates, the Status of the land is " **NON-FOREST** " according to the dictionary meaning of "forest".

Point	Longitude	Latitude	Point	Longitude	Latitude
1	N.25°38'12.61"	E.90°00'52.99"	4	N.25°38'09.36"	E.90°00'58.54"
2	N.25°38'14.04"	E.90°00'54.10"	5		
3	N.25°38'10.73"	E.90°00'59.48"	6		

The applicant, **Smt. Fridina D. Shira of Village: Burny Hills, P.O. Dakopgiri, P.S. Tura, West Garo Hills, Meghalaya**, is required to submit an application complete in all respects in the format and manner prescribed in the said rules to the office of the undersigned for further necessary action for the purpose of the grant of mining lease/issue Quarry Permit in respect of the proposed location of the site subject to the provisions of the Meghalaya Minor Mineral Concession Rules, 2016 as amended from time to time.

This is for the favour of your kind information and necessary action.

APPROVED

Divisional Mining Officer
East Garo Hills, Williamnagar.

Divisional Forest Officer,
West, South & South-West
Garo Hills (T) Division, Tura.

No. A/16/VII/NOC/MMMCR/ Dated Tura, June, 2017

Copy to:

1. The Chairman, State Pollution Control Board, Meghalaya, Shillong for information and necessary action.
2. The Conservator of Forests (WL&T), Garo Hills Circle, Tura for information

Divisional Forest Officer,
West, South & South-West
Garo Hills (T) Division, Tura

A/16/VII/NOC/ MMMCR/1493-499 Dated Tura, 20th June, 2017

Copy to:

1. The Deputy Commissioner, West Garo Hills, Tura for information and necessary action.
2. The Superintendant of Police, West Garo Hills, Tura for information.
3. The Chairman, District Environment Impact Assessment Authority (DEIAA), West Garo Hills District for information and necessary action.
4. The Chief Executive Member, GHADC, Tura for information and necessary action.
5. The Assistant Labour Commissioner, Tura for information and necessary action.
6. Shri. J.W. Sangma, Geologist, Directorate of Mineral Resources, Tura for information and necessary action.
7. **Smt. Fridina D. Shira of Village: Burny Hills, P.O. Dakopgiri, P.S. Tura, West Garo Hills, Meghalaya**, for kind information and necessary action.

Divisional Forest Officer,
West, South & South-West

ANNEXURE IV: APPROVED MINING PLAN

MINING PLAN WITH PROGRESSIVE MINE CLOSURE PLAN OF BOULDER STONE MINE

LOCATED AT – DHAPGURI, P.O.-ZIKABARI, DISTRICT- WEST GARO HILLS,MEGHALAYA.

PREPARED AS PER MMMCR 2016

APPLIED LEASE AREA: 1.26 HA.

APPLICANT

SMT. FRIDINA D. SHIRA

AT- VILLAGE- BURNEY HILLS,P.O.-DAKOPGIRI,P.S.-TURA, DISTRICT- WEST GARO HILLS, MEGHALAYA

APPROVED

Divisional Mining Officer
East Garo Hills, Williamnagar.

Prepared By RQP

ASHOK KUMAR SARKAR

RQP NO.-: RQP/KOL/377/2013/A

Airport Enclave Co-Operative Housing Society, Jessore Road, Kolkata - 700051, West Bengal.

DHAPGURI STONE MINE

AT DHAPGURI, P.O. - ZIKABARI, DIST-WEST GARO HILLS, MEGHALAYA
AREA: 1.26 HA

CONSENT LETTER FROM THE LESSEE

The Mining Plan along with Progressive Mine Closure Plan in respect of Dhapguri Stone Mine over an area of 1.26 Ha located at Dhapguri, P.O. - Zikabari, Dist-West Garo Hills, Meghalaya has been prepared by Shri. Ashok Kumar Sarkar,

RQP No. - RQP/KOL/377/2013/A

I request the Concerned Authority, Government of Meghalaya, to make further correspondence regarding modification etc. in Mining Plan along with Progressive Mine Closure Plan with the said recognized person on the following address:

ASHOK KUMAR SARKAR
Flat No-304, Block-12, Airport Enclave Co-operative
Housing Society, Jessore Road,
Kolkata- 700 051
West-Bengal
Registration No: RQP/KOL/377/2013/A

I hereby undertake that all the modification so made in the Mining Plan along with Progressive Mine Closure Plan by the recognized person be deemed to have been made with my knowledge and consent and shall be acceptable to me and binding on me in all respect.

For Dhapguri Stone Mine

Fridina D Shira

Smt. Fridina D. Shira

Place: - Shillong
Date: - 10/07/2019

DHAPGURI STONE MINE

AT DHAPGURI, P.O. - ZIKABARI, DIST-WEST GARO HILLS, MEGHALAYA

AREA: 1.26 HA

CERTIFICATE

The provision of Mines Act, Rules and Regulations made there under have been observed in the Mining Plan along with Progressive Mine Closure Plan in respect of Dhapguri Stone Mine over an area of 1.26 Ha located at Dhapguri, P.O. - Zikabari, Dist - West Garo Hills, Meghalaya belonging to Smt. Fridina D. Shira and wherever specific permission is required, the applicant will approach the DGMS.

Further, standards prescribed by DGMS in respect of Miners Health will be strictly implemented.

For Dhapguri Stone Mine

Fridina D Shira

Smt. Fridina D. Shira

Place: - Shillong

Date: - 10/07/2019

APPROVED

Divisional Mining Officer
East Garo Hills, Williamnagar

DHAPGURI STONE MINE

AT DHAPGURI, P.O. - ZIKABARI, DIST-WEST GARO HILLS, MEGHALAYA

AREA: 1.26 HA

GOVERNMENT OF MEGHALAYA

CERTIFICATE

The progressive Mine closure plan of Dhapguri Stone Mine over an area of 1.26 Ha located at Dhapguri, P.O. - Zikabari, Dist-West Garo Hills, Meghalaya belonging to Smt. Fridina D. Shira complies all statutory, regulations, order made by the Central or State Govt. statutory organizations, court etc. has been taken into consideration and wherever specific permission is required the concerned authorities will be approached.

I also undertake to the effect that all measures proposed in this closure plan will be implemented in a time bound manner.

For Dhapguri Stone Mine

Fridina D Shira

Smt. Fridina D. Shira

Place: - Shillong

Date: - 10/07/2019

APPROVED

Divisional Mining Officer
East Garo Hills, Williamnagar

DHAPGURI STONE MINE

AT DHAPGURI, P.O. - ZIKABARI, DIST-WEST GARO HILLS, MEGHALAYA.

AREA: 1.26 HA

GOVERNMENT OF MEGHALAYA

CERTIFICATE

Certified that the provisions of Mines Act, Rules and Regulations made there under have been observed in this Mining Plan and wherever specific permissions are required, the Applicant, Smt. Fridina D. Shira will approach the concerned authorities of D.G.M.S. for granting permission.

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

Ashok Kumar Sarkar
REG. No.- : RQP/KOL/377/2013/A

Place: Shillong
Date :10/07/2019

APPROVED

Divisional Mining Officer
East Garo Hills, Williamnagar.

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APPROVED

Divisional Mining Officer
East Garo Hills, Williamnagar.

Ashok Kumar Sarkar
MQP/KOL/07/2013/A

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APPROVED

Divisional Mining Officer
East Garo Hills, Williamnagar.

Ashok Kumar Sarkar
RQP/KOL/377/2013/A

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1	PHOTOCOPY OF LOI	1
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3	PHOTOCOPY OF LEASE DEED	3
4	PHOTOCOPY OF RQP CERTIFICATE	4

APPROVED

Divisional Mining Officer
East Garo Hills, Williamnagar.

INTRODUCTION

1. Smt. Fridina D. Shira has applied for a mining lease for boulder stone over an area of 1.26 Ha located at Dhapguri, P.O. - Zikabari, Dist-West Garo Hills, Meghalaya.
2. Study revealed that the granite gneiss rock of West Garo Hills District, Meghalaya will be used as building materials.
3. The Government of Meghalaya has issued Letter of Intent for mining lease of boulder stone (minor mineral) mining in favour of Smt. Fridina D. Shira on dated Tura, 28TH Jan 2019 vide letter **No B / 16 / VII/ 213.** Mining lease will be granted only after obtaining EC from the concerned authority (Photocopy of Letter of Intent is enclosed as an Annexure)
4. Mining plan including Progressive Mine Closure Plan in respect of Dhapguri Stone Mine is prepared under the provisions of MMMCR 2016.
5. While preparing the mining plan proper attention has been paid to ensure that the relevant provisions under MMDR Act-1957, MMR-1961, and Mines Act-1952, Mines Rules 1955, MMMCR 2016 are followed. All safety measures provided in the statutes will be complied with.
6. Required numbers of competent and qualified persons will be appointed for exercising control, direction and supervision of safe working.
7. For baseline data assistance has been taken from local authorities.

APPROVED

Divisional Mining Officer
East Garo Hills, Williamnagar.

Ashok Kumar Sarkar
RGP/KOL/377/2013/A

CHAPTER – I
GENERAL

1.1 **Name & Address of the Applicant:**

Smt. Fridina D. Shira

Village - Burny Hills, P.O - Dakopgiri, P.S. - Tura, West Garo Hills, Meghalaya

1.2 **Status of the Applicant:**

The Applicant is a Private Individual.

1.3 **Mineral occurring in the area which the applicant intends to mine:**

Boulder Stone (Granite Gneiss rock)

1.4 **Name of the RQP preparing the Mining Plan:**

Ashok Kumar Sarkar

Flat no-304, Block B-12,

Airport Enclave Co-operative Housing Society

Jessore Road, Kolkata.

Pin- 700051

Registration No: RQP/KOL/377/2013/A

1.5 **Name of the Prospecting Agency:**

A qualified surveyor has surveyed the area accompanied by a Geologist, assigned by the applicant. During the process, surface and scarp faces were studied to delineate the Stone exposures by GPS within the lease hold area, followed by contouring by Total Station.

1.6 **Details of the Area**

Applied Area – 1.26 Ha

Non- Forest Private Land.

1.7 **Period of Mining Lease: -** 10 years

APPROVED

Divisional Mining Officer
East Garo Hills, Williamnagar.

Ashok Kumar Sarkar
RQP/KOL/377/2013/A

CHAPTER – II
LOCATION & ACCESSIBILITY

2.1 Location & Accessibility:

Dhapguri Stone Mine is situated near about 7km away from Garobadha. Guwahati Railway station is about 256 km away, the nearest Airport Lokpriya Gopinath Bordoloi International Airport is about 236km away & the nearest Road is SH-11 about 2 km away from the area in south-west direction.

2.2 Co-ordinates of the area

Boundary Pillar no.	Location (Co-ordinates)	
	Latitude	Longitude
1	N25°38'12.61"	E90°00'52.99"
2	N25°38'14.04"	E90°00'54.10"
3	N25°38'10.73"	E90°00'59.48"
4	N25°38'09.36"	E90°00'58.54"

2.3 Availability of Water, Medical & Educational facilities:

Ganol river is flowing at a distance of about 4Kms south-west of the block. High school, Primary Health Center are located at Garobadha lying at a distance of about 7 Kms away from the block.

2.4 Goolge Map – The area has been marked on the image generated from Google Earth showing the vicinity of the area within a Radius of 500m (Plate No 1).

2.5 Co-ordinate Plan - A Co-ordinate plan has been prepared on the basis of the co-ordinates of project boundary pillars to demarcate its location in the concerned area over an area of 1.26 Ha located at Dhapguri, P.O. - Zikabari, Dist-West Garo Hills, Meghalaya on a scale of 1:1500 (Plate no 2).

APPROVED

Divisional Mining Officer
East Garo Hills, Williamnagar.

Ashok Kumar Sarkar
RQP/KOL/377/2013/A

CHAPTER – III
GEOLOGY AND EXPLORATION & RESERVE

3.1 Topography, Drainage and Climate:

The area forms a part of the north western slopes of the east-west trending Tura Range and is covered with typical highly dissected low hills. The highest RL of area is 136m from mean sea level and lowest RL is 116m from mean sea level. South eastern part of the area is entirely plain land covered with alluvium brought by the river Brahmaputra and its tributaries. Along the foothills of Garobadha, there are several depressions filled by stagnant water forming the so called bills (swampy area) in the area.

The area experiences the influences of sub-tropical Monsoon with an average annual rainfall varying from 200 cm to 250 cm. The diurnal change of temperature is high even in winter. Summer is hot and sultry with temperatures ranging from 30°-35°C. Winter starts in late November and ends in March. Winter day temperatures range from 20°-25°C. Pre-Monsoon rain starts in the month of April. The area is prone to cyclone which usually hits the area in the month of April and May.

Regional Geology:

This part of Meghalaya exposes rock types that ranges from Basement Gneisses and intrusive granite that belongs to the Assam Meghalaya Gneissic Complex (AMGC) of Proterzoic age to sedimentaries of Tertiary age. In a Regional Scale of 1:50000 the following is the stratigraphic sequence as noted in this part of West Garo Hills District of Meghalaya

Table-I: Summarised Regional Geological set-up

Age	Group	Formation	Member	Rock types
Quaternary to recent		Alluvium		Pebbles,Ilosesoil,sand and clay
Mid Miocene to Oligocene	Garo	Chengapara		Loose, poorly cemented micaceous S.St, siltstone and clay
		Baghmara		Conglomerate, Feldspathic SSt, mudstone, shale with fossil wood
Palaeocene to Eocene	Jaintia	Kopili		Argillaceous sediments
		Shella	Sylhet L.St	Dominantly limestone
		Langpar	Sylhet S.St	Ferruginous sandstone Coarse S.St,sandy L.St, Calc shale
Jurassic	UNCONFORMITY			Basaltic flow, lamprophyre and dolerite dykes and sills
	NON-CONFORMITY			

Ashok Kumar Sarkar
RQP/KOL/377/2013/A

APPROVED
Divisional Mining Officer
East Garo Hills, Williamnagar

Late Carboniferous to Permian	Lower Gondwana	Karharbari		Gritty to pebbly, coarse to very coarse grained sandstone alternating with medium to fine grained sandstone, carbonaceous shale and coal stringers.
		Talchir		Medium to fine grained sandstone, light greenish grey siltstone and shale, Conglomerates with greenish matrix.
Proterozoic& Archaean(?)	Assam Meghalaya Gneissic Complex			Pegmatites, aplites and quartz veins, granitoids (Porphyritic and grey) granite Gneiss, biotite Gneiss and hornblende gneiss/migmatites, older metasedimentaries.

Basement Complex of AMGC It is represented by Migmatite, Banded Gneiss, Amphibole Gneiss, Biotite Gneiss with intrusive grey and pink homophaneous and porphyritic granite. The basement rocks have pervasive metamorphic foliation striking NW-SE direction dipping towards NE and bears signatures effected by ductile shearing. Banded migmatite gneiss is of granitic composition and exhibit compositional bandings defined by leucosome and melanosome layers. The gneiss has undergone high grade metamorphism from upper amphibolites facies to Granulite Facies condition.

Dykes of ultrabasic and basic rocks occur as intrusive into the AMGC and the Gondwana Group. Most of the dykes trends along NW-SE direction and are exposed along the Baghmara-Singimari Road. Euhedral crystals of olivine and pyroxene are seen the dyke rocks. Pegmatite with coarse-grained quartz and K-feldspar occur as veins and apophyses within the AMGC.

Unique assemblage of Gondwana rocks represented by Talchir and Karharbari Formation are exposed in the western part of the area, near Singrimari (C.S.Fox ,1934) The Talchir Formation is represented by greenish glauconitic fine grained sandstone and the Karharbari Formation is represented by very coarse grained feldspathic sandstone. There are reports of coal-bearing horizons within the Gondwana sequence, for which GSI is actively carrying out exploration in the alluvial covers of the Brahmaputra River.

AMGC at many places is capped by conglomerate horizon followed by sandstone and shale of the Jaintia Group represented by the Sylhet/Tura Sandstone Formation followed upward by the Kopili Formations. Garo Group is represented by Baghmara and Chengapara Formations and exposes erratically. The Tertiary sequence has gentle dip towards SW striking NW-SE direction. Thin coal seams that are found within the Shella, Tura Sandstone formation are being mined locally at places. Occurrence of lignite from West Garo Hills District is being reported for the first time by GSI. Older and newer alluvium is generally confined to the present day river.

APPROVED

Ashok Kumar Sarkar
RQP/KOL/377/2013/A

Divisional Mining Officer
East Garo Hills, Williamnagar

DHAPGURI STONE MINE

AT DHAPGURI, P.O. - ZIKABARI, DIST-WEST GARO HILLS, MEGHALAYA

AREA: 1.26 HA

UNDERTAKING

I, Smt. Fridina D. Shira, applicant of Dhapguri Stone Mine over an area of 1.26 Ha located at Dhapguri, P.O. - Zikabari, Dist-West Garo Hills, Meghalaya do hereby undertake that the boundary pillars of the proposed grant area will be maintained properly.

For Dhapguri Stone Mine

Fridina D Shira

Smt. Fridina D. Shira

Place: - Dhapguri

Date: - Shillong

APPROVED

Divisional Mining Officer
East Garo Hills, Williamnagar.

Local Geology (Refer Plate No. 4):

Table-II provides a glimpse of the Geology that is observed in the proposed mining.

Table-II: Local Geological set-up in the block

Age	Group	Rock types
Recent		Weathered gneiss and reddish soil
Archaean and late-Proterozoic	Assam-Meghalaya Gneissic Complex	Banded gneiss, migmatite, with basic enclaves and with porphyric / homophaneous granite

The block exposes a litho-package of Assam-Meghalaya Gneissic Complex that constitutes of banded biotite gneiss, migmatites with small enclaves of basic rocks. Gneissosity is the dominant penetrative structure noted in the area that exhibits contortion of complex nature. The basement rocks have pervasive metamorphic foliation striking NW-SE direction dipping towards NE. Quartz veins occur as intrusive along gneissosity. Porphyritic and homophaneous grey and pink granite occur as apophyses within banded gneiss. The banded gneissic rock is thinly foliated in the block and is highly fractured.

Thick soil formations are developed at top of litho-units in the block that develops mainly along joint planes and fractures and is elliptical in occurrence.

The soil horizons are well developed due to high precipitation, humid to sub -tropical climate and favorable topography. The soil is mostly deep brown silty-clay to clayed loam. The gneisses give rise to very deep fine textured soils.

3.2 **Method of Estimation of Reserves:**

Standard Cross Sectional Area method.

a) Sections have been drawn from boundary to boundary across the applied area considering the litho units in the area. The sectional area has been estimated on the basis of the cross sections.

b) Length of influence have been measured by taking half of the section interval distance on both side of each section.

c) Bulk density has been taken as 2.8.

3.3 **Resource & Reserve :**

Resources have been divided into two categories, such as Proved Reserve & Probable Reserve.

Up to an average depth of 25 meters (from ground level) has been taken as Proved Reserve category on the basis of granite rock exposed in the quarry face of the nearby mines & also from the exposure on hill top and slope as well as from the nala cutting section around the applied area and further up to a depth of 5 meters has been taken as Probable Reserve category.

Ashok Kumar Sarkar
RQP/NG/177/2013

APPROVED

Divisional Mining Officer
East Garo Hills, Williamnagar.

Mineable reserve is based on the mineable part of the reserve. Mineable mineral (Boulder Stone) reserve has been calculated from the geological reserve in the area considering the stone which is to be left out and maintained as Safety Barrier within ML boundary and in consideration of ultimate pit limit as calculated from the Geological Plans & Sections.

Measured Mineral Resources

SECTION	SECTIONAL AREA(m2)	LENGTH OF INFLUENCE(m)	VOLUME(m3)	T.F	BOULDER STONE (TONNES)
A-A'	1832	57	104424	2.8	292387
B-B'	1626	50	81300	2.8	227640
C-C'	1402	50	70100	2.8	196280
D-D'	1167	52	60684	2.8	169915
TOTAL					**886222**

Indicated Mineral Resources

SECTION	SECTIONAL AREA(m2)	LENGTH OF INFLUENCE(m)	VOLUME(m3)	T.F	BOULDER STONE (TONNES)
A-A'	300	57	17100	2.8	47880
B-B'	300	50	15000	2.8	42000
C-C'	300	50	15000	2.8	42000
D-D'	300	52	15600	2.8	43680
TOTAL					**175560**

Blocked Measured Mineral Resources In Safety Barrier & UPL

SECTION	SECTIONAL AREA(m2)	LENGTH OF INFLUENCE(m)	VOLUME(m3)	T.F	BOULDER STONE (TONNES)
A-A'	1156	57	65892	2.8	184498
B-B'	844	50	42200	2.8	118160
C-C'	778	50	38900	2.8	108920
D-D'	492	52	25584	2.8	71635
TOTAL					**483213**

Blocked Indicated Mineral Resources In Safety Barrier & UPL

SECTION	SECTIONAL AREA(m2)	LENGTH OF INFLUENCE(m)	VOLUME(m3)	T.F	BOULDER STONE (TONNES)
A-A'	300	57	17100	2.8	47880
B-B'	300	50	15000	2.8	42000
C-C'	300	50	15000	2.8	42000
D-D'	255	52	13260	2.8	37128
TOTAL					**169008**

Category of Resource	Mineable Reserves in Tonnes	Non Mineable Reserves in Tonnes	
Proved	403010	Pre-Feasibility Mineral Resources	483213
Probable	6552	Pre-Feasibility Mineral Resources	169008
TOTAL	**409562**		**652221**

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SUMMARY OF TOTAL MINEABLE RESERVE:

Category of Reserve	Total Reserve in tonnes
Mineable Proved Reserve	403010
Mineable Probable Reserve	6552
Total	**409562**

Anticipated life of the mine:

The total mineable reserve would be **409562** Tonnes with an average annual production of **40956(409562 /10= 40956)** Tonnes and production of stone in first 5 years will be **201169** Tonnes. The average annual production of stone may be different from the annual production of first 5 years and the balanced mineable reserve for last 5 years would be **208393** Tonnes. So life of the mine will be 10 years.

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CHAPTER – IV
MINING

4.1 The entire area is highly potential area. The work will be started from the south-eastern i.e the top portion of the area and advanced towards north-western direction and downwards. The benching system 6mX6m will be practised in the area in order to comply with the provisions of Metalliferous Mines Regulations, 1961. Details of advancement and formation of benches are shown in Development Plan & Sections (**Plates: 5**) in the scale of 1:1500.

4.2 **Mining Strategy:**

The deposit in this area is massive and compact in nature. It is proposed to carry out Open cast Semi-Mechanized mining in this area during the plan period i.e. five years. Jack hammer drill machine will be deployed for drilling of shot holes ranging from 39 to 34mm diameter and breaking of boulder stone at the required size will also be done manually. For blasting of holes with burden and spacing of 1.6 m x 2 m in a staggered grid pattern would be adopted. Muffle blasting will be adopted as precautionary measure to control fly rocks.

4.3 **Production Targets:**

Year wise Production of boulder stone from the area has been calculated by cross sectional method. The cross sectional area has been multiplied by the advancement to be worked in each bench as length of influence to get the bulk volume. Thus the value obtained has been multiplied by tonnage factor (T.F.) to get the actual production of stone in each bench. Year wise calculation has been made separately and the details of year wise development of the quarry is given below:

Production :

Year	Production of Boulder Stone in Tonnes	Production of Soil in Tonnes
1st	40121	1518
2nd	40040	1518
3rd	40130	1932
4th	40365	00
5th	40513	930
6th	41679	800
7th	41679	650
8th	41679	00
9th	41678	00
10th	41678	00
Total	**409562**	**7348**

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4.4 Bench Design and Formation:

Since the mine will be worked in semi-mechanized method during this proposed plan period of 5 years, bench height will be restricted to the statutory 6mx6m due to compactness of the hard stone and as per the DGMS norms. Bench slope angle for stabilization of the benches will be maintained at 45°.

4.5 Bench Development over the plan period:

Working of the first 5 years will be started from south-eastern side of the area and advanced towards north - western part attaining further depth. Details of advancement and formation of benches are shown in Development Plan & Sections (**Plates: 5**) in the scale of 1:1500.

1st year: Working will be started from south-eastern hilly portion of the area with two benches of 6mX6m in dimension with RL up to 122m. During quarry advancement some extent of gritty soil will be removed and would be dumped at north- west corner of the area. For haulage of the stone ramp will be maintained at the quarry face. Details of calculations are given below.

BOULDER STONE PRODUCTION 1ST YEAR						
BENCH RL(m)	SECTION	SECTIONAL AREA(m2)	LENGTH OF INFLUENCE(m)	VOLUME(m3)	T.F	BOULDER STONE (TONNES)
134-128	A-A'	146	44	6424	2.8	17987
128-122	A-A'	255	31	7905	2.8	22134
TOTAL				**14329**		**40121**

SOIL PRODUCTION 1ST YEAR						
BENCH RL(m)	SECTION	SECTIONAL AREA(m2)	LENGTH OF INFLUENCE(m)	VOLUME(m3)	T.F	SOIL (TONNES)
134-128	A-A'	23	44	1012	1.5	1518
TOTAL				**1012**		**1518**

2nd year: - During 2nd year working benches will be extended towards the central part in the same quarry with one bench of 6mX6m in dimension with up to 122RL. During quarry advancement some extent of gritty soil will be removed and would be dumped at north-west corner of the area. For haulage of the stone ramp will be maintained at the quarry face. Details of calculations are given below.

BOULDER STONE PRODUCTION 2ND YEAR						
BENCH RL(m)	SECTION	SECTIONAL AREA(m2)	LENGTH OF INFLUENCE(m)	VOLUME (m3)	T.F	BOULDER STONE (TONNES)
128-122	B-B'	325	44	14300	2.8	40040
TOTAL				14300		40040

SOIL PRODUCTION 2ND YEAR						
BENCH RL(m)	SECTION	SECTIONAL AREA(m2)	LENGTH OF INFLUENCE(m)	VOLUME (m3)	T.F	SOIL (TONNES)
128-122	B-B'	23	44	1012	1.5	1518
TOTAL				**1012**		**1518**

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3rd year: - During this year working will be continued in the same quarry in further depth with two benches of 6mX6m in dimension up to the RL 116m.In this year too during quarry advancement some extent of gritty soil will be removed and would be dumped at north-west corner of the area. For haulage of the stone ramp will be maintained at the quarry face. Details of calculations are given below

BOULDER STONE PRODUCTION 3RD YEAR						
BENCH RL(m)	SECTION	SECTIONAL AREA(m2)	LENGTH OF INFLUENCE(m)	VOLUME(m3)	T.F	BOULDER STONE (TONNES)
128-122	C-C'	99	56	5544	2.8	15523
122-116	A-A'	169	52	8788	2.8	24606
TOTAL				14332		40139

SOIL PRODUCTION 3RD YEAR						
BENCH RL(m)	SECTION	SECTIONAL AREA(m2)	LENGTH OF INFLUENCE(m)	VOLUME(m3)	T.F	SOIL (TONNES)
128-122	C-C'	23	56	1288	1.5	1932
TOTAL				1288		1932

4th year: - During this year working will be continued in the same quarry with one bench of 6mX6m in dimension up to the RL 116m.No gritty soil will be removed during quarry advancement of this year. For haulage of the stone ramp will be maintained at the quarry face. Details of calculations are given below.

BOULDER STONE PRODUCTION 4TH YEAR						
BENCH RL(m)	SECTION	SECTIONAL AREA(m2)	LENGTH OF INFLUENCE(m)	VOLUME(m3)	T.F	BOULDER STONE (TONNES)
122-116	B-B'	272	53	14416	2.8	40365
TOTAL				14416		40365

5th year: - During this year working will be continued in the same quarry and further depth with one bench of 6mX6m in dimension up to the RL 116m. In 5th year during quarry advancement some extent of gritty soil will be removed and would be dumped at north-west corner of the area.For haulage of the stone ramp will be maintained at the quarry face. Details of calculations are given below.

BOULDER STONE PRODUCTION 5TH YEAR						
BENCH RL(m)	SECTION	SECTIONAL AREA(m2)	LENGTH OF INFLUENCE(m)	VOLUME(m3)	T.F	BOULDER STONE (TONNES)
122-116	B-B'	273	53	14469	2.8	40513
TOTAL				14469		40513

SOIL PRODUCTION 5TH YEAR						
BENCH RL(m)	SECTION	SECTIONAL AREA(m2)	LENGTH OF INFLUENCE(m)	VOLUME(m3)	T.F	SOIL (TONNES)
122-116	D-D'	31	20	620	1.5	930
TOTAL				620		930

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4.6 **Notes on Conceptual Plan for the Lease Period:**

Mining will be carried out with the help of machinery and manual manpower for digging, excavation and removal of boulder stone in conjunction with shot hole drilling by jack hammer drill. Mining operation shall be carried out in compliance with the provisions of the MMR, 1961.

During the 5 years plan period the area will be worked out maintaining a 7.5m Safety Barrier. The voids created by mining will be reclaimed after the conceptual period of mining.

Land Use Pattern:

Existing Land Use pattern

Category	Area in Hectares
Quarry	0.00
Road	0.01
Total area in use	**0.01**
Balance unused area	1.25
Total Applied Lease Area	**1.26**

Land Use pattern after first five years plan period

Category	Area in Hectares
Quarry including road	0.76
Dump with parapet wall and garland drain	0.12
Green belt within Safety Barrier	0.19
Total area in use	**1.07**
Balance unused area	0.19
Total Applied Lease Area	**1.26**

Land Use pattern after life of the mine

Category	Area in Hectares
Quarry including Reclamation	0.88
Green belt within Safety Barrier	0.38
Total area in use	**1.26**
Balance used area	0.00
Total Applied Lease Area	**1.26**

4.7 **Level of Mechanization:**

The deposit in this area is massive and compact in nature. It is proposed to carry out opencast Semi-Mechanized mining in this area during the plan period i.e. five years. Jack hammer drill machine will be deployed for drilling of shot holes of 39 to 34mm diameter and breaking of stone at the required size will be done manually. For blasting of holes with burden and spacing of 1.6 m x 2 m in a staggered grid pattern will be followed. Muffle blasting will be adopted as precautionary measure to control fly rocks.

4.8. **Machinery Deployment:**

EXCAVATORS: (Loading Equipment)

For Material Production:

Production of Stone	:	40513 MT/annum
Production of Soil (gritty)	:	1932

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No. of working days	:	300
Production of stone per day	:	40513 = 135.04 MTsay 135 300
Production of Soil (gritty) per day	:	1932= 6.44 MT say 6 MT 300
Material required to be handled per day	:	(135+6)=141 MT
Bucket fill factor	:	80%
Bucket Capacity	:	0.6 cu.m. i.e. 0.48 cum @ 80%
Bulk density loose	:	1.85
Material handled by each bucket	:	0.48 x 1.85 = 0.888 MT
Cycle time (including pastime) for each bucket	:	30 sec
Utilization (Job efficiency)	:	70% i.e 0.888X 0.7 = 0.6216 MT
Numbers of Cycles required to fill a dumper with capacity 10 MT	:	10/0.6216 =16
Total loading time	:	16X30 = 480 Seconds i.e. 8 minutes
Tonnage handled/hr	:	0.6216x60x 60 = 74.592 MT 30 Say 75 MT/hr
Tonnage handled per shift (6hrs shift) for one shift working	:	6 x1x 75= 450 MT
Number of excavators required	:	141/ 450 = 0.31
Considering 80% availability the requirement of excavator is 0.31/0.8 = 0.39 say 1 no. Therefore 1 Excavator would be sufficient to meet the production target		

Specification of Excavator:

Type	Nos.	Bucket capacityIn cum	Motive power	H.P
Hydraulic Excavator	1	0.6	Diesel	115

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Haulage and Transport Equipment:

No. of Tippers required for Stone Transportation:

1. Lead distance	=	0.3 km
2. Uphill at 20 kmph speed	=	(60/20)x0.3 = 0.9 min say 1 minute
3. Downhill at 25 kmph speed	=	(60/25)x0.3 = 0.72 min say 1 minute
4. Loading time	=	8 minutes
5. Spotting time	=	1 minute
6. Unloading	=	1 minute
7. Total time requited per trip	=	12 minutes
8. No. of trips per hour	=	60/12= 5
9. With 80% efficiency	=	5 x 0.80 = 4 trips per hour
10. Hourly output per tipper	=	4 x 10 = 40 MT
11.Production of stone per day	=	40513 = 135.04 MTsay 135 300
12.Production of Soil (gritty) per day	:	1932= 6.44 MT say 6 MT 300
13.Material required to be handled per day	=	(135+6)=141 MT
14. Considering one shift per day, 6 hrs per shift so output of 1 tipper per day	=	40 x 6=240MT
15. No. of Tippers required	=	141/240 = 0.59
Considering 80% availability, number of tippers required is 0. 0.59/0.8 = 0.74 no. Say 1. Therefore tippers would be enough to meet the requirement of transport		

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Details of Tippers:

Description	Nos.	Size/ Capacity	Motive power	H.P
Tippers for stone transportation	1	10 MT	Diesel	98.5

Machinery Deployed

Salient features of the Proposed Mining Machinery are as under:

S. No	Type of machine	No	Dia of hole In mm	Size/ capacity	Motive power	H.P
1	Excavators	1	-	0.6 cu. m	Diesel	115
2	Compressor	1	-----	300 cfm	Diesel operated	1
3	Jackhammer Drill	2	--	--	--	--
4	Tippers	1	-	10 MT	Diesel	98.5
5	Rock Breaker	1	--	--	--	--
6	Water tanker	1	--	--	--	--

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CHAPTER – V
BLASTING

5.1. Blasting:

Equipment for compressed air drilling

5.1.1 Air Compressor

Diesel-operated, compressors with 300 cfm capacity -1 Nos.

5.1.2 Jack Hammer Drill

Air operated with 1800 to 2000 RPM – 2 Nos. One jack hammer drill will be sufficient to meet the production target but for emergency purpose one more will be kept standby

Drilling of 3.3m (including 10% sub-grade) depth hole will be performed in four stages of drilling i.e. 1st, 2nd, 3rd and 4th which are as follows:

In 1st stage with drill rod of 800mm long having Diameter 39mm will be used for drilling, during 2nd stage with drill rod of 1600mm long with 38mm Diameter will be used at 3rd stage with of 2400mm long and Diameter 36mm of drill rod will be used for drilling and ultimately in 4th stage with 3300mm long with 34mm Diameter of drill rod will be used for drilling to reach the drilling depth 3.3m.

Two 3m thick layered of stone will be blasted to maintain the 6m bench height and ultimately to achieve the production target.Sufficient numbers of drill rod with required length will be kept stored for emergency purpose and to complete the mining work in time.

5.2 Blasting

In this mine, shallow – hole drilling would be in practice. Holes would be drilled in hard formation by jackhammer drill having diameter from 39mm to 34mm. The holes are generally made up to 3.3m (including 10% sub-grade) depth. Burden and spacing would be maintained as 1.6m and 2m depending upon the compactness of formation. On this basis each hole will yield 1.6mx2mx3mx2.8= 26.88 tonnes.

The shot hole blasting will be carried out manually. The shots will be fired electrically using exploder approved by DGMS. In case of non-availability of electric detonators provision will be kept for ordinary fuse blasting.

5.3 The blasting parameters adopted would be as under:

Average depth of hole	3.3m
Burden	1.6m
Spacing	2m
Yield per hole	1.6mX2mX3mx2.8= 26.88 tonnes
Average daily production	135 Tonnes
No. of hole required /day	135/26.88 = 5.02 Nos. say 5
Size of Cartridge	25mmx200mm

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Weight of Cartridge	125gm
No of Cartridges per hole	2 Cartridges
Charge per hole	250gm
Explosive consumption / day	5X250 =1.25 Kg

Thus to extract 135 tonnes of stone per day drilling and blasting will be required.

Therefore 5 holes are required to be drilled per day, which can be performed by 1 drilling crew consisting of two persons.

Delay Blasting will be practised in the area for 5 holes.

Types of Explosive

Blasting will be carried out by using gel explosives (such as Powergel 901 is a water resistant packaged explosive designed to deliver high energy. It can be used in both priming applications and as a high density column explosive. Powergel 901 cartridges are packaged in film, which readily splits during tamping to maximize coupling and bulk strength within a blast hole) and safety fuse of 5m length.

Storage of Explosive:

An agreement will be made with the blasting agency by the applicant before starting the mining operations.

5.4 SAFE PRACTICES DURING SHOT FIRING

Required precautionary measures would be taken to avoid Kinking during firing.

Drilling and charging of holes shall not be carried out in the same area simultaneously.

A detailed record of the hole positions, type of explosives, quantity of explosives, hole depth, charge column and stemming would be maintained in a Register for locating/ finding out the depth of the charge in case of a chance misfire.

Before firing of shots in a cycle of blasting all persons shall be withdrawn from the blasting site to a safe place, i.e. more than 300m away from the spot/site of blasting.

Blasting time will be fixed in consultation with the neighboring mines and preferably after the end of working shift taking all required precautions, like marking the danger zone of 300m with red flags/ posting of sentries waving red flags, use of warning signals/blowing sirens and providing blasting shelters etc. Controlled blasting will be done to minimize blast vibration impacts and contain fly rocks.

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CHAPTER – VI
MINE DRAINAGE

6.0. **Mine Drainage:**

Ganol river is flowing at a distance of about 4 Kms south-west of the block.

The area is sloping and workings will be kept restricted above ground water table.

The proposed area with its surroundings is gently sloping. The proposed mining operation being semi-mechanized would not affect environment adversely.

However, adequate control measures will be taken to prevent water pollution/contamination.

During rainy season the rain water falling on the mine with silt and clay, wash off particles of the surrounding area will be flown through the garland drain to the settling tank into which the transported suspended particles will be precipitated and allow clear sump water to overflow to the storage tank from where it will be used for plantation, water sprinkling on haul road and daily washing of machineries / transport vehicles.

As such, there is no impact on water regime due to mining activities.

Water quality monitoring will be done as per CPCB norms & MSPCB guidelines.

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CHAPTER – VII
STACKING OF MINERAL REJECT AND DISPOSAL OF WASTE

7.0. **Nature of Waste**:

The entire produce of boulder stone will be used as building material and according to its end use as discussed in the next chapter (Use of Minerals).

7.1. **Nature of soil & selection of dump site**:

At the stage of mining operation some extent of gritty soil will be removed and would be dumped at north-western corner of the area with suitable precaution. Some quantity of the generated gritty soil would also be used for road dressing and plantation. After conceptual period exhausted quarry area will be reclaimed to the extent possible.

To protect dump failure/soil erosion, toe-wall with weep-holes and garland drains will be constructed at the lower side of the dumps to check the wash off during the rainy season.

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CHAPTER – VIII
USE OF MINERALS

8.1. USE OF MINERALS:

ROM will be used for construction of buildings & making/dressing of roads. Stone could be used for various construction works and road projects. Stone extracted from the mine could also be directly used as boulders of different sizes for River Anti-erosion, Dam construction, embankment works etc. After fulfilling the local demand or if there is no demand in the local market then the project proponent can export the mineral to nearby countries.

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CHAPTER – IX
MAN POWER

9.1. Manpower Deployment:

There would be 300 working days in a year. Taking into account 5 years of plan period, the requirement of management & supervisory personnel has been considered as under Reg. 34 (2) (C) of MMR, 1961 & would be as follows

Employment Potential:

The following employment will be generated due to mining operation in the area

Employees	Future
Manager	1
Supervisor	1
Junior Supervisor	1
Blaster	1
Blaster Helper	1
Storekeeper	1
Attendance Clerk – cum Register Keeper	1
Excavator Operator	1
Compressor Operator	1
Jackhammer Drill Operator	2
Tipper Driver	1
Rock Breaker Operator	1
Water Tanker Driver	1
Semi-skilled Miners (inclusive of absentees & leave)	12
Unskilled	4
Total	**30**

9.2 LABOUR SOURCE: Labours will be employed from nearby villages.

9.3 SITE SERVICES

The services provided outside the working site are:

1) Rest Shelter
2) Pit Office
3) First Aid Arrangement and
4) Drinking Water.

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CHAPTER – X
MINERAL PROCESSING

10.1 Mineral Processing:

There is no need for mineral processing or mineral beneficiation to upgrade the ROM produced in stone mining. Mined out stone, in different forms/sizes ranging from boulders to aggregates, could be directly used for various constructional works.

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CHAPTER – XI
ENVIRONMENT MANAGEMENT PLAN

Environment is normally affected due to mining particularly when the methodology adopted is open casting. For environmental protection of the area an Environmental Management Plan has been prepared. The present scenario of environmental attributes and activities are shown in Plate – 7.

11.1 Base Line Data,

11.1.1 Existing Land Use Pattern

Category	Area in Hectares
Quarry	0.00
Road	0.01
Total area in use	**0.01**
Balance unused area	1.25
Total Applied Lease Area	**1.26**

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11.1.2 Water

Ganol river is flowing at a distance of about 4Kms south-west of the block. The area is much above HFL and there is no record of flooding of the area. Natural drainage pattern of the area will not be altered due to mining activity, mining operation will be conducted above ground water table.

11.1.3 Terrestrial Ecology

The study of Terrestrial Ecology involves the identification of animals, birds including nomadic and migratory, reptiles and amphibian fauna.

11.1.3.1 Fauna:

Insects, Lizards and Reptiles etc. are scarcely noticed in the proposed area of mining.

11.1.3.2 Flora:

Different kinds of Creepers, Bushes, Shrubs and small plants etc. are commonly found in the applied area and in its surroundings.

11.1.4 Quality of Air

At present time air is clean and clear and free from the pollutants as no mining activity in existence. The mining operation will be carried out by open cast semi-mechanized method. So after the commencement of mining operation, following measures shall be undertaken.

- Regular water spraying on haul roads, waste dumps and maintaining approach roads to suppress the dust as per practice.
- Transporting equipment shall be maintained regularly.
- Adequate plantation shall be done along lease boundary and transport road.
- Wet drilling shall be practiced.

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- Maintenance of nearby local roads through which transportation of minerals shall be carried out by the project proponent.

Monitoring of ambient air quality shall be done and report of such monitoring shall be submitted to Competent authority.

11.1.5 Climate

The area experiences the influences of sub-tropical Monsoon with an average annual rainfall varying from 200 cm to 250 cm. The diurnal change of temperature is high even in winter. Summer is hot and sultry with temperatures ranging from 30°-35°C. Winter starts in late November and ends in March. Winter day temperatures range from 20°-25°C. Pre-Monsoon rain starts in the month of April. The area is prone to cyclone which usually hits the area in the month of April and May.

11.1.6 Social and Demographic Profile

General people of the region are mainly dependent on farming and mining will help them provide additional sources of job opportunity and would prevent migration. Local people are fully dependent on daily -rated jobs, forest products, agriculture and employment in mines. Area within 500m radius is shown in Plate – 1

11.1.7 Public buildings, places of worship and monuments:

There is no public building, places of worship or monument of historical importance within the proposed applied area.

11.1.8 Whether the area falls under the Water (Prevention & Control of Pollution) Act 1974:

Yes

11.2.1 Relief and Landscape Alteration:

With the gradual extraction/mining of the stone deposit stretching from surface to below ground the profile of the virgin area will change and the topography of the area will also get altered. Thus the altered topographic scenario will have a different visual effect.

11.2.2 Impact on the Water Table:

Boulder Stone mining operation would not require much water except for water sprinkling at points/source of dust generation. No chemical beneficiation would be necessary for ROM stone mined. As the Mining operations would be carried out above Water Table there is no likelihood of impact on ground water table.

11.2.3 Water Contamination

In applied area very thin soil cover is there & less possibilities of rain water causing soil erosion. As precautionary measure garland drain shall be cut surrounding the quarry to collect the runoff water and this shall be conneted to the settling tank which will collect the solid particles of silt and clay and allow clear sump water to flow to the storage tank from where it will be used for plantation, water sprinkling and daily washing of machineries / transport vehicles.

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11.2.4 Air and Noise Pollution

There will be impact on air up to a certain limit due to dust generation during loading operation, transportation of gritty soil/stone and drilling & blasting. Similarly, due to mining operation noise pollution will be there, due to drilling, blasting and movement of transportation vehicles. However effective measures shall be taken to maintain the pollution limit within prescribed CPCB norms and MSPCB guidelines **(For precautionary measures please refer Para 11.3.1 ,11.3.2 & 11.3.5)**

11.2.5 Impact on Climate:

No impact on climate is anticipated due to the proposed level of working.

11.2.6 Impact on Human Environment:

There will be a beneficial impact on human environment due to generation and growth of employment with commencement of mining operation.

11.3 Environment Management Plan:

Necessary action will be taken to monitor Air Quality, Water Quality, Noise Level from time to time as indicated earlier **(Please refer Para 11.3.1, 11.3.2, 11.3.3, 11.3.5).**

11.3.1 Dust Suppression:

During Mining operation, fugitive dust will be the principal air pollutant. Following measures will be provided to reduce the air pollution-

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East Garo Hills, Williamnagar.

- Water spraying will be there in haul road and operational area.
- Wet drilling will be preferred.
- Sharp drill bits will be used to reduce dust generation.
- Dust extractor will be used to reduce dust generation wherever necessary.
- Proper monitoring of air quality data has to be maintained and in case it exceeds the permissible limit, adequate measures have to be taken.
- Avenue plantation in and around the quarry, dump site are to be made.
- The 7.5m Safety Barrier shall be maintained for green belt development at 2.5m spacing left all around and shall be used for plantation of trees with deep and thick vegetation so that air pollution due to dispersal of dust from the mine can be arrested. Pollution from dust, smoke & due to blasting shall be kept minimized by adoption of muffling system.
- Details of year wise greenbelt development along with number of plants and required area. (Taking 305 plants on 0.19 ha area or 2.5mX2.5m grid pattern)

Year	Area for greenbelt in m^2	No of plants
1st	380	61
2nd	380	61
3rd	380	61
4th	380	61
5th	380	61
Total	**1900**	**305**

Ashok Kumar Sarkar
RQP/KOL/377/2013/A

- The species of plants having fast growth and are sustainable with high survival rate and as supported by the local prevailing environmental conditions would be chosen. The plantation shall be done in the safety zone area.
- Green belt plantation will be protected properly and will be maintained by daily watering and regular nursing. Necessary precaution and care will be taken to protect the saplings and to maintain the optimal rate of survival.

11.3.2 Precaution against Air Pollution:

There shall be some air pollution from use of explosives for blasting & also from operation of wagon drill, compressor, jack hammer drills in the process of mining. Efforts will be made to reduce and keep the level of pollution within permissible limits by sprinkling water on haul roads and mining operational area. PPE such as masks, goggles shall be provided to the workers.

11.3.3 Water Pollution Control Measures:

During rainy season the rain water falling on the mine with silt and clay, wash off particles of the surrounding area will be flown through the garland drain to the settling tank into which the transported suspended particles will be precipitated and allow clear sump water to overflow to the storage tank from where it will be used for plantation, water sprinkling on houl road and daily washing of machineries / transport vehicles.

11.3.4 Storage of Top Soil/Rejects:

At the stage of mining operation some extent of gritty soil will be removed and would be dumped at north-western corner of the area with suitable precaution. Some quantity of the generated gritty soil would also be used for road dressing and plantation. After conceptual period exhausted quarry area will be reclaimed to the extent possible.

During rainy season to prevent dump failure/soil erosion, toe-wall with weep-holes and garland drain will be constructed around the dump and would be connected with main garland drain and thus the constructed garland drain will collect the seepage water from the dump and the water will be drained to the settling tank connected with the main garland drain surrounding the quarry area. And also dwarf species of plant would be cultivated on the heap of the dump to check the collapsing.

11.3.5 Noise Pollution Control Measures

The main source of noise in the mining area is the operation of Heavy Earth Moving Machines like Excavators, Tippers. Besides drilling & blasting are also a potential source of noise pollution. In order to minimize the noise pollution following measure will be adopted.

- Regular, proper and timely maintenance of machinery.
- Plantation along the periphery of mining lease area.
- Providing ear plugs to the workers.

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GOVERNMENT OF MEGHALAYA

11.3.6 Land Reclamation

After the full extraction of mineable stone deposit and completion of quarrying operation the excavated vacant area will be reclaimed to the extent possible.

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CHAPTER – XII
PROGRESSIVE MINE CLOSURE PLAN

12.1. Introduction:

Smt. Fridina D. Shira has applied for a mining lease for boulder stone over an area of 1.26 Ha located at Dhapguri, P.O. - Zikabari, Dist-West Garo Hills, Meghalaya.

12.1(a) Name & Address of the Applicant:

Smt. Fridina D. Shira

Village - Burny Hills, P.O.- Dakopgin, P.S. - Tura, West Garo Hills, Meghalaya.

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12.1(b) The Extent of the Area:

Details of the Area:

Applied Area: 1.26 Ha

Whether recorded as forest land – Non- Forest private Land.

Status of the Applicant:

The Applicant is a Private Individual.

Name & Address of the RQP Preparing the Mining Plan:

Ashok Kumar Sarkar

Flat No-304, Block B-12, Airport Enclave Co-operative Housing Society

Jessore Road, Kolkata-700051.

State : West-Bengal

Registration No. : RQP/KOL/377/2013/A

12.1.(c).Method of Mining:

Please refer Chapter – IV.

12.1.(d).Mineral Processing:

Please refer Chapter – X.

12.1.1. Reasons for Closure:

i) Quality Deterioration of Mineral: If the mineral is found to be bad in quality in the proposed mining area at any stage of operation then the mine may have to be closed.

ii) Government Departmental Objection for Violation: During mining operation if any violation/deviation from the approved mining plan is observed/pointed out by the State Government Department officials concerned they may direct to close the mine.

iii) Exhaustion of Reserves in the quarry: As per the Letter of Intent the applicant has to close the mine when the workings would reach up to the ultimate pit limit depth because of exhaustion of the estimated mineable reserve.

iv) Stay order from the Court: If any stay order comes from a Court of Law the mine will have to be stopped forthwith.

12.1.2. Statutory Obligations:

The applicant will comply with all the statutory obligations.

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12.1.3. **Closure Plan Preparation**:

The name and address of the applicant and the recognized qualified person who prepared the Mine Closure Plan and the name of the executing agency is furnished in para 12.1.(a) & 12.1(b).

12.2. **Mine Description**:

12.2.1. **Geology**:

Please refer Chapter - III of the mining plan.

12.2.2. **Reserves**:

Please refer Chapter - III of the mining plan.

12.2.4. **Mining Method:**

Please refer Chapter–IV.

12.2.5. **Mineral Beneficiation:**

Please refer Chapter – X.

12.2.6. **Review of Implementation of Mining Plan / Scheme of Mining including Five Years Progressive Closure Plan up to the Final Closure of Mine:**

This is a fresh applied lease, at this stage it is not required.

12.3. **Closure Plan:**

12.3.1. **Mined-Out Land:**

As a result of mining operation, the original ground profile will get altered. The de-stoned quarry will be reclaimed after conceptual plan period. Details of year wise production land use pattern have been mentioned in the mining chapter (Chapter No- IV).

12.3.2. **Environment:**

The green belt development not only functions as a foreground and background landscape feature resulting in harmonizing and amalgamating the physical structures of the mines with surrounding environment, but also acts as a pollution sink as indicated above. Thus, implementation of afforestation program is of paramount importance. In addition to augmenting existing vegetation, it will also check soil erosion, make the ecosystem more compatible and functionally more stable and make the climate more conducive.

The choice of species of plants shall be such as would be supported by the environmental conditions prevailing in the area for fast and sustained growth. The plantations shall be done in the safety zone area.

- The phase-wise reclamation & afforestation has to be started simultaneously in the production year.
- The 7.5m Safety Barrier shall be used for green belt development at 2.5m spacing left all around and shall be used for plantation of trees with deep vegetation so that air pollution from the mine can be arrested. Pollution from dust, smoke & due to

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blasting shall also be minimized by adoption of muffling system at stipulated interval of time.

- Details of year wise greenbelt development along with number of plants and required area. (Taking 305 plants on 0.19 ha area or 2.5mX2.5m grid pattern).

Year	Area for greenbelt in m^2	No of plants
1st	380	61
2nd	380	61
3rd	380	61
4th	380	61
5th	380	61
Total	**1900**	**305**

- Green belt plantation will be made and protected properly and will be maintained by daily watering and nursing. Suitable precautions will be taken to protect the saplings and to maintain the optimal rate of survival.
- Road side plantation will also be done during the conceptual plan period.

12.3.3. Ground Vibration due to Blasting:

Please refer Chapter – V.

12.3.4. Water Regime:

The water comes across in the working during monsoon. The water will fill in the working pits. Some water will flow by joints and cracks and rest water has dewater in nearby garland drain 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 the lower RL side by slope of the area. The water accumulate in the working pit is being dewatered by diesel operated pumps.

Impact on the Water Table:

As mining operations do not require much water and no chemical beneficiation will be necessary, there is no likelihood of impact on ground water table.

Water Contamination:

The nearest river is flowing approx. 4 kms away from the proposed area, therefore chances of the river water getting contaminated by mining operation are remote.

Water Pollution Control Measures:

During rainy season the rain water falling on the mine with silt and clay, wash off particles of the surrounding area will be flown through the garland drain to the settling tank into which the transported suspended particles will be precipitated and allow clear sump water to overflow to the storage tank from where it will be used for plantation, water sprinkling on houl road and daily washing of machineries / transport vehicles.

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12.3.5. **Air Quality Management:**

Air and Noise Pollution:

There will be impact on Air Quality to a certain limit because of dust generation due to transport operation, waste dumping and drilling/ blasting. Similarly, due to mining operations also there will be noise pollution to some extent.

Air and Noise Pollution Control Measures:

The air pollution will also result due to drilling and blasting, movement of vehicles and mining operation by semi-mechanized method.

Vigorous efforts shall be made to minimize air pollution by keeping the machineries in well maintained condition and proper drilling and blasting. The greenbelt development would also minimize air pollution.

The air quality would be maintained as per the norms of CPCB & MSPCB guidelines wherever necessary.

The main source of noise pollution in the mining area is the operation of Heavy Earth Moving Machinery like Tippers, Excavators. Besides, drilling & blasting operations are also potential sources of noise pollution. In order to minimize the noise pollution the following measures will be adopted.

- Regular water spraying on haul roads, waste dumps and maintaining approach roads to suppress the dust as per practice.
- Transporting equipment shall be maintained regularly.
- Adequate plantation shall be done along lease boundary and transport road.
- Wet drilling shall be practiced.
- Maintenance of nearby local roads through which transportation of minerals shall be carried out by the project proponent.

Monitoring of ambient air quality shall be done and report of such monitoring shall be submitted to Competent authority.

12.3.6. **Waste Management:**

The produced boulder stone from the mine will be entirely used as building material.

12.3.7. **Top Soil Management:**

During mining operation a great extent of gritty soil will be removed and would dumped at north-western corner of the area with suitable precautions (such as cultivation of dwarf species of grass and construction of toe wall and garland drain). Some extent of it would be used for road dressing and plantation. After conceptual stage of working de-stoned area of quarry will be reclaimed to the possible extent.

As precautionary measure a garland drain shall be cut at the lowest RL of the mine to collect the runoff water and this shall be connected to the settling tank which will collect the solid particles of silt and clay and allow clear sump water to flow to the storage tank

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from where it will be used for plantation, water sprinkling on houl road and daily washing of machineries / transport vehicles.

12.3.8. Tailing Dam Management:

As there will be no beneficiation activity in the area, no tailing dam management would be necessary.

12.3.9. Infrastructure:

The Applicant will construct the pit office cum attendance room and first aid center, work shop as per the site selection after grant of mining lease. A rest shelter will be provided near working quarry. Provision of potable water will be made from well/tube well which, in generally, is used by the villagers.

At the final closure stage the infrastructure so constructed will be dismantled after the completion of mining activity.

12.3.10. Disposal of Mining Machinery:

The mining machineries will be engaged on hire basis. After the abandonment of mines all the machineries will be returned to the owner.

12.3.11. Safety & Security:

The size of the working benches will be maintained as per Reg. 106 of MMR, 1961. Personal Protective Equipment (PPE) like industrial safety helmets, gloves, safety spectacles, goggles, visors, high-visibility clothing, safety boots, shoes with protective toecaps, safety harness, earplugs, earmuffs, etc. will be provided to the workers Respiratory Protective Equipment (RPE) like nose masks etc. will be provided to the workers keeping in mind of their comfort ability and friendly fittings and beside these the project proponent would provide Health insurance/Accidental insurance, Hours of work and over time payment, meal and tea breaks, leaves applicable/sick leave, first-aid and medical treatment.

At the time of final closure of the mines, the abandoned pits shall be fenced properly and signboards will be set up indicating the safety cautions at prominent places.

12.3.12. Disaster Management & Risk Assessment:

The applied lease area is small and the mining operation will be in semi- mechanized method. No heavy seismic activities are recorded in this area during the last 50 years as per the village officials. The mining operation will not go to the much deeper side, hence chances of land slide or subsidence are rare. The proposed project site falls in zone- V as per IS 1893 (Part-I): 2002. Hence, seismically it is an active zone.

12.3.13. Care & Maintenance during Temporary Discontinuance:

Proper care and maintenance during temporary discontinuance will be taken. Proper safety and security for the machineries as well as for staffs will be taken.

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East Garo Hills, Williamnagar.

12.3.14. Economic Repercussions of Closure of Mine & Manpower Retrenchments:

Taking into account of the plan period of five years the requirement of management & supervisory personnel has been considered as under Reg. 34 (2) (C) of MMR, 1961. Since a handful of workmen would be employed for mining activity, no major repercussion is expected after closure of mine.

12.3.15. Number of Local Residents Employed in the Mine, Status of the Continuation Family Occupation & Scope of Joining the Occupation Back:

The mine would provide employment to local workers mostly from the nearby villages outside the applied area. The main occupation of their family is farming. All the statutory facilities under the mines rules will be extended to the workers. In case of final closure, they can revert back to their family occupation along with the statutory monetory benefits given by the management.

12.3.16 Time Scheduling for Abandonment:

Time schedule of all abandonment operations as proposed is given below in self explanatory bar chart.

Activities	Tentative time frame for completion of jobs for mine closure operation (In months) from date of cessation											
	1	2	3	4	5	6	7	8	9	10	11	12
Reclamation & Rehabilitation of mined out land	The excavated area will be reclaimed, after complete extraction of mineable reserve, to the extent possible.											
Waste management	Not Applicable											
Decommissioning of infrastructure	→											
Safety & Security	Safety and security will be provided and ensured by the mine proponent.											
Monitoring of air & water	→											

12.3.17 Expenditure during the five years plan period: -

Description	Quantum of work to be done	Approx. total cost of process (in Rs.)
Reclamation and Rehabilitation of excavated pits	Quarry will be reclaimed after extraction of total mineable reserve.	-----
Soil dump Management	Top gritty soil will be dumped in north-western portion of the applied area	30,000/-
Plantation & green belt development	0.19 Ha area within the safety barrier will be used for greenbelt development about 305 plants	61,000/-
Air Noise and water Quality monitoring	Monitoring will be done yearly for five years (Air, Water, and Noise)	75,000/-
Settling tank & Garland drain	Construction of garland drain & Settling tank	40,000

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Settling tank cleaning	Silt and clay remove from settling tank	60,000
Tentative cost of abandonment		**2,66,000/-**

12.3.18 Financial Assurance :

Computation of financial assurance:

Total Applied Lease Area – 1.26 Ha say 2 Ha

Rates. – Rs. 10000/-per Hectare

Amount of financial assurance – 2 Ha X 10000/ - = Rs. 20,000/-

The amount of financial assurance as may be specified by the State Govt. will be submitted in the form of Bank Guarantee by the applicant to the concerned authority of the State Govt. Meghalaya before execution of the lease deed.

12.3.19 Certificate:

The above certificates are enclosed at the beginning of the mining plan.

12.3.20 Plans, sections etc:

Progressive Mine Closure Plan is enclosed as plate No 9 with this plan.

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East Garo Hills, Williamnagar.

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GOVERNMENT OF MEGHALAYA

OFFICE OF THE DIVISIONAL FOREST OFFICER:
WEST, SOUTH & SOUTH-WEST GARO HILLS (T) DIVISION: TURA

STATUS OF LAND CERTIFICATE

In pursuance to Rule 6 (d)/Rule 23 (b) read with Rule 4(2)(b) of the Meghalaya Minor Mineral Concession Rules, 2016 and based on the inspection report submitted by Range Forest Officer, I/c Tura Beat Office(State), Tura dated **13-06-2017**, in respect of the land located at **Dhapguri, P.O. Zikabari, West Garo Hills, Meghalaya** having the following GPS Co-ordinates, the Status of the land is " **NON-FOREST** " according to the dictionary meaning of "forest".

Point	Longitude	Latitude	Point	Longitude	Latitude
1	N.25°38'12.61"	E.90°00'52.99"	4	N.25°38'09.36"	E.90°00'58.54"
2	N.25°38'14.04"	E.90°00'54.10"	5		
3	N.25°38'10.73"	E.90°00'59.48"	6		

The applicant, **Smt. Fridina D. Shira of Village: Burny Hills, P.O. Dakopgiri, P.S. Tura, West Garo Hills, Meghalaya**, is required to submit an application complete in all respects in the format and manner prescribed in the said rules to the office of the undersigned for further necessary action for the purpose of the grant of mining lease/issue Quarry Permit in respect of the proposed location of the site subject to the provisions of the Meghalaya Minor Mineral Concession Rules, 2016 as amended from time to time.

This is for the favour of your kind information and necessary action.

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Divisional Mining Officer
East Garo Hills, Williamnagar.

Divisional Forest Officer,
West, South & South-West
Garo Hills (T) Division, Tura.

No. A/16/VII/NOC/MMMCR/ Dated Tura, June, 2017

Copy to:

1. The Chairman, State Pollution Control Board, Meghalaya, Shillong for information and necessary action.
2. The Conservator of Forests (WL&T), Garo Hills Circle, Tura for information

Divisional Forest Officer,
West, South & South-West
Garo Hills (T) Division, Tura

A/16/VII/NOC/ MMMCR/1493-499 Dated Tura, 20th June, 2017

Copy to:

1. The Deputy Commissioner, West Garo Hills, Tura for information and necessary action.
2. The Superintendant of Police, West Garo Hills, Tura for information.
3. The Chairman, District Environment Impact Assessment Authority (DEIAA), West Garo Hills District for information and necessary action.
4. The Chief Executive Member, GHADC, Tura for information and necessary action.
5. The Assistant Labour Commissioner, Tura for information and necessary action.
6. Shri. J.W. Sangma, Geologist, Directorate of Mineral Resources, Tura for information and necessary action.
7. **Smt. Fridina D. Shira of Village: Burny Hills, P.O. Dakopgiri, P.S. Tura, West Garo Hills, Meghalaya**, for kind information and necessary action.

Divisional Forest Officer,
West, South & South-West

Government of Meghalaya
Forests & Environment Department
West, South & South-West
Garo Hills (Territorial) Division, Tura
Email- garohillsdiv@gmail.com
Fax No. 03651-223850

Shri. Sachin Gavade, IFS
Divisional Forest Officer

Memo No. B/16/VIII/213 Dated Tura, the 28th Jan., 2019.

From: The Divisional Forest Officer,
West, South & South-West
Garo Hills (T) Division, Tura

To: Smt. Fridina D. Shira,
Village: Burny Hills,
P.O. Dakopgiri & P.S. Tura,
West Garo Hills, Meghalaya

Sub: Letter of Intent (LoI) under the Meghalaya Minor Mineral Concession Rules, 2016 for lease of Mining Lease based on your application dated 26-06-2017.

Sir/Madam,

With reference to the subject cited above and in pursuance to Rule 10 of the Meghalaya Minor Mineral Concession Rules, 2016 and in continuation to earlier issued LoI vide order No. B/16/VIII/31E2 dated 3rd Nov., 2017, this letter of Intent (LoI) is being issued for the purpose of the grant of mining lease in respect of the proposed mining site of **1.26 Ha** area located at ***Dhapgiri, P.O. Zikabari, West Garo Hills, Meghalaya*** with the GPS co-ordinates as follows:

Point	Latitude	Longitude	Point	Latitude	Longitude
1	N.25°38'12.61"	E.90°00'52.99"	3	N.25°38'10.73"	E.90°00'59.48"
2	N.25°38'14.04"	E.90°00'54.10"	4	N.25°38'8936"	E.90°00'58.54"

in favour of ***Smt. Fridina D. Shira, of Village: Burny Hills, P.O. Dakopgiri & P.S. Tura, West Garo Hills, Meghalaya***, based on the Enquiry Report submitted by the Beat Forest Officer, I/C Tura Beat (North) vide letter No. [illegible] dated Tura, the 10th July, 2017 from the office of the undersigned, subject to the following terms and conditions:

Terms and Conditions

1. This letter of intent and subsequent grant of aforementioned mining lease shall be subject to the provisions of the Meghalaya Minor Mineral Concession Rules, 2016 as amended from time to time.
2. Smt. Fridina D. Shira, *of Village:* Burny Hills, P.O. Dakopgiri & P.S. Tura, *West Garo Hills, Meghalaya*, shall be granted mining lease in respect of the proposed site with the above mentioned GPS co-ordinates located at *Dhapgiri, P.O. Zikabari, West Garo Hills, Meghalaya*, only upon satisfactory fulfilment of the requirements as stipulated in the said rules, which among others includes submission of the following documents to the office of the undersigned within a period of 6 (six) months from the date of issue of this letter of intent (LoI), failing which this letter of intent shall deemed to be cancelled:

- Mining Plan duly approved by the Director of Mineral Resources, Meghalaya. The Mining Plan shall be prepared by a person empanelled with the Meghalaya State Government or other State Governments or the Central Government with the qualification and experience as laid down in Rule 19(2) of the Meghalaya Minor Mineral Concession Rules, 2016.
- Environmental Clearance under the Environmental (Protection) Act, 1986 from the District Environment Impact Assessment Authority (DEIAA) or State Environment Impact Assessment Authority (SEIAA), as per extant rules and regulations.
- Consent to Establish under the Water (Prevention & Control of Pollution) Act, 1974 and Air (Prevention & Control of Pollution) Act, 1981 from the Meghalaya State Pollution Control Board, Shillong.
- Clearance from Revenue and Disaster Management Department, and
- Clearance from Labour Department for occupational health and labour laws including child labour.

This is for the favour of your kind information and necessary action.

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Yours faithfully,

Divisional Forest Officer,
West, South & South-West
Garo Hills (T) Division, Tura

Divisional Mining Officer
East Garo Hills, Williamnagar

Contd-2

MEGHALAYA 00AA 425456

AFFIDAVIT

I, **Shri. Gotjeng M. Sangma**, S/o. (Lt) Batjeng [illegible] of Kilmangittim [illegible] P.O. Selsella, P.S. Tura, Dist. West Garo Hills, Meghalaya, [illegible] Christian, by occupation Farmer, being Nokma of Kilmangittim Aking, do hereby solemnly affirm and declare as follows:

1. That I am the recognized registered Aking Nokma of Kilmangittim Aking land and which Aking land was recognized by the Garo Hills Autonomous District Council (GHADC) Tura. The Kilmangittim Aking is also a registered and recognized Aking by the Council of Nokmas, a Conglomeration of Aking Nokmas of entire Garo Hills, which is a registered body incorporated under the Societies Registration Act of Meghalaya.

2. That the Aking No. III-25(12) pertaining to Kilmangittim Aking land was previously provided by the Deputy Commissioner, Garo Hills Division, Tura, prior to creation of Meghlaya State then. It is therefore pertinent to state that no specific Land Patta is issued to any Aking land either by the District Council/Council of Nokmas in all of the districts of Garo Hills of Meghalaya. Since pre-independence period, Aking Name were allotted with Aking Number (which were combination of Roman Number and Numeric Figures) by the Britishers for identification of land and Elaka (Area) through Mouza Number. The entire land of Garo Hills region belong to different clans of Garo community and the dominion of land by such clan was termed as Aking land of that particular Clan (Sect of Garo Tribe) of Garo Hills region. Hence most of the land of Garo Hills was classified as Aking land which was identified with Hill Mouza No. III, Kilmangittim Aking and 25(12).

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Divisional Mining Officer
East Garo Hills, Williamnagar.

JUDICIAL OFFICER,
MAGISTRATE 1st CLASS
GARO HILLS AUTONOMOUS
DISTRICT COUNCIL
TURA

Contd.....2/-

मेघालय MEGHALAYA

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00AA 425455

[2]

Divisional Mining Officer
Tura Division

3. The only basis of Claim towards existence of any Nokmaship of any Aking land is the Genealogical Tree (GT) also known as "Ma Ambi" in Garo language, which document shows names of the predecessor Nokmas of any particular Aking land in chronology and which names indicate the lineage of the Aking Nokma. In similar fashion, 'Map Wareng' is the boundary Map allotted to every Aking land which shows the area of the Aking land and the said Map Wareng is also a document prepared by the Britishers during pre-independence period. This document indicates the entire map and boundary of the Aking land which was surveyed during the stated period. After constitution of the Garo Hills Autonomous District Council under the VIth Schedule of the Constitution of India all of the records of the Aking land of Garo Hills was handed over by the then Custodian Deputy Commissioner to the District Council authority. Hence, the GT and the Map Warang are the authentic document to establish Aking property by a Nokma in any given situation. In case of my Kilmangittim Aking land a photocopy of the Map Warang marked as Annexure-I may be treated as an integral part of this affidavit.

That I have been bestowed with the privilege of becoming the Nokma of Kilmangittim Aking for having married Smti. Arji Ch. Momin, being the Nokma of Kilmangittim Aking and who is the daughter of the previous Aking Nokma of Kilmangittim Aking Late Ranjeng Sangma. My appointment to Nokmaship is in consonance with the Garo customary usages and practices.

4. That being the Nokma of Kilmangittim Aking, I am the Custodian of the entire Aking

JUDICIAL OFFICER,
MAGISTRATE 1st CLASS
GARO HILLS AUTONOMOUS
DISTRICT COUNCIL
TURA

Contd.....3/-

MEGHALAYA 00AA 425454

land and its property and by virtue of such Garo customary practice I am being bestowed with the authority to take any decisions pertaining to the Aking land and property however after taking due consent with my wife; she being the Nokma of the Aking land.

That this affidavit is being sworn in neither to cause any wrongful loss to anybody, authority or person nor to cause wrongful gain to myself, but to declare the above stated facts pertaining to my above state Aking in testimony and to submit this declaration before any concerned authority as may be deemed necessary in future.

VERIFICATION:

I, **Shri. Gotjeng M. Sangma**, the Deponent above named, do hereby state that the contents of the above paras are found to be true to the best of my knowledge, belief and information and I verify the same to be so true; intoken whereof I sign this Affidavit on this 28th day of March, 2017 at Tura.

(LTI of Shri Gotjeng M. Sangma) **Deponent**

APPROVED

Identified by:-

Divisional Mining Officer
East Garo Hills, Williamnagar

Advocate, Tura

Solemnly affirmed and declared before me by the above named deponent who is identified by Nandita Hajong, Advocate ,on this 28th day of March, 2017 at Tura.

Date: 28.03.2017

MAGISTRATE/NOTARY

JUDICIAL OFFICER,
MAGISTRATE 1st CLASS
GARO HILLS AUTONOMOUS
DISTRICT COUNCIL
TURA

भारत सरकार /GOVERNMENT OF INDIA
खान मंत्रालय /MINISTRY OF MINES
भारतीय खान ब्यूरो /INDIAN BUREAU OF MINES

Ashok Kumar Sarkar APPROVED

Divisional Mining Officer
East Garo Hills, Williamnagar.

अर्हताप्राप्त व्यक्ति के रुप में मान्यता प्रमाण पत्र

(खनिज रियायत निमावली, 1960 के नियम 22सी के तहत)

CERTIFICATE OF RECOGNITION AS QUALIFIED PERSON

(Under Rule 22C of Mineral Concession Rules, 1960)

श्री अशोक कुमार सरकार पुत्र स्व. श्री चित्तरंजन सरकार, निवासी फ्लेट सं. 304, ब्लॉक बी –12, एयरपोर्ट एनक्लेव कॉपरेटिव हाउसिंग सोसायटी, जेसोर रोड, कोलकाता – 700 051, जिनका फोटो और हस्ताक्षर उपर दिया हुआ है, तथा जिन्होने अपनी अर्हता और अनुभव का संतोषजनक साक्ष्य दिया है, को खनन् योजना तैयार करने हेतु खनिज रियायत निमावली, 1960 के नियम 22सी के तहत् अर्हता प्राप्त व्यक्ति के रुप में मान्यता प्रदान की जाती है ।

Shri Ashok Kumar Sarkar, S/O Late Shri Chittaranjan Sarkar, resident of Flat No. 304, Block B-12, Airport Enclave Co-operative Housing Society, Jessore Road, Kolkata – 700 051, whose Photograph and signature is affixed herein above, having given satisfactory evidence of his qualifications and experience is hereby **RECOGNISED** under Rule 22(C) of the Mineral Concession Rule, 1960 as a Qualified Person to prepare Mining Plans.

उनकी पंजीयन संख्या है
His registration number is **RQP/KOL/377/2013/A**

यह मान्यता 10(दस) वर्षों की अवधि के लिए मान्य है जो दिनांक 21.02.2023 को समाप्त होगी । This recognition is valid for a period of 10(ten)years ending on 21.02.2023.

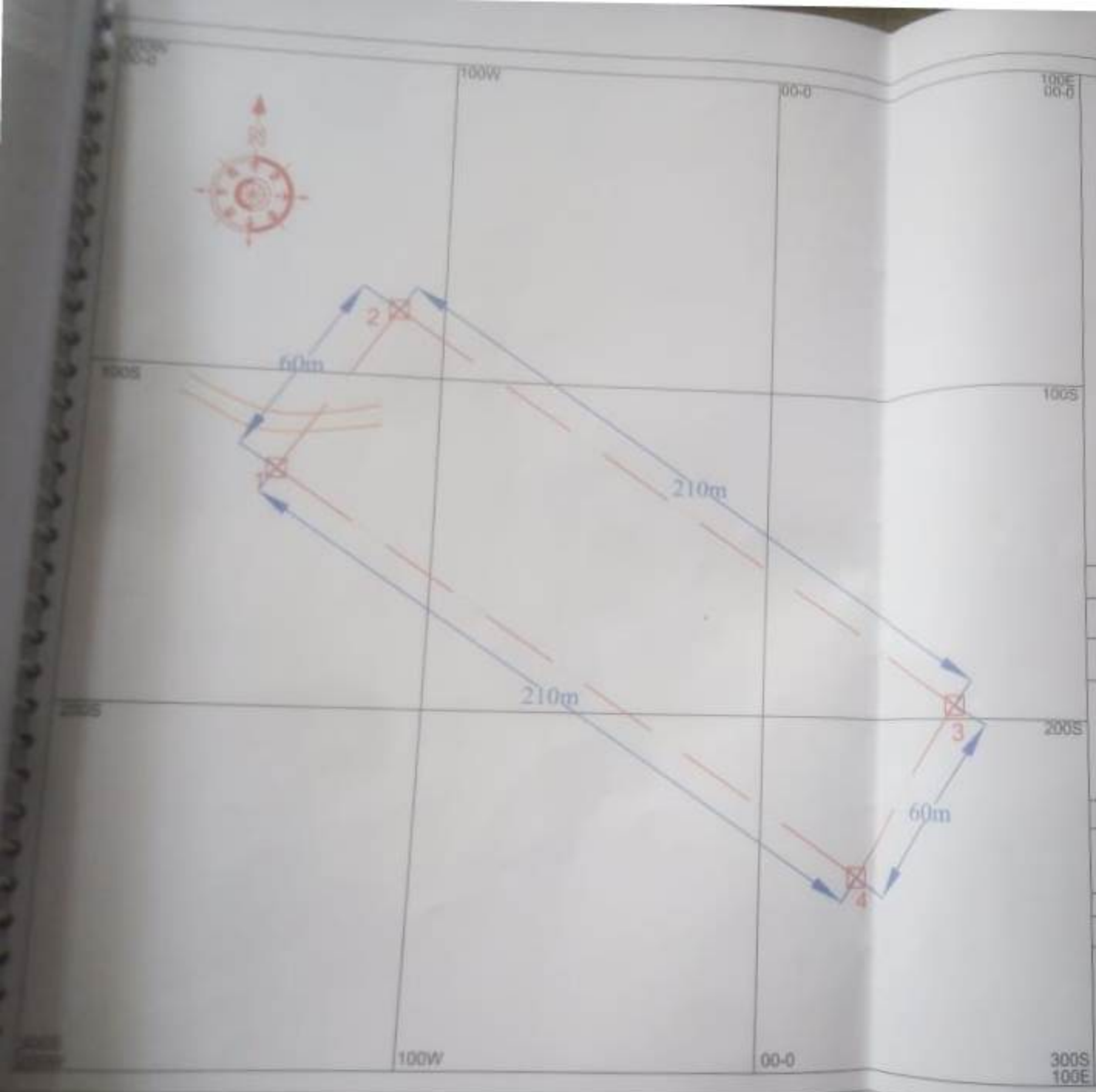
उनके द्वारा प्रस्तुत खनन् योजना में गलत जानकारी / दस्तावेज पाए जाने की स्थिति में यह प्रमाण पत्र वापस लिया जाएगा / निरस्त किया जाएगा ।

This certificate is liable to be withdrawn/cancelled in the event of furnishing the wrong information/documents in the Mining Plan submitted by him.

स्थान / Place : Kolkata
दिनांक / Date : 22.02.2013

21/2/2013

क्षेत्रीय खान नियंत्रक / Regional Controller of Mines
भारतीय खान ब्यूरो / Indian Bureau of Mines
कोलकाता क्षेत्र / Kolkata Region



Coordinate of Pillars

Sl.No	Coordinates	
1	N25°38'12.61"	E90°00'52.99"
2	N25°38'14.04"	E90°00'54.10"
3	N25°38'10.73"	E90°00'59.48"
4	N25°38'09.36"	E90°00'58.54"

APPROVED

Divisional Mining Officer
East Garo Hills, Williamnagar

INDEX

- APPLIED LEASE BOUNDARY
- B4 BOUNDARY PILLARS
- GRID LINES
- APPROACH ROAD
- BOUNDARY DISTANCE

Plate No. - 2

Coordinate Plan

Dhapguri Stone Mine

Applicant

Smt. Fridina D. Shira

Village - Burny Hills, P.O.- Dakopgiri, P.S. - Tura, West Garo Hills, Meghalaya.

Applied Lease Area - 1.26 Ha

Applied Lease Area Located at Mouza - Dhapguri, P.O. - Zikabari, Dist-West Garo Hills, Meghalaya.

Scale 1:1500

CERTIFIED THAT THE ABOVE PLAN IS CORRECT

SIGNATURE-

RQP- ASHOK KUMAR SARKAR
Reg No- RQP/KOL/377/2013/A

APPROVED

INDEX

- APPLIED LEASE BOUNDARY
- GRID LINE
- 1.26 / 1.26 CONTOUR LINE
- TBM 116m / 1 TEMPORARY BENCH MARK
- APPROACH ROAD

Plate No. - 3

Surface Plan

Dhapguri Stone Mine

Applicant

Smt. Fridina D. Shira

Village - Burry Hills, P.O.- Dakopgiri, P.S. - Tura,
West Garo Hills, Meghalaya

Applied Lease Area - 1.26 Ha

Applied Lease Area Located at Mouza - Dhapguri,
P.O. - Zikabari, Dist-West Garo Hills, Meghalaya.

Scale 1:1500

CERTIFIED THAT THE ABOVE PLAN IS CORRECT

SIGNATURE-

RQP- ASHOK KUMAR SARKAR
Reg No- RQP/KOL/377/2013/A

INDEX

- APPLIED LEASE BOUNDARY
- 1 2 BOUNDARY PILLARS
- 500M RADIUS BOUNDARY
- APPROACH ROAD

APPROVED

Divisional Mining Officer
East Garo Hills, Williamnagar

Plate No. - I

Google Map

Dhapguri Stone Mine

Applicant

Smt. Fridina D. Shira

Village - Bumy Hills, P.O - Dakopgre, P.S. - Tura, West Garo Hills, Meghalaya

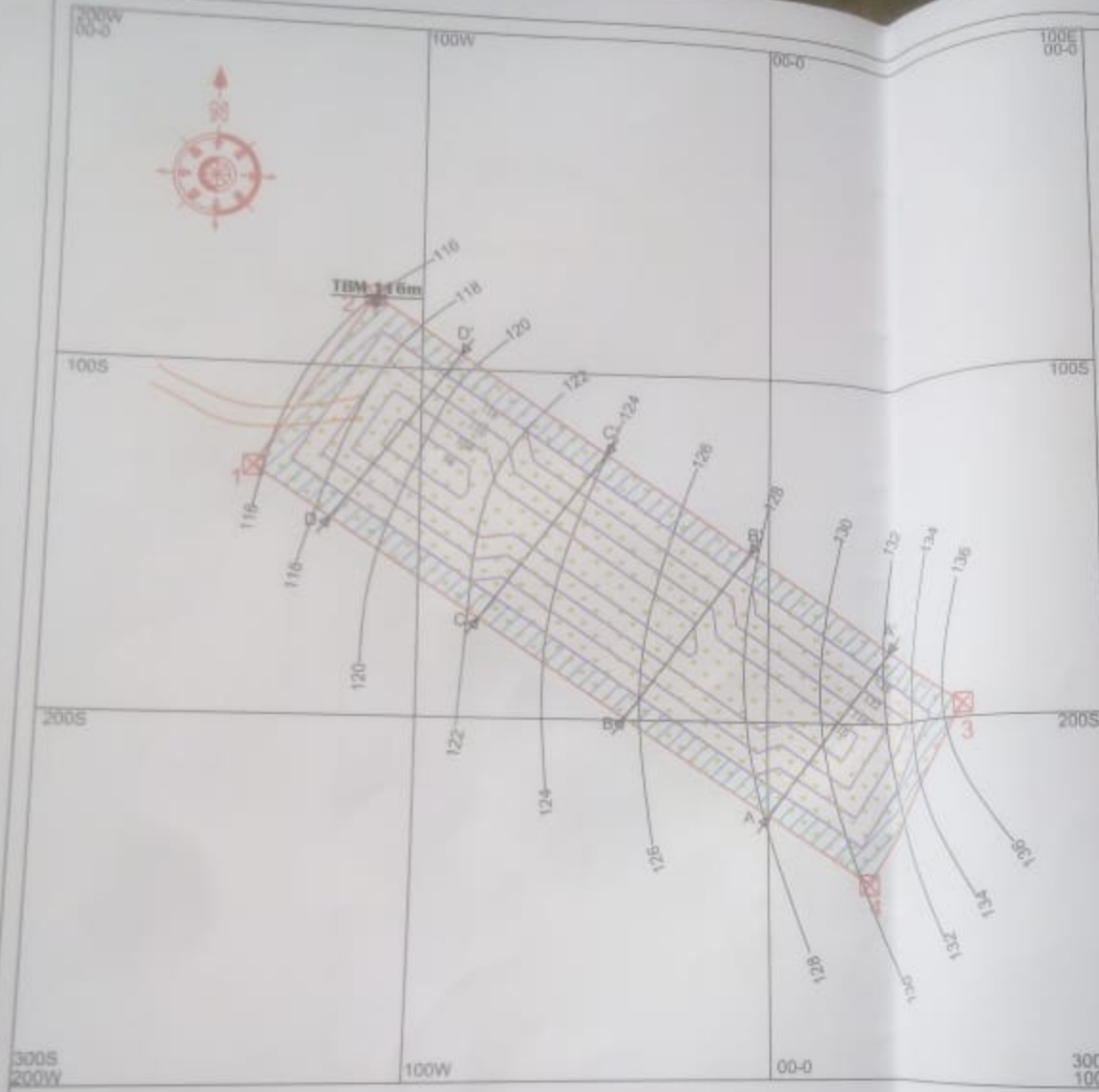
Applied Lease Area - 1.26 Ha

Applied Lease Area Located at Mouza - Dhapgre, P.O. - Zikabari, Dist-West Garo Hills, Meghalaya.

CERTIFIED THAT THE ABOVE PLAN IS CORRECT

SIGNATURE-

SQP- ASHOK KUMAR SARKAR
Reg No- SQP/KOL/177/2013/A



INDEX

- APPLIED LEASE BOUNDARY
- SAFETY BOUNDARY
- GRID LINE
- CONTOUR LINE
- TBM 116m — TEMPORARY BENCH MARK
- APPROACH ROAD
- GRITTY SOIL
- ULTIMATE PIT LIMIT

APPROVED

Deputy Mining Officer
East Garo Hills, Williamnagar

Plate No. - 4

Geological Plan & Section

Dhapguri Stone Mine

Applicant

Smt. Fridina D. Shira

Village - Burny Hills, P.O.- Dakopgiri, P.S. - Tura, West Garo Hills, Meghalaya

Applied Lease Area - 1.26 Ha

Applied Lease Area Located at Mouza - Dhapguri, P.O. - Zikabari, Dist-West Garo Hills, Meghalaya.

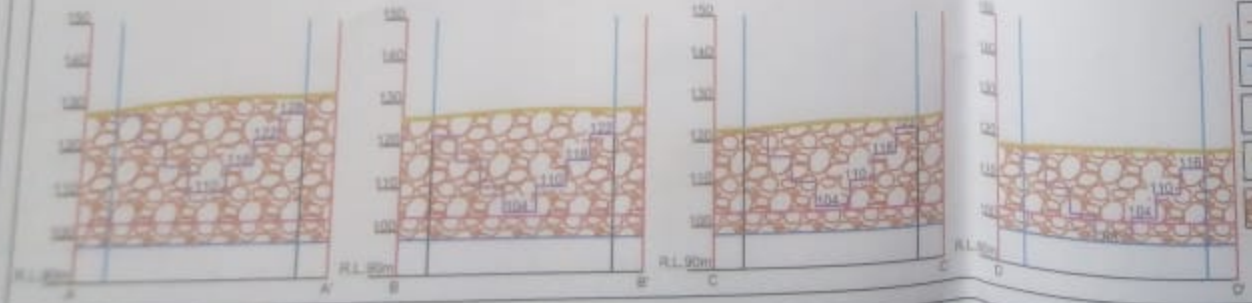
Scale 1:1500

CERTIFIED THAT THE ABOVE PLAN IS CORRECT

SIGNATURE-

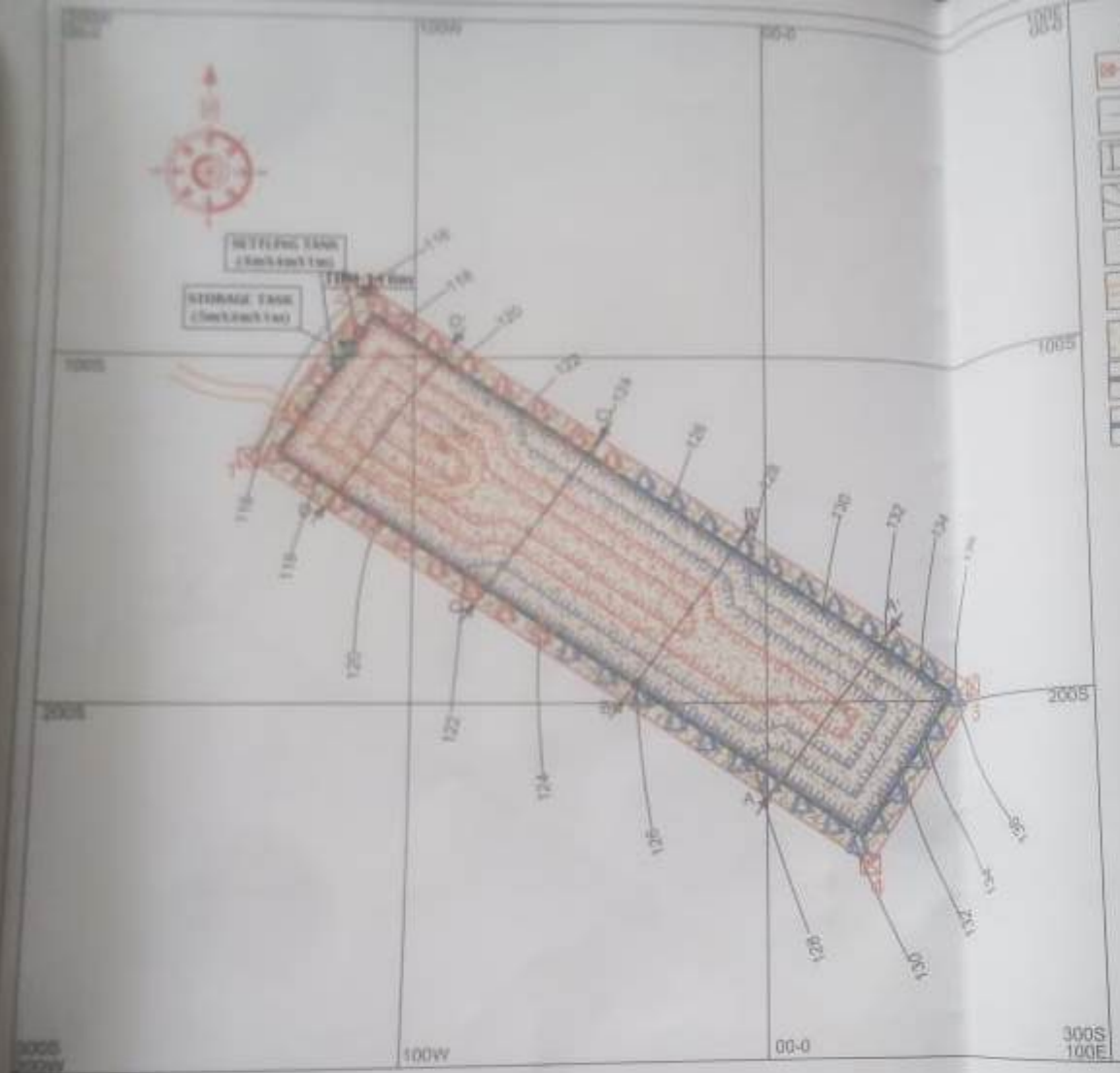
RQP- ASHOK KUMAR SARKAR
Reg No- RQP/KOL/377/2013/A

Geological Section



INDEX

- APPLIED LEASE BOUNDARY
- SAFETY BARRIER
- 122,116.. SPOT LEVELS
- GRITTY SOIL
- BOULDER STONE
- ULTIMATE PIT LIMIT
- PROVED ZONE
- PROBABLE ZONE



INDEX

- APPLIED LEASE BOUNDARY
- SAFETY BOUNDARY
- GRID LINE
- 130 / 125 CONTOUR LINE
- TBM 116m TEMPORARY BENCH MARK
- APPROACH ROAD
- GRITTY SOIL
- PROPOSED PARAPET WALL
- PROPOSED GARLAND DRAIN
- PLAN PERIOD WORKING
- CONCEPTUAL WORKING
- PLAN PERIOD PLANTATION
- CONCEPTUAL PLANTATION
- CONCEPTUAL RECLAMATION

APPROVED

Divisional Mining Officer
East Garo Hills, Williamnagar

Plate No. - 6

Conceptual Plan & Section

Dhapguri Stone Mine

Applicant

Smt. Fridina D. Shira

Village - Burny Hills, P.O.- Dakopgiri, P.S. - Tura, West Garo Hills, Meghalaya

Applied Lease Area - 1.26 Ha

Applied Lease Area Located at Mouza - Dhapguri, P.O. - Zikabari, Dist-West Garo Hills, Meghalaya.

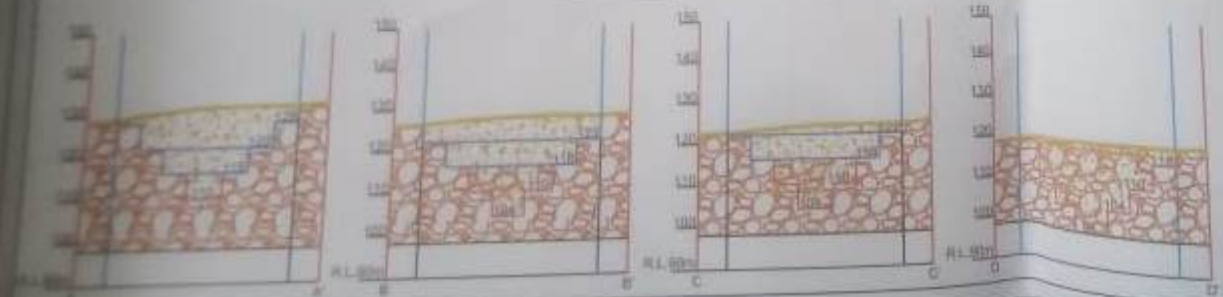
Scale 1:500

CERTIFIED THAT THE ABOVE PLAN IS CORRECT

SIGNATURE-

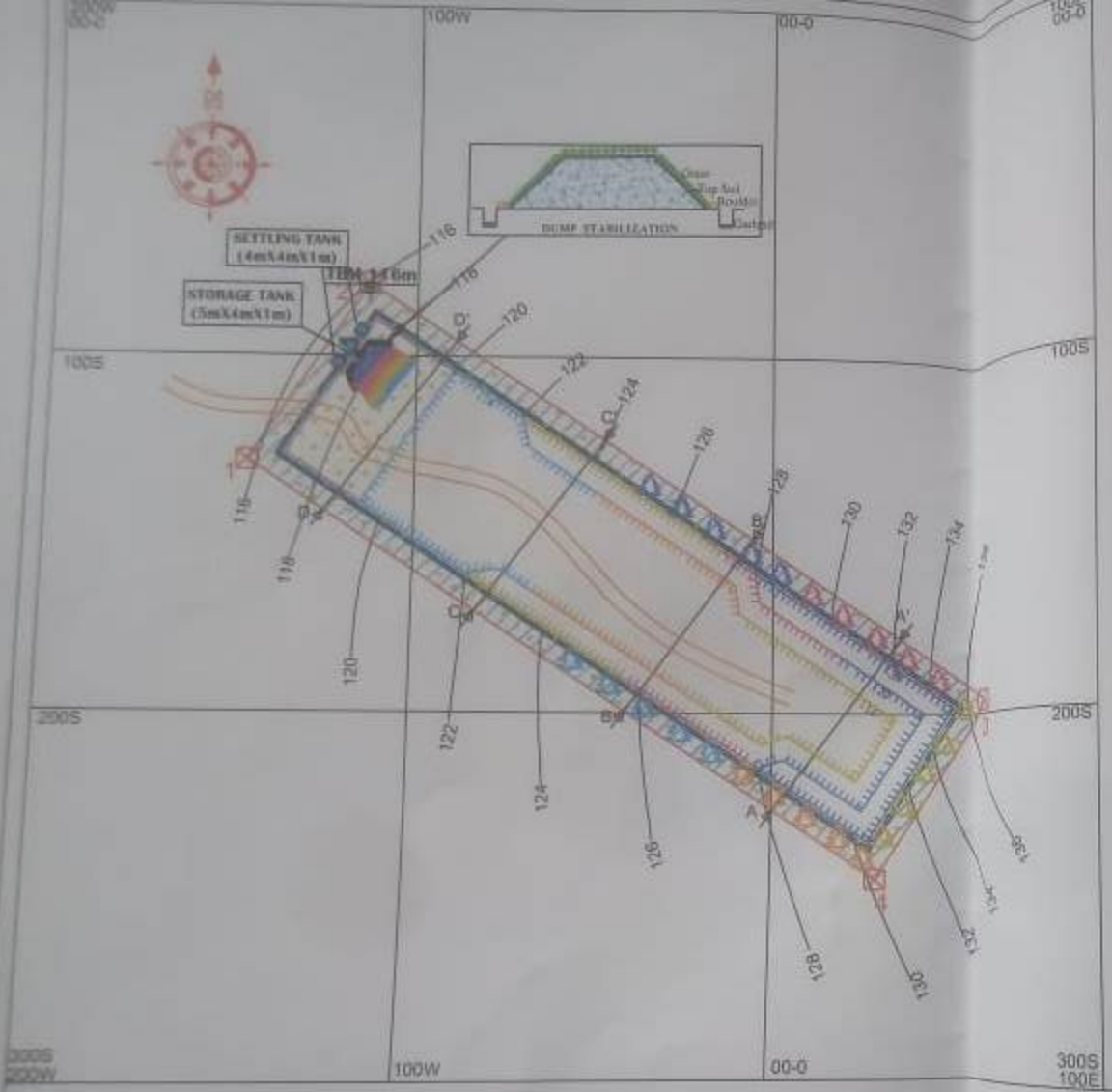
RQP- ASHOK KUMAR SARKAR
Reg No- RQP/KOL/377/2013/A

Conceptual Section



INDEX

- APPLIED LEASE BOUNDARY
- SAFETY BARRIER
- 122,116.. SPOT LEVELS
- GRITTY SOIL
- BOULDER STONE
- PROPOSED WORKING
- CONCEPTUAL WORKING
- CONCEPTUAL RECLAMATION



INDEX

- APPLIED LEASE BOUNDARY
- SAFETY BOUNDARY
- GRID LINE
- CONTOUR LINE (130 / 125)
- TEMPORARY BENCH MARK (TBM 116m)
- APPROACH ROAD
- GRITTY SOIL
- ULTIMATE PIT LIMIT
- PROPOSED PARAPET WALL
- PROPOSED GARLAND DRAIN

PROPOSED WORKING

PROPOSED PLANTATION
- 1ST YEAR
- 2ND YEAR
- 3RD YEAR
- 4TH YEAR
- 5TH YEAR

PROPOSED DUMPING
- 1ST YEAR
- 2ND YEAR
- 3RD YEAR
- 4TH YEAR (N/A)
- 5TH YEAR

APPROVED

Plate No. - 5

Development Plan & Section

Dhapguri Stone Mine

Applicant

Smt. Fridina D. Shira

Village - Burny Hills, P.O - Dakopgiri, P.S. - Tura, West Garo Hills, Meghalaya

Applied Lease Area - 1.26 Ha

Applied Lease Area Located at Mouza - Dhapguri, P.O. - Zikabari, Dist-West Garo Hills, Meghalaya.

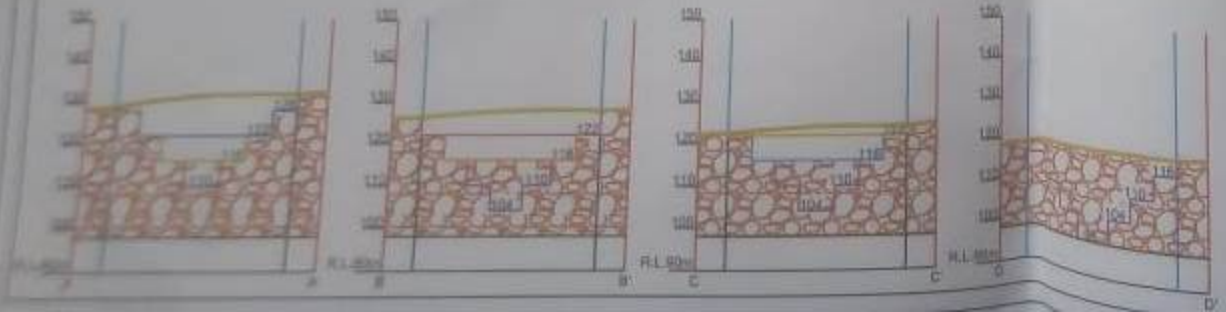
Scale 1:1500

CERTIFIED THAT THE ABOVE PLAN IS CORRECT

SIGNATURE-

RQP- ASHOK KUMAR SARKAR
Reg No- RQP/KOL/377/2013/A

Development Section



INDEX

- APPLIED LEASE BOUNDARY
- SAFETY BARRIER
- 122, 116... SPOT LEVELS
- GRITTY SOIL
- BOULDER STONE
- ULTIMATE PIT LIMIT

PROPOSED WORKING
- 1ST YEAR
- 2ND YEAR
- 3RD YEAR
- 4TH YEAR
- 5TH YEAR

LEGEND

- APPLIED LEASE BOUNDARY
- 7.5M SAFETY BARRIER
- BUSHES & SHRUB
- BOUNDARY LINE
- BOUNDARY LINE
- ROAD (Out in Scale)
- CONTOUR
- HABITATION
- WATER MONITORING STATION
- AIR MONITORING STATION
- NOISE MONITORING STATION

APPROVED

Deputy Mining Officer
East Garo Hills, Williamnagar

Plate No. - 8

Environment Plan

Dhapguri Stone Mine

Applicant

Smt. Fridina D. Shira

Village - Burny Hills, P.O.- Dakopgiri, P.S. - Tura, West Garo Hills, Meghalaya

Applied Lease Area - 1.26 Ha

Applied Lease Area Located at Mouza - Dhapguri, P.O. - Zikabari, Dist-West Garo Hills, Meghalaya.

Scale 1:500

CERTIFIED THAT THE ABOVE PLAN IS CORRECT

SIGNATURE-

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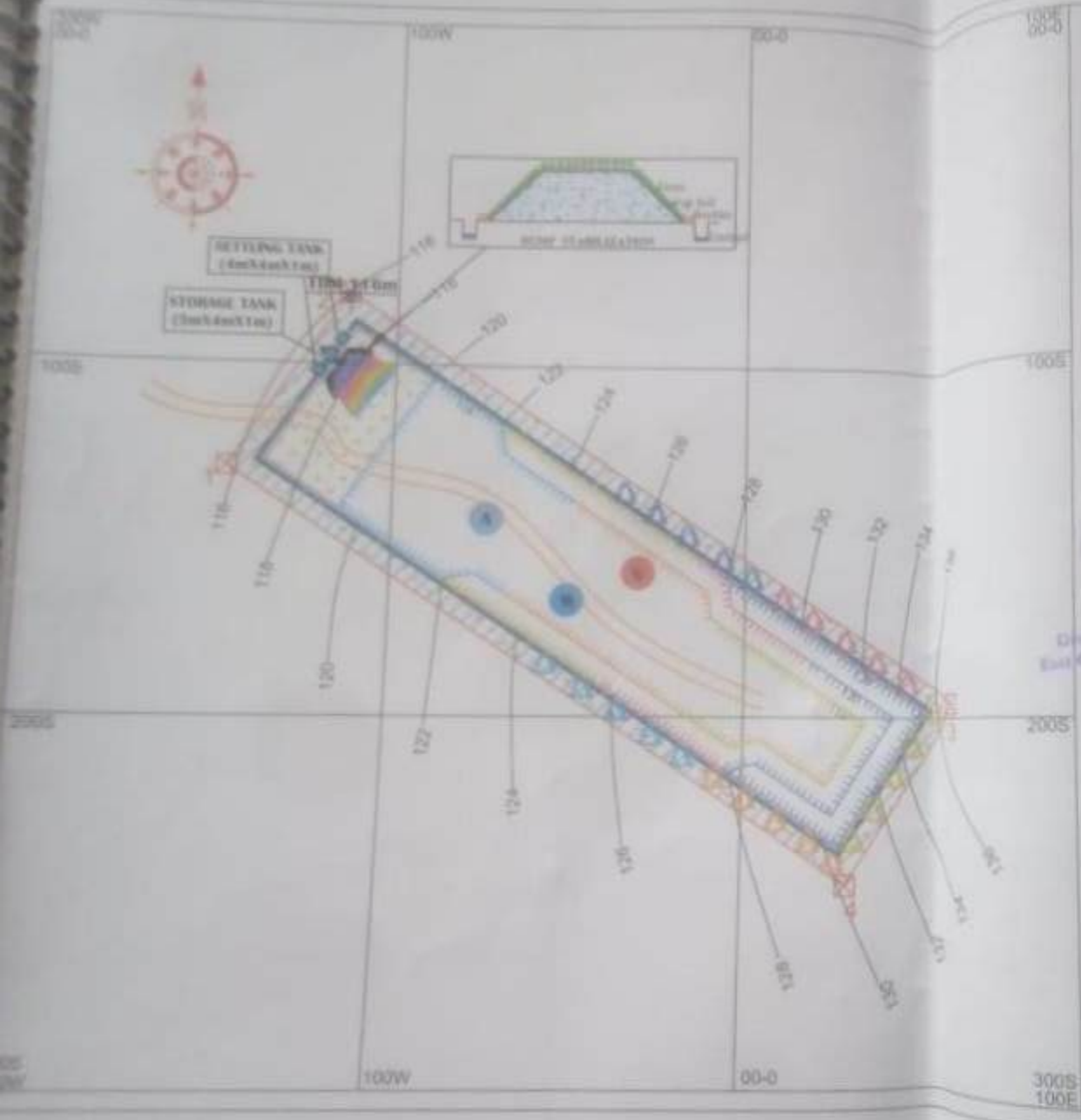
Reg No- RQP/KOL/377/2013/A



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- APPLIED LEASE BOUNDARY
- SAFETY BOUNDARY
- GRID LINE
- CONTOUR LINE
- TBM 116m TEMPORARY BENCH MARK
- APPROACH ROAD
- GRITTY SOIL
- ULTIMATE PIT LIMIT
- PROPOSED PARAPET WALL
- PROPOSED GARLAND DRAIN

PROPOSED WORKING

PROPOSED PLANTATION
- 1ST YEAR
- 2ND YEAR
- 3RD YEAR
- 4TH YEAR
- 5TH YEAR

PROPOSED DUMPING
- 1ST YEAR
- 2ND YEAR
- 3RD YEAR
- N/A 4TH YEAR
- 5TH YEAR

MONITORING STATION
- AIR
- NOISE
- WATER

APPROVED

Deputy Mining Officer
East Garo Hills, Williamnagar

Plate No. - 7

Environment Management Plan

Dhapguri Stone Mine

Applicant

Smt. Fridina D. Shira

Village - Burny Hills, P.O.- Dakopgiri, P.S. - Tura, West Garo Hills, Meghalaya

Applied Lease Area - 1.26 Ha

Applied Lease Area Located at Mouza - Dhapguri, P.O. - Zikabari, Dist-West Garo Hills, Meghalaya.

Scale 1:1500

CERTIFIED THAT THE ABOVE PLAN IS CORRECT

SIGNATURE-

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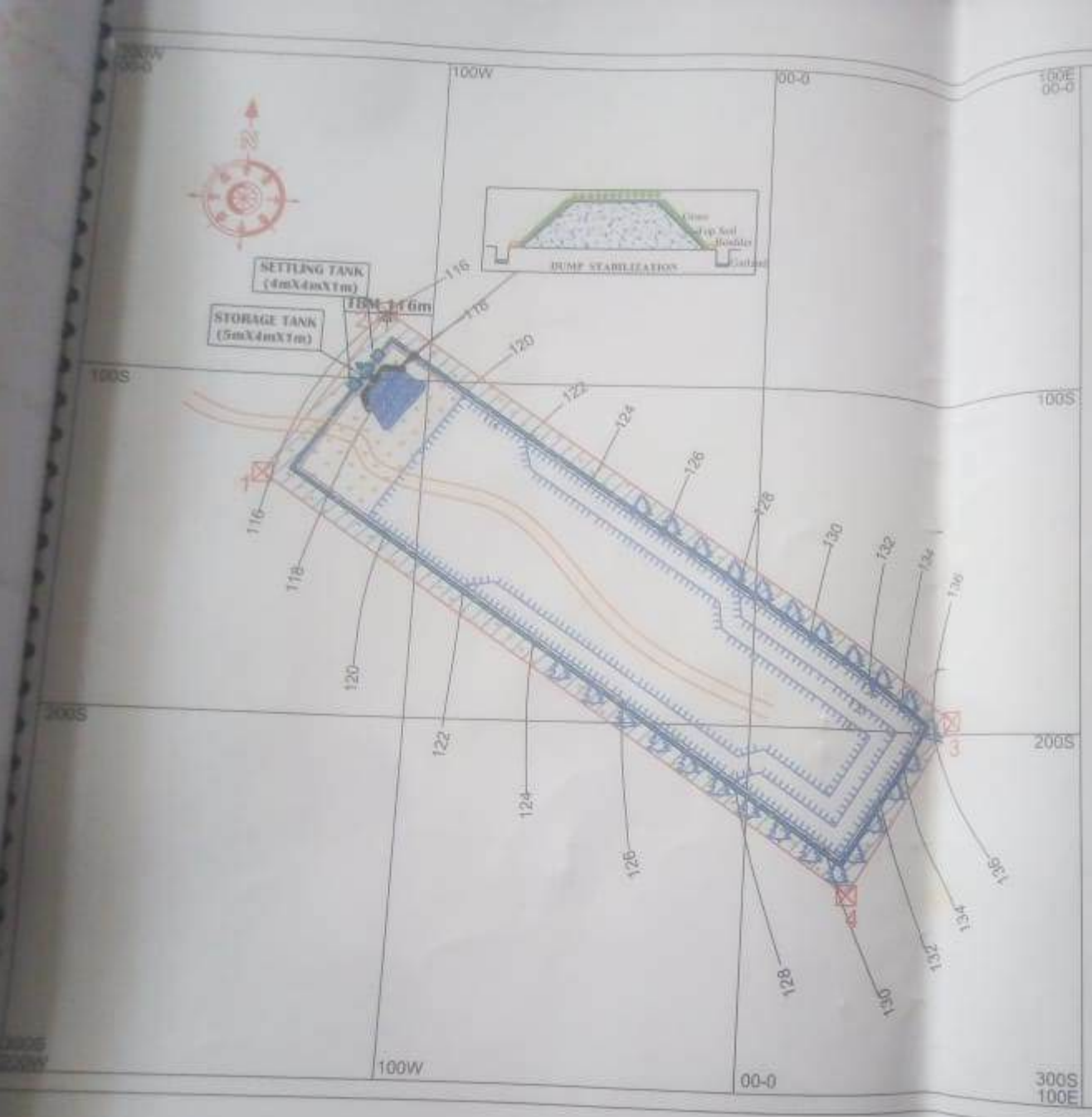
Reg No- RQP/KOL/377/2013/A



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- ULTIMATE PIT LIMIT
- PROPOSED PARAPET WALL
- PROPOSED GARLAND DRAIN
- PROPOSED MINING
- PROPOSED PLANTATION
- PROPOSED DUMPING

APPROVED

Plate No. - 9

Progressive Mine Closure Plan

Dhapguri Stone Mine

Applicant

Smt. Fridina D. Shira

Village - Burny Hills, P.O.- Dakopgiri, P.S. - Tura, West Garo Hills, Meghalaya

Applied Lease Area - 1.26 Ha

Applied Lease Area Located at Mouza - Dhapguri, P.O. - Zikabari, Dist-West Garo Hills, Meghalaya

Scale 1:1500

CERTIFIED THAT THE ABOVE PLAN IS CORRECT

SIGNATURE-

RQP- ASHOK KUMAR SARKAR
Reg No- RQP/KOL/377/2013/A

ANNEXURE V: CLUSTER CERTIFICATE

GOVERNMENT OF MEGHALAYA
OFFICE OF THE DIVISIONAL MINING OFFICER, EAST GARO HILLS, WILLIAMNAGAR.

No. DMO-W/MP/15/ 2019/ 116 **Dated Williamnagar, the** 15th **October 2020**

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 stone boulder over an area of 1.26 hectares at Dhapguri, PO: Zikabari, West Garo Hills District, Meghalaya of **Smt. Fridina D. Shira**, Village: Burny Hills, PO: Dakopgiri & PS: Tura, West Garo Hills, Meghalaya:

S. No	Approved mining plan of:	(Area) & location	Mineral	Distance from the approved mining plan of **Smt. Fridina.D. Shira**
(1)	Shri. Prisbar Sangma	(1.61 hectares) Galamatgre, PO: Zikabari, PS: Tura West Garo Hills District	Stone boulder	180 m
(2)	Shri. Aijonish D. Shira	(4.00 hectares) Kilmangittim, P.O: Selsella, West Garo Hills District	Stone boulder	205 m
(3)	Shri. Drostarland Lyngdoh	(3.11 hectares) Kilmangittim area, West Garo Hills District	Stone boulder	400 m

(R. A. Thabah)
Divisional Mining Officer,
East Garo Hills, Williamnagar.

15/10/20