MATCHA-NOKPANTE STONE MINE

2025

Draft Environmental Impact Assessment report

Production of 25,637.7 TPA Boulder Stone through Opencast Semi-mechanized Mining method spread over 1.68 Acres (0.68 ha) at Village- Matcha-Nokpante, P.O. – Dhanua, P.S.- Tura, District – West Garo Hills, State- Meghalaya by Shri Simsang Ch. Marak

TOR: ML/SEAC/SEIAA/PP/WGH/27/2024

Dated: 25.07.2024

Baseline Monitoring Period:

March 2024 to May2024

Project Proponent:

Shri Simsang Ch. Marak

Environment Consultant :

Sathi Planners Private Limited

NABET/EIA/2225/RA 0264 Dated 06.12.2022 valid up to 14.02.2025

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ToR Compliance

Point wise compliance for the specific TOR issued by SEIAA Meghalaya vide File No. ML/SEAC/SEIAA/PP/WGH/27/2024, dated: 25.07.2024.

S. No	Terms of Reference	Compliance	Reference/Remarks
I	**Standard Terms of Reference**		
1.1	An EIA-EMP Report shall be prepared for peak capacity (25,637.7 TPA) operation in an ML/project area of 0.68 ha based on the generic structure specified in Appendix III of the EIA Notification, 2006.	EIA-EMP report prepared as per the generic structure specified in Appendix III of the EIA Notification, 2006.	
1.2	An EIA-EMP Report would be prepared for peak capacity operation to cover the impacts and environment management plan for the project specific activities on the environment of the region, and the environmental quality encompassing air, water, land, biotic community, etc. through collection of data and information, generation of data on impacts including prediction modelling for …… TPA of stone production based on approved project/Mining Plan for …… TPA. Baseline data collection can be for any season (three months) except monsoon.	EIA-EMP report prepared for peak capacity of 25,637.7 TPA.	
1.3	Proper KML file with pin drop and coordinate of mine at 500-1000 m interval be provided.	Complied. Proper KML file provided.	
1.4	A Study area map of the core zone (project area) and 10 km area of the buffer zone (1: 50,000 scale) clearly delineating the major topographical features such as the land use, surface drainage pattern including rivers/streams/nullahs/canals, locations of human habitations, major constructions including railways, roads, pipelines, major industries, mines and other polluting sources. In case of ecologically sensitive areas such as Biosphere Reserves/National Parks/WL Sanctuaries/ Elephant Reserves, forests (Reserved/Protected), migratory corridors of fauna, and areas where endangered fauna and plants of medicinal and economic	Complied.	All maps provided in Chapter 3

	importance found in the 15 km study area should be given. The above details to be furnished in tabular form also.		
1.5	Map showing the core zone delineating the agricultural land (irrigated and un-irrigated, uncultivable land as defined in the revenue records, forest areas (as per records), along with other physical features such as water bodies, etc should be furnished.	Will be Complied.	Chapter 3
1.6	A contour map showing the area drainage of the core zone and 25 km of the study area (where the water courses of the core zone ultimately join the major rivers/streams outside the lease/project area) should also be clearly indicated in the separate map.	Will be Complied.	Chapter 3
1.7	Catchment area with its drainage map of 25 km area within and outside the mine shall be provided with names, details of rivers/ river let system and its respective order. The map should clearly indicate drainage pattern of the catchment area with basin of major rivers. Diversion of drains/ river need elaboration in form of length, quantity and quality of water to be diverted.	Will be Complied.	Chapter 3
1.8	Details of mineral reserves, geological status of the study area and the seams to be worked, ultimate working depth and progressive stage-wise working scheme until the end of mine life should be provided on the basis of the approved rated capacity and calendar plans of production from the approved Mining Plan. Geological maps and sections should be included. The Progressive mine development and Conceptual Final Mine Closure Plan should also be shown in figures. Details of mine plan and mine closure plan approval of Competent Authority should be furnished for green field and expansion projects.	Complied.	Chapter 2
1.9	Details of mining methods, technology, equipment to be used, etc., rationale for selection of specified technology and equipment proposed to be used vis-à-vis the potential impacts should be provided.	Complied.	Chapter 2

1.10	Impact of mining on hydrology, modification of natural drainage, diversion and channelling of the existing rivers/water courses flowing though the ML and adjoining the lease/project and the impact on the existing users and impacts of mining operations thereon.	Complied.	Chapter 3
1.11	A detailed Site plan of the mine showing the proposed break-up of the land for mining operations such as the quarry area, OB dumps, green belt, safety zone, buildings, infrastructure, CHP, ETP, Stockyard, township/colony (within and adjacent to the ML), undisturbed area -if any, and landscape features such as existing roads, drains/natural water bodies to be left undisturbed along with any natural drainage adjoining the lease /project areas, and modification of thereof in terms of construction of embankments/bunds, proposed diversion/re-channeling of the water courses, etc., approach roads, major haul roads, etc should be indicated.	Complied.	Chapter 4
1.12	Original land use (agricultural land/forestland/grazing land/wasteland/water bodies) of the area should be provided as per the tables given below. Impacts of project, if any on the land use, in particular, agricultural land/forestland/grazing land/water bodies falling within the lease/project and acquired for mining operations should be analyzed. Extent of area under surface rights and under mining rights should be specified. Area under Surface Rights.	Will be Complied.	Chapter 4
	Study on the existing flora and fauna in the study area (10km) should be carried out by an institution of relevant discipline. The list of flora and fauna duly authenticated separately for the core and study area and a statement clearly specifying whether the study area forms a part of the migratory corridor of any endangered fauna should be given. If the study area has endangered flora and fauna, or if the area is occasionally visited or used as a habitat by Schedule-I species, or if the project falls within 15 km of an ecologically sensitive area, or used as a migratory corridor then a Comprehensive Conservation Plan along with the appropriate	Complied.	Chapter 3

1.13	budgetary provision should be prepared and submitted with EIA-EMP Report; and comments/observation from the CWLW of the State Govt. should also be obtained and furnished.		
1.14	One-season (other than monsoon) primary baseline data on environmental quality - air (PM10, PM2.5, SOx, NOx and heavy metals such as Hg, Pb, Cr, As, etc), noise, water (surface and groundwater), soil - along with one-season met data coinciding with the same season for AAQ collection period should be provided. The detail of NABL/ MoEF&CC certification of the respective laboratory and NABET accreditation of the consultant to be provided.	Complied.	Chapter 3
1.15	Map (1: 50, 000 scale) of the study area (core and buffer zone) showing the location of various sampling stations superimposed with location of habitats, other industries/mines, polluting sources, should be provided. The number and location of the sampling stations in both core and buffer zones should be selected on the basis of size of lease/project area, the proposed impacts in the downwind (air)/downstream (surface water)/groundwater regime (based on flow). One station should be in the upwind/upstream/non-impact/non-polluting area as a control station. The monitoring should be as per CPCB guidelines and parameters for water testing for both ground water and surface water as per ISI standards and CPCB classification wherever applicable. Observed values should be provided along with the specified standards.	Complied.	Chapter 3
1.16	For proper baseline air quality assessment, Wind rose pattern in the area should be reviewed and accordingly location of AAMSQ shall be planned by the collection of air quality data by adequate monitoring stations in the downwind areas. Monitoring location for collecting baseline data should cover overall the 10 km buffer zone i.e. dispersed in 10 km buffer area. In case of expansion, the displayed data of CAAQMS and its comparison with the monitoring data to be provided	Complied.	Details in Chapter 3

1.17	A detailed traffic study along with presence of habitation in 100 mts distance from both side of road, the impact on the air quality with its proper measures and plan of action with timeline for widening of road. The project will increase the no. of vehicle along the road which will indirectly contribute to carbon emission so what will be the compensatory action plan should be clearly spell out in EIA/ EMP report.	Will be Complied.	Details in Chapter 3
1.18	The socio-economic study to conducted with actual survey report and a comparative assessment to be provided from the census data should be provided in EIA/ EMP report also occupational status & economic status of the study area and what economically project will contribute should be clearly mentioned. The study should also include the status of infrastructural facilities and amenities present in the study area and a comparative assessment with census data to be provided and to link it with the initialization and quantification of need-based survey for CSR activities to be followed.	Socio economic study will be conducted with actual survey report and comparative assement to be provided from the census data provided in EIA/EMP report.	Chapter 3
1.19	The Ecology and biodiversity study should also indicate the likely impact of change in forest area for surface infrastructural development or mining activity in relation to the climate change of that area and what will be the compensatory measure to be adopted by PP to minimize the impact of forest diversion.	Forest diversion not applicable	Chapter 3
1.20	Baseline data on the health of the population in the impact zone and measures for occupational health and safety of the personnel and manpower for the mine should be submitted.	Complied	Chapter 3
1.21	Impact of proposed project/activity on hydrological regime of the area shall be assessed and report be submitted. Hydrological studies as per GEC 2015 guidelines to be prepared and submitted.	Complied	Chapter 4.
	Impact of mining and water abstraction from the mine on the hydrogeology and groundwater regime within the core zone and 10 km	Complied	

1.22	buffer zone including long-term monitoring measures should be provided. Details of rainwater harvesting and measures for recharge of groundwater should be reflected in case there is a declining trend of groundwater availability and/or if the area falls within dark/grey zone.		
1.23	Study on land subsidence including modeling for prediction, mitigation/prevention of subsidence, continuous monitoring measures, and safety issues should be carried out.	Noted	Chapter 4
1.24	Detailed water balance should be provided. The break up of water requirement as per different activities in the mining operations, including use of water for sand stowing should be given separately. Source of water for use in mine, sanction of the Competent Authority in the State Govt. and impacts vis-à-vis the competing users should be provided.	Complied	Chapter 2
1.25	PP shall submit design details of all Air Pollution control equipment (APCEs) to be implemented as part of Environment Management Plan vis-à-vis reduction in concentration of emission for each APCEs.	Complied	Chapter 6
1.26	PP shall propose to use LNG/CNG based mining machineries and trucks for mining operation and transportation of boulder stone. The measures adopted to conserve energy or use of renewable sources shall be explored.	Noted	
1.27	PP to evaluate the green house emission gases from the mine operation/ washery plant and corresponding carbon absorption plan.	Noted	
1.28	PP shall explore the use of vent gases as generated from underground Mine for use of energy generation/ in house energy consumption.	Noted	
1.29	Site specific Impact assessment with its mitigation measures, Risk Assessment and Disaster Preparedness and Management Plan should be provided.	Complied.	Chapter 7

1.30	Impact of choice of mining method, technology, selected use of machinery and impact on air quality, mineral transportation etc, Impact of blasting, noise and vibrations should be provided.	Mining method, technology, selected use of machinery and impact on air quality, mineral transportation etc.	Chapter 4
1.31	Impacts of mineral transportation within the mining area and outside the lease/project along with flow-chart indicating the specific areas generating fugitive emissions should be provided. Impacts of transportation, handling, transfer of mineral and waste on air quality, generation of effluents from workshop etc, management plan for maintenance of HEMM and other machinery/equipment should be given. Details of various facilities such as rest areas and canteen for workers and effluents/pollution load emanating from these activities should also be provided.	Complied.	Details in Chapter 4.
1.32	Details of various facilities to be provided to the workers in terms of parking, rest areas and canteen, and effluents/pollution load resulting from these activities should also be given.		
1.33	The number and efficiency of mobile/static water jet, Fog cannon sprinkling system along the main mineral transportation road inside the mine, approach roads to the mine/stockyard/siding, and also the frequency of their use in impacting air quality should be provided.		
1.34	Impacts of CHP, if any on air and water quality should be given. A flow chart showing water balance along with the details of zero discharge should be provided.		
1.35	Conceptual Final Mine Closure Plan and post mining land use and restoration of land/habitat to the pre- mining status should be provided. A Plan for the ecological restoration of the mined out area and post mining land use should be prepared with detailed cost provisions. Impact and management of wastes and issues of re-handling (wherever applicable)		

	and backfilling and progressive mine closure and reclamation should be furnished.		
1.36	Adequate greenbelt shall be provided with details of species selected and survival rate Greenbelt development should be undertaken particularly around the transport route and CHP.	Complied.	Details in Chapter 2.
1.37	Cost of EMP (capital and recurring) should be included in the project cost and for progressive and final mine closure plan.	Complied.	Details in Chapter 10.
1.38	Details of R&R. Detailed project specific R&R Plan with data on the existing socio- economic status of the population (including tribals, SC/ST, BPL families) found in the study area and broad plan for resettlement of the displaced population, site for the resettlement colony, alternate livelihood concerns/employment for the displaced people, civic and housing amenities being offered, etc and costs along with the schedule of the implementation of the R&R Plan should be given.	Complied.	R & R not applicable.
1.39	CSR Plan along with details of villages and specific budgetary provisions (capital and recurring) for specific activities over the life of the project should be given.		
1.40	Corporate Environment Responsibility:		
1.41	a) The Company must have a well laid down Environment Policy approved by the Board of Directors.	Noted	
1.42	b) The Environment Policy must prescribe for standard operating process/procedures to bring into focus any infringements/deviation/violation of the environmental or forest norms/conditions.	Noted	

1.43	c) The hierarchical system or Administrative Order of the company to deal with environmental issues and for ensuring compliance with the environmental clearance conditions must be furnished.	Noted	
1.44	d) To have proper checks and balances, the company should have a well laid down 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.	Complied.	
1.45	e) Environment Management Cell and its responsibilities to be clearly spell out in EIA/ EMP report	Noted & will be Complied.	
1.46	f) In built mechanism of self-monitoring of compliance of environmental regulations should be indicated.	Complied.	
1.47	Status of any litigations/ court cases filed/pending on the project should be provided.	Noted	Details in Chapter 1.
1.48	PP shall submit clarification from PCCF that mine does not fall under corridors of any National Park and Wildlife Sanctuary with certified map showing distance of nearest sanctuary.	Complied.	
1.49	Copy of clearances/approvals such as Forestry clearances, Mining Plan Approval, mine closer plan approval. NOC from Flood and Irrigation Dept. (if req.), etc. wherever applicable.	Complied.	
1.50	Details on the Forest Clearance should be given as per the format given: Total ML Project Area | Total Forest land (ha) If more than one provide | Date of Extent of FC Forest Land | Balance area for which FC is yet to be obtained | Status of appl. For diversion of forest land	FC not applicable.	

	details of each FC			
1.51	In case of expansion of the proposal, the status of the work done as per mining plan and approved mine closure plan shall be detailed in EIA/ EMP report	Not applicable.		
1.52	Details on Public Hearing should cover the information relating to notices issued in the newspaper, proceedings/minutes of Public Hearing, the points raised by the general public and commitments made by the proponent and the time bound action proposed with budgets in suitable time frame. These details should be presented in a tabular form. If the Public Hearing is in the regional language, an authenticated English Translation of the same should be provided.	After Public hearing will be provided.		
1.53	PP shall carry out survey through drone highlighting the ground reality for atleast 10 minutes			
1.54	Detailed Chronology of the project starting from the first lease deed alloted/Block allotment/ Land acquired to its No. of renewals, CTO /CTE with details of no. renewals, previous EC(s) granted details and its compliance details, NOC details from various Govt bodies like Forest NOC(s), CGWA permissions, Power permissions, etc as per the requisites respectively to be furnished in tabular form.	Complied.		Details in Chapter 1.
1.55	The first page of the EIA/ EMP report must mention the peak capacity production, area, detail of PP, Consultant (NABET accreditation) and Laboratory (NABL / MoEF & CC certification)	Complied.		Cover page
1.56	The compliances of ToR must be properly cited with respective chapter section and page no in tabular form and also mention sequence of the	Complied.		

	respective ToR complied within the EIA-EMP report in all the chapters section.		
II	**Specific Conditions**		
1.1	Site photographs together with photographs and other related details of site visits by resource persons of NABET accredited consultant of project proponent, with their names and profession/designation, together with date(s) of visit, date(s) of data collection including names of instrument/machine actually used in the field, during preparation of EIA report, is to be clearly highlighted in the EIA/EMP report.	Will be complied	
1.2	Boundary pillars with the height not less than 2.5 feet above the ground level and 1.5 feet below ground and minimum 8 inches on all face of pillar should be erected.	Noted & will be submitted	
1.3	GPS coordinates of each pillar should be carved/painted clearly on the pillars with red colour.	Noted & will be submittted	

Executive Summary

Introduction

Name of the Project

The proposed project is a mining project for production of 25,637.7 TPA Boulder Stone through semi-mechanised opencast mining method, spread over 1.68 acres (0.68 ha.) in village Matcha-Nokpante, P.O. – Dhanua, P.S. – Tura, District – West Garo Hills, State – Meghalaya by Shri Simsang Ch. Marak.

The proposed project is a mining proposal under schedule 1(i) (a) "Mining of Minerals" of the EIA notification 2006 and its amendments. It falls under Category B1 (minor mineral). The method of mining adopted will be an opencast semi-mechanized method.

Project location

The Project is located in the village Matcha-Nokpante, P.O. – Dhanua, P.S. – Tura, District – West Garo Hills, State – Meghalaya by Shri Simsang Ch. Marak. Matcha-Nokpante Stone Mine is situated near about 74 km SW away from Mendipathar Railway Station. The nearest National Highway is NH127-B 0.17km in the West direction. The Nearest airport is Lokpriya Gopinath Airport, Assam at a distance of 170 km in NE direction. Tura, the district headquarter is at a distance of 33 km in SE direction.

Resource Requirement

Land Details	1.68 Acre (0.68 ha)
Water Requirements	7.38 KLD
Power Requirement	NA
Fuel Requirement	HSD – 676 Liters/day (202.8 KL/year)
Manpower Requirement	26
Explosive requirement	23 kg/Day

Machinery Requirement

No.	Type	Nos.	Size/Capacity
1	Wagon Drill	1	100 mm dia
2	Excavator	1	0.9 m^3
3	Compressor	1	300 cfm
4	Diesel Pump	1	For Water Pumping
5	Tippers	2	10 T
6	Rock Breaker	1	For rock breaking
7	Water Tanker	For Water Sprinkling	

Mitigation Measures

Air Environment

Dust generation during drilling of shot holes, haul road, smoke from vehicles shall be controlled by following practices:

- Dust extractor or wet drilling will be followed to control dust at source of emission during drilling.
- Sharp drill bits will be used for drilling and regrinding will be done periodically to reduce the dust generation.
- Controlled blasting to reduce dust emission and reduction in NOx emission
- All machineries and transport vehicles will be properly maintained and pollution check will be done once in a year to keep the emissions from machineries and vehicle under control.
- Water sprinkling will be done on haul road to control emission of dust while transporting minerals and waste. Provision for water spray by tankers on 'kaccha' road shall be done.
- Water sprinkling at loading area.
- Tree plantation along the haul roads & approach road will be done. A total of 550 trees would be planted.
- Use of personal protective equipment like dust mask.
- Ambient air pollution monitoring will be carried out.

Water Environment

- Mining is planned to above the ground water table. Therefore, pumping of ground water from mine pit does not arise in this mine. The rain water during rainy season is proposed to settle in a pit and shall be use for dust suppression and plantation. Excess water, if any shall be discharged in natural stream after settling of suspended particles in the pit. Pump having required capacity will be installed to lift accumulated rain water from working pit and pumped to the settling tank.

- Garland drain shall be made around the Waste dump and the rain water shall be collected in garland drain and allowed to settle in a small pit for settling suspended particles before allowing discharge to natural drainage system.
- For domestic waste water Septic Tank with Soak Pit shall be provided, discharge from Soak Pit, if any shall be used for plantation.
- It shall be ensured that quality of drinking water for the worker is hygienic and good sanitation system shall be made available.

Noise Environment

Drilling, Blasting & increased vehicular traffic is the main source of noise Pollution. Blasting will be done occasionally. Mining activity will be done only day hours.

- Generation of noise during blasting shall be controlled by delay blasting and use of adequate charge per blast.
- Diesel powered machineries, which is major source of noise in open cast mining shall be properly maintained. Attention shall be paid towards rigorous maintenance of the silencer of the diesel engines.
- Protective devices shall be provided for use of persons employed in the vicinity of high noise areas.
- With the adoption of controlled blasting techniques, the ground vibrations will be minimized.
- Plantation around the lease boundary will cut the noise levels.

Solid Waste Management

- No hazardous & other solid waste generation is envisaged from the stone mining activities.
- Gradation of dump shall be done automatically as coarser materials go to the bottom and finer at the top and therefore drain of rain water flow freely to the bottom without endangering the stability of dump.
- Stabilization of dump with top soil and tree plantation shall make the dump more stable on long. Dump should be terraced for every 5 m height and stabilized
- 1m height parapet shall be constructed for dumps more than 6 m height along the toe to prevent and control wash out from dumps entering into natural system through rain water
- Garland drainage around dump shall prevent under wash of dump by hydrostatic pressure to be developed by surface water and control wash outs and collapse.

Capital Cost of the Project

The proposed project cost is Rs. 62.7 Lakh Rupees.

Baseline Environmental Studies

Baseline Monitoring Period: March 2024 – May 2024

Type	Parameter
AAQ Parameter at 8 locations	PM_{10} = 66.4 µg/m^3 to 60.2 µg/m^3 $PM_{2.5}$ = 36.7 µg/m^3 to 30.2 µg/m^3 SO_2 = 13.6 µg/m^3 to 9.1 µg/m^3 NO_x = 17.6 µg/m^3 to 11.1 µg/m^3
Noise quality at 8 locations	Daytime 53.1 to 40.6 dB(A) Night-time 42.8 to 40.1 dB(A)
Surface water at 2 locations	pH – 6.88 to 6.72 TDS – 274 to 259 mg/l Sulphate – 30.5 to 28.4 mg/l Fluoride – 0.291 to 0.268 mg/l
Ground water at 8 locations	pH – 7.25 to 6.85 TDS – 383 to 312 mg/l Sulphate – 35.2 to 22.7 µS/cm
Soil at 8 locations	pH – 7.24 – 6.45 Potassium – 135 to 114 mg/kg Nitrogen – 286 to 245 mg/kg

Environment Management Plan

Sl. No.	Category	Capital Cost (Rs)	Recurring Cost (Rs)
1	Water Sprinkling & Dust Suppression System	-	80,000
2	Plantation (@ Rs. 500 per plant) 598 x 500 = 2,99,000 (Includes fertilizer, pesticides, maintenance)	2,99,000	40,000
3	Environment Monitoring (One Day Monitoring) • Ambient air (3 points) 24 hrs – Rs. 5000 • Surface Water (Per sample) – Rs. 1500	0.0	24,000

	• Ground Water (Per sample) – Rs. 1500 • Noise (3 points) 24 hrs – Rs. 2000 • Stack Monitoring (D.G. Set) – Rs. 2000 Total – Rs. 12,000 (per season) At least two season in a year – Rs. 12,000 x 2 = Rs. 24,000		
Total		**2,99,000**	**1,44,000**

Chapter 1 Introduction

1.1 Background of the Project

The mining lease of Matcha-Nokpante Stone Mine at Village - Matcha-Nokpante, P.O. – Dhanua, P.S. - Tura, District West Garo Hills, State- Meghalaya has been already granted to Shri Simsang Ch. Marak for a period of 10 years w.e.f. 05.06.2017 to 04.06.2027. This lease shall be subject to renewal if the Lessor and the Lessee so desire to continue. Earlier, the Mining Plan of Matcha-Nokpante Stone Mine was prepared under Rule 19 of MMMCR 2016 for opencast semi-mechanized mining over an area of 0.68 ha. The plan was approved by the Divisional Mining Officer, East Garo Hills, Williamnagar vide Memo No. – DMO-W/MP/49/2020/57, Williamnagar, dated 10th July, 2020 for a period of 5 years.

The applied area is a Non Forest Land which was confirmed by the Divisional Forest Officer, West, South & South-West Garo Hills (T) Division, Tura vide letter No.B/16/VII/NOC/MMMCR/2207-213 dated 17th August 2017 and renewed Letter of Intent vide letter No. B/16/VII/620-623, dated 13th Feb 2020.
The project proponent obtained a cluster certificate from the Divisional Mining Officer, East Garo Hills, Williamnagar vide letter No.DMO-W/MP/15/2023/1166 dated 19th January 2024 which states that there are (5) five approved mining plans lying within 500 meters from the applied mining lease area. Hence the applied mining area falls under cluster category since the total area of these six mines is summed up to 24.71 hectares.

The project was already awarded Environmental Clearance by the District Environment Impact Assessment Authority, West Garo Hills District, Tura vide letter No. WGH/DEIAA/EC/2017/10, dated 23rd October 2018 and also obtained a detailed statement of production for a period of five years from the Divisional Forest Officer, West & South-West Garo Hills (T) Division, Tura vide letter No. B/16/VII/279 dated 14th February, 2024.

Then, the approved mining plan (0.80 ha) was surrendered vide letter no. DMR/MM/135/2017/12, dated – 12.05.2020. Revised LOI for the area of 0.68 ha was issued vide letter no. B/16/VII/620-623, dated – 13th Feb 2020.

On the basis of revised LOI the Scheme along with Progressive Mine Closure Plan for the next 4 years in favour of Shri Simsang Ch. Marak. over an area of 1.68 Acres (0.68 ha) for stone mining has been prepared and approved by DMO, West Garo Hills, Meghalaya (ref. no. - DMOW/MP/49/2020/106, dated – 20.12.23) along with various statutory clearances/certificates. The Government of Meghalaya has granted LOI vide letter no. Dated 13.02.2020 for Nokma Aking Land No. III-26(6) in favour of Shri Simsang Ch. Marak for mining of Boulder Stone.

The applied area is located in survey of India Toposheet No G45R14, with bounding co-ordinates of Latitudes: 25°41'22.11"N to 25°41'24.10"N and Longitudes: 89°56' 19.46"E to 89°56' 18.38"E. The nearest National Highway is NH127-B 0.17km in the West direction.

The proposed stone mining operation will be undertaken Opencast Semi-Mechanised method of mining, using Compressor, Wagon Drill, Tippers and Water Tanker. The stone boulders will be sized as per requirement within the lease area. Maximum and minimum elevation attained by the lease area is 98 m and 84 m respectively from M.S.L. The excavation will be done up to a maximum depth of 68 m RL at the ultimate period.

The total mineable reserve in the lease area is 2,72,205 Tonnes. The proposed average production target is 25,637.7 TPA of stone. The anticipated life of the mine is approximately 4.14 years.

The project falls under Schedule l (a) of category B2 of EIA Notification 2006 and its amendments thereof but due to the cluster condition, now, the project is categorized as B1. The mining lease area is located at Rochonpara (Matcha Nokpante), P.O: Dhanua, PS: Tura, West Garo Hills District, Meghalaya. The current proposal is a fresh application for environment clearance.

Table 1.1 Statutory Clearances

Particulars	Department/ Organisation	Letter No.	Date	Remarks
LOI	DFO, West Garo Hills	B/16/VII/620-623	13.02.20	-
Grant of Mining Lease	DFO, West & South-West Garo Hills (T) Division, Tura	B/16/VII/846-54	05.03.19	-
DMO Cluster	District Mining Officer, East Garo Hills, Williamnagar	DMO-W/MP/15/2023/116	19.01.2024	Total 5 mines under 500 m
Mine Scheme Approval	DMO, East Garo Hills, Meghalaya	DMO-W/MP/49/2020/106	20.12.2023	Plan approved by DMO, East Garo Hills, Meghalaya over 0.68 ha.

1.2 Purpose of the Report

The report has been prepared as per the EIA Notification dated 14th September 2006 and amendments thereof. The purpose of this report is to assess the environmental Impacts from the proposed Stone mining project of Shri Simsang Ch. Marak and to evaluate the social, environmental, and economic development activities to provide information on the environmental consequences for decision making.

The following aspects have been considered in this report:

- Air quality impact
- Noise impact
- Water quality impact
- Drainage impact
- Soil quality impact
- Hazard to life
- Ecological impact
- Land use impact

1.3 Details of Project Proponent

1.3.1 Name of the Project

The proposal is for production of 9,638.2 Cum Boulder Stone through semi-mechanised opencast mining method with spread over 1.68 acres (0.68 ha.) in village Matcha-Nokpante, P.O. – Dhanua, P.S. – Tura, District – West Garo Hills, State – Meghalaya.

1.3.2 Name of the Company/Organization, Legal Status of the Company

The project has been proposed by Shri Simsang Ch. Marak, at Village – Rochonpara, P.O.- Dhanua, P.S. – Tura, District – West Garo Hills, State- Meghalaya. There is no company involved and the mining is being undertaken by the individual mentioned above.

1.3.3 Registered Address of the Company/Proponent

Shri Simsang Ch. Marak, C/O: Salijeng Ch. Sangma, 2 – Rochonpara, West Garo Hills, Meghalaya - 794104.

1.4 Brief Description of the Project

1.4.1 Location

Matcha-Nokpante Stone Mine is situated near about 74 km SW away from Mendipathar Railway Station. The nearest National Highway is NH127-B 0.17km in the West direction. The Nearest airport is Lokpriya Gopinath Airport, Assam at a distance of 170 km in NE direction. Tura, the district headquarter is at a distance of 33 km in SE direction. A location map for the Project is shown in figure 1.1. Area as per LOI: 1.68 Acres/0.68 Ha, Nokma (Non-forest) Land, Aking No. – III-26(6). (Enclosed as Annexures). Aking land no. for each village is mentioned below in table 1.2.

Table 1.2 – Aking numbers with land type

Village/ Forest Block	Aking No.	Land Type & Area in Ha
Matcha-Nokpante	III-26(6)	Nokma (Non-forest) Land, Area – 1.68 Acre/0.68 ha

The mine lease is bounded by 25°'41’22.11"N to 25°41'25.86"N and Longitudes: 89°56' 18.38"E to 89°56'22.50"E and falls in the Survey of India Toposheet number G45R14. Coordinates of the bounding pillars is furnished in Table 1.3.

Table 1.3 Coordinates of the bounding Pillars

Boundary Pillar No.	Latitude	Longitude
1	25° 41' 22.11" N	89° 56' 19.46" E
2	25° 41' 24.06" N	89° 56' 22.50" E
3	25° 41' 25.86" N	89° 56' 21.79" E
4	25° 41' 24.10" N	89° 56' 18.38" E

1.4.2 Nature, Size & Category of the Project

The proposed project is a mining proposal under schedule 1(i) (a) “Mining of Minerals” of the EIA notification 2006 and its amendments. It falls under Category B1 (minor mineral) due to cluster situation. Currently there are 6 no. of mines present in the 500m radius including this project. The method of mining adopted shall be an Opencast Semi-mechanized method with the deployment of required machinery and with the use of drilling & blasting. The hard massive stone deposit shall be blasted within the lease.

The total Geological reserve is 3,95,114 tons. The mineable reserve would be 2,33,746 tons. During Scheme of Mining Period of Mining Period (4 years) (up to the mining lease period i.e. 04.06.2027) production will be 1,27,434.6 tons and the balance reserve will be (233746 – 1,27,434.6) = 1,06,311.4 tons. The proposed average production target is 25,637.7 TPA and the anticipated life of the mines is approximately 4.14 years on the proposed production rate.

1.4.3 Importance of the Project

Stone boulders and aggregates (stone chips) are used in almost any type of construction activity. It is also the most important input in road construction activity. Further, they are also required by railway projects for track laying and other construction activities. Thus, in the current times, where the focus of the governments is on improvement of basic infrastructure like roads, highways, dams and other social infrastructure – both in rural and urban areas, there is a constant need for ensuing regular supply of these minor minerals. Further, since this project is located in a rural/remote area of the state, it also has a potential to generate employment opportunities. The people residing in the nearby areas will be benefited indirectly. Locals will be employed in the project under various heads. Such small/medium scale mining projects can provide an answer to the problem of equitable sharing of benefits from the mineral wealth of this country.

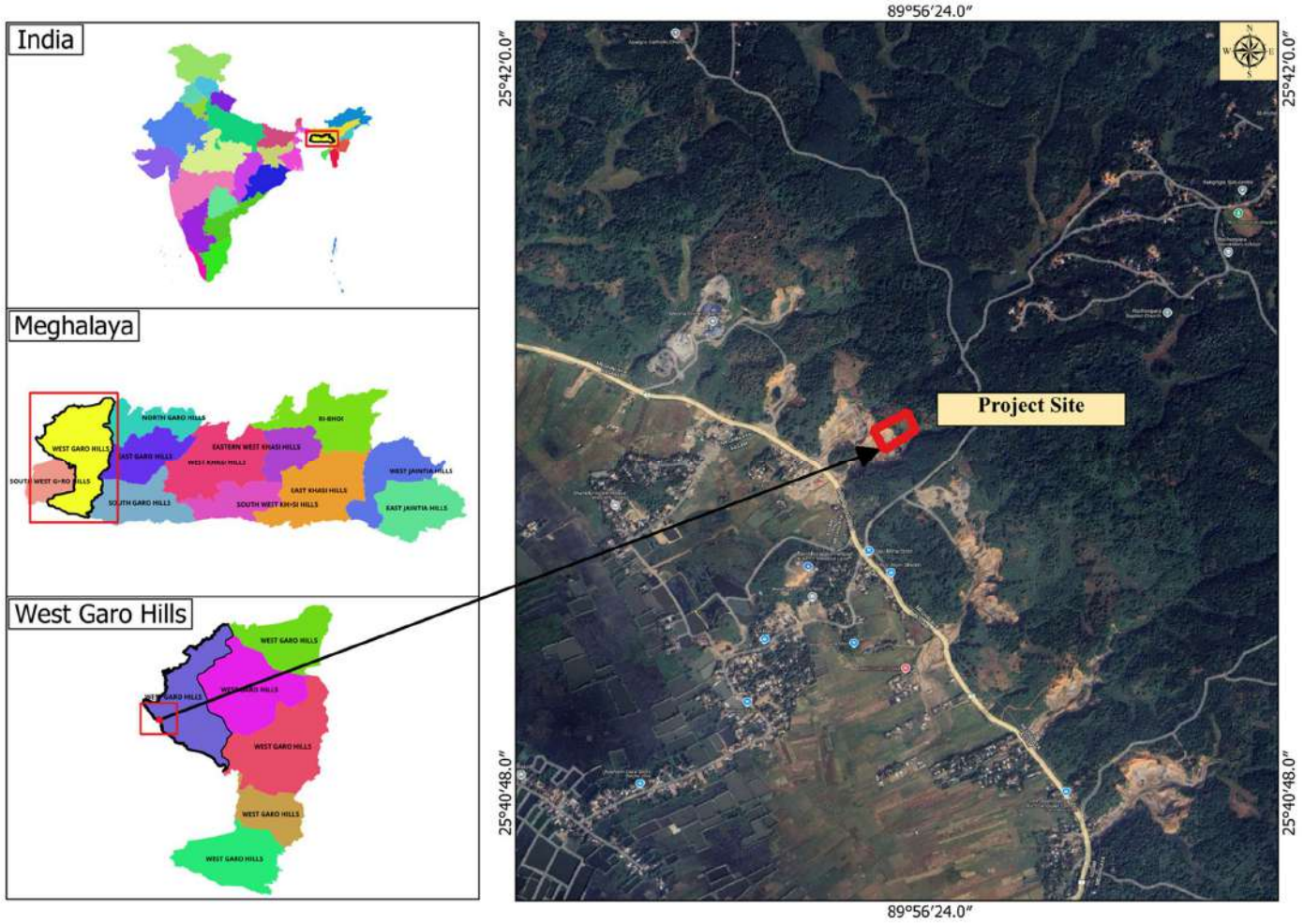

Figure 1.1 – Location Map of the Project Site

Figure 1.2 Google Earth Image of the Mine Lease Area

1.4.4 Salient features & Environmental Sensitivity

Table 1.4 - Salient features & Environmental Sensitivity

Sr. No.	Particular	Details
A	Nature of the project	Stone Mining
B	**Size of Project**	
(i)	Project Area	1.68 Acres (0.68 ha)
(ii)	Type of the land within Mine lease Area	Nokma (Non-forest) Land
(iii)	Minerals of mine	Boulder Stone
(iv)	Total Geological reserves	3,95,114 tons
(v)	Total Mineable reserves	2,72,205 tons
(vi)	Blocked reserves	1,22,909 tons
(viii)	Proposed production of mine	25,637.7 TPA (Maximum)
C.	**Project Location**	
(i)	Villages	Matcha-Nokpante
(ii)	P. S	Tura
(iii)	District	West Garo Hills
(iv)	State	Meghalaya
(v)	Toposheet No.	Lease Area – G45R14
(vi)	Elevation	84 m – 98 m AMSL
D.	**Environmental Setting Details (with approx. aerial distance & direction from the mining lease boundary)**	
(i)	Nearest Town & District Headquarter	Tura – 33 km SE
(ii)	Nearest Highway	NH-127B – 0.17 km W
(iii)	Nearest Railway Station	Mendipathar Railway Station – 74 km NE
(iv)	Nearest Major Airport	Lokpriya Gopinath Airport, Assam – 170 km NE
(v)	Nearest Tourist Places	None within 10 Kms
(vi)	Defence Installations	None within 10 Kms
(vii)	Archaeologically listed Important Place	None within 10 Kms
(viii)	National Parks, Wildlife Sanctuaries, Elephant Corridor, Biosphere Reserves etc. (Existing as well as proposed)	No existing National Park, wildlife sanctuary, Biosphere reserve within 10 Kms

(ix)	Reserved / Protected Forests within 10 Kms Radius	None within 10 kms
(x)	Nearest Water Body	Bramhaputra River – 12km W
(xi)	Seismic Zone	Zone V as per Seismic Map of India
(xii)	Mineral User (End Use)	construction activity such as Building, Road
(xiv)	Other Industries/Mines	• Shri Kejendro D. Sangma (Area: 1.10 Ha) • Smti Tangkame D. Marak (Area: 10 Ha) • Smti Marsilla Ch. Sangma (Area: 1.10 Ha) • Smti Amrita Sangma (Area: 1.83 Ha) • Shri Ivayle Mickdenov Ch. Sangma (Area: 10 Ha)

1.5 Scope of the Study

The scope of this report has been defined by the Terms of Reference (ToR) issued by SEIAA, Meghalaya vide letter no. ML/SEAC/SEIAA/PP/WGH/27/2024, Dated 25/07/2024. Point-wise compliance for the same has been incorporated in this EIA/EMP report.

In general, the objective of the report includes:

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Objective 1
Primary and Secondary data collection for the Project Site.</td>
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Objective 2
Baseline monitoring for environmental parameters such as air, water, noise, soil, etc. and analysis of said parameters.</td>
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Objective 3
Identification of critical environmental parameters that are susceptible to damage.</td>
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Objective 4
Assessment and determination of mitigation measures to reduce and control the impact.</td>
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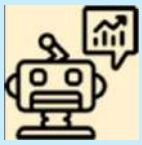
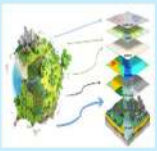
<td> 
Objective 5
Prediction of post project concentration with and without control measures.</td>
<td> 
Objective 6
Site specific studies such as R&R, Socioeconomic study, ecological study etc.</td>
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Objective 7
Formulating an Environment Management Plan.</td>
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1.5.1 Structure of the EIA report

The EIA/EMP report has been prepared as per the Generic Structure proposed by EIA notification 2006. List of chapters and general details have been tabulated below:

Table 1.5 – Structure of EIA/EMP Report

Chapter Name	Description
Chapter 1: Introduction	Provides background information, brief location settings of the area along with the scope and objectives of the EIA/ EMP study.
Chapter 2: Project Description	Includes project details, project layout, process details, material balance, operating parameters, power requirements, water requirement and sources pollution and its management, cost, etc.
Chapter 3: Description of the Environment	Includes existing environmental status of the 10 km surroundings from the project site i.e., the study area including topography, geology, drainage pattern, water environment, climate & meteorology, ambient air quality, ambient noise levels, ecology & biodiversity, socio-economic status, etc.
Chapter 4: Anticipated Environmental Impacts & Mitigation Measures	Describes the anticipated impact on the environment due to the proposed project Activities and corresponding mitigation measures. It gives the details of the impact on the baseline parameters, both during the site preparation/construction and operational phases, and suggests the mitigation measures to be implemented by Project Proponent
Chapter 5: Analysis of Alternatives	Examines alternatives analysis for site and technology for the proposed project activities.
Chapter 6: Environmental Monitoring Plan	Describes the Environmental Monitoring Plan for the proposed project activities during site preparation/construction and operation phases.
Chapter 7: Additional Studies	Hazard identification, risk analysis, disaster management plan (On-site & Off-site) for an unlikely event of an emergency for proposed project activities and other additional studies etc.

Chapter 8: Project Benefits	Includes the benefits in terms of improvement in physical infrastructure, social infrastructure, employment potential, etc.
Chapter 9: Environmental Cost-Benefit Analysis	Describes the environmental cost-benefit analysis deriving all the budgetary measures of the proposed project
Chapter 10: Environmental Management Plan	Describes the environmental management plan to mitigate adverse environmental impacts and to strengthen beneficial impacts. It also includes the organization chart & budget allocation for implementation of the EMP etc.
Chapter 11: Summary & Conclusions	Provides an overall summary and conclusion of the EIA/EMP study.
Chapter 12: Disclosure of Consultants Chapter	Comprises the details of SPPL and respective experts engaged, and nature of consultancy rendered.

1.5.2 Applicable Environmental and Mining Laws/Rules/Acts

Table 1.6 – Key Environmental & Mining Laws

Name	Description	Applicability & Action Required
National Environmental Policy, 2006	NEP is a comprehensive guiding document in India for all environmental conservation programs and legislations by central, state, and local government. The dominant theme of this policy is to promote betterment of livelihoods without compromising or degrading the environmental resources. The policy also advocates collaboration method of different stakeholders to harness potential resources and strengthen environmental management.	As a stone mining company shall adhere to NEP principle of "enhancement and conservation of environmental resources and abatement of pollution". Concerned clearances will be acquired before start of operation.
Environment (Protection) Act 1986; Environment Protection Rules 1989.	The Environment (Protection) Act is an umbrella legislation seeking to supplement the existing laws on the control of pollution (the Water Act and the Air Act) by enacting a general legislation for environment protection and to fill the gaps in regulation of major environmental hazards.	The project and all activities under the same should adhere to the regulations and standards under the Environment (Protection) Act, 1986 and Environmental Standards.

		Concerned clearances will be acquired before start of operation.
EIA Notification, 2006	The EIA Notification set out the requirement for environmental assessment in India. This states that Environmental Clearance is required for certain defined activities/projects, and this must be obtained before any construction work or land preparation (except land acquisition) may commence. The Schedule I of the notification defines threshold of activities which require to undertake an environmental assessment and obtain an environmental clearance from statutory bodies.	The proposal consists of Stone Mining which falls under schedule 1(a)(i) of EIA Notification 2006 which falls under the Environmental Protection Act. Application for grant of Environmental Clearance will be submitted.
Forest (Conservation) Act,1980 and Forest Conservation Rules, 2003 as amended	As per Rule 6, every user agency, who wants to use any forest land for non-forest purposes, shall seek approval of the Central Government.	No forest land is involved in the current project.
Water (Prevention and Control of Pollution) Act 1974 & Rules 1975	Control of water pollution is achieved through administering conditions imposed in consent issued under provision of the Water (Prevention and Control of Pollution) Act of 1974. These conditions regulate the quality and quantity of effluent, the location of discharge and the frequency of monitoring of effluents. Any component of the Project having the potential to generate sewage or trade effluent will come under the purview of this Act, its rules, and amendments. Such projects must obtain Consent to Establish (CTE) under Section 25 of the Act from State Pollution Control Board (SPCB) before	As it is a Stone Mining Project, surface and underground water generation will require control measure to prevent pollution which is in the scope of Water (Prevention

	starting implementation and Consent to Operate (CTO) before commissioning. The Water Act also requires the occupier of such subprojects to take measures for abating the possible pollution of receiving water bodies.	and Control of Pollution) Act.
Air (Prevention and Control of Pollution) Act 1981 & Rules 1982	The subprojects having potential to emit air pollutants into the atmosphere must obtain CTE under Section 21 of the Air (Prevention and Control of Pollution) Act of 1981 from SPCB before starting implementation and CTO before commissioning the project. The occupier of the project/facility has the responsibility to adopt necessary air pollution control measures for abating air pollution.	As this is a Stone Mining Project, Drilling, Blasting and vehicular movements will cause air pollution.
The Motor Vehicles Act, 1988 (59 of 1988) (14 Oct. 1988)	The equipment and vehicles used in the sub-projects will emit air pollutants. Enforcement of air pollution norms and other applicable rules as per the motor vehicle act.	Rule no 115. Emission of smoke, vapor, etc. from motor vehicles and Rule 115 (A) sub-rule (8) also provides standards for construction equipment.
Noise Pollution (Regulation and Control) Rules, 2002 amended up to 2010	This provides for standards for noise for day and night for various land uses and specifies special standards in and around sensitive receptors of noise such as schools and hospitals. Contractors will need to ensure compliance to the applicable standards and install and operate all required noise control devices as may be required for all plants and work processes.	Noise generation is expected from the Drilling, Blasting and movement of vehicle. The control is guided by the Noise Pollution (Prevention & Control) Act.
National Institute of Occupational Safety and	NIOSH has laid down criteria for a recommended standard: occupational noise exposure. The standard is a combination of noise exposure levels and duration that no worker exposure shall equal or exceed.	Internationally recognized environmental standards will be adhered to during

Health (NIOSH) Publication No. 98-126		the construction and operation of the Project. OHS cell will monitor that all the standards are observed.
Construction and Demolition Waste Management Rules, 2016	Rules to manage construction and to waste resulting from construction, remodelling, repair, and demolition of any civil structure. Rules define C and D waste as waste comprising of building materials, debris resulting from construction, re-modelling, repair, and demolition of any civil structure.	There will be no C&D Waste Generation.
Solid Wastes Management Rules, 2016	Rules to manage municipal solid waste generated; provides rules for segregation, storage, collection, processing, and disposal.	There is no Waste Generation envisaged
Hazardous and Other Wastes (Management and Trans boundary Movement) Rules, 2016	According to the Rules, hazardous wastes are wastes having constituents specified in Schedule II of the Rules if their concentration is equal to or more than the limit indicated in the said schedule.	Hazardous wastes like used oil, oily sludge will be generated from vehicles, Same will be handled as per HWM Rules 2016.
Bio-medical Waste Management ules, 2016	Management of bio-medical waste generation, collection, store, transport, or handle bio medical waste in any form	Generation of bio-medical waste from First-Aid clinic. It will be handled as per BMW Management Rules 2016
Public Liability Insurance Rules, 1991 & amendments.	These provide for public liability insurance for providing immediate relief to the persons affected by accident occurring while handling hazardous substances and for matters connected herewith or incidental thereto. Hazardous substance means any substance or preparation which is defined as	The Contractor needs to obtain an insurance under this act to compensate any liability arising out of

	hazardous substance under the Environment (Protection) Act 1986 and exceeding such quantity as may be specified by notification by the Central Government	Environmental degradation caused wilfully or unwilfully by him.
The Child Labour (Prohibition and Regulation) Amendment Act, 2016 The Child Labour (Prohibition and Regulation) Act, 1986	No child below 14 years of age will be employed or permitted to work in any of the occupations set forth in the Act's Part A of the Schedule or in any workshop wherein any of the processes set forth in Part B of the Schedule. Child can help his family or family enterprise, which is other than any hazardous occupations or processes set forth in the Schedule, after his school hours or during vacations	No children below 18 years of age will be engaged in hazardous working conditions.
Minimum Wages Act, 1948	The employer is supposed to pay not less than the Minimum Wages fixed by appropriate Government as per provisions of the Act if the employment is a scheduled employment. Construction of Buildings, Roads, Railway, and Runways are scheduled employment.	All construction workers should be paid not less than the prescribed minimum wage.
Workmen Compensation Act, 1923	The Act provides for compensation in case of injury by accident arising out of and during employment.	Compensation for workers in case of injury by accident.
Equal Remuneration Act, 1979	The Act provides for payment of equal wages for work of equal nature to Male and Female workers and not for making discrimination against Female employees in the matters of transfers, training, and promotions etc.	Equal wages for work of equal nature to male and female workers.
The Ancient Monument and Archaeological Sites and Remains (Amendment and Validation) Act 2010	The Rules designate areas within a radius of 100 m and 200 m from the "protected property/monument/ area" as "prohibited area" and "regulated area" respectively.	The Ancient Monument and Archaeological Sites and Remains (Amendment And Validation) Act 2010.

The National Green Tribunal (NGT) Act, 2010	NGT provides an effective and expeditious disposal of cases relating to environmental protection and conservation of forests and other natural resources including enforcement of any legal right relating to environment and giving relief and compensation for damages to persons and property and for matters connected therewith. NGT has jurisdiction over matters related to Water Act, 1974; Water Cess Act, 1977; Forest (Conservation) Act, 1980; Air Act, 1981; Environment (Protection) Act, 1986; Public Liability Insurance Act, 1991; and Biodiversity Act, 2002. Consequently, no other court will have jurisdiction over the matters related to environment falling under the above referred Acts. Being a dedicated tribunal for environmental matters with the necessary expertise to handle environmental disputes.	Affected persons may approach NGT to resolve project induced environmental issues.

Chapter 2 Project Description

2.1 Type of Project

2.1.1 Nature of the Project

The proposed project is a mining project for production of Boulder Stone through semi-mechanised opencast mining method spread over 1.68 acres (0.68 ha.) in village Matcha-Nokpante, P.O. – Dhanua, P.S. – Tura, District – West Garo Hills, State - Meghalaya. The proposed project falls under Schedule 1(a) (i) "Mining of Minerals", Category B of the EIA notification 2006 and its amendments thereof.

2.1.2 Size & Magnitude of Operation

The mine lease area is over 1.68 Acre (0.68 ha). The total no. of working days is 200 days with 26 (Skilled, Semi-Skilled, Unskilled) manpower under Semi-Mechanised Opencast Mining method. The Proposed production capacity is 25,637.7 TPA (Max). The Total estimated reserve is 3,95,114 tons out of which 2,75,205 ton will be mineable. Therefore, the total life of mine at maximum rated production is expected as 4.14 years.

2.1.3 Need for the Project

Stone boulders and aggregates (stone chips) are used in almost any type of construction activity. It is also the most important input in road construction activity. Further, they are also required by railway projects for track laying and other construction activities. Thus, in the current times, where the focus of the governments is on improvement of basic infrastructure like roads, highways, dams and other social infrastructure – both in rural and urban areas, there is a constant need for ensuing regular supply of these minor minerals. Further, since this project is located in a rural/remote area of the state, it also has a potential to generate employment opportunities. Such small/medium scale mining projects can provide an answer to the problem of equitable sharing of benefits from the mineral wealth of this country.

2.2 Site Characteristics and Land Requirements

2.2.1 Vicinity of the Proposed Site

The proposed site is located at village Matcha-Nokpante, P.O. – Dhanua, P.S. - Tura, District- West Garo Hills, State- Meghalaya. The site falls under Survey of India toposheet no. G45R14 with Latitudes: 25°'41'22.11"N to 25°41'25.86"N and Longitudes: 89°56' 18.38"E to 89°56'22.50"E.

2.2.2 Industries in the area

Table 2.1 – List of Mines in the Cluster area

SL. No.	Name of Project	Area & Location	Distance from the approved Mining Plan.	Product
1	Shri Kejendro D. Sangma	1.10 Ha. Rochonpara, West Garo Hills, Meghalaya.	455 m	Boulder Stone
2	Smti Tangkame D. Marak	10 Ha. Rochonpara, West Garo Hills, Meghalaya.	446 m	Boulder Stone
3	Smti Marsilla Ch. Sangma	1.10 Ha. Rochonpara, West Garo Hills, Meghalaya.	280 m	Stone Mine
4	Smti Amrita Sangma	1.83 Ha Jewali Rochonpara, West Garo Hills, Meghalaya	204 m	Stone Mine
5	Shri Ivayle Mickdenov Ch. Sangma	10 Ha. Rochonpara, West Garo Hills, Meghalaya	240 m	Boulder Stone

Total Cluster area including this project is 61.06 Acres.

2.2.3 Land Details

Table 2.2 – Proposed & Final Land Use Pattern at the end of Mine Life

Type of land use	Existing (ha)	During Plan Period (ha)	During Conceptual Period (ha)
Quarry	0.20	0.44	0.46
Mining Road	0.02	0.02	0.00
Garland Drain	0.00	0.05	0.00
Green Belt	0.00	0.17	0.22
Balance /Unused area	0.46	0.00	0.00
Total	0.68	0.68	0.68

2.3 Technology and Process Description

2.3.1 Mining Method

The proposed method of mining is Opencast Semi-Mechanized Mining method along with drilling & blasting. For fragmentation and dislodging the hard, massive stone bed and rock, blasting is required. The development of the faces shall be carried out keeping the bench height and width at 6 m x 6 m.

Since the area is massive in nature, it is proposed to carry out only opencast semi-mechanized mining during this scheme period, i.e., 4 years. The operations like drilling of shot holes, sorting of ore and breaking at the size will be done to deploy 100 mm dia. Wagon drilling to drill and blast holes, having burden and spacing of 3 m x 3.5 m in staggered grid pattern. To avoid fly rock problem at the edge of the hill, light charged muffle blasting will be adopted as precautionary measure.

2.3.2 Mining Machineries

Table 2.3 – Proposed Equipment's as per Mining Plan

No.	Type	Nos.	Size/Capacity
1	Wagon Drill (100 mm dia)	1	100 mm dia
2	Hydraulic Excavator	1	0.9 m^3
3	Compressor	1	300 cfm
4	Tippers	2	10 MT
5	Rock Breaker	1	For rock breaking

6	Water Tanker	1	For water sprinkling
7	Portable Pump	1	For water pumping

2.3.3 Drilling & Blasting

The exploitation of hard rock needs drilling and blasting to generate ROM. The Air Compressor / Wagon drills of 100 mm dia. rods will be deployed to drill blast holes and these will be charged with explosive cartridges. Drilling and blasting operations will be carried on strictly as per the provision of MMR, 1961 under the strict supervision of qualified persons. For storage and issue of explosives, the relevant provisions of Indian Explosives Act, 1884 will be followed. Blasting time is generally fixed at lunch interval or after the working shift-taking. All required precautions, like marking the danger zone with red flags, use of warning signals and providing blasting shelters etc.

Drilling Practice:

Table 2.4 – Drilling Pattern

Sl. No.	Particulars	Details
1	Bench height	6m
2	Burden	3m
3	Spacing	3.5m
4	Bulk Density	2.8 MT/m^3
5	Depth of hole	6.0m + (6.0m x 10%) (Considering 10% sub grade drilling) = 6.6m
6	Tonnage per hole	6.6 x 3 x 3.5 x 2.8 = 194.04 Tonnes
7	Average Production/day	128 Tonnes
8	Number of hole/day	128/194 = 0.66 say 1

The general blasting w.r.t explosive practice is given below: -

Table 2.5 – Explosive & Blasting Parameters

Sl. No.	Particulars	Details
1	Type of Explosive	Slurry Explosives
2	Bench height	6.0m
3	Depth of hole	6.6m
4	Burden	3m
5	Spacing	3.5m
6	Volume	6.6 x 3 x 3.5 = 69.3 m^3
7	Charge/hole	23kg
8	Number of hole/day	1
9	Explosive required	1 x 23kg = 23kg slurry explosives (1 hole)

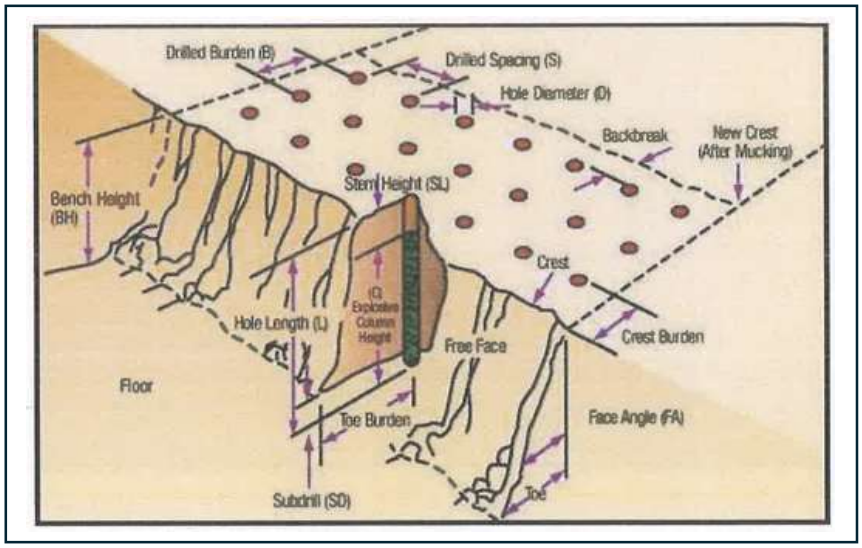

Figure 2.1 – Drilling and Blasting Pattern

2.3.4 Exploration

The entire area has high potential. The work will be started from the around all part of the area and gradually extended towards with greater depth. The area is highly undulated land. The average elevation of the lease area ranges from 84 m to 98 m. The benching system 6 m x 6 m will be practiced in the area in order to comply with the Metalliferous Mines Regulation, 1961.

During survey, traversing was carried in & around the applied area. Geological mapping has also been done for the area. The quarry section within the adjacent area shows that Basalt rock is exposed on the quarry wall.

Since the deposit in this area is massive in nature, it is proposed to carry out only opencast semi-mechanized mining during this plan period, i.e., 4.14 years. The operations like digging, excavation and removal of stone in conjunction with deep hole drilling and blasting will be done with the help of heavy earth moving machineries (100 mm dia. wagon drill, excavators, tippers, rock breakers etc.). To avoid fly rock problem at the edge of the hill, muffle blasting will be adopted as precautionary measure, having burden and spacing of 3 m x 3.5 m in staggered grid pattern.

2.3.5 Reserve Estimation

Resources have been calculated with Proved Mineral Reserve Category. Up to Maximum depth of 30 meters has been taken as Proved Mineral Reserve category, which is above the Ground Water Table. Proved Mineable reserve is based on the mineable part of the applied area. Mineable stone reserve has been calculated from the geological plan of the area considering the stone which is not mineable according to the blocked zone within the project boundary and ultimate pit limit as calculated from the geological plan & sections.

Parameters taken for resources /reserve estimation:

- **Recovery:** The recovery of stone is 95% and the rest 5% is treated as intercalated quarry waste.
- **Top Soil:** The total top soil removed in the 6th year will be 3,444.9 cum that will be in mining road.
- **Bulk Density:** Based on nature of rock type & going through the scientific literature it has been assumed that the bulk density will be 2.8 (The bulk density/specific gravity test will be carried out within six months after the opening of mine as this is a fresh grant area).

Table 2.6 – Availability of resources & minerals reserves

Category of Reserves	Total Reserves	
	in cum	in tonnes
Total Mineral Reserves	1,41,112.14	3,95,114
Mineable Reserves	97,216.07	2,72,205
Non-Mineable Reserves	43,896.07	1,22,909

Source: Approved Mining Plan

2.3.6 Production

Year wise production of 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 to get the actual production of stone in each bench.

Table 2.7 – Year wise Proposed Production

Year	Production of Stone/Year		Production/Day	Removal of O.B	
	In cum	In tonnes	In tonnes	Cum	Per day cum
6th	9,598.7	25,532.5	85.11	3,444.9	17.22
7th	9,638.2	25,637.7	85.46	0	0
8th	9,495.3	25,257.4	84.19	0	0
9th	9,615.5	25,577.3	85.26	0	0
10th	9,560.0	25,429.6	84.76	0	0
Total	**47,907.7**	**1,27,434.5**	**85.46 Max**	**3,444.9**	**17.22 Max**

Source: Approved Mining Plan

Table 2.8 – Year-Wise Development

Year	Bench RL	Section	Height of bench (m)	Total Annual Production (T)
6th	98 m to 92 m 92 m to 86 m	A – A'	6	4,552.4 20,980.2
7th	92 m to 86 m 86 m to 80 m	A – A'	6	12,672.5 12,965.2
8th	86 m to 80 m	A – A'	6	25,257.4
9th	86 m to 80 m	A – A'	6	25,577.3
10th	86 m to 80 m 80 m to 74 m	A – A'	6	3,155.1 22,274.5

2.3.7 Conceptual Mine Planning

Mining will be carried out with the help of machineries (100mm dia wagon drill, excavators, tippers, rock breakers etc.) for digging, excavation and removal of stone in conjunction with deep hole drilling and blasting. In this connection, guidelines, issued by the Director of Mine's Safety by various circular, will be adopted. During this plan period

of 4.14 years the area will be worked out except 7.5m safety barrier. As there is OB & intercalate waste will be removed and this will be used as construction of mining road and backfilled within the exhausted quarry. The voids, so left, in the conceptual will be filled with rain water and shall be treated as water reservoir and local people will be use the water for their domestic used and irrigation purpose.

Land Use Pattern:

Table 2.9 - Land Use Pattern

Type of land use	Existing (ha)	During Plan Period (ha)	During Conceptual Period (ha)
Quarry	0.20	0.44	0.46
Mining Road	0.02	0.02	0.00
Garland Drain	0.00	0.05	0.00
Green Belt	0.00	0.17	0.22
Balance /Unused area	0.46	0.00	0.00
Total	0.68	0.68	0.68

2.3.7.1 Ultimate extent and size of the pit

Maximum and minimum elevation attained by the area is 98 m and 84 m respectively from M.S.L. The excavation will be done up to a maximum depth of 30 m RL during the plan period.

2.3.7.2 Manufacturing Process

In stone mining, there is no need for mineral processing or mineral beneficiation to upgrade the ROM Production. Here, mined out stone is directly used in different forms ranging from boulders to aggregates. Hence, no manufacturing is proposed in the mine lease area.

2.3.7.3 Mineral Transport

Daily requirement of Dumpers/tippers will depend upon production capacity and handling of minerals. For this mine, proposed production capacity is 128.2 TPD. The mineral will be transported by road through 2 tippers making several rounds.

2.3.7.4 Quantity of Raw materials & Fuel Required

This is mining project, so raw material is not required. Here the stone boulder produced from the mine is the raw material for other industrial product. Stone boulders and

aggregates (stone chips) are used in almost any type of construction activity. It is also the most important input in road construction activity. Fuel required for operation of mining equipment is expected to be 202.8 KL/annum.

2.3.8 Power Requirement

As mining activities will be done in the day time only so, no power is required for mining activity.

2.3.9 Utilities & Services

2.3.9.1 Water Requirement

Since Opencast Quarrying operations using Semi-Mechanized methods is envisaged, no major requirement of water for quarrying operations is anticipated. However, water will be required for dust suppression at various stages. Further water will be required for domestic use. Water required for domestic purpose, will be sourced from surface water, Water for other uses will be sourced from authorized tanker providers.

Table 2.10 – Detailed Water Requirements

Details	Requirement of Water (KLD)
Dust Suppression (10 KLD in 1 km)	Total length of approach road is 0.26 km. Requirement of water = 0.26 x 10 = 2.6 KLD Two times water sprinkling per day = 2.6 x 2 = 5.2 KLD
Drinking & Domestic	Water requirement for drinking & domestic purpose per person is 15 litres per day. Therefore, requirement is 15 x 26 = 390 litre / day say 0.39 KLD
Greenbelt Development	Water requirement for Greenbelt Development is 3 L/Plant. Requirement of water = 598 x 3 = 1794 L = 1.79 KLD
Total	7.38 KLD (Nearly one Water tanker of Capacity 12 KLD will be required in a day)

2.3.10 Manpower Requirement

The applicant will employ 07 miners for raising ores and 07 unskilled workers for removal of soil, quarry cleaning, road repairing and greenbelt development. The number of unskilled labours may increase depending on the quantum of overburden removal.

Table 2.11 – Proposed Manpower Requirement for Manual Mining

Serial No	Designation	Working forces per day (1 shift basis)
1	Mining Mate	1
2	Blaster Helper (Auxiliary M.M)	1
3	Storekeeper	1
4	Attendance Clerk cum Register Keeper	1
5	Quarry Munshi	1
6	Compressor Operator	1
7	Wagon Driller	1
8	Excavator Operator	1
9	Tipper Operator	2
10	Rock Break Operator	1
11	Water Tanker Driver	1
12	Miners (Semi-skilled, inclusive of absentees & leaves)	7
13	Unskilled	7
	Total	**26**

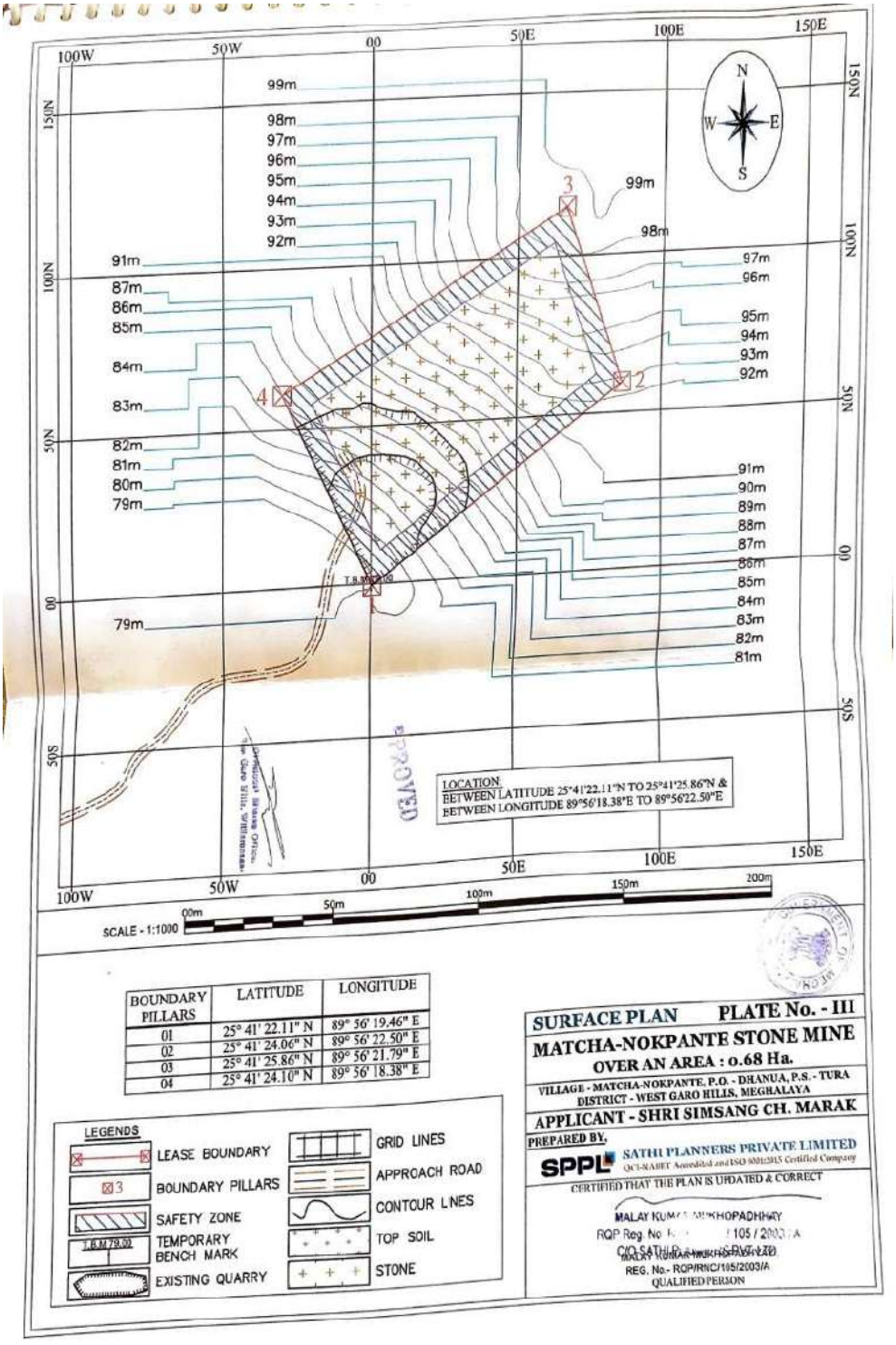

Figure 2.2 – Surface Plan

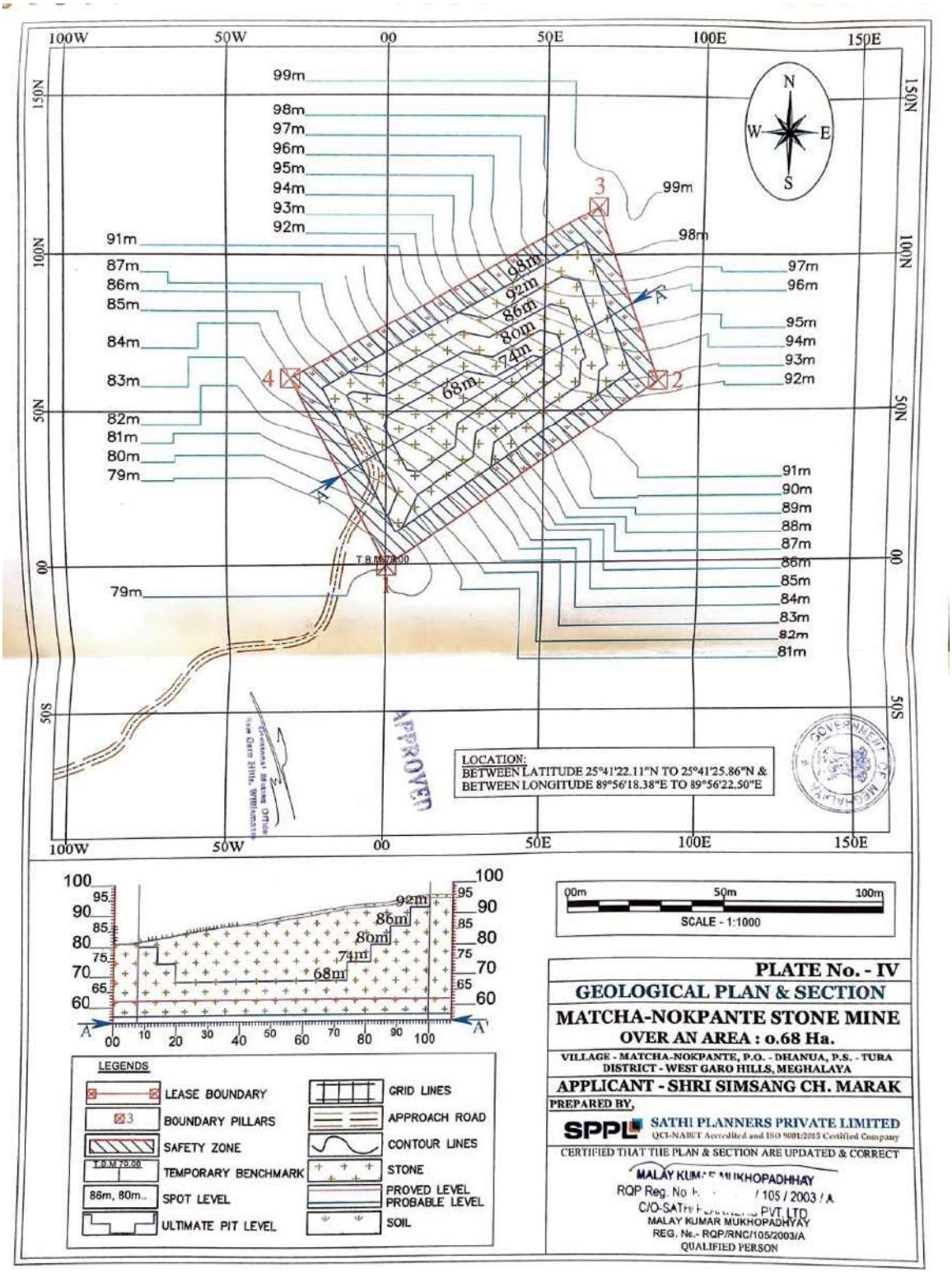

Figure 2.3 - Geological Plan & Section

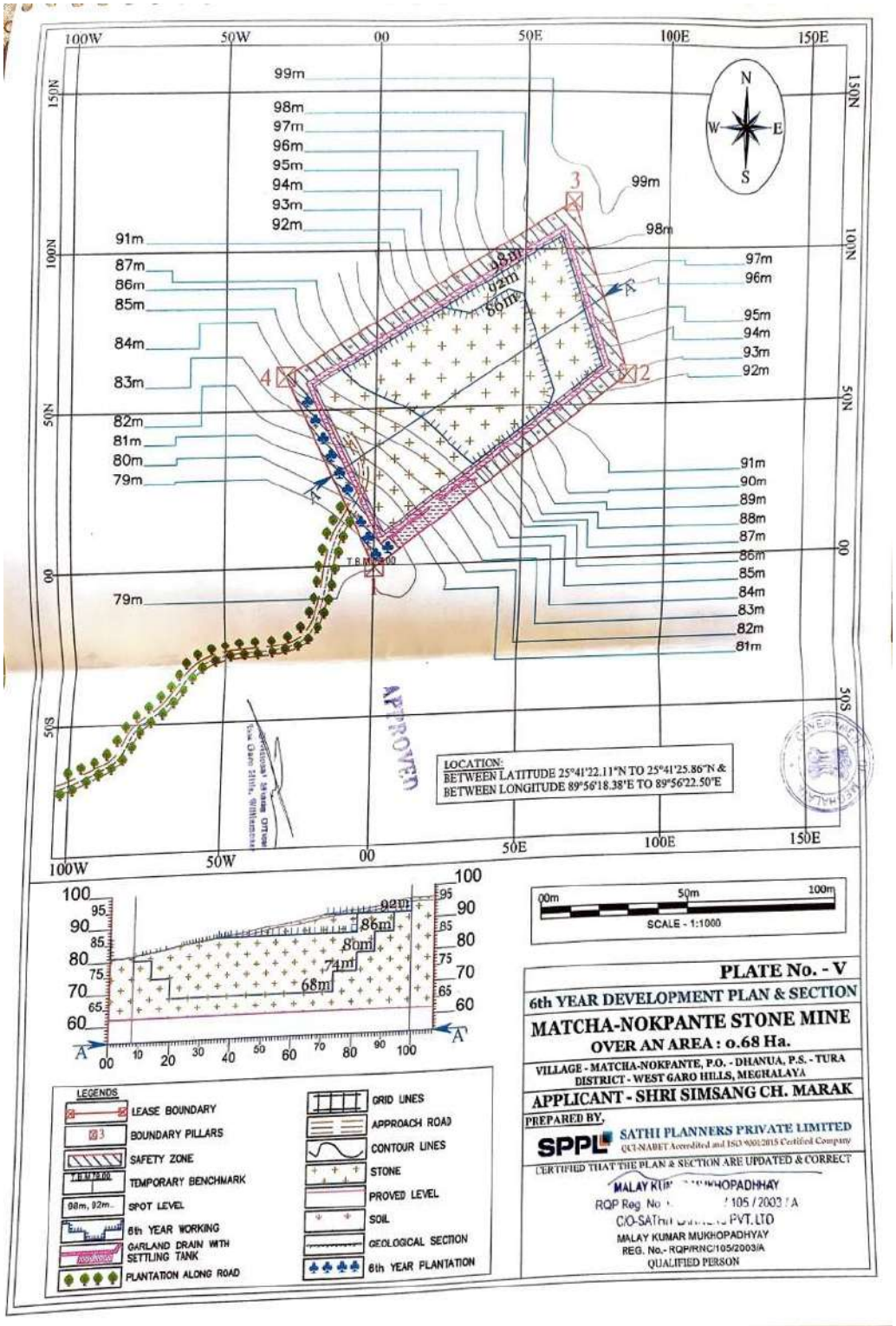

Figure 2.4 -6th year Development Plan & Section

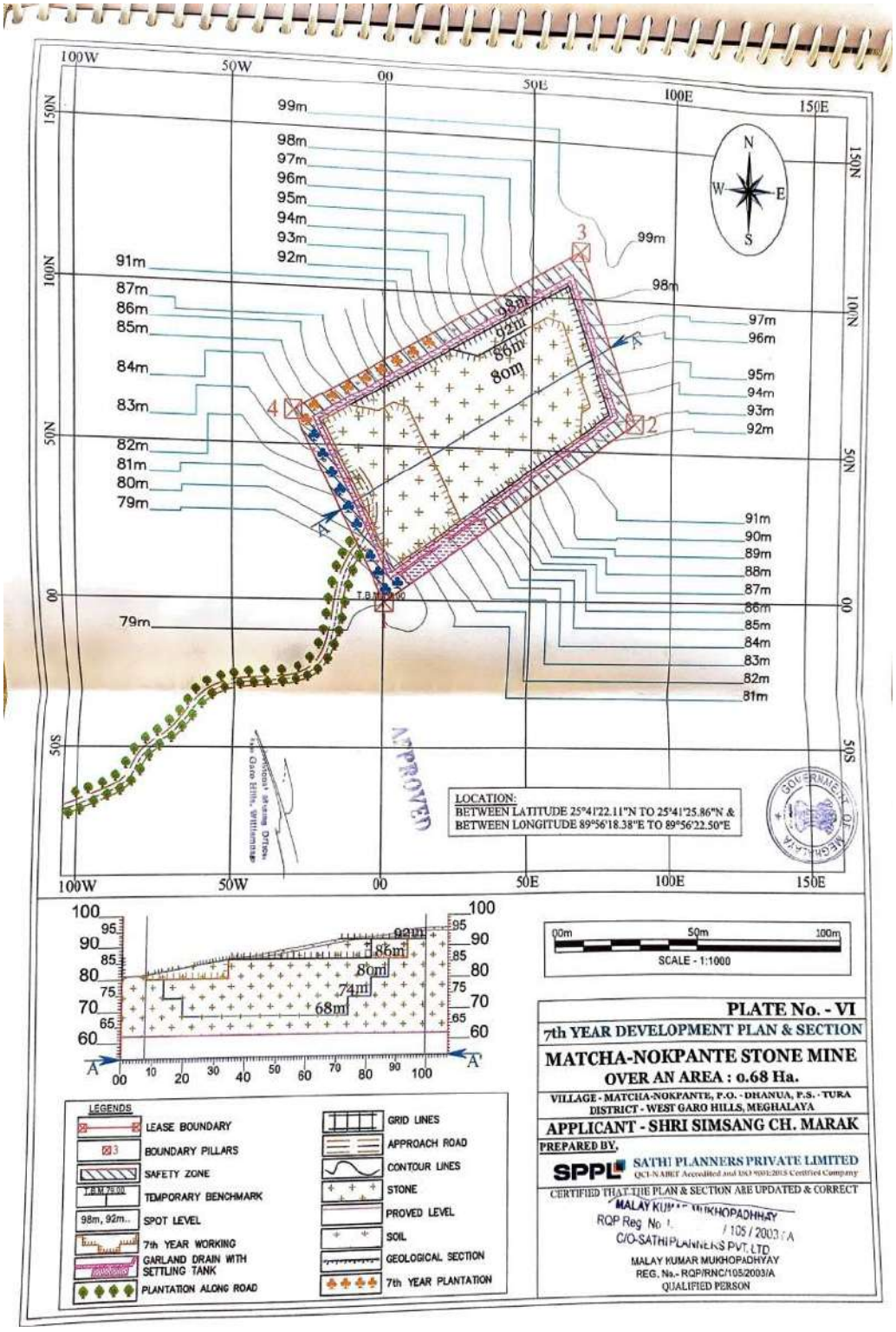

Figure 2.5 – 7th year Development Plan & Section

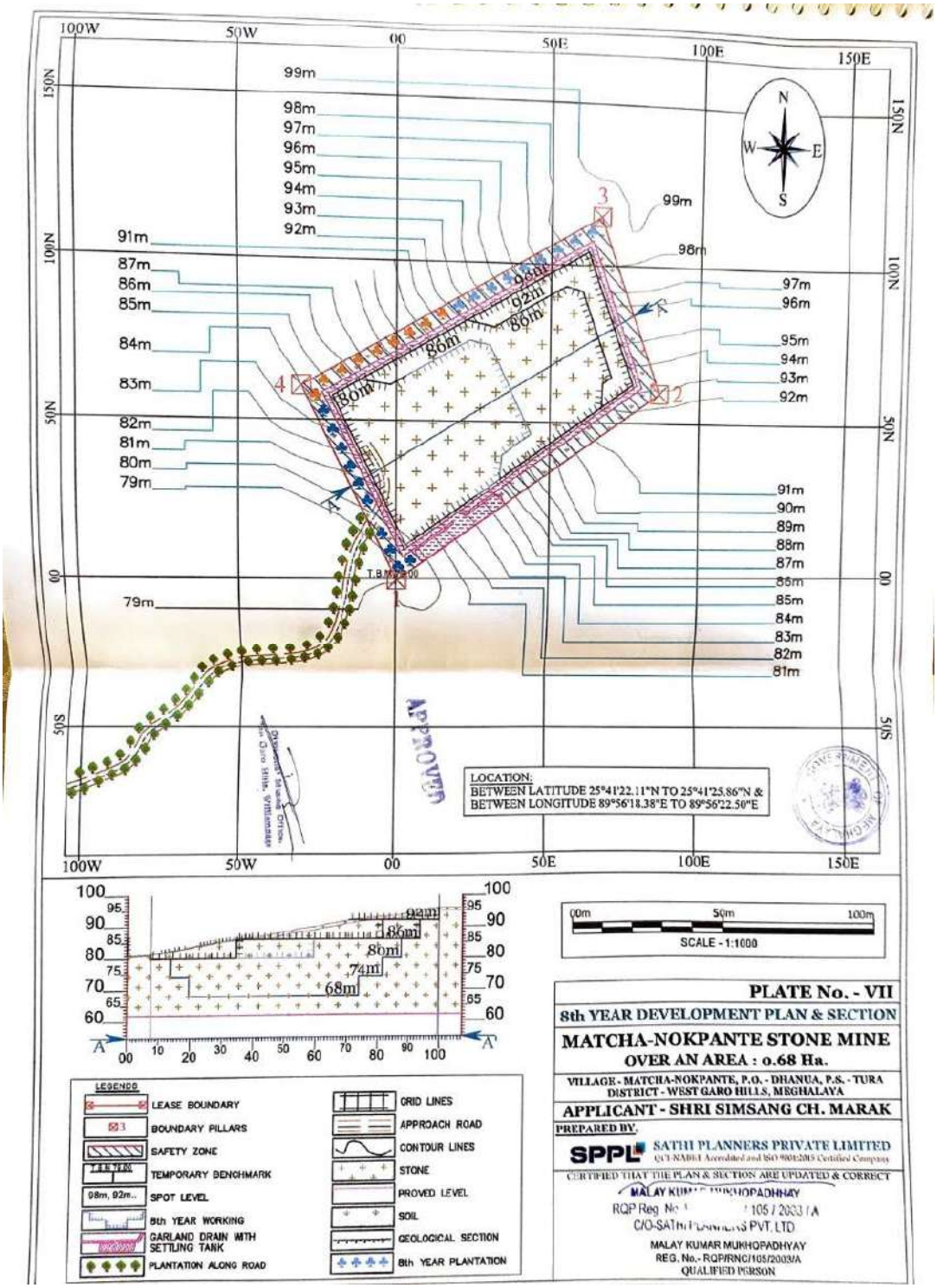

Figure 2.6 - 8th Year Plan Development & Section

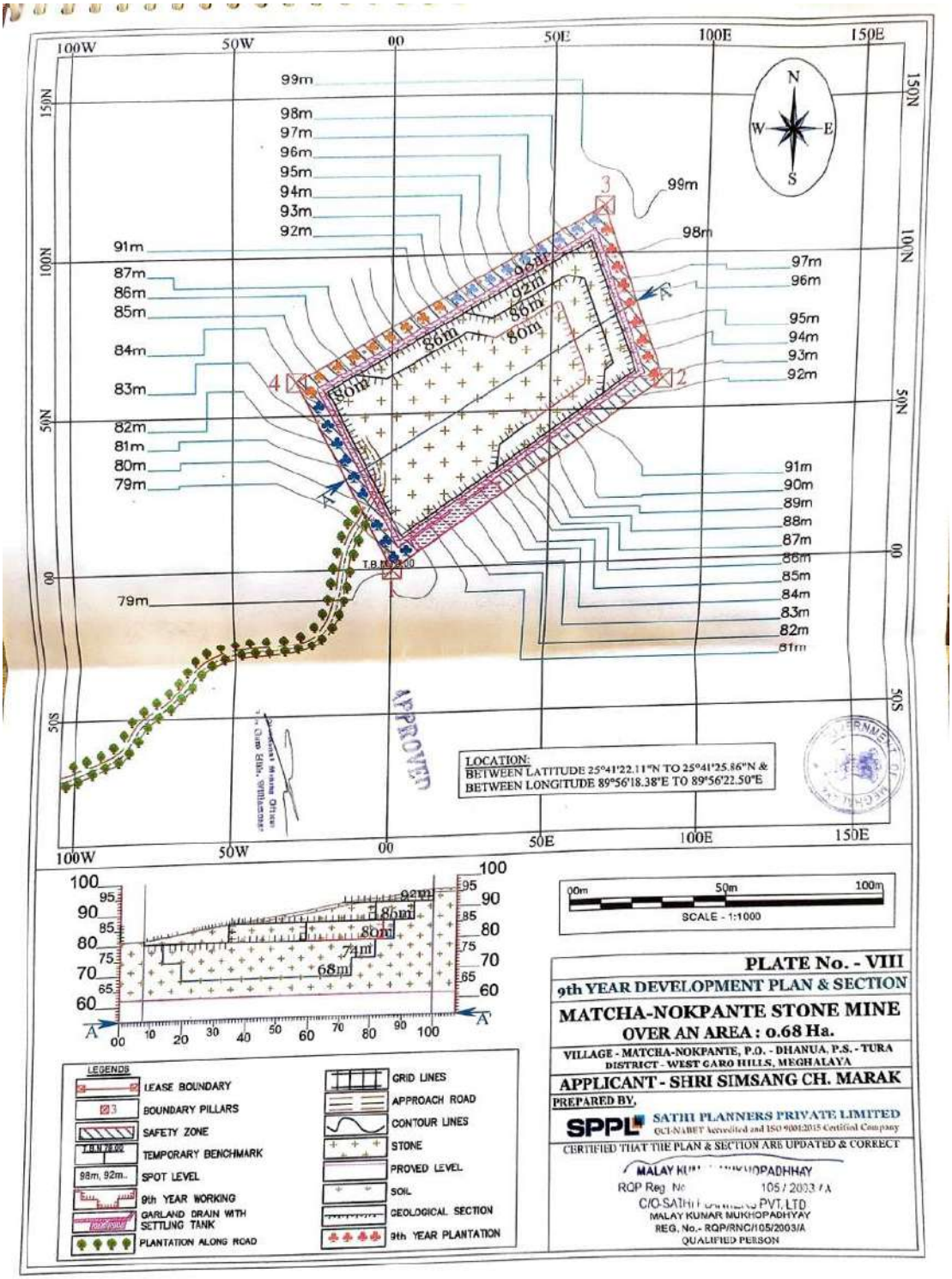

Figure 2.7 – 9th Year Plan Development & Section

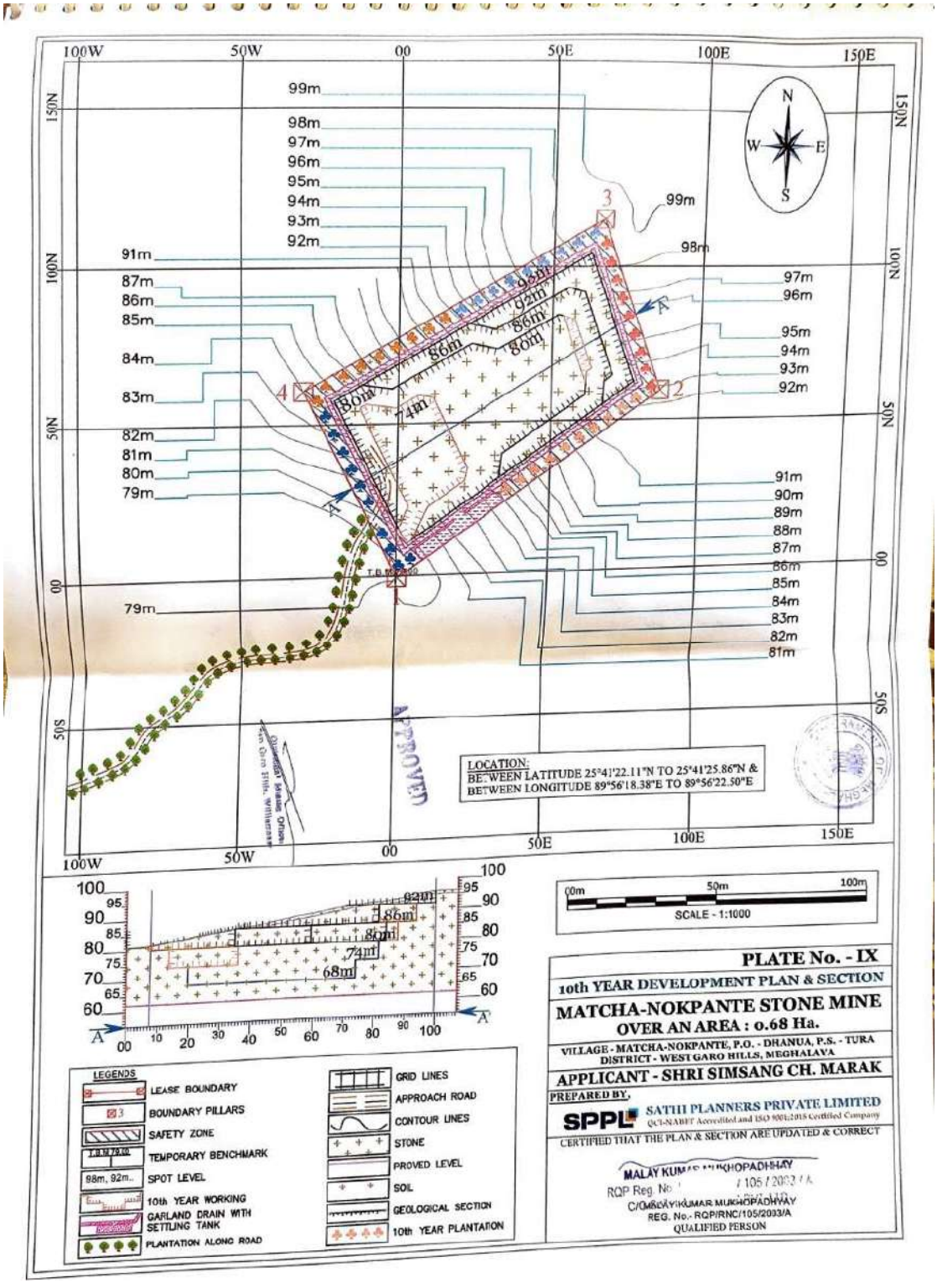

Figure 2.8 10th Year Plan Development & Sectio

2.4 Proposed Schedule for Approval and Implementation

Table 2.12 – Proposed Schedule for Approval and Implementation

Activity	Timeline in Months																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Application for TOR																		
Grant of TOR																		
Submission for Public Hearing																		
Conduct of Public Hearing																		
Submission of Final EIA																		
Grant of EC & CTE																		
Land Development																		
Commercial Production																		

2.5 Project Cost Breakup

Project cost presently estimated along with pollution control measure costs is mentioned in table 2.13

Table 2.13 – Project Cost Breakup

Sl. No.	Particular	Capital Cost (Rs. in Lakhs)	Recurring Cost (Rs. in Lakhs)
1	Cost of Infrastructure	2.00	--
2	Machinery & Equipment a. Compressor b. Wagon Drill c. Tippers/ Dumpers	55.00	--
	Mining Machineries on hired basis (Water Tanker – 1, D.G. Set – 1, Diesel Pump – 1, Hydraulic Excavator with Rock Breaker -1) (10% of the Equipment Cost of Rs. 152 Lakhs)	--	4.73
3	Lease Rent (lump-sum)	--	0.34
4	Contingency @10%	5.7	--
Total Project Cost		**62.7**	**5.07**
Budget for Environment Management		**2.99**	**1.44**

2.6 Description of Mitigative Measures Incorporated

2.6.1 Mitigation measures for control of Air Pollution

- Dust is the major pollution in stone mining activity due to vehicular movement and mining activities w.r.t machinery in the mining area. Operations may cause deterioration in air quality.
- Dust extractor or wet drilling will be followed to control dust at source of emission during drilling.
- Sharp drill bits will be used for drilling and regrinding will be done periodically to reduce the dust generation.
- Controlled blasting to reduce dust emission and reduction in NO_x emission.
- All machines and transport vehicles will be properly maintained and pollution check will be done once in a year to keep the emissions from machineries and vehicle under control.

- Water sprinkling will be done on haul road to control emission of dust while transporting minerals and waste. Provision for water spray by tankers on 'kaccha' road shall be done.
- Water sprinkling at loading area.
- Tree plantation along the haul roads & approach road will be done. A total of 550 trees would be planted.
- Use of personal protective equipment like dust mask.
- Ambient air pollution monitoring will be carried out.

2.6.2 Mitigative measures for control of Water Pollution

- Mining is planned to be done above the ground water table. Therefore, pumping of ground water from mine pit does not arise in this mine. The rain water during rainy season is proposed to settle in a pit and shall be used for dust suppression and plantation. Excess water, if any, shall be discharged in natural stream after settling of suspended particles in the pit. Pump having required capacity will be installed to lift accumulated rain water from working pit and pumped to the settling tank.
- Garland drain shall be made around the Waste dump and the rain water shall be collected in garland drain and allowed to settle in a small pit for settling suspended particles before allowing discharge to natural drainage system.
- For domestic waste water Septic Tank with Soak Pit shall be provided, discharge from Soak Pit, if any, shall be used for plantation.
- It shall be ensured that the quality of drinking water for the worker is hygienic and good sanitation system shall be made available.

2.6.3 Mitigative measures for control of Noise Pollution

Drilling, Blasting & increased vehicular traffic is the main source of noise Pollution. Blasting will be done occasionally. Mining activity will be done only day hours.

- Generation of noise during blasting shall be controlled by delay blasting and use of adequate charge per blast.
- Diesel powered machineries, which is major source of noise in open cast mining shall be properly maintained. Attention shall be paid towards rigorous maintenance of the silencer of the diesel engine.
- Protective devices shall be provided for use of persons employed in the vicinity of high noise areas.
- With the adoption of controlled blasting techniques, the ground vibrations will be minimized.

- Plantation around the lease boundary will cut the noise levels.

2.6.4 Solid Waste Management

Waste management is an important facet of environmental management. Thus, solid waste management is important from both aesthetics and environmental points of view & managed as per the Solid Waste Management Rules 2016. Waste generation in ML area will be mainly in the form of waste reject. During quarry development in 1st Year & 5th Year OB waste will be removed will be temporarily dumped at the East part of the area with suitable precautions like parapet wall, garland drain & will be backfilled within the exhausted quarry after the end of mine.

- Gradation of dump shall be done automatically as coarser materials go to the bottom and finer at the top and therefore drain of rain water flow freely to the bottom without endangering the stability of dump.
- Stabilization of dump with top soil and tree plantation shall make the dump more stable on long. Dump should be terraced for every 5 m height and stabilized.
- 1 m heigh parapet shall be constructed for dumps entering into natural system through rain water.
- Garland drainage around dump shall prevent wash of dump by hydrostatic pressure to be developed by surface water and control wash outs and collapse.

2.7 Assessment of new & untested technology

No new technology is being used in the proposed project

2.8 Feasibility Drawing with Schematic Representation for EIA Purpose

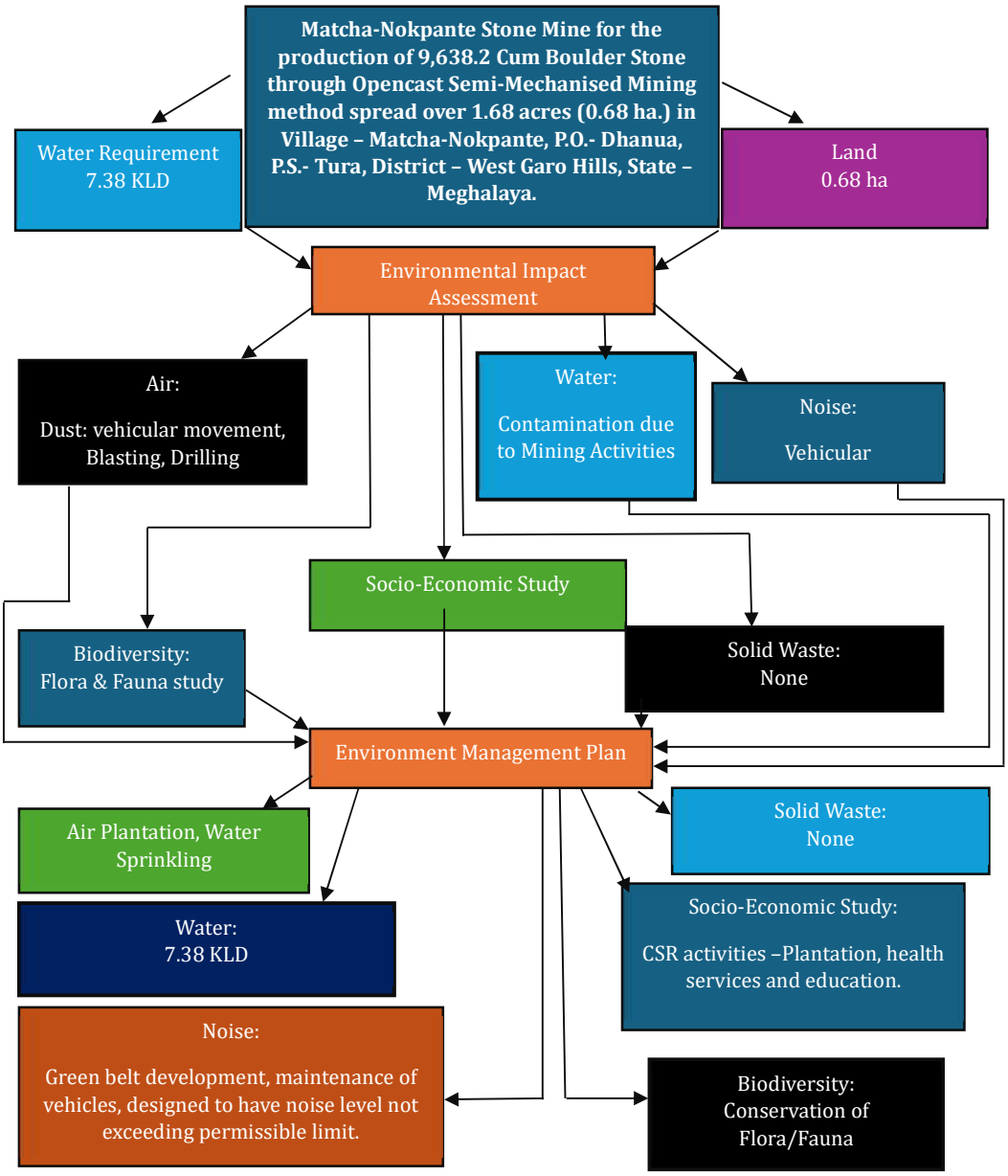

Figure 2.9 – Feasibility Drawing with Schematic Representation for EIA

2.9 Specific Details as per Form -II

Whether the proposal is mining of minerals (coal / non-coal) project?			Yes
1	**No. of Mineral to be Mined**		1
	Minerals to be Mined	Minerals to be Mined	
	Boulder Stone	Boulder Stone	
2	Mine Capacity in ROM (Run of Mine)		-
3	500 meters Cluster Certificate from State Mines and Geology in case of minor minerals		DMO, East Garo Hills, Williamnagar (Annexure Attached)
4	**Mining Plan**		
	a.	Approval Letter No.	DMO-W/MP/49/2020/106
	b.	Date of Approval	20/12/23
	c.	Approved by State Mines & Geology Department / Indian Bureau of Mines / Ministry of Coal /Ministry of Mines / State Government / Atomic Mineral Directorate / Others Approved Mining Lease Area	DMO, East Garo Hills, Williamnagar
	d.	Approved Mining Lease Area	1.68 acres (0.68 ha.)
	e.	Approved Capacity	25,637.7 TPA (Max)
5	**Technical Details**		
	a.	Total Geological Reserves (Million Ton)	3,95,114 T
	b.	Mineable Reserves (Million Ton)	2,72,205 T
	c.	Percent of Extraction	68.89 %
	d.	Grade of Coal Ore Mineral	-
	e.	Stripping Ratio	18:01
	f.	Average Gradient	-
	g.	Mining Method	Semi-Mechanised - Opencast
	h.	Life of Mine	4.14 years
6	**Details of Beneficiation (including crushing/ screening / others)**		
	a.	Whether it is proposed to install crusher within the mining lease area?	No

	b.	Whether it is proposed to install Beneficiation plant / Coal washery within the mining lease area?	No
	c.	Beneficiation / Washing technology	NA
	d.	Capacity	NA
7	**Details of Mining Lease**		
	a.	Details of Mining Lease	1.68 acres (0.68 ha.)
	b.	Letter of Intent	Letter no. - B/16/VII/620-623 Date - 13.02.2020
	c.	Date of Execution of Mining Lease	-
	d.	Validity of Mining Lease	Upto 04.06.2027
	e.	Lease Deed	-
	f.	Supplementary Deed	-
8	Details of Topsoil Management		
	a.	Quantity of Topsoil excavated during the entire life of the mine in cubic meter	3444.9 cum
	b.	Quantity of Topsoil proposed for utilization for reclamation during the entire life of the mine. (in Million cubic meters)	3444.9 cum
	c.	Quantity of Topsoil proposed for utilization for other activities during the entire life of the mine in Million cubic meter	-
9	Details of Final Mine Void		
	a.	Area (in Hectare)	0.46 ha
	b.	Depth (in meter)	30 m
	c.	Volume (in Million cubic meter)	-
10	Details of Quarry		
	a.	Final Void (Hectare)	0.46 ha
	b.	At a depth of (meter which is proposed to be converted into a water body	-
	c.	Total Quarry area (Hectare)	0.46
11	Details of Transportation		
	a.	In pit / Underground to Surface	-
	b.	Surface to Siding / Loading	-
	c.	Transportation / Conveyor Details	2 Tipper
12	Details of Land Usage (Pre-Mining) Existing		
	a.	Quarry	0.2 ha

	b.	Mining Road	0.02 ha
	c.	Garland Drain	0
	d.	Green Belt	0
	e.	Balance/Unused area	0.46 ha
	Total		0.68 ha
13	Details of Land Usage (Post-Mining) Conceptual		
	a.	Quarry Area	0.46 ha
	b.	Mining Road	0 ha
	c.	Garland Drain	0
	d.	Green Belt	0.22 ha
	e.	Balance/unused	0 ha
	Total		0.68 ha
14	Details of Reclamation		
	a.	External 0B Dump (in Hectare)	-
	b.	Internal Dump (in Hectare)	-
	c.	Quarry	-
	d.	Safety Zone (in Hectare)	0.22 ha
	e.	Final Void (Hectare)	0.46 ha
	f.	Proposed to be converted into a Water Body	-
	g.	Density of Tree Plantation per Ha (in no.)	808 Plants/ha
	h.	Others in Ha	-
	i.	Total afforestation plant (in Hectare)	0.46 ha
15	Status of Progressive Mining Closure Plan		
	a.	Implementation of Various Activities as per A roved Progressive Mine Closure Plan	-
	b.	Any Deviation from the Approved Progressive Mine Closure Plan	-
	c.	Total Area Excavated (in Hectare)	0.46 ha
	d.	Total Area Backfilled after Excavation (in Hectare)	0.46 ha
	e.	Total Area Reclaimed	0.46 ha

Chapter 3 – Description of Environment

3.1 Study Area

Study area consists of 10 km buffer area from the project site. For ease of study, it has been divided into Core Zone (enclosing the mine lease area) and the buffer zone (consisting of area around the project site).

3.1.1 Core Zone

This is the area of direct maximum impact since it will hold the project and its facilities. The core zone consists of 0.68 ha land located in Village – Matcha-Nokpante, P.O. – Dhanua, P.S. – Tura, District – West Garo Hills, State - Meghalaya. The area in West Garo Hills district lies in Very High Earthquake Damage Risk Zone {Zone-V as per IS-1893 (Part-1)-2002} with Moderate Wind and Cyclone Damage Risk Zone A (44 m/s). The area has all necessary infrastructure facilities such as road, nearness to rail head, telephone facilities and electric power with electric substation etc.

3.1.2 Buffer Zone

10 km area around the mining lease area which is susceptible to the impact of the project has been considered as Buffer Zone. This is covered in Survey of India OSM No. G45R14. The topography of the applied area is mostly hilly with plains fringing the northern, western and the south-western borders. The maximum and minimum elevations are 168m and 40m respectively.

3.1.3 Study Period

The area around the proposed mining site has been surveyed for physical features and existing environmental scenario. The baseline monitoring has been done from the period of March 2024 to May 2024 (Annexure) in accordance with IS codes, CPCB guidelines, and MoEF guideline for preparation of EIA report.

3.1.4 Study Components

The Study area was examined in relation to its environmental setting under the following components:

- **Physicochemical components** – Comprising of meteorological & air environment, noise environment, land & soil environment, and water environment.
- **Ecological Component** – Including of terrestrial & aquatic flora-fauna.
- **Socio-Economic Component** – Consisting of demographic, socio-economic status and environment in & around the study site.

- **Traffic density analysis**- Comprising of traffic data respect to the project.

3.1.5 Study Methodology

An assessment of the baseline environment status and identification of impacts is a prerequisite for prediction of likely impacts due to the proposed project. With this specific view, an environmental quality study was undertaken, which included the collection and analysis of samples of ambient air, water, soil, and noise, etc. covering three months data. Wind speed, wind direction, dry and wet bulb temperature, relative humidity, and general weather conditions were logged throughout the study period. Data on temperature as well as relative humidity were recorded hourly for 24 hours throughout the study period.

- Ambient Air quality was monitored in 8 locations in the study area including core zone. Samples were collected using Respirable Dust Sampler with gaseous attachments, Fine Particulate Sampler, CO analyzer etc.
- Groundwater and Surface water samples were collected from 8 & 2 locations respectably, respectively. Parameters for analysis was determined using IS:10500 criteria. Also, parameters important for mining were also considered.
- Soil samples were collected from 8 locations and analysed.
- Noise levels were measured at 8 locations in the study area with sound level meter to establish baseline noise levels.
- Biodiversity survey was carried out in core & buffer zone logging flora & fauna during the study period.
- Primary data collected through field survey and interpreted with Secondary socio-economic data from Census of India 2011.

The likely impacts on the present environment were assessed due to proposed activity and type of changes expected. To evaluate the pollution load before and after proposed activity, assessment was done based on the collected data from the various environmental components in & around the site. Trained staffs with adequate qualification and experience are involved in sampling and collection of data from the study area.

3.2 Land Environment

3.2.1 LULC in the 10 km Buffer Area

It has already been described that the mining of boulders stones will be carried out at Matcha-Nokpante Mine, Located at village- Matcha-Notpante, P.O.- Dhanua, P.S.- Tura, District- west Garo Hills, State Meghalaya. The four corners of the said stone mine have already been mentioned and thereby located on the google image. As per the ToR dated 25.07.2024, study area will comprise of the 10 km zone around the proposed mine.

Accordingly, a circular area with a radius of 10 km around the central point of the said stone mine has been considered for the land use land cover is given below:

The web Map service of Bhuvan, NRSC data has been used for describing the Land Use land Cover of the study area. The study area is located within West Garo district of Meghalaya.

The mining site is located in the survey of india topographic sheet no…. .It is a restricted sheet since the area is located near the International boundary. The land use land cover of the study area has been determined using the Web Map Service of Bhuvan, NRSC. Land use land Cover map of Meghalaya state was prepared by NRSC, government of India on 1:50,000 scale using the Resources at P-6 LISS III data of different seasons namely October/November, (Post monsoon season as also Kharif season), January/February/March (Rabi Season) April/May, (pre-monsoon season as also Zaid season) followed by detailed ground truth survey.

3.2.2 Land Use Pattern

The land use pattern of mine lease has been detailed from start of plan period to the end of conceptual period. It has been detailed in table 3.1 below.

3.2.3 Land use of the Study Area

The study area is mostly covered by Bare Ground and Agricultural land followed by Built-Up area and Forest land. Remaining small portion is covered by water bodies and other deposits.

3.2.4 Observation & Interpretation of the Land Use/ Land Cover Data

Field Survey/Ground Truthing

Ground truthing was carried out to confirm whether the interpreted land uses are correct thus improving the quality of the output. It also allowed interaction with local parties and stakeholders, thereby giving background information on the land use. Ground truthing was carried out to check the discrepancy of the interpreted data. The survey consisted of traversing the study area, crosschecking identified features with those represented on the map.

Field notes were kept in the form of log sheets that recorded information pertaining to co-ordinates, photographs, and identified land uses. Additional features identified or remarks made against existing interpretations were also recorded. The field survey was carried out in the study area by SPPL land use and land cover Functional Area Expert and team for quality check of the map. GPS readings were taken during the surveys wherever it was felt that additional confirmation in the interpretation of the data and also observations of land features were noted. Additionally, spot checks were also done to

confirm the land use/land cover interpretation even where the confidence of interpretation was high. The following LULC classes were identified in the study area.

- Water Bodies
- Forest Area
- Barren Land
- Agriculture Land
- Built up area

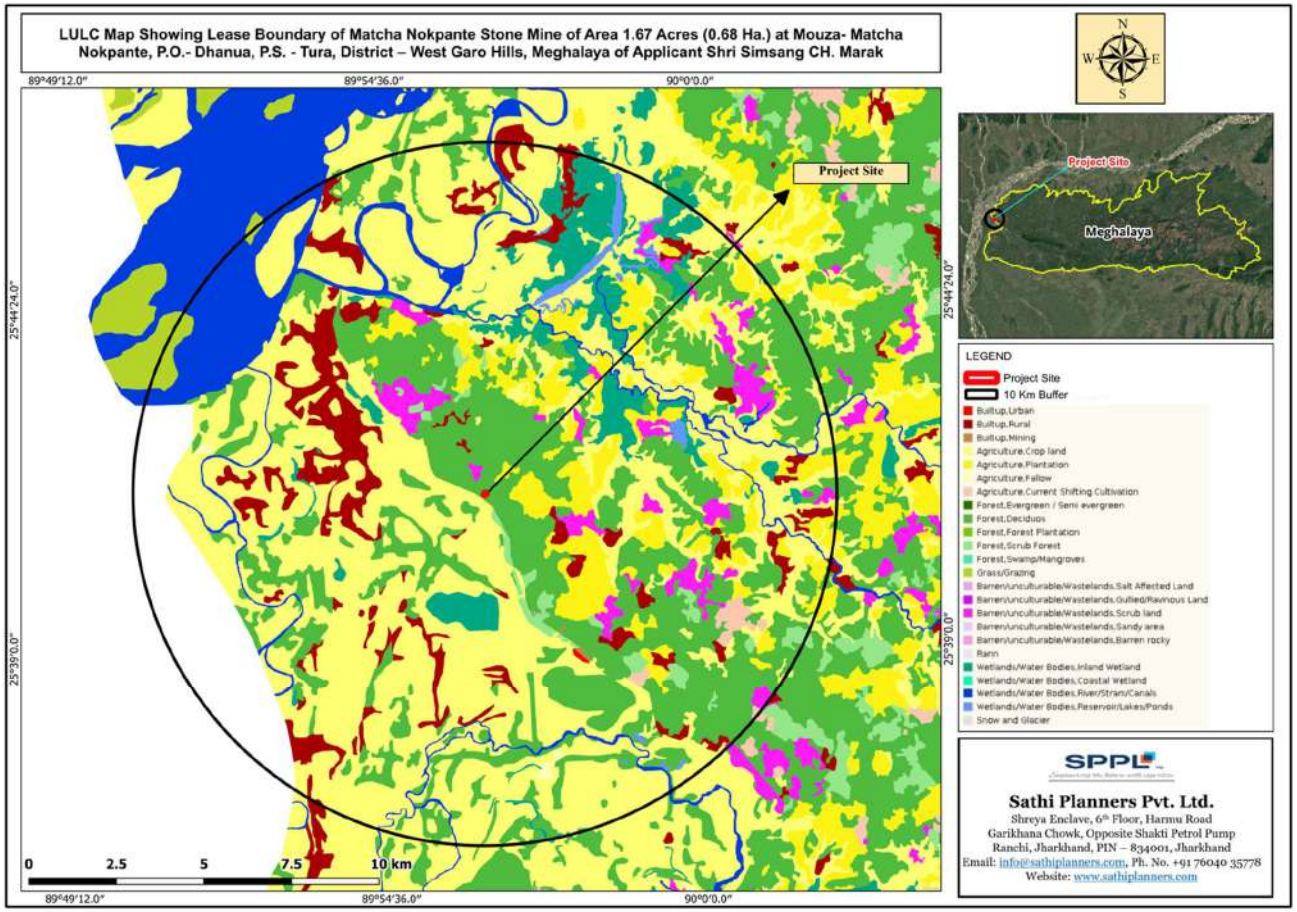

Figure 3.1 – Land Use/ Land Cover Map

3.3 Meteorology & Climate

The principal variable of dispersion of air pollutants being released into the atmosphere are horizontal transport i.e., wind speed & direction, and vertical convective transport, i.e., mixing height, stability class and topography of the area. The meteorological data recorded during the study period is very useful for proper interpretation of the baseline information as well as for input in modelling. Historical data on meteorological parameters will also play an important role in identifying the general meteorological pattern of the region. On site monitoring was taken for various meteorological variables to record the site- specific data. Data was recorded from March 2024 to May 2024. Due to the fluctuations in the meteorological data with time, interpretations are only valid for long term reliable data from source like Indian Meteorological Department (IMD).

3.3.1 Regional Meteorological Data & Wind Direction as per IMD

Assessment of micro and macro meteorology is important from the point of view of understanding the nature of environment in the study area. Climate has an important role in the build-up of pollution levels. Garo Hills district has tropical climate characterized by high rainfall and humidity, generally warm summers and moderately cold winters. The lower elevated areas experience fairly high temperatures for most part of the year having mean maximum of 23°C to 26°C and a mean minimum of 12°C to 17°C. The mean summer temperature is 26°C and the mean winter temperature is 9°C. The mean annual rainfall varies from 2000-4000 mm with most rainfall concentrated from May to September. The meteorological station was set-up at the project site and baseline data was collected, which are reproduced and discussed further.

Table 3.1 – Meteorological data from IMD Climatological Normal (for period 1961– 1991, IMD Station - Tura)

Month	Air Temp		Humidity		All Clouds Amounts		Monthly Rainfall (mm)	Mean Wind Speed (m/sec)	Predominant Wind Direction from
	Daily Max	Daily Min	0830 IST	0530 IST	0830 IST	0530 IST			
Jan	22.7	11.0	71	65	3.1	4.9	9.2	1.56	E, SW, SE
Feb	24.8	12.7	67	59	3.4	4.0	9.3	1.75	SW, E, S
Mar	29.0	16.8	63	56	3.4	3.7	52.5	2.03	SW, S, E=SE
Apr	30.4	19.3	71	67	4.7	4.7	165.7	2.44	S, SW, SE
May	29.7	19.4	76	62	5.9	5.3	423.7	2.14	S, SW, SE
Jun	29.1	20.5	82	80	6.7	6.7	555.8	1.89	S, SW, E
Jul	28.6	21.6	82	82	6.8	7.1	669.9	1.69	S, SW, E
Aug	28.7	21.5	83	84	6.6	7.2	422.4	1.31	SW, S, E
Sep	29.0	21.0	81	82	6.2	6.8	345.8	1.22	SW, S, E
Oct	28.8	19.1	78	78	4.3	5.5	173.3	1.25	SW, S, E
Nov	26.4	15.6	72	70	2.7	4.8	15.0	1.44	E, S=SW
Dec	23.3	12.5	71	68	2.6	5.0	3.3	1.47	E, SE, N
Annual Mean	**27.5**	**17.6**	**75**	**72**	**4.7**	**5.5**	**237.16**	**1.69**	**E=W, S, SE**

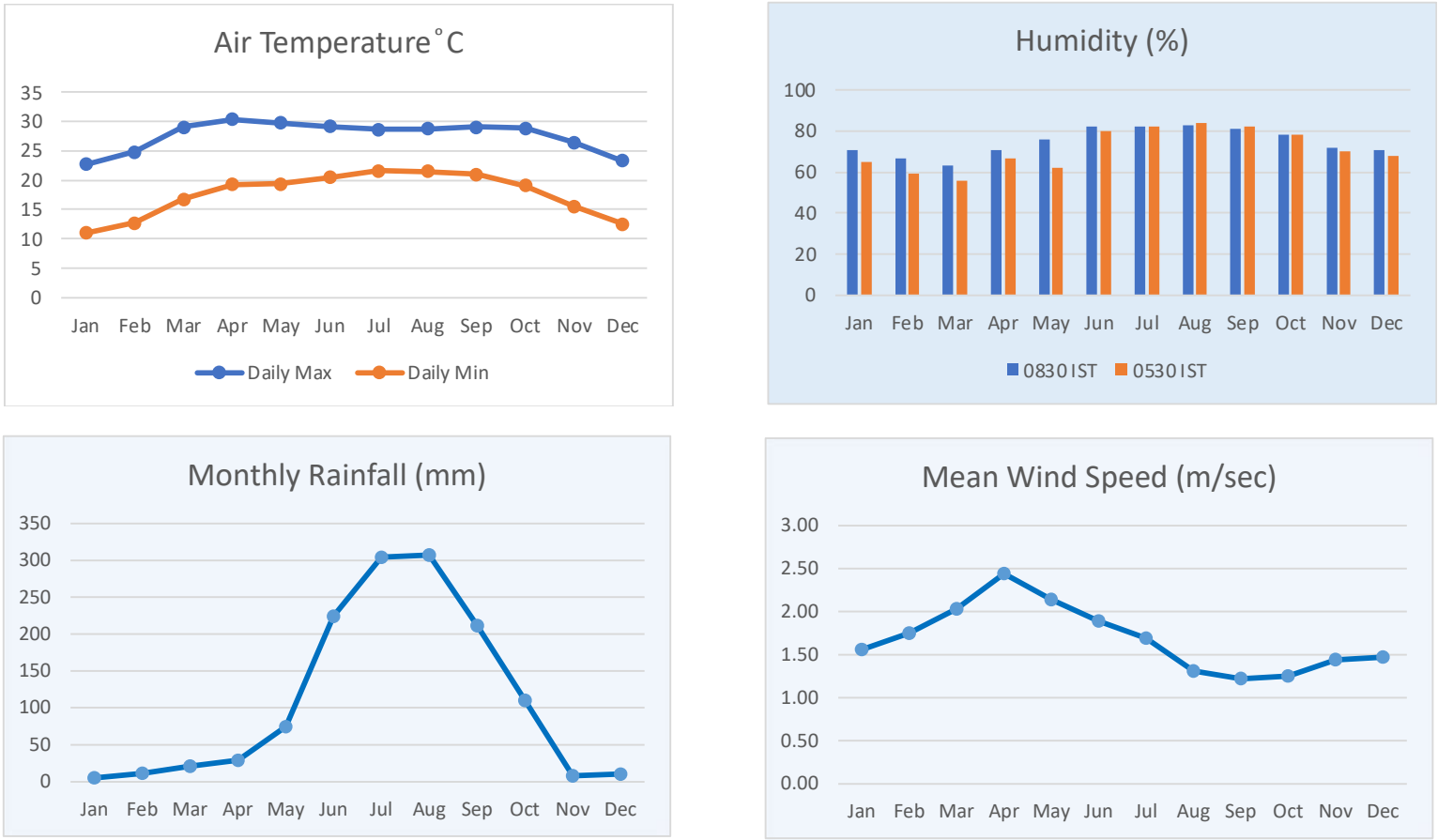

Figure 3.2 Climatological Variables of the Study Area

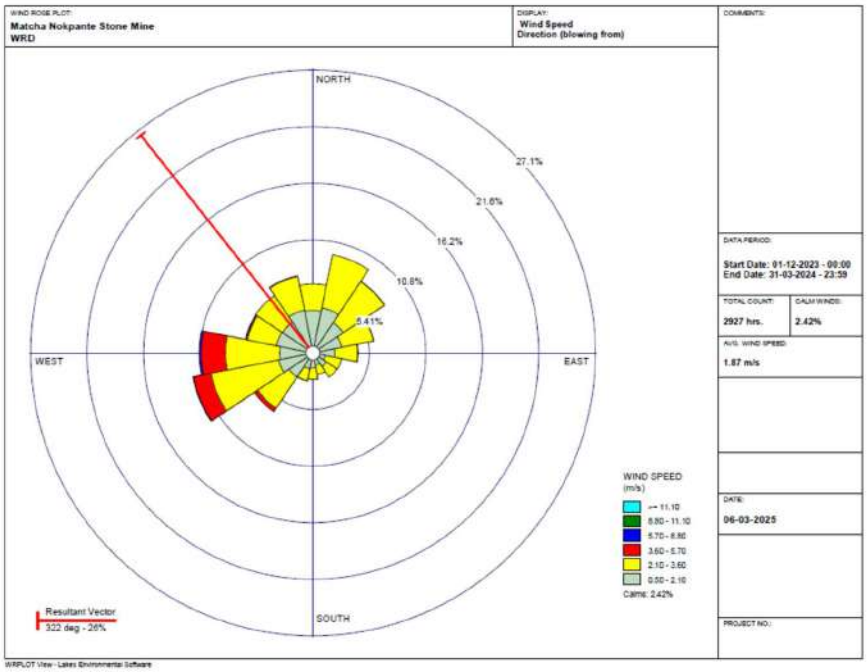

Figure 3.3 - Wind Rose as per IMD Data

3.3.2 Meteorological Data Recorded at site

Meteorological parameters like wind speed, wind direction, temperature, humidity, rainfall, etc. were recorded on hourly basis in the project site. The details have been tabulated below:

Table 3.2 – Summary of Site-Specific Meteorological Data

Meteorological Parameters	Extrema	Dec-24	Jan-25	Feb-25
Temperature	Maximum	27.84	24.38	29.09
	Minimum	10.69	6.89	8.63
	Average	18.86	15.79	19.15
Relative Humidity	Maximum	100.00	100.00	100.00
	Minimum	41.30	35.41	20.93
	Average	78.63	71.59	57.68
Wind Speed	Maximum	2.90	2.70	5.65
	Minimum	0.08	0.15	0.19

	Average	1.60	1.73	2.05
Rainfall	Maximum	48.20	21.16	64.33
	Minimum	0.00	0.00	0.00
	Average	1.11	0.22	0.53
Pressure	Maximum	1003.50	1004.20	1003.80
	Minimum	992.10	994.70	991.40
	Average	997.95	998.91	997.98

Wind Rose (Site Specific data)

The wind rose prepared from Site Specific data has "NNE" as pre-dominant wind direction. Resultant wind vector shows that wind will blow from NW to SE direction. The average wind speed is 1.78 m/s.

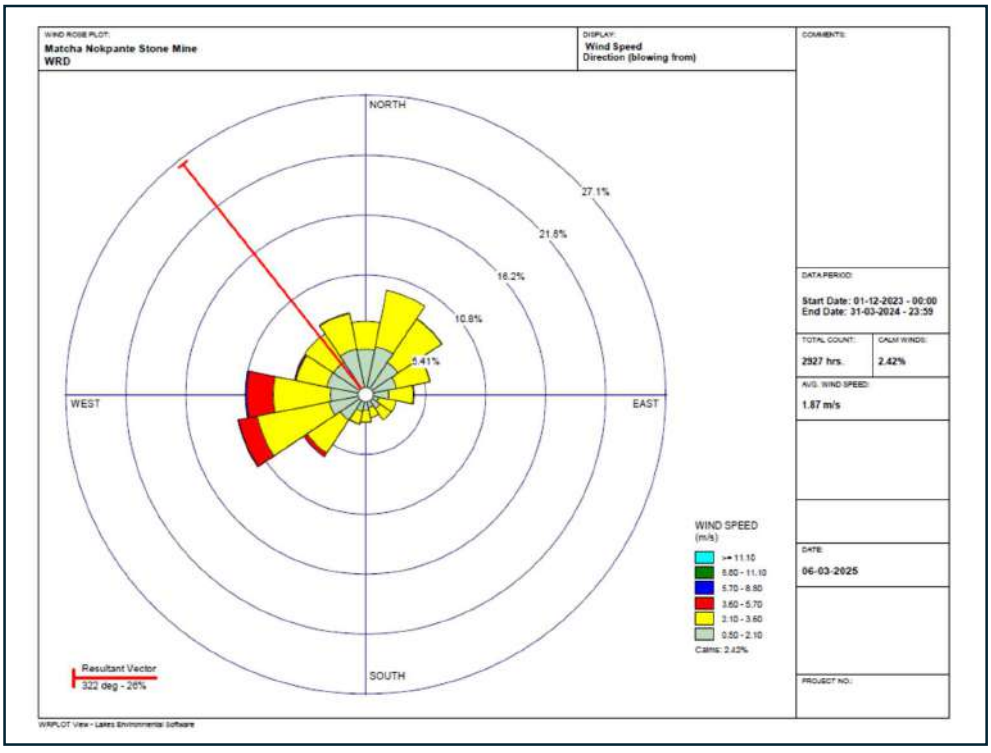

Figure 3.4 - Wind-Rose based on Site-Specific data

3.3.3 Observation & Interpretation of the Met Data

There is significant variation between the long term IMD data and site-specific data. This can be seen due to increasing and decreasing temperature anomalies over the time in the images below. However, overall temperature in the area is increasing gradually.

Table 3.3 – Comparison between IMD and Site-Specific Meteorological Data

Parameters	**Long Term IMD Data (1961-1990) for the study period i.e. December to February**	**Site Specific Data (December 2023 to February 2024) for the study period**	**Comparison**	**Remarks**
Temperature	Temperature ranges from 11.0° to 24.8° C	Temperature ranges from 6.89° to 29.09° C	There is increase of 17.30% in the max temperature compared to the IMD data	Reasons for the increase is due to the change in land use patter, micro climatic factors and short-term weather fluctuations such as heat waves
Wind Speed	Average wind speed is 1.59 m/s	Average wind speed is 1.78 m/s	There is increase in the wind speed compared to the climatology data	This is due to the localized wind effect such as temperature gradients, change in surface roughness

Humidity	Average Humidity varies between 66.83 %	Average Humidity varies between 69.3 %	There is increase of 3.70% in the humidity compared to the climatology data	This can be attributed to the increased evaporation rates, moisture from the Bay of Bengal by local wind and air mass, anthropogenic activities dominantly mining activities in the region.

3.4 Air Environment

3.4.1 AAQ Monitoring Locations & Map

The monitoring was carried out from March 2024 to May 2024 to represent post-monsoon season for the parameters such as PM10, PM2.5, SO2, NOx, CO. Monitoring of Ambient Air Quality was done twice a week. The baseline status of the ambient air quality has been established through a scientifically designed ambient air quality monitoring network considering the followings:

- Meteorological condition on synoptic scale.
- Topography of the study area.
- Representatives of regional background air quality for obtaining baseline status.
- Location of residential areas representing different activities.
- Accessibility and power availability; etc.

AAQ Samples were collected in air-tight locked polyethene and cassettes. Gaseous samples were collected in sample bottles preserved in ice box and transported to central laboratory as per the guidelines of BIS (Bureau of Indian Standard).

Sampling Locations

Selection of monitoring locations was based on dominant wind direction based on IMD data. Monitoring stations have been tabulated below:

Table 3.4 – Ambient Air Quality Monitoring Locations

Location	Name	Latitude	Longitude
A -1	Mine Site (Matcha-Nokpante Stone Mine)	25°41'23.45" N	89°56'19.47"'E
A - 2	Mine Site (Matcha-Nokpante Stone Mine)	25°41'23.45" N	89°56'19.47"'E
A - 3	Bangtimari Kalimandir	25°40'58.60" N	89°56'7.77" E
A - 4	Rambholapara	25°41'20.89" N	89°55'55.68" E
A - 5	Pipulbari Bazzar	25°39'28.61" N	89°56'56.58" E
A - 6	PipulbariPt.IV	25°40'33.30" N	89°55'25.31" E
A - 7	Gachuabari	25°39'9,74 N	89°55'41.15" E
A – 8	Hatsingimari	25°43'14.85" N	89°53'46.04” E

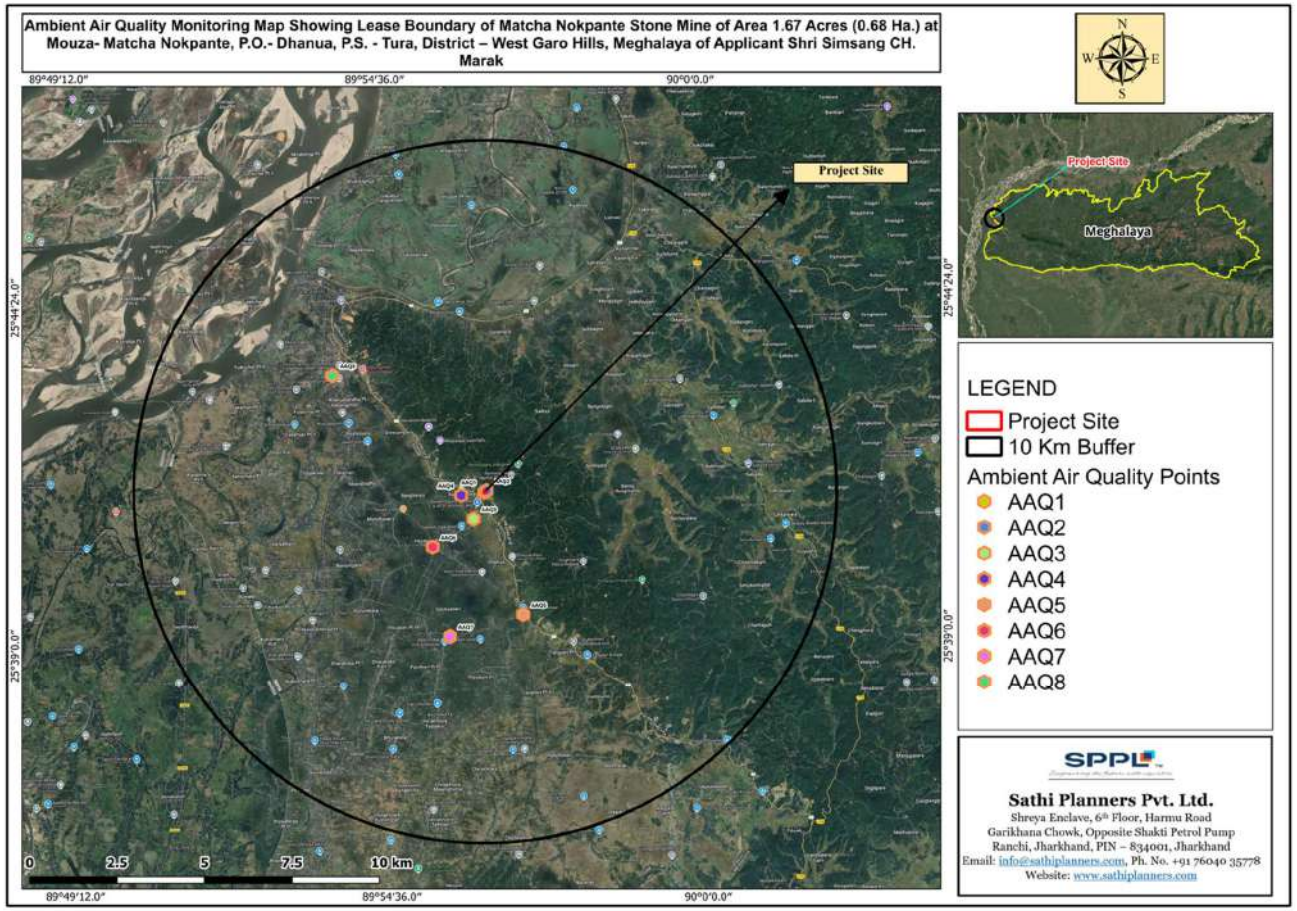

Figure 3.5 – Ambient Air Quality Monitoring Location Map

3.4.2 Summary of AAQ data

Sampling and Analytical Techniques

Samples for PM2.5 and PM10 were collected on 24 hourly basis while samples for SO2 & NOx were collected on 4 hourly basis and reported on 24 hourly basis. CO monitoring was carried out once in 8 hours and is reported on 24 hourly bases.

The sampling and analysis of ambient air quality were carried out as per the procedures detailed in IS-5182 (Indian Standards for Ambient Air Quality Parameters) for specific parameters. Brief of the sampling and testing procedures used are given in Table 3.6.

Table 3.5 – Testing and Monitoring Procedures

Sr. No.	Parameter	Technical Protocol	Sampler	Instrument for Analysis	Methodology Adopted
1	Particulate Matter (PM2.5)	IS 5182: Part 24	Fine Particulate Sampler (APM 550)	Weighing Balance, Oven, Desiccator	Gravimetric Method
2	Particulate Matter (PM10)	IS 5182: Part 23	RDS with cyclone separator (APM 460)	Weighing Balance, Oven, Desiccator	Gravimetric Method
3	Sulphur dioxide (SOx)	IS 5182 Part 2 RA2017	Gaseous Sampler of RDS	UV Spectro photometer	Improved West & Gaeke Method
4	Oxide of Nitrogen (NOx)	IS 5182 Part 6 RA 2017	Gaseous Sampler of RDS	UV Spectro photometer	Modified Jacob & Hochheiser method

Table 3.6 – Summarized results of 24-hours average ambient pollutant level µg/m3

Pollutants		A-1	A-2	A-3	A-4	A-5	A-6	A-7	A-8	NAAQS Standards
PM 10 (µg/m3)	Max	66.4	66.3	65.5	65.3	65.3	65.5	65.7	65.2	100 (µg/m3)
	Min	61.5	62.4	60.2	60.3	60.5	61.3	61.3	61.2	
	Average	63.6	63.744	62.668	62.9	62.754	63.058	63.088	62.808	
	98%	65.872	65.916	65.404	64.916	64.886	65.5	65.47	65.2	
PM 2.5 (µg/m3)	Max	36.7	36.7	35.3	35.3	34.5	34.3	35.5	35.5	60 (µg/m3)
	Min	32.4	32.4	30.3	30.2	30.3	30.2	30.2	30.2	
	Average	34.088	34.436	32.725	32.292	31.725	32.017	32.530	32.571	
	98%	36.604	36.652	35.3	35.252	33.994	33.932	35.04	35.408	
SO2 in (µg/m3)	Max	13.4	13.3	13.3	13.5	12.6	13.2	13.4	13.6	80 (µg/m3)
	Min	10.2	10.2	9.2	9.2	9.3	9.1	9.1	9.2	
	Average	11.504	11.384	10.984	11.164	10.904	10.854	10.420	11.238	
	98%	13.112	12.964	13.3	13.02	12.554	12.878	12.894	13.508	
NO2 in (µg/m3)	Max	17.4	17.6	16.4	15.3	15.5	15.6	15.2	15.1	80 (µg/m3)
	Min	12.4	12.6	11.3	11.2	11.2	11.2	11.3	11.1	
	Average	15.564	15.416	14.044	13.156	12.933	12.925	12.95	12.513	
	98%	17.304	17.456	16.304	15.3	15.454	15.462	15.2	14.824	

3.4.3 Observation & interpretation of the AAQ data

The results of baseline monitoring (Table 3.7) show that all the pollutants fall well within the limits prescribed by Pollution Control Board in Notification dated 18th November 2009 for NAAQ standards. The project is situated in West Garo Hills district. This is a stone mining project; Therefore, the area is subjected to release less pollutants.

Particulate matter (PM10):

- The maximum value for PM10 is 66.4 µg/m^3 observed at Project Site (A-1). The reason for high value may be due to mining activities including crushing of rocks & vehicular movements ongoing adjacent to the proposed site
- The minimum value was 60.2 µg/m^3 observed at (A-3) as there is no major activity nearby.
- The average value ranged from 62.668 µg/m^3 to 63.744 µg/m^3.
- 98th Percentile value ranged from 64.886 µg/m^3 to 65.916 µg/m^3

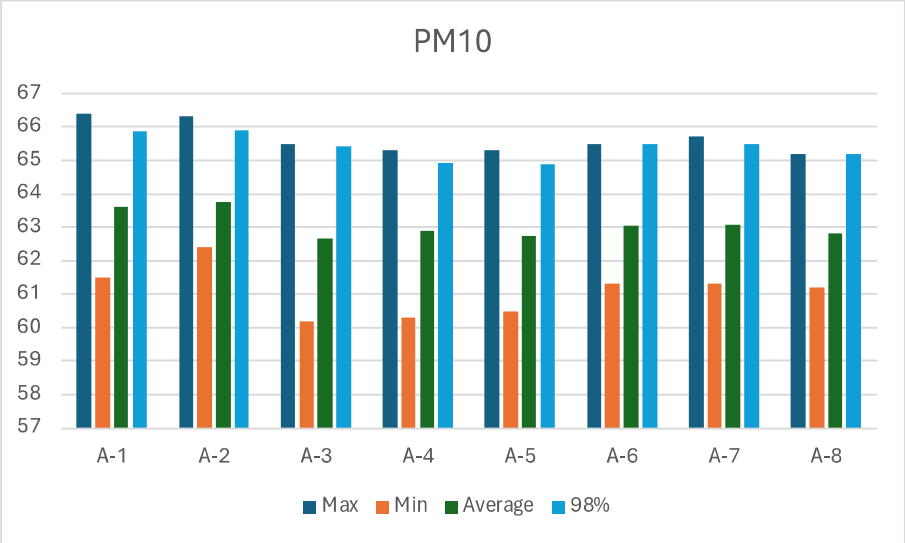

Figure 3.6 – PM10 Concentration in Monitoring Locations

Particulate matter ($PM_{2.5}$):

- The maximum value for PM2.5 is 36.7 µg/m^3 observed at Project Site (A-1, A-2). The reason for high value may be due to mining activities including crushing of rocks & vehicular movements ongoing adjacent to the proposed site
- The minimum value was 30.2 µg/m^3 observed at (A-4,6,7 & 8) as there is no major activity nearby.
- The average value ranged from 31.725 µg/m^3 to 34.436 µg/m^3.
- 98th Percentile value ranged from 33.932 µg/m^3 to 36.652 µg/m^3

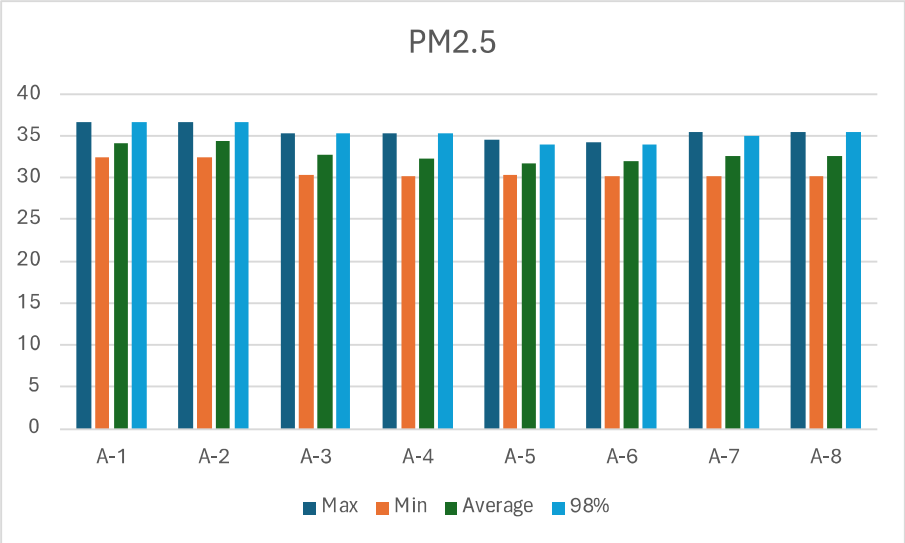

Figure 3.7 - PM2.5 Concentration in Monitoring Locations

Sulphur Dioxide (SO2):

- These value for SO_2 are within prescribed CPCB limit of 80 µg/m³ respectively for Industrial, Residential, Rural, and other areas.
- The maximum value observed was 13.6 µg/m³ observed at (A-8) whereas minimum value of 9.1 µg/m³ was observed at (A-6 & 7). The limits were well within the NAAQs standards.
- The average value ranged from 10.42 µg/m³ to 11.504 µg/m³.
- 98th Percentile value ranged from 12.554 µg/m³ to 13.508 µg/m³

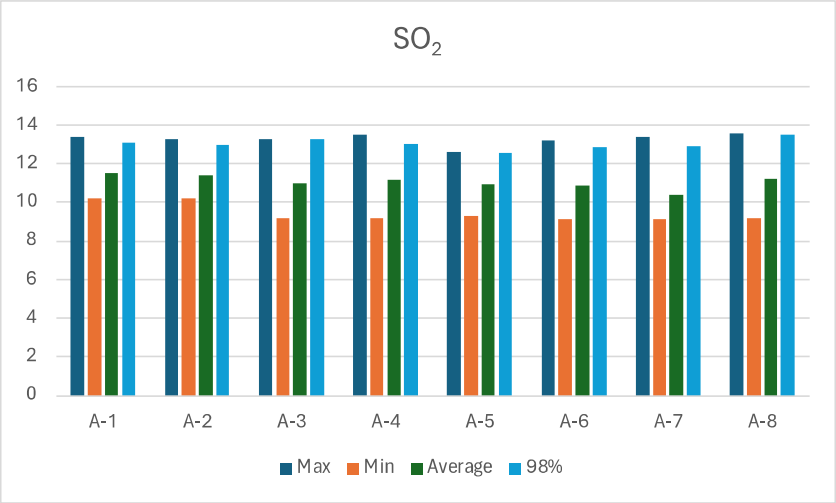

Figure 3.8 – SO2 Concentration in Monitoring Locations

Nitrogen Dioxide (NO_2)

- The maximum value observed was 17.6 µg/m3 at location (A-2), Project Site. The minimum value of 11.1 µg/m3 was observed at location (A-8). The limits were well within the NAAQs standards.
- Average value ranged from 12.513 µg/m^3 to 15.564 µg/m^3.
- 98th percentile ranged from 14.824 µg/m^3 to 17.456 µg/m^3.

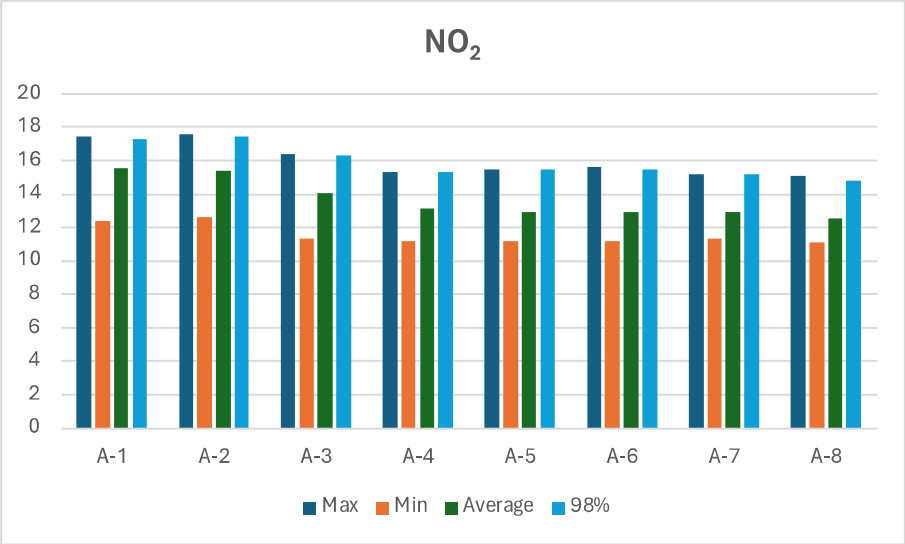

Figure 3.9 - NOx Concentration in Monitoring Locations

3.5 Noise Environment

Integrated Sound Level Meter was used for the study. All readings were taken on the 'A-Weighting' frequency network, at a height of 1.5 meters from ground level and on the 'Fast' Range Time Weighting. The sound level meter does not give a steady and consistent reading and it is quite difficult to assess the actual sound level over the entire monitoring period.

To mitigate this shortcoming, the Continuous Equivalent Sound level, indicated by L_{eq}, is used. Equivalent sound level, 'L_{eq}', was obtained from variable sound pressure level, 'L', over a time period by using following equation.

The equivalent noise level is defined mathematically as

$L_{eq} = 10 \text{ Log } L / T\sum (10^{Ln/10})$

Where L = Sound pressure level at function of time dB (A)

T = Time interval of observation

3.5.1 Noise Monitoring Location & Map

In order to assess the noise levels within the study area, noise monitoring was carried out at Eight (8) locations as per details given in **Table - 3.8**. Noise data collection is basically based on study of habitation and manmade activities in the study area.

Table 3.7 – Ambient Noise Monitoring Locations

Location	Name	Latitude	Longitude
N-1	Mine Site (Matcha-Nokpante Stone Mine)	25°41'23.45" N,	89°56'19.47"E
N-2	Mine Site (Matcha-Nokpante Stone Mine)	25°41'24.68" N	89°56'21.70" E
N-3	Bangtimari Kalimandir	25°40'58.62" N	89°56'07.81" E
N-4	Rambholapara	25°41'20.89" N	89°55'55.68" E
N-5	Pipulbari Bazzar	25°39'28.58" N	89°56'56.57" E
N-6	PipulbariPt.IV	25°40'33.36" N	89°55'25.26" E
N-7	Gachuabari	25°39'9.74" N	89°55'41.15" E
N – 8	Hatsingimari	25°43'14.86" N	89°53'46.13" E

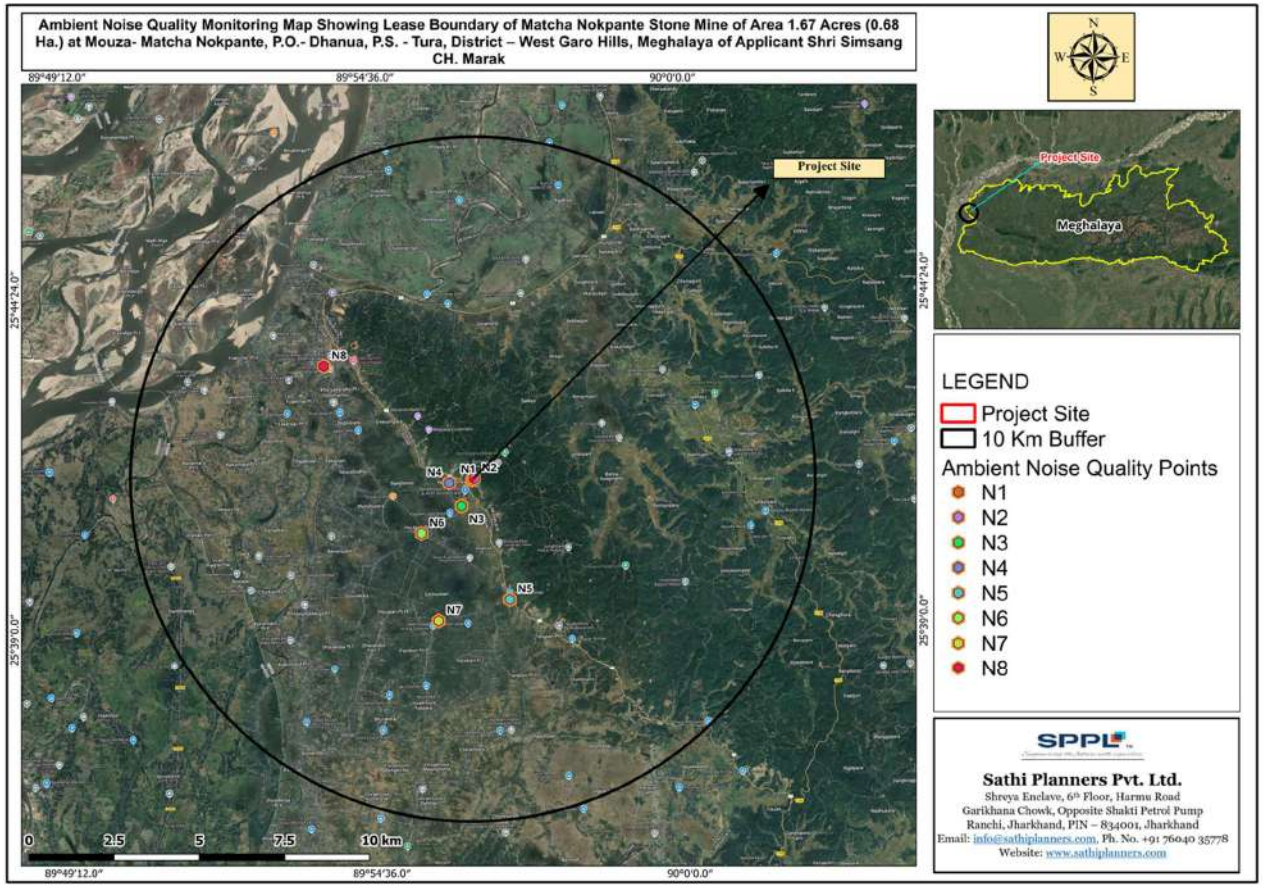

Figure 3.10 - Ambient Noise Monitoring Locations

3.5.2 Summary of Noise Data- Day & Night

At each noise monitoring station, noise level as Leq was recorded on an hourly basis for 24 hours continuously.

Table 3.8 – Noise Monitoring results summary

Location	Type of Area	Latitude	Longitude	Sound Level		
				Leq-Day Time [dB (A)]	Leq-Night Time [dB (A)]	Leq-Day-Night [dB (A)]
N 1	Mine Site (Matcha-Nokpante Stone Mine)	25°41'23.45" N,	89°56'19.47" E	51.6	40.1	11.4
N 2	Mine Site (Matcha-Nokpante Stone Mine)	25°41'24.68" N	89°56'21.70" E	52.3	41.6	12.2
N 3	Bangtimari Kalimandir	25°40'58.62" N	89°56'7.81" E	52.4	40.8	10.5
N 4	Rambholapara	25°41'20.89" N	89°55'55.68" E	52.6	40.6	10.9
N 5	Pipulbari Bazzar	25°39'28.58" N	89°56'56.57" E	53.1	40.4	11.5
N 6	PipulbariPt.IV	25°40'33.36" N	89°55'25.26" E	51.2	41.4	12.3
N 7	Gachuabari	25°39'9.74" N	89°55'41.15" E	40.6	40.6	11.2
N 8	Hatsingimari	25°43'14.86" N	89°53'46.13" E	42.8	42.8	11.6

3.5.3 Observation & Interpretation of Noise Data

- The summary of the Ambient Noise Monitoring Result shows the Noise level are mostly within the permissible limits for all the locations with respective to the various categories of the standard.
- Ambient Noise levels fall within the standards specified by CPCB. The overall values vary scarcely from one another. This suggests the noise environment is consistent.
- In day time Ambient Noise value ranges from 40.6 (N7) to 53.1 (N5) and 40.1 (N1) to 42.8 (N8) in night-time.
- Close vicinity of public connectivity has engaged continuous flow of vehicles for public convenience and the mining activities nearby the project site creating a rise of the noise level at project site.
- Though the proposed project is a Stone Mining project the Noise level is high due to the machinery and other mining activities, vehicular movement & their horns.

3.6 Water Environment

This section describes the prevailing water environment in the study area in terms of water resources i.e. quantitatively and qualitatively. This has been achieved by performing qualitative analysis of water samples collected from ground water source and surface water body falling within the study area.

Primary objective of the study is to assess the water quality for critical parameters and evaluate its impact on habitat and aesthetics in the surrounding areas of the project. This assessment will be useful in formulating mitigation measures to minimize the impacts of the project on the surrounding environment.

The sampling locations were selected based on reconnaissance survey with the following consideration:

- Location of water sources.
- Location of residential areas representing different activities

Surface and ground water samples were analysed as per parameter mentioned in Standards as per IS-2296 Class – 'C' and IS: 10500 respectively.

Table 3.9 – Surface Water Sampling Locations

Location Name	Latitude	Longitude
SW-1 Brahmaputra River (upstream)	25°43'58.64" N	89°52'5.49" E
SW-2 Brahmaputra River (downstream)	25°42'32.69" N	89°48'59.36" E

3.6.1 Surface Water Monitoring Locations and Map

Table 3.10 Analytical Techniques for Water Analysis

Parameters	Standards
pH Value	APHA 4500H^+B
Temperature	---
Conductivity	APHA 2510 B
Suspended solids	APHA 2540 D
Dissolved Oxygen as DO	APHA 4500 O^-C
Chloride (max)	APHA 4500Cl^-B
Total Dissolved Solids as TDS	APHA 2540 C
Alkalinity as $CaCO_3$	APHA 2320 B
Total Hardness or TH	APHA 2340 C
Calcium as Ca	APHA 3500Ca B
Magnesium as Mg	APHA 3500Mg B
BOD (3) days at 27^0C (max)	APHA 5210 B
Chemical Oxygen Demand as COD	APHA 5220 C
Sodium as Na	APHA 3500Na B
Potassium as K	APHA 3500K B
Silica	APHA SiO_2 C
Oil & Grease	APHA 5520 B
Fluoride as F (max)	APHA 4500F C
Sulphates (SO_4) (max)	APHA 4500SO_4^{2-} E
Phenolic Compounds as C_6H_5OH (max)	APHA 5530 B, D
Nitrate as NO_3, (max)	APHA 4500 N_{org} B
Phosphate as PO_4	APHA 4500 P, D
Total Coliform as TC	APHA 9221 B
Arsenic as As	APHA 3500 As B
Mercury as Hg	APHA 3112B
Lead as Pb	APHA 3111 B
Cadmium as Cd	APHA 3111 B
Hexavalent Chromium as Cr^{6+}	APHA 3500 Cr B
Total Chromium as Cr	APHA 3111 B
Copper as Cu	APHA 3111Cu B
Zinc as Zn	APHA 3111 B
Selenium as Se	APHA 2340 C

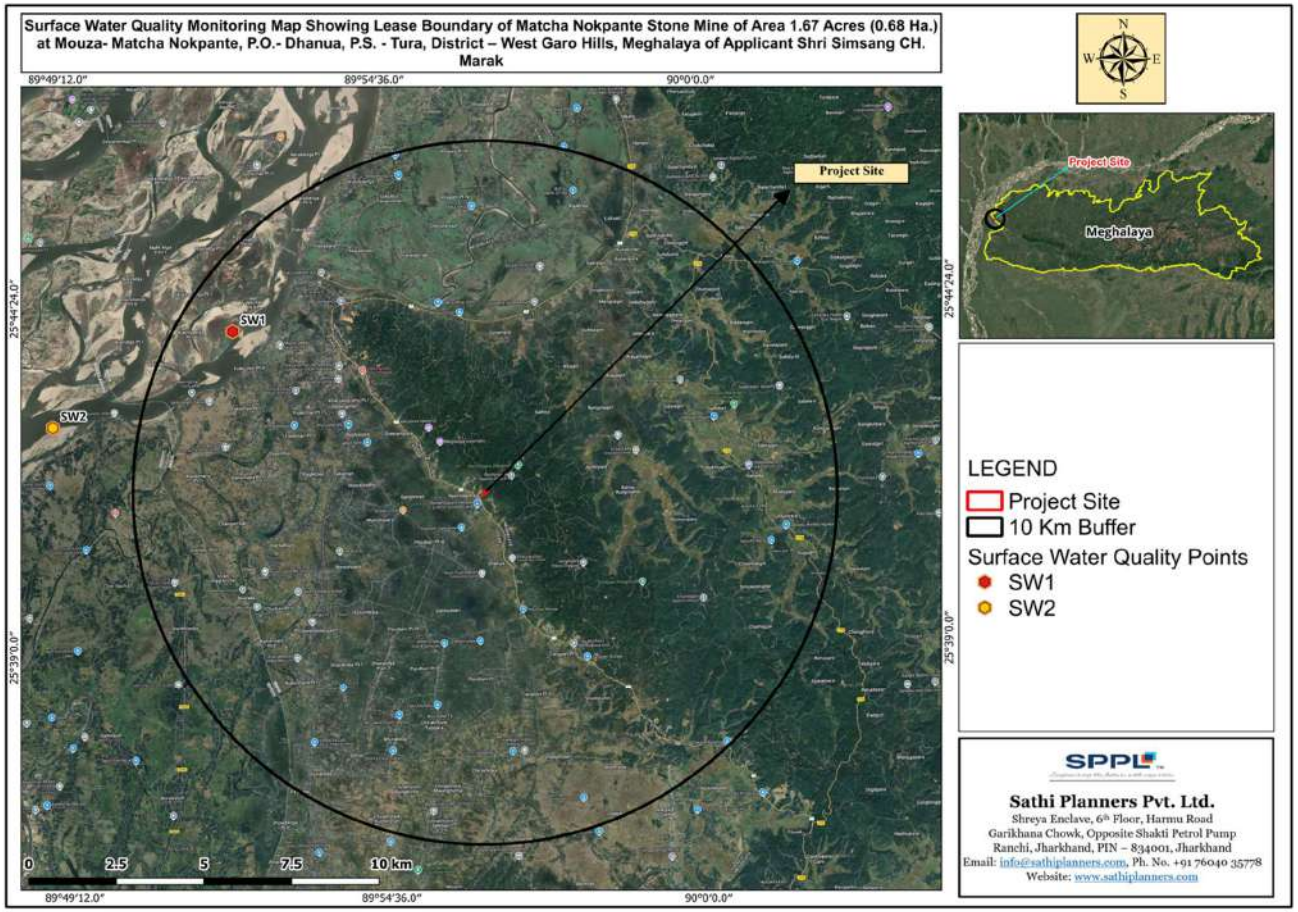

Figure 3.11 – Surface Water Monitoring Location Map

3.6.2 Summary of Surface Water Data

Table 3.11 – Summary of Surface Water

Sl. No	Parameters	Test Method (APHA 23rd Edition)	UoM	SW1	SW2
1	pH (at 25°C)	IS 3025 (P-11):1983, RA 2017	--	6.88	6.72
2	Electrical Conductivity	IS 3025 (P-11):1983, RA 2017	µS/cm	392	424
3	Color	APHA 24th Ed. 2120 B	Hazen	<5.0	<5.0
4	Turbidity	IS 3025 (P-10):1984, RA 2017	NTU	1.6	1.8
5	Total Dissolved Solids (TDS)	IS 3025 (P-16):1984, RA 2017	mg/L	259	274
6	Total Hardness (as $CaCO_3$)	IS 3025 (P-21):2009, RA 2019	mg/L	68.2	70.1
7	Calcium (as Ca^{+2})	IS 3025 (P-40):1991, RA 2019	mg/L	21.2	20.5
8	Magnessium (as Mg^{+2})	IS 3025 (P-46):1994, RA 2019	mg/L	3.7	4.6
9	Total Alkalinity (as $CaCO_3$)	IS 3025 (P-23):1986, RA 2019	mg/L	70.5	75.2
10	Chloride (as Cl^-)	IS 3025 (P-32):1988, RA 2019	mg/L	15.4	12.1
11	Chlorine Residual (as Cl_2)	APHA 24th Ed. 4500 Cl B	mg/L	<0.5	<0.5
12	Fluoride (as F^-)	IS 3025 (P-60):2008, RA 2019	mg/L	0.268	0.291

13	Sulphate (as SO_4^{-2})	IS 3025 (P-24):1986, RA 2019	mg/L	28.4	30.5
14	Nitrate (as NO_3)	IS 3025 (P-34):1988, RA 2019	mg/L	1.27	1.13
15	Iron (as Fe)	IS 3025 (P-53):2003, RA 2019	mg/L	0.242	0.218
16	Arsenic (as As)	APHA 24th Ed. 3114 B	mg/L	<0.01	<0.01
17	Total Chromium (as Cr)	APHA 24th Ed. 3111 B	mg/L	<0.03	<0.03

3.6.3 Observations and Interpretation of the Surface Water Data

- Surface water data show significant variations in results for different locations.
- pH value is still well within the prescribed limits as per IS 2296:1992 class 'C' with highest value of 6.88 in SW-1 and lowest value of 6.72 in SW1.
- Chloride content is within the permissible limits for all the locations. The value ranges from 12.1 (SW-2) to 15.4 (SW-1).
- The TDS value is within limit for all locations ranges from 259 (SW-1) to 274 (SW-2).
- Sulphate (as SO4) varies between 28.4 mg/l to 30.5 mg/l.
- Calcium (as Ca2) varies from 20.5 mg/l and 21.2 mg/l.
- All heavy metals like Arsenic, Lead, etc. are below detectable levels.
- Fluoride is in permissible limits ranging between 0.268 mg/l to 0.291 mg/l.
- Total coliform is also well within specified limits.
- Phenolic compounds are below detectable levels. Nitrates also show levels below permissible limits.
- Quality wise surface water is fit for regular use but for drinking purpose it needs to be treated.

3.6.4 Groundwater Monitoring Locations and Map

Table 3.12 Groundwater Sampling Locations

Location Code	Name	Latitude	Longitude
GW-1	Dhanua	25°40'25.96" N	89°56'14.85" E
GW -2	Bangtimari	25°41'16.14" N	89°55'22.66" E
GW -3	Bangtimari Kalimandir	25°40'58.55" N	89°56'9.02" E
GW -4	Rambholapara	25°41'20.83" N	89°55'55.62" E
GW-5	Pipulbari Bazzar	25°39'28.68" N	89°56'56.37" E
GW-6	PipulbariPt.IV	25°40'33.17" N	89°55'25.40" E
GW-7	Gachuabari	25°39'9.46" N	89°55'41.29" E
GW-8	Hatsingimari	25°43'14.78" N	89°53'45.72" E

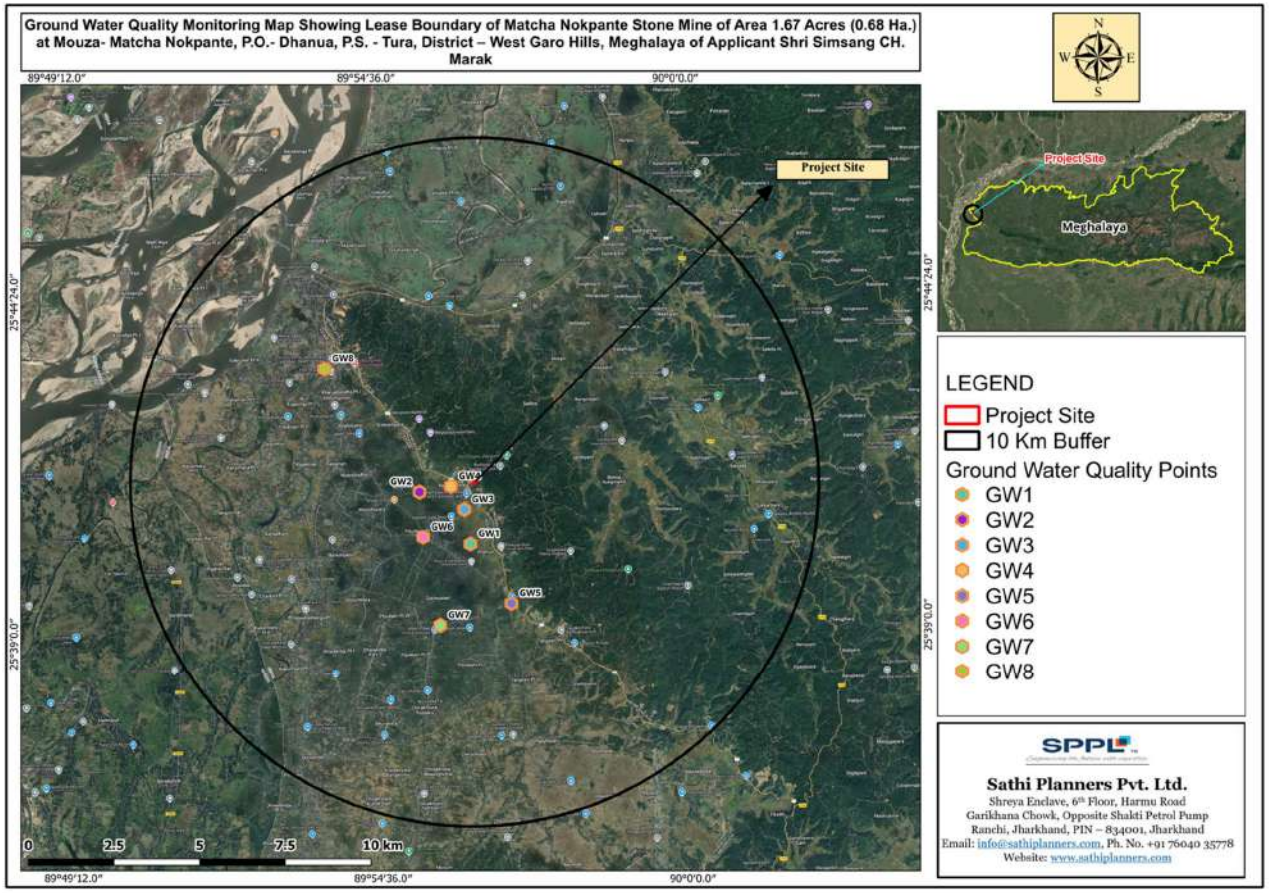

Figure 3.12 – Groundwater Monitoring Location Map

3.6.5 Summary of Groundwater Sampling Data

Table 3.13 – Summary of Groundwater Sampling Data

Sl. No	Parameters	Test Method (APHA 23rd Edition)	Standards (IS:10500)	UoM	GW - 1	GW - 2	GW - 3	GW - 4	GW - 5	GW - 6	GW - 7	GW - 8
1	pH (at 25°C)	IS 3025 (P-11):1983, RA 2017	6.5-8.5	--	7.03	6.86	7.01	6.89	6.92	7.18	7.25	6.85
2	Electrical Conductiv	IS 3025 (P-11):1983, RA 2017	--	µS/cm	503	532	640	632	595	548	652	580
3	Color	APHA 24th Ed. 2120 B	5 Max	Hazen	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
4	Turbidity	IS 3025 (P-10):1984, RA 2017	1 Max	NTU	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
5	Total Dissolved	IS 3025 (P-16):1984, RA 2017	500 Max	mg/L	312	325	378	383	369	318	381	352
6	Total Hardness	IS 3025 (P-21):2009, RA 2019	200 Max	mg/L	128.5	142.2	134.8	162.4	135.4	145.2	140.5	131.2
7	Calcium (as Ca^{+2})	IS 3025 (P-40):1991, RA 2019	75 Max	mg/L	36.4	39.6	37.2	42.6	43.8	46.7	38.8	40.9
8	Magnessium (as	IS 3025 (P-46):1994, RA 2019	30 Max	mg/L	9.1	10.5	10.1	13.6	6.3	6.9	10.6	7.1
9	Total Alkalinity	IS 3025 (P-23):1986, RA 2019	200 Max	mg/L	92.5	86.2	84.3	98.4	82.5	88.5	90.8	84.2
10	Chloride (as Cl^{-})	IS 3025 (P-32):1988, RA 2019	250 Max	mg/L	26.8	25.2	22.1	20.4	25.6	20.4	19.8	24.7

11	Chlorine Residual	APHA 24th Ed. 4500 Cl B	0.2 Min	mg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
12	Fluoride (as F^-)	IS 3025 (P-60):2008, RA 2019	1 Max	mg/L	0.1277	0.1145	0.1293	0.1233	0.1124	0.1242	0.1176	0.1311
13	Sulphate (as SO_4^{-2})	IS 3025 (P-24):1986, RA 2019	200 Max	mg/L	26.8	32.4	35.2	30.6	31.5	22.7	30.1	24.2
14	Nitrate (as NO_3)	IS 3025 (P-34):1988, RA 2019	45 Max	mg/L	5.02	3.56	4.57	3.15	3.47	3.38	3.72	4.71
15	Iron (as Fe)	IS 3025 (P-53):2003, RA 2019	1 Max	mg/L	0.108	0.134	0.198	0.104	0.107	0.121	0.123	0.117
16	Arsenic (as As)	APHA 24th Ed. 3114 B	0.01 Max	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
17	Total Chromiu	APHA 24th Ed. 3111 B	0.05 Max	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
18	Cyanide	APHA 24th Ed. 4500 B	0.05 Max	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
19	Phenolic Compoun	APHA 24th Ed. 5530 C	0.001 Max	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

3.6.6 Observations & Interpretation of Groundwater Data

- The odour and taste of groundwater are all agreeable.
- The pH is also around in acceptable range i.e., 6.85 – 7.25.
- Hardness and Iron are also well within permissible limit.
- Chloride is in the acceptable limit from 19.8 mg/l near (GW-7) to 26.8 mg/l max. in (GW-1).
- Residual Free chlorine is not detectable in all the groundwater samples.
- TDS value is within the acceptable limit and is highest value is in GW-4 (383 mg/l) and the lowest value of TDS is found in GW-1 (312 mg/l).
- Magnesium values are very low in all the samples and calcium is found to be in acceptable limit in all the ground water samples.
- Sulphates and Nitrate values are well within permissible limits ranging from 22.7 mg/l (GW-6) to 35.2 mg/l (GW-3) & 3.15 mg/l (GW-4) to 5.02 mg/l (GW-1) respectively.
- Fluoride is also below permissible limits reducing the risk of contamination in the area.
- All the heavy metals are below detectable range in the ground water including Hexavalent Chromium.
- Pesticides are absent in all the groundwater samples shows no leeching of such contamination through soil and irrigation activities.
- These values show that ground water is safe for domestic purpose in surroundings of the project area, but for safer side it is recommended to treat the water before drinking use.

3.7 Soil Environment

Soil may be defined as a thin layer of earth's crust which serves as a natural medium for the growth of plants. It is unconsolidated mineral matter that has been subjected to and influenced genetic and environmental factors like plant material, climate, organism and topography all acting over a period. Soil differs from the parent material in the morphological, physical, chemical and biological properties. Also, soils differ among themselves in some or all the properties depending on the difference in the genetic and environmental factors. Therefore, some soils are light yellow and others are black. Some are coarse textured, and the others are fine textured. They serve as a reservoir of nutrients and water for crops and provide mechanical anchorite. Soil Sampling is based on agriculture field available in the study area. Composite sampling is done following BIS method. Coning and Quartering method is done & the samples were collected in air locked polyethene following with proper PPE (Personal Protective equipment) and transported to laboratory.

The sampling locations have been finalized with the following objectives:

- To determine the baseline soil characteristics of the study area; and
- To determine the impact of Mining on soil characteristics.

Quality of the soil in the area is showing a marked diversity in nature depending upon the parent rock and climatic conditions prevailing in different parts of the district. The analysis results of the soil samples collected are given in table below.

3.7.1 Soil Monitoring Locations and Map

Table 3.14 – Soil Monitoring Locations

Location Code	Location Name
S- 1	Bhusko Village
S- 2	Kalajora Village
S-3	Asandhipa Village
S- 4	Pachatol Village
S- 5	Bipranandigram Village

The samples have been analyzed as per the established scientific methods for physico-chemical parameters. The heavy metals have been analyzed by using Atomic Absorption Spectrophotometer and Inductive Coupled Plasma Analyzer. The methodology adopted for each parameter is described in Table 3.16.

Table 3.15 – Analytical Techniques for Soil Analysis

Parameter	Testing Method
pH	IS 2720 (P-26) : 1987
Appearance	Soil Testing India 2011
Conductivity	IS 14467:2002
Water Holding capacity	Soil Testing India 2011
Bulk Density	Soil Testing Inida 2011
Moisture	IS 2720 (P-2):2011
Permeability	Soil Testing India 2011
Porosity	Soil Testing India 2011
Organic Matter	IS 2720 (P-22): 1972
Total Alkalinity	Soil Testing India 2011
Available Phosphorus	Soil Testing India 2011
Available Nitrogen	IS 14684:1999
Total Sodium	Soil Testing India 2011
Available Potassium	Soil Testing India 2011
Chloride	Soil Testing India 2011
Copper	APHA-3030D APHA-3111B
Cadmium	APHA-3030D APHA-3111B
Iron	APHA-3030D APHA-3111B
Zinc	APHA-3030D APHA-3111B
Sulphur	Soil Testing India 2011
Boron	Soil Testing India 2011
Texture	Soil Testing India 2011
Sand	
Silt	
Clay	

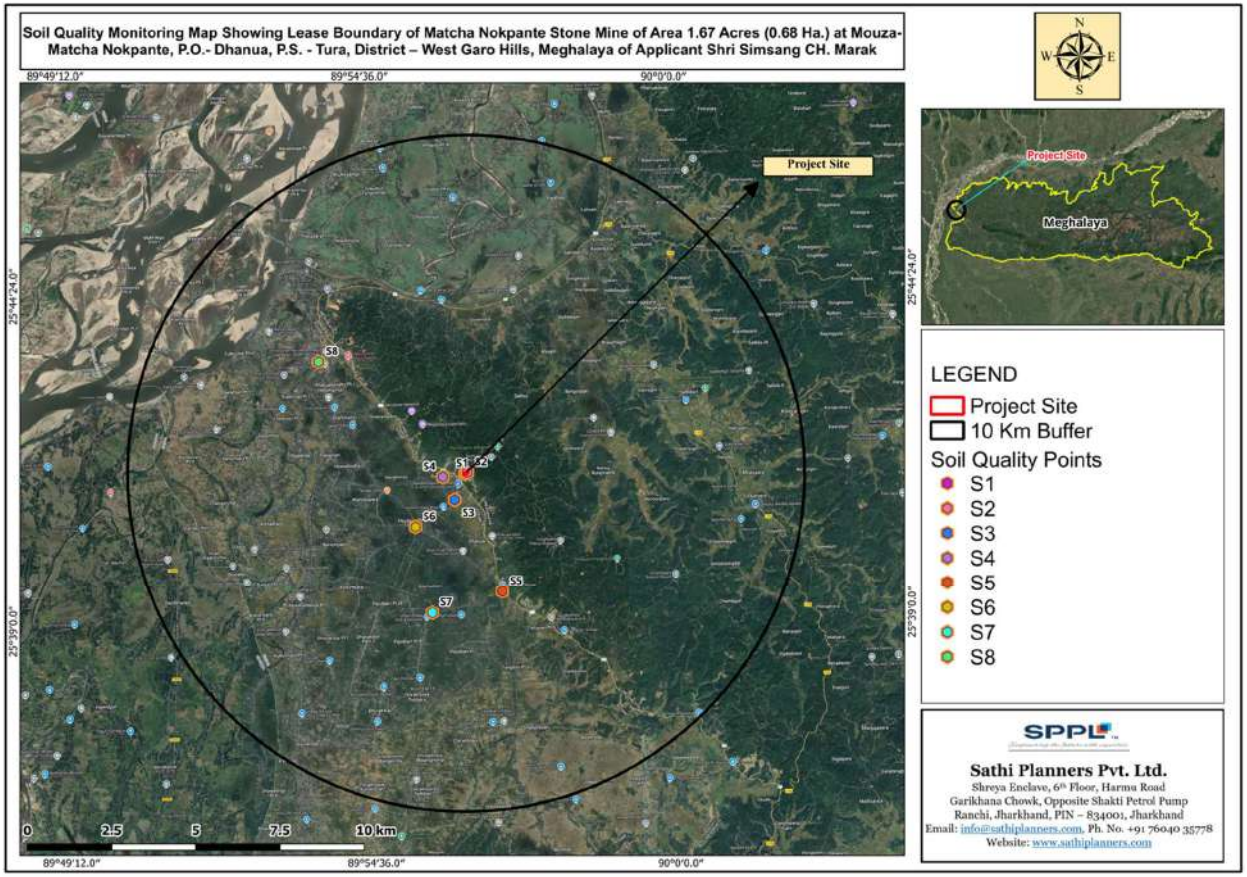

Figure 3.13 Soil Quality Monitoring Locations Map

3.7.2 Summary of Soil Monitoring Data

Table 3.16 – Summary of Soil Monitoring Data

SL No.	Parameters	Protocol	UoM	Sampling Location				Sampling Location			
				Mine Site (Matcha - Nokpante Stone Mine)	Mine Site (Matcha - Nokpante Stone Mine)	Bangtimari Kalimandir	Rambholapara	Pipulbari Bazzar	Pipulbari Pt. IV	Gachuabari	Hatsingimari
1	pH	IS 2720 (P-26):1987	--	7.12	7.22	6.86	6.92	6.45	7.18	7.24	6.81
2	Appearance	Soil Testing India 2011	--	Light Brown	Dark Brown	Dark Brown	Light Brown	Dark Brown	Brown	Dark Brown	Dark Brown
3	Conductivity	IS 14467:2002	µS/cm	1586	1529	1687	1615	1768	1625	1603	1750
4	Water holding capacity	Soil Testing India 2011	%	32.5	36.4	34.1	32.4	35.3	31.2	38.2	37.5

5	Bulk Density	Soil Testing India 2011	gm/cc	1.39	1.36	1.27	1.39	1.32	1.28	1.3	1.25
6	Moisture	IS 2720 (P-2):2011	%	22.3	24.5	20.6	26	19.8	22.7	20.2	22.4
7	Permeability	Soil Testing India 2011	cm/hr	13.8	11.1	10.2	11.9	12.1	12.7	10.2	13.2
8	Porosity	Soil Testing India 2011	% v/v	48	52	48	52	44	55	42	45
9	Organic Matter	IS 2720 (P-22):1972	%	1.05	1.12	1.04	1.15	1.17	1.12	1.02	1.16
10	Total Alkalinity	Soil Testing India 2011	mg/kg	257.5	265.4	268.8	272.4	259.5	280.8	276.6	284.5
11	Available Phosphorus	Soil Testing	kg/ha	16.5	16.8	16.6	16.7	16.3	16.9	17.1	17.3

		India 2011									
12	Available Nitrogen	IS 14684:1999	kg/ha	286	245	246	271	252	274	251	272
13	Total Sodium	Soil Testing India 2011	mg/kg	34.1	36.7	34.8	32.4	32.5	30.6	33.8	31.5
14	Available Potassium	Soil Testing India 2011	kg/ha	124	118	115	126	114	129	135	133
15	Chloride	Soil Testing India 2011	mg/kg	24.3	25.6	28.1	22.5	27.4	28.1	31.6	30.8
16	Iron	APHA-3030D APHA-3111B	mg/kg	4.22	4.28	3.97	4.25	3.86	4.44	3.92	4.15
17	Sulphur	Soil Testing India 2011	mg/kg	7.6	8.4	9.7	8.4	8.8	7.9	8.4	8.2

18	Boron	Soil Testing India 2011	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
19	Texture	Soil Testing India 2011		Sandy Clay Loam	Sandy Clay Loam	Sandy Clay Loam	Sandy Clay Loam	Sandy Clay Loam	Sandy Clay Loam	Sandy Clay Loam	Sandy Clay Loam
	Sand		%	54	56.1	55.8	57.5	56.1	59.8	54.2	54.8
	Silt		%	23.4	19.8	21.5	18.4	16.2	14.1	17.3	18.5
	Clay		%	22.6	24.1	22.7	24.1	27.7	26.1	28.5	26.7

3.7.3 Observation & Interpretation of Soil Data

- The soil sample shows pH ranging between 6.45 (S-5) to 7.24 (S-7). The pH range of approximately 5 to 7 promotes the readiest availability of plant nutrients.
- At all the monitoring locations the soil is sandy Loamy.
- Phosphorus ranges from 16.3 kg/ha to 17.3 kg/ha.
- Sodium ranges from 30.6 mg/kg to 36.7 mg/kg.
- Total potassium ranges from 114 mg/kg to 135 mg/kg.
- Nitrogen content varies from 245 mg/kg to 286 mg/kg.

3.8 Topography, Geology – Geomorphology and Drainage

3.8.1 Topography of the Area

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 district of Garo Hills – Tura Range, Arbella Range and Ranggira Range. Someswari is the largest and the second longest river in the West Garo Hills district. The river is locally known as Simsang. The main drainage system is of …… pattern. The maximum and minimum elevation of the area is 84 m – 98 m respectively.

3.8.2 Geology

The geology of Garo Hills is characterised by the presents of a wide variety of rock types that originated in various epochs of the earth evolution, starting from the most ancient time upto the recent, the oldest known rocks comprises the "Archaean group" (about 3600 million years). This group is represented by hard massive rock like Gnessic, granulites, pegmatite, amphibioteties and the blanded ferruginous, quartzite which occupies 60 percent of the area in the northern part of the district. The Garo Hills is rich in minerals wealth, the potentiality of initiation or expansion of mineral based industries in the districts of Garo Hills mainly depend on the three principle mineral deposits, viz., limestone, coal and clay.

There were three mountain ranges – the Arabella range, the Tura range and Rangira range passes through the Garo Hills, forming the great Balpakram Valley in between Garo Hills is known for the abundant of wild life, should interest naturalist and photographer captured the facts of life of animals and the flora and fauna. The highest peak of Garo Hills is Nokrek peak (1412 m). From the point of view of physical features the district of Garo Hills can be divided into three regions –

(1) Northern sub-montane region,

(2) the Central main plateau region and

(3) Southern Hill slope region. The water divides or the drainage basin of the district can be divided distinctly into 2 zones –

(a) Northern river basin zone and

(b) Southern river basin zone.

3.8.3 Geomorphology of the Area

Geomorphological Features:

- **Hills and Ridges:** West Garo Hills is predominantly characterized by hilly terrain, with the Tura Range forming a prominent feature. These hills are part of the broader Garo Hills system, composed mainly of Precambrian rocks and metamorphic formations.
- **Plateau and Upland Areas:** In certain parts, the terrain transitions into elevated uplands that are extensions of the Meghalaya Plateau. These uplands are typically dissected by streams and valleys, creating a rugged landscape.
- **River Drainage:** The district is drained by several rivers, including the Jinjiram, Ganol, and Didram. These rivers generally flow westward or southwestward, eventually joining larger river systems and draining into Bangladesh. Seasonal variations in flow are common due to the region's high rainfall and steep gradients.

Slope and Elevation:

- **Elevation:** The altitude in West Garo Hills varies from around 100 meters above mean sea level (MSL) in the lower, southwestern plains near the Bangladesh border, to about 872 meters at Tura Peak. While Tura Peak is one of the most notable high points in the district, other nearby hilltops also reach significant elevations, contributing to the district's rugged profile.
- **Slope:** Slopes range from gentle to moderately steep in most areas, with the hill ranges exhibiting more pronounced gradients. The southwestern parts of the district, closer to the plains, have gentler slopes, whereas the central and northern hilly zones show steeper inclines and more dissected terrain.

Soil Types and Classification:

The soils in West Garo Hills District are diverse, influenced by the underlying geology and topography.

The soils of Garo Hills have developed under varied conditions of geology, relief, climate and vegetation. They are of four different types –

Red Loamy Soils occupy the central part of Garo Hills, i.e., upland zones of central part of Meghalaya. They are derived from the weathering of rocks like Granites, Gneisses, diorites and others which are relatively rich in clay farming minerals and poorer in Silica. These soils are generally loamy but sometimes vary from clayey to sandy loam. The surface horizon which is about 30 cm. thick has occurs ranging from reddish-brown to dark reddish-brown. The soil are rich in organic matter and nitrogen but deficient in phosphate and potash. They are wealthy acidic in character and are suitable for the cultivation of rice, potato and fruits.

The Laterite Soils occurs in a broad belt extending from West to East in the northern part of the districts. They have been formed by the weathering of rocks like quartzites, schist, conglomerate, granites and gneisses which are rich in iron and allumina. From the agriculture point of view, the soil are not very important but can be used for the purpose by mixing heavy amount of organic matter.

The Red and Yellow Soils are found in a belt running from east to west in the foothills of the districts. They vary in colour from yellow to red, reddish yellow and yellowish brown. These soils are usually fine textured ranging from loam to silty loam and are suitable for rice and fruits.

The Alluvial Soil occurs all along the north-western and southern fringes of the districts. These soils are rich in potash but poor in phosphate. They are being used for the cultivation of rice, jute and fruits. The terrain has played an important role in determining the nature of the soil in Garo Hills. In general the soils are immature, light in colour, less clayey and less fertile on the hill-top and are thick, matured, deep in colour, more clayey and more fertile in the valleys and alluvial lawlands. The soil erosion is one of the major problem of agriculture in Garo Hills district. It is mainly caused by the practices of shifting cultivation which is characterised by rugged topography and heavy rainfall. The uncontrolled grazing which limits the growth of vegetations on the land surface and in some areas, the top-soil has been completely washed away from the hill slopes, making them useless for cultivation.

These geomorphological features and soil types significantly influence the agricultural practices and land use patterns in Pakur District.

3.8.4 Drainage

Drainage Patterns:

- **Dendritic Drainage:** West Garo Hills exhibits a dendritic drainage pattern, where rivers and tributaries form a branching structure similar to tree roots. This pattern is common in regions with relatively uniform rock types and gentle to moderate slopes.

- **Major Rivers:** The district is primarily drained by the Jinjiram River and Ganol River, along with several smaller seasonal streams. These rivers generally flow westward or southwestward, eventually joining larger river systems that drain into Bangladesh.

Jinjiram River:

- **Origin and Course:** The Jinjiram River originates in the Garo Hills and flows westward, serving as one of the key drainage systems in the district. It eventually enters Bangladesh, where it merges with the Brahmaputra river system.
- **Tributaries:** The Jinjiram River is fed by numerous smaller streams originating from the hills of West Garo Hills. It plays a crucial role in the region's water availability, especially during the monsoon season.

Ganol River:

- **Origin and Course:** The Ganol River also originates in the Garo Hills, flowing westward through the district. It is one of the significant rivers supporting local agriculture and livelihoods.

- **Tributaries:** The Ganol River is fed by smaller seasonal streams that contribute to its flow during the rainy season. Due to its hilly catchment area, the river experiences fluctuating water levels based on seasonal rainfall patterns.

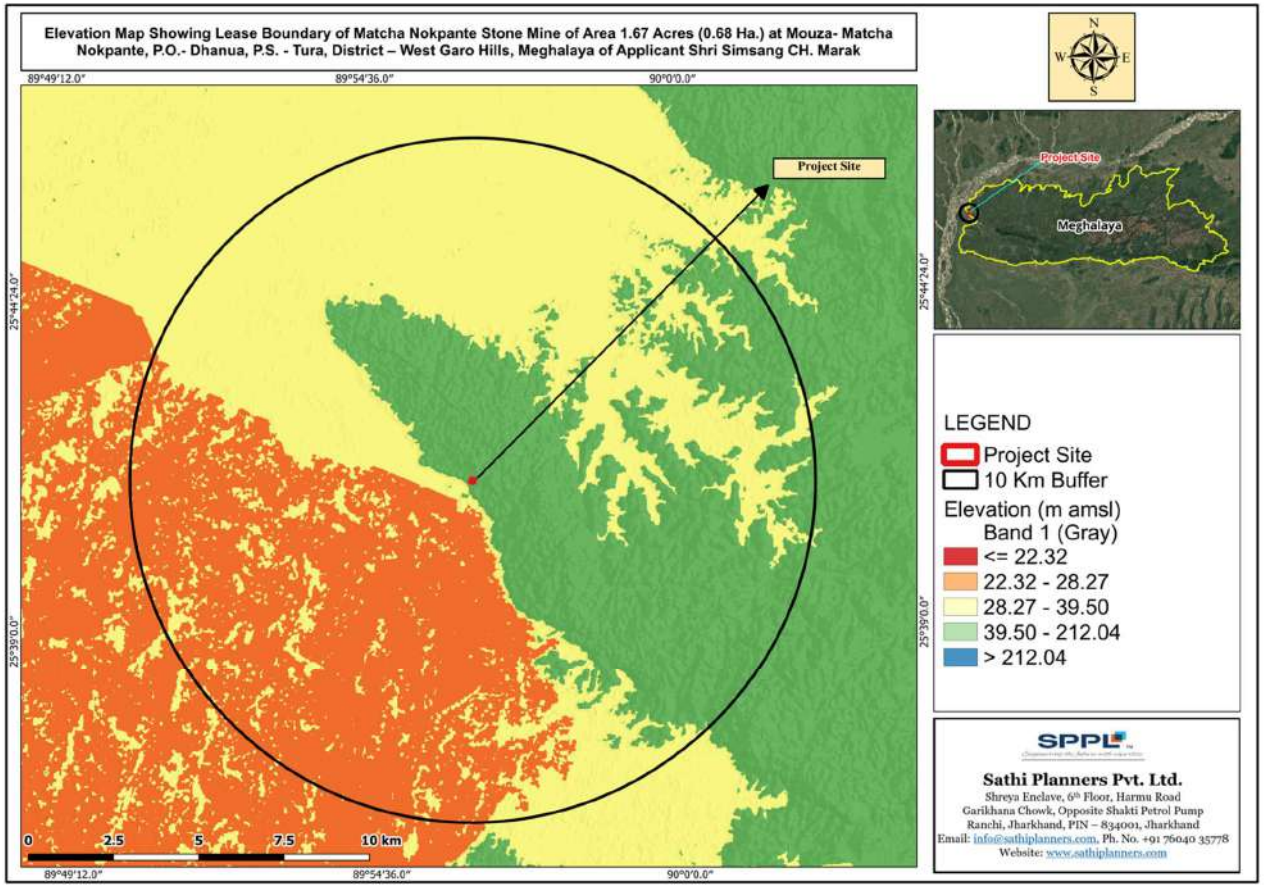

Figure 3.14 – Elevation Map of the study area

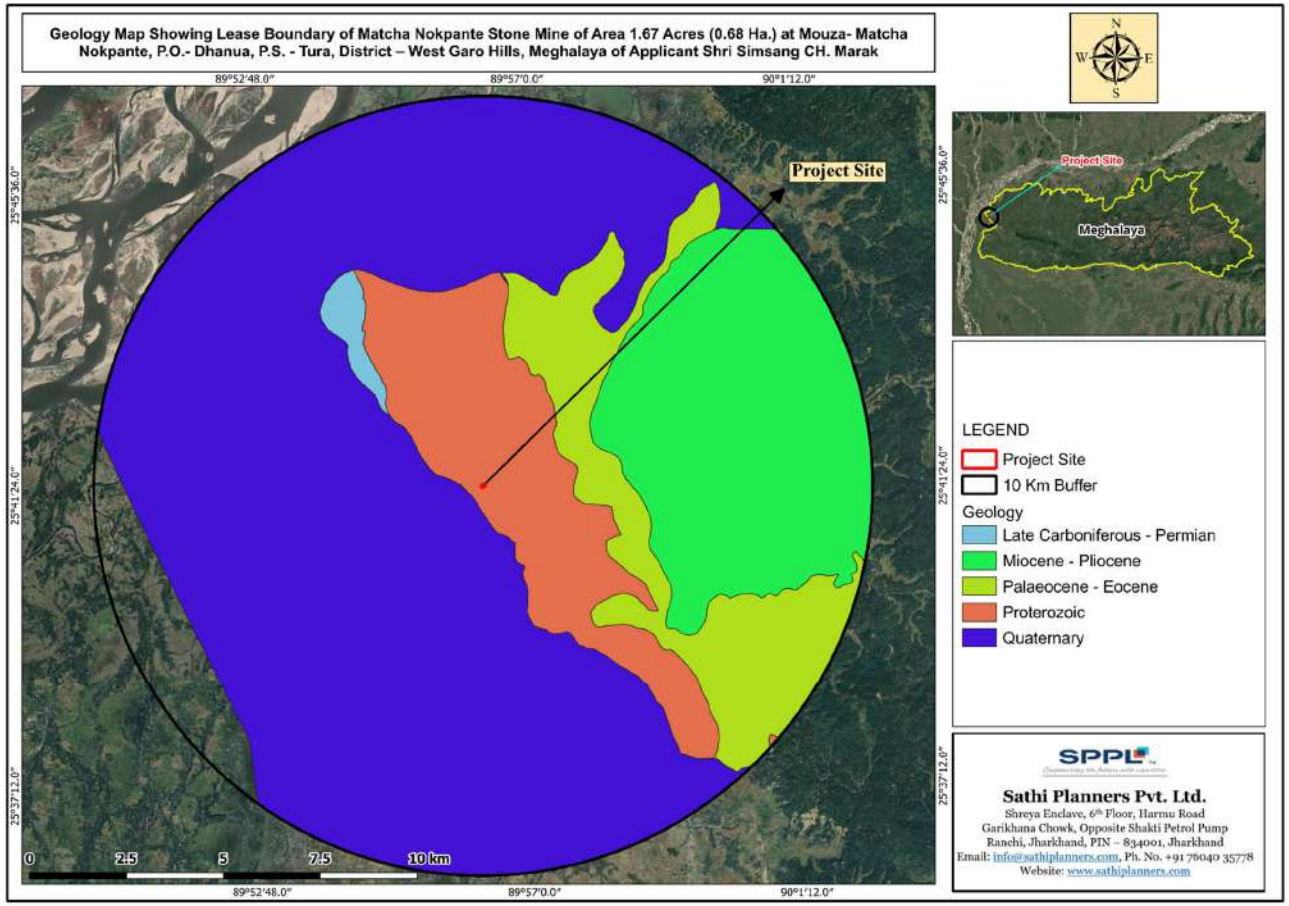

Figure 3.15 – Geology Map of the study area

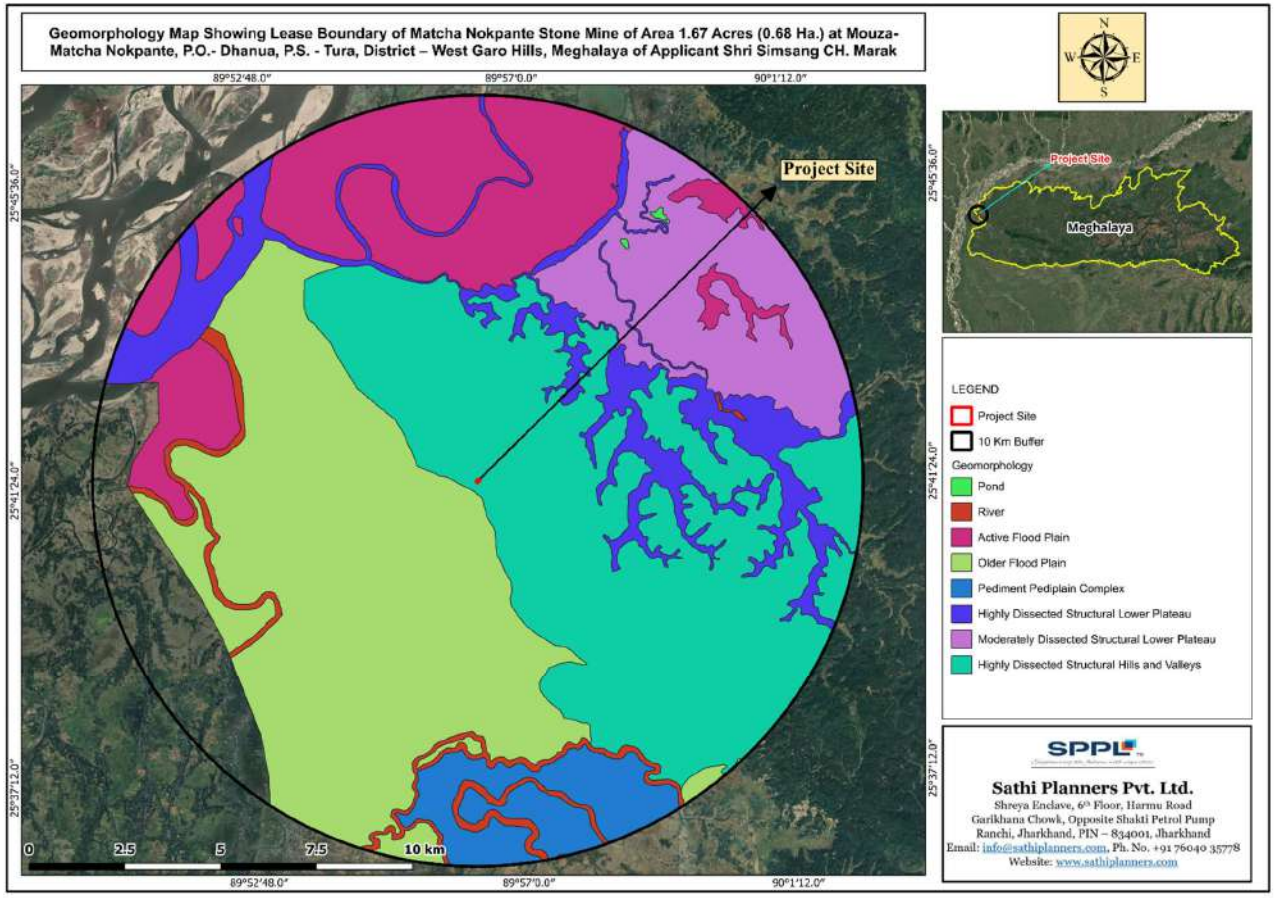

Figure 3.16 – Geomorphology Map of the study area

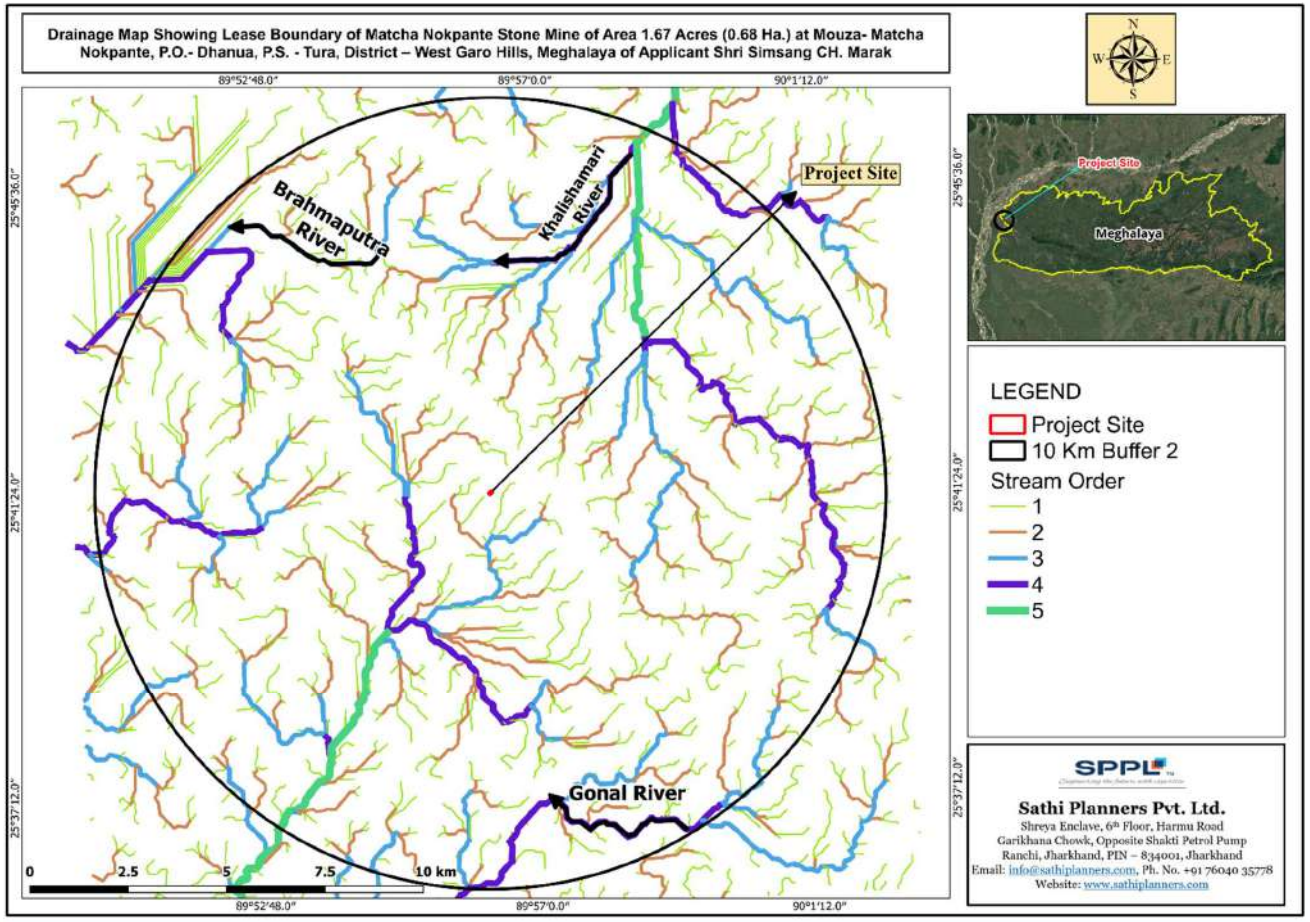

Figure 3.17 – Drainage Map of the study area

3.9 Traffic Study

3.9.1 Purpose of the Study

To assess the impact on the traffic scenario of the roads under study due to increased production at Matcha-Nokpante Stone Mine predicted increment in traffic volume is calculated below and change in 'LEVEL of SERVICE (LOS)' for the same roads has been worked out.

Table 3.17 – PCU for Operation Phase

#	Material for Transportation	Proposed Material & Products for Transportation	Working Days	TPD	Truck Capacity	Number of Trucks	PCU/Day
1	Trucks	25,637.7 TPA	200	128.2	10	13	39

Table 3.18 – LOS Study of Proposed Project

Road	V (Volume in PCU/day)	C (Capacity in PCU/day)	V/C Ratio	LOS
NH 127B	**1239**	**2000**	**0.62**	**B**

Result & Discussion

- Increase in traffic volume and in V/C ratio for roads NH 127B is being observed by inclusion of proposed expansion project when compared to that obtained during analysis of baseline study data.
- However, the increased traffic volume will be less than the design capacities of same roads as prescribed by IRC and 'Level of Service' also remains 'Good.'
- Proper traffic management plan will be adopted to maintain the same LOS and minimize the impending impacts, if any.

3.10 Ecological & Biological Environment

The lease area does not form a part of any National Park or Wildlife Sanctuary or Critical Wildlife habitat. No protected area is situated in the lease area or within the Zone of Influence. The lease area is surrounded by a series of existing mines and no important wild animals are noticed in the area.

The Forest around the lease & impact zone area are disturbed due to various Mining activities and presence of Wildlife is very sparse. As per the information collected the following flora & fauna are found in the core and Buffer area of the project. No endemic species are found either in project area & in the ZOI area.

The ecology & biological study of the area of interest was undertaken with the following objectives:

- To assess the nature and distribution of vegetation in and around the existing project site.
- Analyse the distribution of animal life spectra.
- To quantify the ethano botanical importance of the plant species.
- Possibility of presence of breeding grounds.

Scope and Methodology for Ecological Study

The coverage of the ecological study for the project included a core zone comprising the immediate project area covering the bridge location, approach road locations, and a buffer zone of a 10 km radius surrounding the immediate project primary area. Figure shows the area covered for the ecological study with delineation of areas where primary and secondary data was collected. The field surveys are carried out by a team of experts from forestry, wildlife, and fisheries fields. Primary data collection was carried out in the immediate project area. Data collection methods involved:

- Geo-spatial survey through use of GPS
- Compilation of secondary data and literature.
- Generation of primary data by undertaking systematic ecological studies in the area.
- Discussion with local people to elicit information about local flora and fauna.
- Primary data collection for flora through random sampling method for trees, shrubs and herbs from the selected locations to know the vegetation cover qualitatively.

3.10.1 Floral Diversity in the Study Area

The West Garo Hills region is mainly covered by tropical moist evergreen, tropical semi-evergreen and tropical moist decidious forests. The tropical vegetation covers areas upto an elevation of about 1,000 m. The majority of the forests. Viz. Dilma, Dhima, Chimabangsi, Rajasimla Eldek, Darugre, Songsak, Siju, Rewak,Emangre, Baghmara, Phulbari, Rongmachokgre, Rongchugre, singgimari, etc. fall in this zone. These forests mainly consist of Shorea robusta and in certain area tectona grandis has also been introduced. The tallest trees are Schima wallichii, Terminalia belirilia belirica, Engelhasdtia spicata, Aesculus assamica, Aporusa wallichii, Bridelia retusa, Cryptocarya andersonii, Talauma hodgsinii, Lagerstroemia parviflora, Gmelina arborea, Munronia pinnata, Toona ciliate, Dillenia pentagyna, Dillenia indica, gymnosporia saltficifolia, Leea

macrophylla, Growia ap., Ficus spp., syzygium kurzii, Catanopis armata, Terminalia chebula, Vetex pedunchrularis, Hovenia acerba, Butea monosperma, Pilioatigma malabaricum, Schleichera trijuga, etc.

Miliusa velutina, Hibiscus macrocarpus, Zizyphus rugosa, Helicia robusta, Engelhardtia spicata var. Colebkookiana and Ficus Prostrata, etc. form the lower canopy. The main components of shrubby species are-Capparis zeylanica, Garcinia lancifolis, Bauhinia acuminate, Mimosa himalayayana, Acacia concinna, Mussaenda roxburghii, Eupatorium nodiflorum, Solanum kurzii and Phlogacanthus tiboflorus, etc. In a few areas, numerous lianas intertwining the trees, e.g., Dysolobium grande, Mucuna bracteata, Fissistigma wallichii, Paederia scandens, solena hetephylla and Aristolocjis saccata ae prominent. Rarely, Aristolochia cathcartii may be seen in certain forests. Several species of bamboo stretch for long distances formaing thickets of secondary vegetation without any competition. A few falms like Areca, Caryota, Pinanga and Didymosperma are also conspicuous. The ground flora in deciduous forests is very poor and seasonal, while in evergreen forests, species of epiphytic climbers viz, Rhaphidophora spp., members of Gesneriacease, Hoya app. With beautiful bunches of star like flowers and stem parasites of Loranthacease viz. Dendrophthoe falcata, Helioxanthera ligustrina, Lorathus scurrula, Macrosolen cochinchinencis and Total root parasite Cascuta reflexa are also seen. A few species of epiphytic orchids viz. Aeridis, Bulbophyllum, Dendrobium, Eria, Liparis, Pholidota, Thunia and Vanda etc. are seen in the evergreen Forests but they show less species diversity. The herbaceous vegetation is less profuse and includes the members of Oxalidaceae, Balsaminanceae, Acanthaceae, Leesceae, Fabaceae, Asteraceae and Poaceae. Besides, Sida spp., Leea spp., Coffee benghalensis, Imperata cylindrical and Chromolaena odorata, etc. are also predominant. Ferns and fern-allies, liverworts and mosses, etc. are also seen on old tree trunks and stones etc. near sources, in shady place in the evergreen forests but species diversity is very poor. Due to excessive Jhum practice most of the forest areas are cleared and secondary monoculture forests of Shorea robusta established, Tectona grandis, Lagerstroemia parviflora are seen in most places. Artocarpus spp. Are also vary common in the vicinity and towns. In more or less open moistlocalities and near water sources, herbs like Dictyospermum, Aneilema scaberrimum, Burmania sp., Ciox spp. Cyprus spp. Oxalis corniculate, Anemone spp. And Ericcaulon etc. can be seen. A botanic curio shrub Nepenthes khasiana grows in and around Baghmara.

3.10.1.1 Forest Types

Generally, survey of flora has been carried out in 10 km buffer area. On the basis of Survey and secondary data collected from forest office a large variety of Trees, herbs and shrubs found suited to climatic condition. The structure and type of vegetation depends on climatic conditions and physiographic conditions, as well as requirements of the local

inhabitants of the area. The most prominent vegetation cover around the proposed project site is shown in the table below:

Figure 3.18 Vegetation types of Buffer Zone around the Project Site

S. No.	Vegetation Cover	Dominant Species Composition
1.	Moist mixed deciduous with Sal patches	Shorearobusta, Artocarpus chaplasha , Gmelina arborea, Albizia lebbeck, Erythrina stricta, Morus macroura, Schimawallichii etc.
2.	Semi Evergreen	Shorearobusta, Artocarpus chaplasha ,Gmelina arborea, Albizia lebbeck,
3.	Subtropical Evergreen	Terminalia bellirica, Pterocarpus marsupium, Syzygiumcumini, Ficus sps, Alnus nepalensis etc.
4.	Subtropical Pine	Pinus kesiya
5.	Bamboo	Dendrocalamushamiltonii, Melocannabambusoides etc.

In the forest area a few medicinal plants viz. Acorus calamus, Asparagus racemosus, Garcinia cowa, Myrica esculenta, Panax pseudoginseng etc. etc were noticed. Many such plants used by local people for treatment of various ailments. Dominant flora are tabulated below:

Table 3.19 – Floral Diversity observed in the study area

No.	Plant	Scientific Name	Family
(A)	Trees	*Shorearobusta (Sal)*	*Dipterocarpaceae*
		Dysoxylumgobara	
		Castanopsis tribuloides	*Fagaceae*
		Diospyros kaki	*Ebenaceae*
		Rhus acuminate	*Anacardiaceae*
		Quercus griffithii	*Fagaceae*
		Schimawallichii	*Theaceae*
		Syzygiumcumini	*Myrtaceae*
		Pinus kesiya	*Pinaceae*

		Macaranga denticulate	*Verbenaceae*
		Myrica esculenta	*Myricaceae*
		Terminalia belerica	*Combretaceae*
		Alnus nepalensis	
		Gmelina arborea	*Verbenaceae*
		Albizia lebbeck	*Mimosoideae*
		Erythrina stricta	*Papilionaceae*
		Artocarpus chaplasha	*Moraceae*
		Pterocarpus marsupium	*Sterculiaceae*
		Elaeocarpus acuminatus	
		Tectona grandis	*Verbenaceae*
		Garcinia cowa	
		Ficus nerifolia	*Moraceae*
		Alstoniascholaris	
(B)	Shrubs	*Rubus ellipticus*	*Rosaceae*
		Rubus khasiana	*Rosaceae*
		Cassia floribunda	*Caesalpiniaceae*
		Psychotriaerratica	*Rubiaceae*
		Polygonum molle	
		Eupatorium adenophorum	*Asteraceae*
		Melastomanepalensis	*Melastomataceae*
		Symplocospyrifolia	*Symplocaceae*
		Lantana camara	*Verbenaceae*
		Melastomanepalensis	*Melastomataceae*
		Symplocos spicata	*Symplocaceae*
		Smilax aspera	*Smilacaceae*
		Castanopsis indica	*Fagaceae*
		Neilliathyrsiflora	*Rosaceae*
		Artemisia nilagirica	*Asteraceae*
		Zanthoxylum aromaticum	*Rutaceae*

(C)	Herbs	*Globbaclarkei*	*Zingiberaceae*
		Panicum brevifolium	*Poaceae*
		Elsholtziablanda	*Lamiaceae*
		Bidens pilosa	*Asteraceae*
		Crotalaria anagyroides	*Papilionoideae*
		Gnaphalium pensylvanicum	*Asteraceae*
		Pouzolzia hirta	*Urticaceae*
		Paspalum orbiculare	*Poaceae*
		Plantago erosa	*Plantaginaceae*
		Ageratum conyzoides	*Asteraceae*
		Centella asiatica	*Apiaceae*
		Commelinapaludosa	*Commelinaceae*
		Cyperus flavidus	*Cyperaceae*
		Drymaria cordata	*Caryophyllaceae*
		Anaphalisadnata	*Asteraceae*
		Elsholtziablanda	*Lamiaceae*
		Potentilla fulgens	*Rosaceae*

Though the faunal health is fairly high in Meghalaya State, yet in these surveyed areas due to anthropogenic activities & also deforestation, endemic endangered animals' species are not visible so much. Among the primates, Northern Pig Tailed Macaque *(Macaca leonine),* Rheno Macaque *(Macaca mulatta*), Assamese Macaque *(Macaca assamensis*), Stumped Tail Macaque *(Macaca arctoides)* and Capped Langur *(Trachypithecuspileatus)* are occasionally seen in dense forested patches in and around buffer zone. There are *scattered reports of other carnivorous in this region. There are viz. Jungle Cat (*Felis chaus), Asiatic Jackal *(Canis aureus*), Bengal Fox *(Vulpes bengalensis),* Small Indian Civet (*Viverricula indica),* Common Palm Civet *(Paradoxurus hermaphroditus)* and Small Indian Mongoose *(Herpestesauropunctatus).*

Among the reptiles Calotes versicolor *(Garden Lizard*), Pareasmonticola*(Assam Snail Eater)*, Himalayan Krait *(Bungarusbungaroides),* Green Pit Vipers *(Trimeresurusalbolabris)*, Striped Neck Snake *(Liopeltisfrenatus*) are very common.

A few amphibians also reported from this region vig, skipper frog like Rana mawlyndipi, Rana cyanophlyctis and Hylaannectans. However, this state is fairly rich in avian fauna. Tabulated below are the dominant Avifauna:

Sl. No.	Common Name	Scientific Name
1	Cormorant	*Phalacrocorax niger*
2	Cattle Egret	*Bubulcus ibis*
3	Black Winged Kite	*Elanus caeruleus*
4	Ring Dove	*Streptopeliadecaocro*
5	Koel	*Eudynamys*
6	Common Kingfisher	*Alcedoatthis*
7	Small Green Bee eater	*Meropsorientalis*
8	Black Drongo	*Dicrurusmacrocercus*
9	Myna	*Acridotheres tristis*
10	Little Grebe	*Podicipediformes*
11	Oriental White Backed Vulture	*Gyps bengalensis*
12	Dark Rumped Swift	*Apus acuticauda*
13	Great Pied Hornbill	*Bucerosacuticauda*
14	Darter	*Anhinga melanogaster*

3.10.2 Observation

West Garo Hills region's tropical moist deciduous forests and tropical dry mixed deciduous areas are ecologically significant, hosting diverse species like Sal, Mahua and Teak which provide important ecosystem services. The forests support biodiversity, Carbon sequestration and water regulation. The non-forest area, with species like siris and kachnar, contribute to soil stabilization and urban greenery.

3.10.3 Biodiversity Index

Biodiversity is often used as a measure of the health of biological systems. Biodiversity is a contraction of "biological diversity' and is used to describe the variety of life. It refers to the number and variety of organisms within a particular area. Species diversity relates to the number of the different species and the number of individuals of each species within any one community.

Species biodiversity may be used to indicate the 'biological health of a particular habitat. An increase in the biodiversity of an area may mean that corrective measures have been effective.

Diversity Index

A diversity index is a mathematical measure of species diversity in a given community. Diversity Index is based on the species richness (the number of species present) and species abundance.

Methodology

The Shannon-Wiener Index is an information statistic index, which means it assumes all species are represented in a sample and that they are randomly sampled.

In the Shannon-Wiener Index, Pi is the proportion (n/N) of individuals of one particular species found (n) divided by the total number of individuals found (N), ln is the natural Log.

Σ= is the sum of the calculations and is the number of species.
Shannon-Wiener Index denoted by H = -SUM [(pi) * ln [(pi)]
SUM = summation
pi = proportion of total sample represented by species i Divide no. of individuals of species i by total number of samples.
S = number of species. = species richness H/max = In(S) Maximum diversity possible
E = Evenness = H/Hmax

3.11 Socio-Economic Environment

3.11.1 Social Economic Survey

In order to access and evaluate likely impacts arising out of any development projects on socio economic environment, it is necessary to gauge the apprehensions of the people in the study areas.

3.11.2 Methodology applied for selection of sample & data collection.

The methodology which is applied for primary source of data collection i.e. gathering data through field survey for socio-economic environment is depicted below: For the process of data collection through primary source certain methods are used among that are:

Sampling Method

A judgmental and purposive sampling method was used for choosing respondents of various sections of the society i.e. Sarpanch, adult males and females, teachers, medical

practitioners, businessmen, agriculture labourers, unemployed group etc. Judgmental and purposive sampling method includes the right cases from the total population that helps to fulfil the purpose of research needs.

Sample Size

The sample size of roughly 10-20 percent of the total Study area is selected that may include all strata of the study area (including women and other vulnerable groups).

Interview Method

Structured interview method is used to collect data regarding the awareness and opinion from the samples selected of the various socio-economic sections of the community. Structured interviews involve the use of a set of predetermined project questions that includes fixed and alternative questions. The questionnaire mainly highlights the parameters such as income, employment and working conditions, housing, food, water supply, sanitation, health, energy, transportation and communication, education, environment and pollution to assess the standard of living of that particular region and general awareness, opinion and expectation of the respondents about the proposed project. Interview method helps to collect more correct and accurate information as the interviewer is present during the field survey.

Socio-economic survey was conducted in the villages within the study areas located in all directions with reference to the study area. 10 villages were surveyed from study area.

The respondents were asked for their awareness / opinion about the existing plant and also of their opinion about the impacts of the project which are an important aspect of socio-economic environment, viz. job opportunities, education, health care, housing, transportation facility and economic status.

The salient observations recorded during socio economic survey in the study areas are depicted below:

- More than 62.86% of the main workforce is engaged in agriculture activity in rural area of the study area.
- Majority of workers are practicing farming activities with minor irrigation source, it means that area under irrigation is very low and maximum area is covered by unirrigated land.
- Most of the villages have Primary School (PS) while in some villages it is extended up to Middle School (MS). While for further education villagers go to the town places that are to, Hatsingmari, Tura, Dhubri, Selsella, Mankacharand town.
- No vocational training centre is available in the villages to provide skill development techiniques to the unemployed youth.

- The main source of drinking water supply is through uncovered wells, treated tap water, covered well and hand pump and tube well while few villages have untreated tap water facility.
- Government medical facility in the form of Community health centre is available in Selsella and primary health centre in Jeldopara village.
- Two wheelers, auto rickshaws & bus facility are the main mode of transportation used by natives in the study area.
- Power supply is available in mostly all the sampling villages. Street lights are also available in all villages but frequent power cut/ load shedding problem is experienced by the people in the area.
- Wood, kerosene and LPG gas is a major fuel used for cooking purpose.

3.11.3 Employment Generation Potential of Project

The employment potential will ameliorate economic conditions of these families directly and provide employment to many other families indirectly who are involved in business and service-oriented activities. The employment of local people in primary and secondary sectors of project shall upgrade the prosperity of the region. These will in turn improves the socioeconomic conditions of the area.

The total including temporary and permanent manpower requirement for the proposed mining operation is 26. Locals will be hired as much as possible to minimize the influx of people in the area. This project operation will provide livelihood to the poorest section of the society.

3.11.4 Assessment of Quality of Life in Study Area

Definition of Quality of life (QoL)- Quality of life (QoL) is a term, which indicates overall status of socio-economic environment in a given area. Quality of life (QoL) is defined as a function between "objective conditions" and "subjective attitudes" involving a defined "area" of concern.

The "objective conditions" are defined as numerically measurable artifacts of a physical, sociological event or economic event. Objective conditions may be defined as any number, which stands for a given quantity of a variable of interest so long as it is independent of subjective opinion.

QoL(objective) is obtained through both Primary and secondary data

Primary Data- During the Survey done by the expert in the study area to know the status of Infrastructure facilities available actually.

Secondary Data- The sources of secondary data such as Census records having the details of village amenities and infrastructure are used to determine the objective condition of the area and accordingly ranking is given to each parameter.

Subjective attitude" is primarily concerned with affective and cognitive dimensions. It is specifically concerned with 'how aspects of cognition vary with variation in objective conditions.

Likert scale, rating system was used in questionnaires that are designed to measure people's attitudes, opinions, or perceptions. In the present study of Metro project, the subjects' satisfactory level towards the parameters to assess the Qol was studied by asking the respondents to choose from a range of possible responses that typically included "very satisfied," "somewhat satisfied," "neither," "somewhat not satisfied," and "not satisfied." Often, the categories of response are coded numerically, in which case the numerical values must be defined for that specific study, such as where 1 = very satisfied, 0.8 = somewhat satisfied, 0.5 = neither, 0.3 = somewhat not satisfied, and 0 = not satisfied.

The weights assigned to each factor by ranked-pairwise technique, by the expert group based on the secondary data and general observations.

For each objective measure, a corresponding subjective measure is developed for each individual of the sample population by asking him to rate his satisfaction scale (value function curve). It is used such that 0 corresponds to the lowest level of attitudinal satisfaction and 1 corresponds to the highest level of satisfaction. Weights are assigned to each factor using ranked - pairwise comparison techniques.

Figure 3.19 - Maslow's Hierarchy of Needs

As per the Maslow's Hierarchy of Needs, the needs of human being are measured into different categories which help to determine the satisfaction level of people and are the indicators to assess the quality of life. The Socio-economic Indicators for QoL Assessment are:

I. Income, Employment and Working Condition
II. Housing
III. Food
IV. Clothing
V. Water Supply and Sanitation
VI. Health
VII. Energy
VIII. Transportation and Communication
IX. Education
X. Environment and Pollution
XI. Recreation
XII. Social Security
XIII. Human Rights

The Subjective Quality of Life (QoL(S)), Objective Quality of Life (QoL(O)) and Quality of Life (Cumulative Index) (QoL(C)) indices prior to commissioning of the project are presented in Table given below:

The average QoL index value for the study area is leaning towards satisfactory level due to good economic status like income, employment and also availability of basic needs, viz. food, clothing, housing. The area lacking with medical, educational facilities and social security, besides water scarcity, lack of sanitation, which are subjective conditions and are not much satisfactory as compared to objective conditions.

Chapter 4 Anticipated Environmental Impacts and Mitigation Measures

4.1 Objective & Methodology of Impact Prediction

4.1.1 Objective of Impact Prediction

An environmental impact is defined as any change to the environment, whether adverse or beneficial, resulting from a facility's activities, products, or services. *(Source: Environmental Aspects, US EPA, August 7, 2015)*

Through this EIA/EMP Report, an attempt has been made to identify and list all possible aspects, which could generate significant impact on different environmental attributes during various phases of implementation of the Project. Some of these impacts are less threat or insignificant and do not need further analysis. The objective is to identify and list only the significant impacts, which shall require detailed analysis to the extent of decision-making purposes. The major construction activities will be of short duration and will have very few lasting impacts. The operation will have the potential of major impacts, which has been analysed in detail. Based on the impacts identified, most affected environmental attributes have been considered for detailed evaluation.

The impacts are identified based on the possible worst-case emission, effluent discharge, and solid waste generation from the proposed project and also taking into consideration the baseline environmental status of the proposed project site. All the potentially significant environmental impacts from the project are:

- Impacts on the air environment.
- Impacts on the water environment.
- Impact on Soil/Land.
- Impacts of disposal of solid wastes.
- Impacts on socio-economic condition.
- Impacts on flora & fauna.

The environmental impacts can be categorized as either primary or secondary. Primary impacts are those, which are attributed directly due to the project and secondary impacts are those, which are indirectly induced. The proposed project is likely to create impact on the environment in two distinct phases:

- During the construction phases, it may be regarded as temporary or short-term effects.
- During the operation phase that would have long term effects.

4.1.2 Methodology of Impact prediction for various components

After screening and scoping the identification of potentially significant environmental impacts constitute one of the preliminary steps of Environmental Impact Assessment (EIA). There are three principal methods for identifying environmental effects and impacts; these are checklists, matrices and flow diagrams, overlays and geographic information systems, expert systems, etc.

4.2 Impacts of the Project

Impact Matrix

The primary function of an environment impact assessment study is to predict and quantify the magnitude of these impacts, evaluate, and assess the importance of the identified changes, present information and monitor actual changes. Environmental impacts could be positive or negative, direct, or indirect, local, or regional and also reversible or irreversible. The activities of the proposed project are studied. The impacts of various activities of the proposed project are identified and presented as matrix in Table 4.1.

Table 4.1 Impact Identification Matrix

Environmental Attributes	Impact Parameters	Mining Activities						
		Drilling & Blasting	Mining Operation	Material Storage & Transport	OB Storage	Movement of Vehicles	Water Use	Mine Drainage
Soil/Land	Soil quality				*			*
	Soil Contamination	*	*	*	*			*
Resources	Fuel/Electricity			*		*	*	
	Mineral Excavation	*	*	*			*	
Water	Water quality	*	*	*			*	
	Surface runoff and contamination	*	*	*		*		
Air	Air quality	*	*	*		*		
	Noise quality	*	*	*		*		
	Traffic			*		*		
Biological	Removal of vegetation							
	Disturbance of biotic environment							
Socio Economic	Development of Local Employment		*	*		*		

Environmental Attributes	Impact Parameters	Mining Activities						
		Drilling & Blasting	Mining Operation	Material Storage & Transport	OB Storage	Movement of Vehicles	Water Use	Mine Drainage
	Increase in infrastructure facility							
	Impact on health	*	*	*		*	*	

4.3 Impact on Air Environment

Selection of Pollutants for Air Dispersion Modelling

- Particulate matters.
- Gases such as, Sulphur Dioxide, Oxides of Nitrogen, Carbon Monoxide, etc. from vehicular exhaust.
- Dust is the single air pollutant observed in mining activities. Diesel operating machines, blasting and movement of machinery/ vehicles produce NO_x, SO_2 and CO emissions usually at low levels. Dust can be of significant nuisance to surrounding land users and potential health risks in some circumstances.

However, the impacts will be localized in nature and area outside the project boundary is not likely to have any adverse impact with respect to ambient air quality.

4.3.1 Impact on Ambient Air Quality

Information on air quality studied by line source modelling techniques predicted that the mining activity will not affect the air quality in a significant manner. In mining operations, loading. transportation and unloading operations may cause deterioration in air quality due to handling dry materials. There is no other source of air pollution as there is no boiler, DG Set or furnace. Only source of air pollution is re-suspension dust from the movement of trucks to and from the mining site. To reduce the impact of air pollution, best available measures taken at the mining site will be continued: The impact on the ambient air quality of the study area has been predicted using mathematical modelling (AERMOD VIEW) by following the guidelines developed by CPCB. Modelling was carried out using the software AERMOD VIEW.

Air quality modelling has been attempted using AERMOD View. Line and area source modelling has been carried out for prediction of the Ground Level Concentration (GLC). Meteorological data was processed in AERMET and wind diagram for the area has been generated. Wind rose diagram for the month of March 2024 to May 2024, shows the direction of wind is pre-dominant wind direction is given in chapter 3. Assessed PM due to dust levels at mine site is given in table below and it was found that the resultant level

at these locations will remain within the NAAQS norms. Isopleths for dust particles which are presented in Figure 4.1 & 4.2.

4.3.2 Methodology

The area source model is based on the equation for a finite crosswind line source. Individual area source has the normal east-west and north-south dimensions. CPCB guidelines on dispersion modelling states that the area sources which do not emit into a wake region should be treated as either point source with initial crosswind spread or as non-buoyant volume source with initial vertical and cross wind speed. If an area source is treated as an effective point source modelling may proceed as it would for a point source located at the centre of the area. Area sources treated as point sources may have release heights which are above the ground level but usually these sources are emitting into a structure wake. If a non-buoyant area source is treated as a volume source, it is assumed to be located at the centre of the area and have initial spreads in the vertical and crosswind direction.

4.3.3 Meteorological Data

Meteorological file comprising wind direction, wind speed, ambient temperature, and stability class and mixing height has been prepared for modelling purposes. Surface meteorological data for wind speed, wind direction and ambient temperature has been generated at the project site. F Class stability during night-time and B and C Class stability were assumed during daytime.

4.3.4 Results and Discussion

The model was set up for calculation of 24-hour average values, so that the values could be compared with the baseline levels and national ambient air quality standards. Significant GLC values were observed inside the mining lease area (GLC is located inside the ML area). Outside the ML area, the incremental GLC values are insignificant.

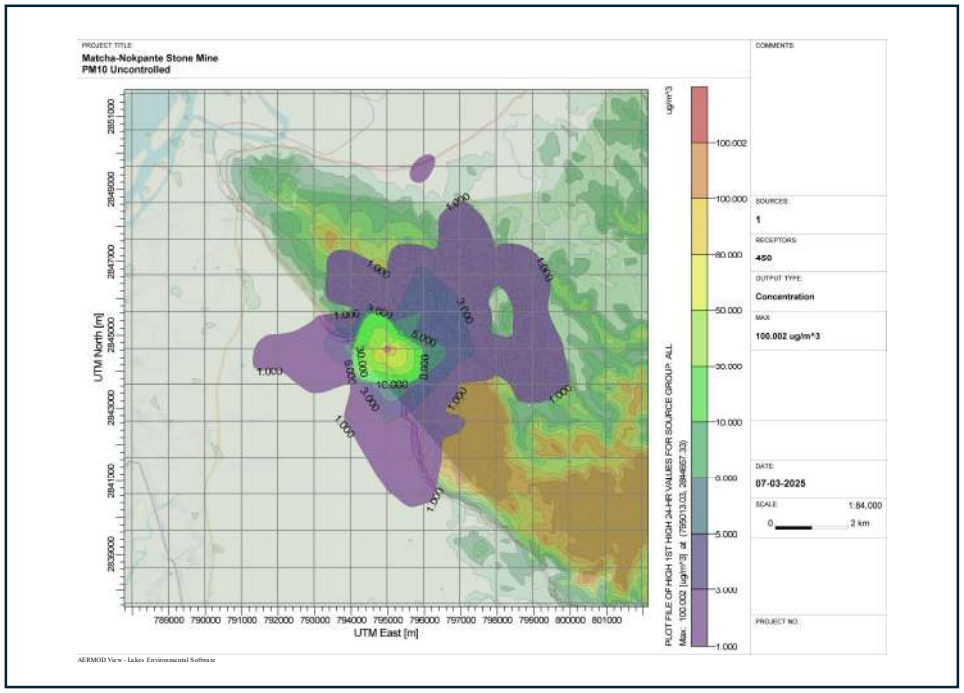

Figure 4.1 Isopleth of PM10 Concentration (Uncontrolled)

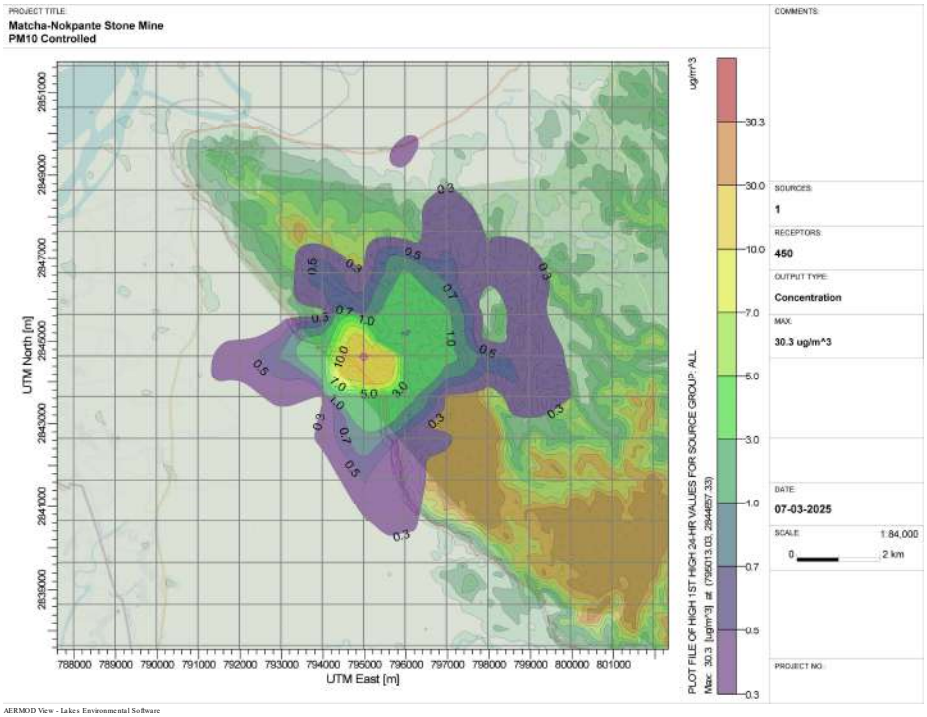

Figure 4.2 Isopleth of PM 10 Concentration (Controlled)

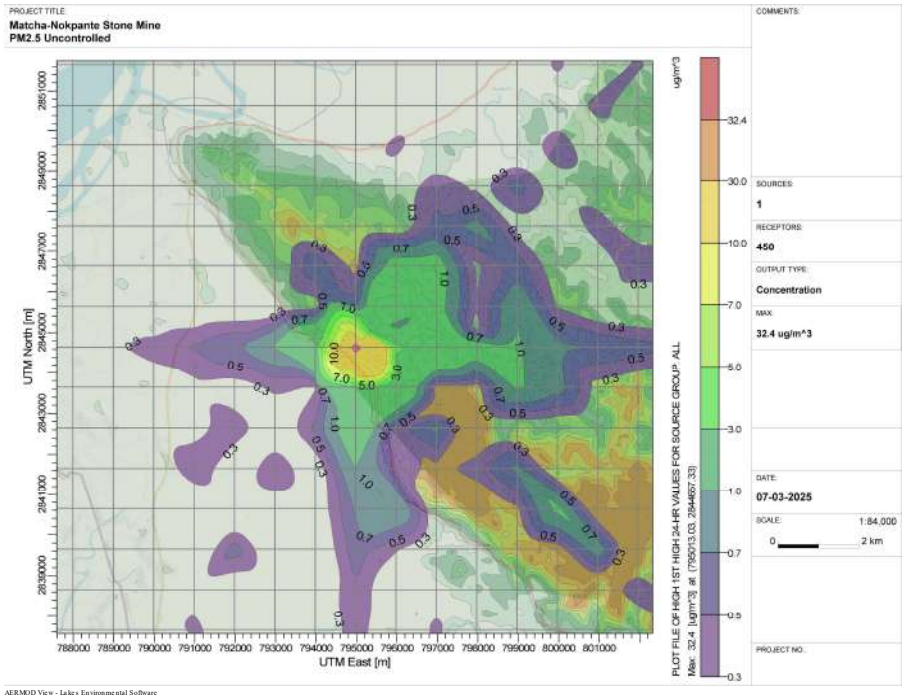

Figure 4.3 Isopleth of PM 2.5 Concentration (Uncontrolled)

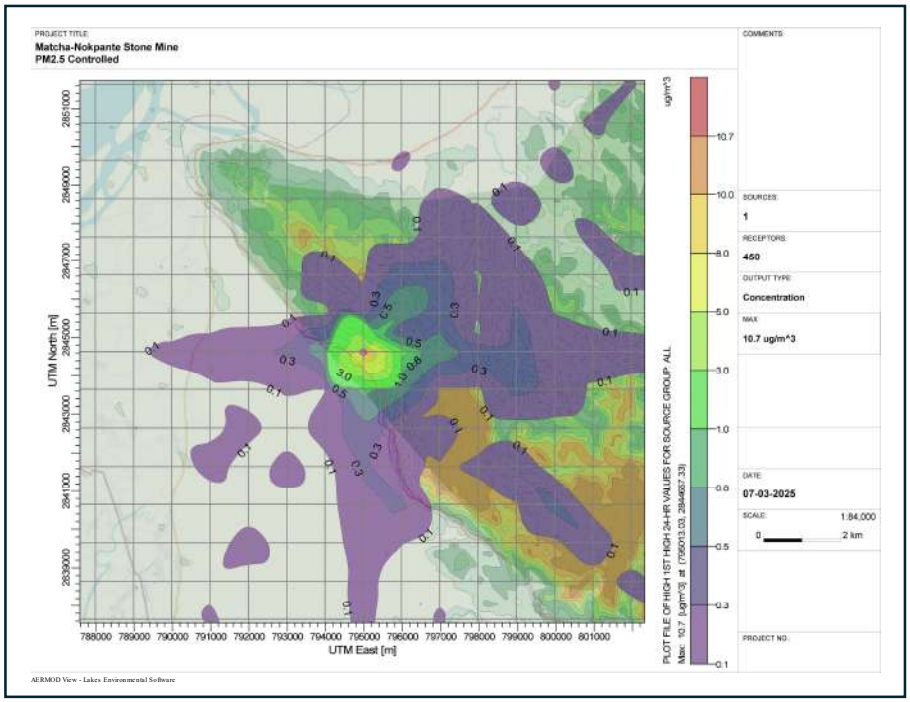

Figure 4.4 Isopleth of PM 2.5 Concentration (Controlled)

Table 4.2 – Incremental GLC of Pollutants on AAQ (Standalone & Cluster)

Air Monitoring Locations	Controlled Scenario	
	PM10	PM2.5
	µg/m3	µg/m3
AAQ1	23.04566	7.12759
AAQ2	30.33755	10.7459
AAQ3	0.96904	0.26408
AAQ4	0.64472	0.19838
AAQ5	2.68569	1.01358
AAQ6	0.21186	0.0825
AAQ7	0.16674	0.04363
AAQ8	0.1312	0.03808

Table 4.3 – Incremental GLC of Pollutants on AAQ

Vehicular Emissions				
Line Area Source				
PM10	PM2.5	SO2	NOx	CO
µg/m3	µg/m3	µg/m3	µg/m3	µg/m3
4.16E-02	3.94E-02	3.90E-04	0.53329	0.15766
0.01105	0.01061	1.10E-04	0.1437	0.04248
0.00055	5.20E-04	1.00E-05	0.00706	0.00207
0.00042	0.00041	0.000000	0.00556	0.00164
0.00206	0.00204	2.00E-05	0.02763	0.00817
0.00056	0.00061	1.00E-05	0.00832	0.00246
0.00011	0.00011	0.00E+00	0.00147	0.00043
0.00015	0.00016	0.00E+00	0.00212	0.00062

4.3.5 Mitigation Measure for Air Environment

Dust generation during drilling of shot holes, haul road, smoke from vehicles shall be controlled by following practices:

- Dust extractor or wet drilling will be followed to control dust at source of emission during drilling.
- Sharp drill bits will be used for drilling and regrinding will be done periodically to reduce the dust generation.
- Controlled blasting to reduce dust emission and reduction in NOx emission

- All machineries and transport vehicles will be properly maintained and pollution check will be done once in a year to keep the emissions from machineries and vehicle under control.
- Water sprinkling will be done on haul road to control emission of dust while transporting minerals and waste. Provision for water spray by tankers on 'kaccha' road shall be done.
- Water sprinkling at loading area.
- Tree plantation along the haul roads & approach road will be done. A total of 550 trees would be planted.
- Use of personal protective equipment like dust mask.
- Ambient air pollution monitoring will be carried out.

4.4 Noise & Ground Vibrations

4.4.1 Impact on Ambient Noise Levels

During the mine operation, noise is generated from various transport vehicles, blasting and drilling. With increasing distance from the source, the noise level decreases due to wave divergence. Additional decrease also occurs due to atmospheric effects and interaction with objects in the transmission paths.

Anticipated Impacts:

- Mental disturbance, stress & impaired hearing.
- Decrease in speech reception & communication.
- Distraction and diminished concentration affecting job performance efficiency.

Noise generation is assumed 1 m above ground and spreading on a flat terrain devoid of any barriers. Noise attenuation effects due to barriers like undulating topography, shrubs, bushes, and trees, mine benches and dumps, absorption by air, wind, temperature, and humidity, were not considered for modelling, hence the values depict worst case scenario. The noise level will remain well within the prescribed CPCB standards and thus the impact of the project operation on the ambient noise level of study area will be insignificant.

4.4.2 Noise Impact Modelling

Noise modeling has been carried out to assess the impact on surrounding ambient noise levels. Mining machinery like drills, excavators, dozers, etc. and dumpers used for mineral transport generate noise in the working areas and along transport routes. Predictions have been carried out to compute the noise level at various distances around the mine lease area due to these major noise-generating sources.

4.4.3 Impacts due to Ground Vibrations

In this stone mining movement of vehicles, Blasting & Drilling are the main ground vibration agent. Ground-borne vibrations are generally perceptible in situations where the road surface is uneven, and buildings are situated close to the road. Road humps and cushions can therefore be a potential source of this type of vibration. The frequencies of these vibrations are generally in the range 8–16 Hz and result from the "wheel hop" mode of vibration of the vehicle's suspension, i.e. the oscillation of the axle and wheel between the tyre and suspension.

4.4.4 Noise Control Measures

Following noise control measures are being adopted by Matcha-Nokpante Stone Mine and the measures will be further strengthened, wherever required:

- Generation of noise during blasting shall be controlled by delay blasting and use of adequate charge per blast.
- Diesel powered machineries, which is major source of noise in open cast mining shall be properly maintained. Attention shall be paid towards rigorous maintenance of the silencer of the diesel engines.
- Protective devices shall be provided for use of persons employed in the vicinity of high noise areas.
- With the adoption of controlled blasting techniques, the ground vibrations will be minimized.
- Plantation around the lease boundary will cut the noise levels.

4.5 Land Environment

4.5.1 Impacts

The mining and allied activities involved in the project area are creation of temporary haul roads, Plantation, Drilling, Blasting, Material transport. The scientific mining i.e. systematic blasting and drilling of stone with mechanised method.

4.5.1.1 During Construction Phase

No major construction is involved. The impact during construction phase will be localized and short term and primarily related to civil works and erection of equipment. The duration of impact will be limited to the construction period only. The following activities may cause environmental impacts during construction of the cement plant:

- Site Preparation
- Hauling of earth materials
- cutting and drilling

- Road construction
- Clean-up operations
- Landscaping
- Local labours will be deployed for construction hence no permanent facilities will be required at site.

Temporarily, some of the environmental parameters may get disturbed during the construction phase. The anticipated impacts of each of these parameters are discussed below:

- Fugitive dust emission.
- Emission from construction equipment's and Machinery.

4.5.1.2 During Operation Phase

During operational phase the land use Pattern will be change.

- The direct impact of any construction activity on land use pattern is confine within core zone only.
- Out of the total project area, 33% of the total area is being/ will be developed under greenbelt/plantation.
- At the stage of site clearing and site preparation, the overall slope of the area is being/will be maintained.

Table 4.4 Land Use Pattern

Type of land use	Existing (ha)	During Plan Period (ha)	During Conceptual Period (ha)
Quarry	0.20	0.44	0.46
Mining Road	0.02	0.02	0.00
Garland Drain	0.00	0.05	0.00
Green Belt	0.00	0.17	0.22
Balance /Unused area	0.46	0.00	0.00
Total	0.68	0.68	0.68

4.5.2 Mitigation Measures

- The mining activities will be restricted within the lease area only.
- The waste material will be utilized for the construction of road and also will be used by the local people for construction work.

- The surface run off from the lease area will be retain within the lease and used for plantation, dust suppression and block cutting. So, there will be no soil erosion from the lease area and its surrounding due to mining activity.
- Thedumpwillhaveinwardslopewithcatchdrainsatinwardsideoftheterraceand the catch drain of the individual terrace will be connected to the garland drain outside the periphery of the dump. Retaining wall and garland drain will be constructed around the dumps and the surface runoff water pass through the garland drain and finally settled in a settling pit before released outside.
- Retainingwallandgarlanddrainsfortheproposedwastedumpwillbeconstructed to arrest wash offs from the dump.
- Maintenance/repairofvehiclesandmachinerieswillnotbeinsidetheminingarea. However, steel trays will be used for any emergency repair and sudden leakage of oil.

4.6 Impact on Water Environment

4.6.1 During Construction Phase

No impact is envisaged on water body during the Construction phase.

4.6.2 During Operation Phase

Contamination of surface water due to mining operation such as mixing on mine effluent into surface water bodies. However, the proposed site is free of any surface water bodies.

4.6.3 Mitigation measures for Water Environment

- Mining is planned to above the ground water table. Therefore, pumping of ground water from mine pit does not arise in this mine. The rain water during rainy season is proposed to settle in a pit and shall be use for dust suppression and plantation. Excess water, if any shall be discharged in natural stream after settling of suspended particles in the pit. Pump having required capacity will be installed to lift accumulated rain water from working pit and pumped to the settling tank.
- Garland drain shall be made around the Waste dump and the rain water shall be collected in garland drain and allowed to settle in a small pit for settling suspended particles before allowing discharge to natural drainage system.
- For domestic waste water Septic Tank with Soak Pit shall be provided, discharge from Soak Pit, if any shall be used for plantation.
- It shall be ensured that quality of drinking water for the worker is hygienic and good sanitation system shall be made available.

4.7 Impacts on Soil quality & Solid Waste

Mining and its subsequent activities have been found to degrade the land to a significant extent. Overburden removal from the mine area results in a very significant loss of top soil. However, work has been planned to carried out in a manner that minimum damage is done and mitigation measures restore the balance to maximum extent possible. There will be no solid waste generation throughout the planned period.

4.7.1 Mitigation measures for Soil & Solid Waste

- Gradation of dump shall be done automatically as coarser materials go to the bottom and finer at the top and therefore drain of rain water flow freely to the bottom without endangering the stability of dump.
- Stabilization of dump with top soil and tree plantation shall make the dump more stable on long. Dump should be terraced for every 5 m height and stabilized
- 1m height parapet shall be constructed for dumps more than 6 m height along the toe to prevent and control wash out from dumps entering into natural system through rain water.
- Garland drainage around dump shall prevent under wash of dump by hydrostatic pressure to be developed by surface water and control wash outs and collapse.

4.8 Impact on Ecological Environment

4.8.1 Mitigation measures for Ecological Environment

Conservation of wildlife habitat

The forest area will not be available for general purpose such as collection of fuel, small timber and other NTFP items by the local population. This area will also not be available for use by the wild animals. The objective therefore is to provide minimum possible cover and protection for the small animals which are available within the project area and to create conditions for absorbing the additional biotic pressure that may accrue on the surrounding forest areas. As per the Wildlife Protection Amendment Act of 19th December 2022, there is no schedule -I species reported in the area.

4.9 Socio Economic Impact

#	Impact Parameter	Positive Impact (Predicted)	Negative Impact (Predicted)
1	Human Settlement	• No displacement of people or habitations would occur. • Additional land requirement does not arise at this junction	• Existing land will be converted for mining purposes.

2	Livelihood	• No loss of existing livelihoods. Direct or indirect employment is expected to occur. • Additional non-agricultural livelihood opportunities are expected both directly and as spinoffs. • Most of the worker will be employed from local areas only	• A moderate influx of people in project construction and operation phases.
3	Employment Generation	• No loss of existing employment due to the proposed project is expected. • Total Direct employment opportunities of 51 with 50 indirect employments are expected. • Local people will be given preference. • Indirect employment during construction as a sequel to income multiple effect and induced growth during construction & operation phases of the project	• NIL
4	Incomes and Revenues	• Improvement of incomes of locals engaged in tertiary businesses by an average 10- 15 % through induced spending. • The successful commissioning and running of the proposed project will attract more industrial investments which in turn will	• NIL

5	Demographics	• The population levels of the Study villages are not likely to change in any significant manner. However, an influx of people in search of employment or business opportunities are expected. • The lifestyles of people are expected to improve in tune with the rise in incomes and improvement in infrastructure facilities. • The skill sets of the local residents are expected to improve in keeping with the emerging employment opportunities.	• Minor population growth
6	Community Health	• Health of people residing in buffer zone/Study area is not likely to be impacted adversely considering the nature of emissions and the state-of-the-art Emission control systems planned. • Health Initiatives and Environment Management Plan are planned and will be executed for well-being of the peripheral villages.	• If mitigation measure pertaining with Pollution are not appropriately carried out or addressed, it may raise community health issue. • Adequate health care facilities without inadequate health workers makes the community vulnerable
7	Education	• Initiatives pertaining with Education shall be	• Nil

		promoted partnering with Govt. of Meghalaya.	
8	Physical Infrastructure	• The road and power network in the area is expected to be strengthened as a sequel to industrial development around. • Provision for Drinking Water and Community Centre for development may be some of the Socio-Economic development initiatives of SDEPL.	• Increase in vehicular traffic may lead to an increase in road accidents. • Influx of workers from outside areas may cause an increased pressure on water supply and sanitation in the neighborhood during construction & operation phase
9	Social Infrastructure	• Improvement in housing stock and educational facilities could be expected in the long run as industrialization in the area gains acceleration. • Quality of Life (QoL) is considered to get boosted.	• NIL

Chapter 5 - Analysis of Alternatives (Technology & Site)

5.1 Alternative Analysis

The Proposed project is an opencast semi-mechanised mine. The mining plan has been prepared as per the MCR & MCD rules to minimize waste generation and proper utilization of minerals.

5.2 Site Selection Alternatives

5.2.1 Site Alternatives

Mining of mineral is site specific, therefore no alternate site has been considered.

5.2.2 Selection of Site

Matcha-Nokpante Stone Mine is located at Village- Matcha-Nokpante, P.O. – Dhanua, P.S. – Tura, District – West Garo Hills, State - Meghalaya over an area of 1.68 Acres (0.68 ha). The applied land over an area of 1.68 acres (0.68 ha) is located in survey of India Toposheet (OSM No. G45R14), with co-ordinates Latitudes: 25°41'22.11"N to 25°41'24.10"N and Longitudes: 89°56'19.46"E to 89°56'18.38"E. The nearest National Highway is NH127-B 0.17km in the West direction. Maximum and minimum elevation attained by the area is 98 m and 84 m A.M.S.L. The excavation will be done up to a maximum depth of 68 m RL at the ultimate period. The total Geological reserve is 3,95,114 tons. Out of which Mineable reserve in the lease area at present is estimated at 2,72,205 tons (~128.2 TPD). Taking the average production of 25,637.7 TPA, the anticipated life of the mines is nearly 4.14 years. The proposed project is a mining proposal under schedule 1(i) (a) "Mining of Minerals" of the EIA notification 2006 and its amendments. It falls under Category B1 (minor mineral). The method of mining adopted will be an opencast semi-mechanized method with the deployment of required machinery and with the use of drilling & blasting. The hard massive stone deposit shall be blasted within the lease.

5.3 Selection of Technology

Matcha-Nokpante Stone Mine will be operated through a semi-mechanized method of mining. The proposed project is a greenfield mining proposal under schedule 1(i) (a) "Mining of Minerals" of the EIA notification 2006 and its amendments. It falls under Category B1 (minor mineral). It would have been a B2 category project but due to the cluster condition, it is a B1.

5.4 Conclusion

The site proposed is suitable for mining operations. It will help to fulfil the demand of the market and proponents keeping in view the socio-economic, health, and environmental aspects.

Chapter 6 – Environmental Monitoring Programme

6.1 Objective of Environmental Monitoring

In the implementation of any project, monitoring and evaluation of management procedures is critical in efficient operation of the project. Periodic checks are necessary to prepare an action plan to rule out issues, if any, in the project. This also enables the management to maintain the time schedule of the program.

Roughly, the purposes of monitoring are:

- To evaluate performance.
- To evaluate the adequacy of Environmental Impact Assessment (EIA).
- Suggestions for improvement in EIA.
- Enhancement of environmental quality.
- Implementation and management of mitigative measures proposed in EMP.
- Compliance monitoring of the proposed project and evaluation of mitigative measures.
- To certify that the envisaged purpose of the project is achieved.

6.1.1 Technical Aspects of monitoring for the effectiveness of mitigation measures

For monitoring, following instrumentation will be used:

- Weather Monitoring Station (WMS)
- Respirable Dust Sampler (RDS)
- Fine Particulate Sampler (FPS)
- Sound Level Meter
- Water Level Indicator

Soil sampling and water sampling will be done with great care. Surface soil samples will be collected in two categories – upper 6 inches and upper 3 feet to account for shallow and relatively deep pollutants. Grab sampling will be done for water. Proper decontamination of equipment will be done to reduce error in data.

6.2 Methodologies of Measurement

Ambient Air Monitoring

Monitoring of ambient air will be done for PM_{10}, $PM_{2.5}$, SO_2, NO_x, and CO. Locations of monitoring stations will be determined based on the receptors in the airshed, and a network of monitoring stations will be set up to determine the exposure levels. Test method adopted for monitoring result analysis will be Gravimetric method (IS 5182: Part 23), Gravimetric (EPA 1998), Improved West & Geake method (IS 5182 Part 2 RA2017),

Modified Jacob & Hochheiser method (IS 5182 Part 6 RA 2017) and Non-Dispersive Infrared method (IS 5182 Part 10: 1999) respectively.

Surface Water Monitoring

Similar to Ambient Air Monitoring, monitoring locations and stations will be setup to determine the quality. But the number of parameters to be observed will be higher in case of Surface water. A battery of tests will be performed for various parameter which have been listed below:

Table 6.1 – Surface water monitoring parameters with Testing Methods

Sl. No.	Parameter	Testing Methods
1	Colour	Visual Comparison Method APHA 23RD Ed,2017: 2120 B, C
2	pH at 25^{0}C	pH Meter APHA 23RD Ed,2017 4500H^+ B
3	Dissolved Oxygen (min)	Modified Winkler Method APHA 23RD Ed,2017: 2540 C
4	Turbidity	Nephelometric Method APHA 23RD Ed,2017: 2130 B
5	Chloride (max)	Titrimetric Method APHA 23RD Ed,2017: 4500Cl^- B
6	Total Dissolved Solids	Gravimetric Method APHA 23RD Ed,2017: 2540 C
7	Oil & Grease (max)	Gravimetric Method (Solvent Extraction) APHA 23RD Ed,2017:5520-B
8	BOD (3) days at 27^{0}C (max)	Oxygen Depletion Method IS 3025(P-44): 1993 RA 2003
9	Chemical Oxygen Demand (COD)	Open Reflux Method APHA 23RD Ed,2017: 5220 C
10	Arsenic as As	By AAS Method APHA 23RD Ed,2017: 3114 B
11	Lead as Pb	By AAS Method APHA 23RD Ed,2017 3111 B
12	Cadmium as Cd (max)	By AAS Method APHA 23RD Ed,2017: 3111 B
13	Hexavalent Chromium as Cr^{+6}	Diphenyl Carbazide Method APHA 23RD Ed,2017: 3500Cr B
14	Copper as Cu (max)	By AAS Method APHA 23RD Ed,2017: 3111 B
15	Zinc as Zn(max)	By AAS Method APHA 23RD Ed,2017: 3111 B
16	Selenium as Se (max)	By AAS Method APHA 23RD Ed,2017: 3500 Se C

17	Cyanide as CN (max)	Distillation followed by Spectrophotometric Method. APHA 23RD Ed,2017: 4500 CN^- C, D
18	Fluoride as F (max)	Distillation followed by Spectrophotometric Method. APHA 23RD Ed,2017: 4500F^- C
19	Sulphates (SO_4) (max)	Turbidimetric Method APHA 23RD Ed,2017: 4500 $SO4^{2-}$ E
20	Phenolic Compounds as C_6H_5OH (max)	Chloroform extraction by Colorimetric Method APHA 23RD Ed,2017: 5530 B, D
21	Iron as Fe (max)	By AAS Method APHA 23RD Ed,2017: 3500Fe, B
22	Nitrate as NO_3 (max)	By UV-Screen Method APHA 23RD Ed,2017: 4500 NO_3^- E
23	Anionic Detergents (max)	Anionic Surfactants as MBAS APHA 23RD Ed,2017: 5540 C
24	Total Coli form	By Multiple Tube Fermentation Technique APHA 23RD Ed,2017: 9221 B

Ground Water Monitoring

Monitoring for Ground water will also be done in a very comprehensive manner to avoid contamination of the aquifer. Parameters and testing methods are tabulated below:

Table 6.2 – Ground water monitoring parameters and testing methods

Sl. No.	Parameter	Testing Methods
1.	Colour	Visual Comparison Method APHA 23RD Ed,2017: 2120 B, C
2.	Odour	Threshold Odour Test APHA 23RD Ed,2017 :2150 B
3.	Taste	Flavor Threshold Test APHA 23RD Ed,2017: 2160 C
4.	Turbidity	Nephelometric Method APHA 23RD Ed,2017 :2130 B
5.	pH at 25^0C	pH Meter APHA 23RD Ed,2017: 4500H^+ B
6.	Total Hardness (as $CaCO_3$)	EDTA Titrimetric Method APHA 23RD Ed,2017: 2340 C
7.	Iron (as Fe)	By AAS Method APHA 23RD Ed,2017: 3111, B
8.	Chloride (as Cl)	Argentometric Method APHA 23RD Ed,2017: 4500Cl^- B

9.	Residual Free Chlorine	Iodometric Method APHA 23RD Ed,2017: 4500Cl, B
11.	Total Dissolved Solids as TDS	Gravimetric Method APHA 23RD Ed,2017: 2540 C
12.	Calcium as Ca	EDTA Titrimetric Method APHA 23RD Ed,2017: 3500Ca B
13.	Magnesium as Mg	Calculation Method APHA 23RD Ed,2017: 3500Mg B
14.	Copper as Cu	By AAS Method APHA 23RD Ed,2017: 3111 B
15.	Manganese as Mn	Persulfate Method APHA 23RD Ed,2017: 3500Mn B
16.	Sulphate as SO_4	Turbidimetric Method APHA 23RD Ed,2017: 4500 $SO4^{2-}$ E
17.	Nitrate as NO_3	By UV-Screen Method APHA 23RD Ed,2017: 4500 NO_3^- E
18.	Fluoride as F	Distillation followed by Spectrophotometric Method. APHA 23RD Ed,2017: 4500F^- C
19.	Phenolic Compounds as C_6H_5OH	Chloroform extraction by Colorimetric Method APHA 23RD Ed,2017: 5530 B, D
20.	Mercury as Hg	AAS Method APHA 23RD Ed,2017: 3112 B
21.	Cadmium as Cd	AAS Method APHA 23RD Ed,2017: 3111 B
22.	Selenium as Se	By AAS Method APHA 23RD Ed,2017: 3500 Se C
23.	Arsenic as As	By AAS Method APHA 23RD Ed,2017: 3114 B
24.	Cyanide as CN	Distillation followed by Spectrophotometric Method. APHA 23RD Ed,2017: 4500 CN^- C, D
25.	Lead as Pb	By AAS Method APHA 23RD Ed,2017 3111 B
26	Zinc as Zn	By AAS Method APHA 23RD Ed,2017: 3111 B
27.	Chromium as Cr^{+6}	Diphenyl Carbazide Method APHA 23RD Ed,2017: 3500Cr B
28.	Mineral Oil	Partition-Gravimetric Method APHA 23RD Ed,2017: 5520 B
29.	Alkalinity	Titration Method APHA 23RD Ed,2017:2320 B
30.	Aluminium as Al	AAS Method

		APHA 23RD Ed,2017: 3111 D
31.	Boron	Curcumin Method APHA 23RD Ed,2017: 4500B, B

Noise Monitoring

Unlike other parameters, Noise monitoring will be done only for Ambient Noise levels. Noise levels will be measured in dB (A) on an hourly basis for 24 hours.

6.3 Performance Monitoring

Monitoring Schedule during Operation Phase

The following parameters will be monitored with schedule and duration of monitoring.

Table 6.3 – Monitoring Parameters & Frequency

SL. No.		Particulars	Monitoring Frequency	Duration of Sampling	Important Monitoring Parameters
1	Air Pollution and Meterology				
	A	Ambient Air Quality in the Core area			
		Selected 4 location in and around mine lease area specified by JSPCB.	Twice a week	24 hr continuously	PM 10, PM2.5, SO2, Nox
	B	Ambient Air Quality Monitoring outside mine lease area			
		Selected 3 location in and around mine lease area specified by JSPCB.	Twice a week	24 hr continuously	PM 10, PM2.5, SO2, Nox
	C	Meteorology			
		Meteorological data to be monitored at mine lease area	Daily	Continuous monitoring	Wind speed, direction, temperature, relative humidity and rainfall.
2	Water and Wastewater Quality				
	A	Industrial			
	1	Effluent Treatment Plant	Once in a month	Grab Sample	Mine Discharge
	2	Oil Separation Pit	Once in a month	Grab Sample	Oil and Grease
	B	Water Quality in study area			
	1	Ground Water Quality	Once in a month	Grab	As per the parameters specified under IS:10500 and as per OSPCB listed parameters.

	2	Surface Water	Once in a month	Grab	As per parameters specified under IS:10500 and as per OSPCB.
	3	Water level studies in open dug wells or piezometers in Mine lease and surrounding villages	Once in a quarter	One time	Water levels, pH, Cr^{+6} on seasonal basis and other parameters specified under IS:10500 on six monthly basis.
3	Noise Levels				
	Industrial Noise				
	1	Major noise generating sources	Quarterly	24 hr continuous with 1 hr interval	Noise level in dB(A)
	2	Near the blasting/drilling site	Quarterly	24 hr continuous with 1 hr interval	Noise level in dB(A)
	3	Along the haul road for transportation noise	Quarterly	24 hr continuous with 1 hr interval	Noise level in dB(A)
	Ambient Noise level				
		10 locations around mine lease area	Quarterly	24 hr continuous with 1 hr interval	Noise level in dB(A)
4	Inventory of Flora				
	1	Green Belt	Once in two years		List of all the flora (trees, shrubs, grasses, etc.)
5	Inventory of Fauna				
	1	PAN in buffer zone	Once in two years		List of all the fauna (mammals, avifauna, reptiles, etc.)
6	Soil				
	1	Within mine lease area	Once in a year	Grab sample	As per SPCB/CPCB guidelines
	2	2 locations in the vicinity of the mine lease from different land use types	Once in a year	Grab sample	As per SPCB/CPCB guidelines

6.4 Occupational Health & Safety Monitoring

Organized once a year through qualified medical personnel for detection of occupational diseases amongst staff and workers of the mine for the prompt action on devising remedial measure urgently.

6.4.1 Accident and Disease Monitoring

Regular check-up of employees through recognized institute shall be done.

6.5 Post Monitoring of Environment Management System

6.5.1 Analysis of Monitoring Data

Analysis will be done as per CPCB guidelines and will be submitted to concerned authority as specified in Environmental Clearance (EC) and Consent to Operate (CTO) issued by MoEF & CC and SPCB respectively.

6.5.2 Reporting Schedules of Monitoring Data

Voluntary reporting is proposed with reference to the EMP. All the monitoring program data shall be coordinated by the Environmental Monitoring Cell and regularly submitted to the state regulatory agencies. The reports shall be submitted on a six-monthly basis.

6.6 Cost of Environment Monitoring

Estimated cost for environmental monitoring plan has been tabulated below.

Table 6.4 – Estimated Cost of Environment Monitoring

S.No.	Particulars	Cost (in Rs.)
1.	Ambient Air (3 points) 24 hrs	5,000
2.	Surface Water	1,500 per sample
3.	Ground Water	1,500 per sample
4.	Noise (3 points) 24 hrs	2,000
5.	Stack Monitoring (D.G. Set)	2,000
	Total	Rs. 12,000 per season. At least two season in a year = 12,000 x 2 = **Rs. 24,000**.

Chapter 7 - Additional Studies

7.1 Public Consultation

Public hearing will be conducted after submitting draft EIA report as per the requirement of EIA Notification 2006 and amendment thereafter time to time. The proposed project falls in Mining of Minerals, Coal Mining under schedule 1(a) of EIA notification. The Draft EIA will be submitted to MS, MSPCB and other places as specified for the conduction of Public Hearing. Summary EIA report prepared in the format given in Appendix IIIA by the PP along with a copy of the application in the prescribed form within 7 days of the receipt of a written request for arranging the public hearing. The notice of public hearing will be published in two News Paper (Local and National) for the wide coverage. The action plan will be prepared accordingly the issues raised in public hearing.

7.2 Rehabilitation and Resettlement Plan

There will be no Rehabilitation and Resettlement.

7.3 Risk Assessment and Disaster Management Plan

Analyzing the risks and planning to manage the same after identifying the different hazards and hazardous scenarios in the project will lead to safer practices in the organization. Safety of personnel within the project area, in the surroundings of the project area is utmost important followed by safeguarding the assets, environment and the economy.

The possible risks in the case of stone mining projects are inundation, accidents due to vehicular movement, accident due to storage of explosives and blasting, accident during loading and transporting etc. Risk assessment is the determination of quantitative or qualitative value of risk related to a concrete situation and a recognized threat. Activities requiring assessment of risk due to occurrence of most probable instances of hazard and accident are both onsite and off-site. Risk assessment is essential for prevention of accidents and there is a need to be aware about the risk of an accident and steps can be taken to prevent the same before its happening.

Stone Mining and allied activities are associated with several potential hazards to both the employees and the public. A worker in a quarry should be provided with safety workplace and same time the environmental conditions should be such as not to impair his working efficiency. This is possible only when there is an adequate safety and health system in the quarry.

7.3.1 Risk Assessment and Damage Control

At Matcha-Nokpante Stone Mine, they believe in Swiss Cheese Model of Safety. In this the core idea is 'Expect the Unexpected'. Regular assessment of risks to prevent incidents is part of their SoP. This is carried out through:

a) Engineering Controls
b) Administrative Controls and
c) Behavioral Controls

In Engineering Controls, practices involved are safer designs, Instrumentation/ Automation in Protective Systems and Isolation of Hazardous activity / situation by LoTo technique. This needs revision in case of modification, expansion and change in equipment, technology, process is initiated.

In Administrative Controls, preparing safer lab procedures, operational methods, Job-safety analysis, Chemical Hygiene plan, Management of change and Process Safety Hazard analysis are in place. Documentation of every change should be maintained and communicated to all concerned from time to time. This will reduce the chances of incidence and create a safer place for operation.

In Behavioral Controls, asserting the use of right tools, practicing compulsorily PPE use as per the hazard and risk, Training and awareness measures for stress free working environment is needed. Counseling if needed for better and safer performance to be introduced to new as well as regular and contract employees.

Mitigation plan and measures like updated Emergency Response Plan and use of Safety IEC material will help in less severe consequences in case of an untoward incidence.

7.3.2 Hazard Identification and Risk Assessment (HIRA)

Hazards are identified by detailed observation and knowledge application, studying the process, The MSDS of material that is used, the group discussion and inputs from concerned subject matter experts and the experienced professionals from the same field. Various techniques viz. What-If analysis, Fault Tree analysis, Hazop, Hazan as per the type and severity may be utilized during the different stages in the Project.

This includes design, erection, commissioning, commercial production, planned maintenance, and plant shutdown / overhauling of machinery and equipment from time to time.

This also should include Occupational Health Safety measures during construction, for visitors, contractors, and all stakeholders. Procedures for Safe Operation must be displayed at required places in local language along with Do's and Don'ts list so that any person passing from that location get an idea about the same.

There will be neither any stacking of soil nor creation of OB dumps in the lease area. The mining activity will be carried out up to a depth of 2.5 m (max) below the surface level. So, there is no chance of slope failure or bench failure in these mines. However, there are some identified risks in this mining activity which are as below:

- An accident during mineral loading and transportation
- Inundation

Mitigation Measures during Mineral loading and transportation:

During the loading truck would be brought to a lower level so that the loading operation suits to the ergonomic condition of the workers.

- The workers will be provided with gloves and safety shoes during loading.
- Opening of the side covers of the truck should be done carefully and with warning to prevent injury to the loaders.
- The loading will be done from one side of the truck only.
- Mining Operations will be takes place during daylight only.
- The truck will be covered with tarpaulin and maintained to prevent any spillage.
- To avoid danger while reversing the trackless vehicles especially at the embankment and tipping points, all areas for reversing of lorries should be made man free as far as possible.
- All transportation within the main working will be carried out directly under the supervision and control of the management.
- Overloading should not be permitted, and the maximum permissible speed limit should be ensured.
- There will be regular maintenance of the trucks and the drivers will have valid driving licence.

7.3.2.1 OSH

- Safety training to the workers will be given.
- PPE will be provided to all the workers / contract labors.
- Workplace environment monitoring will be carried out regularly and records will be maintained.
- First aid boxes will be provided at defined locations / spots.
- Pre-employment and periodical medical examination of workers will be done by government approved medical practitioners and the details will be maintained.

7.3.2.2. Any other excluding above

This includes Biological Hazards due to different viruses, Fungi, Protozoa, and Helminthes transmitted in certain occupations.

7.4 Disaster Management Plan (DMP)

Disaster has many definitions. It is a serious disruption of the functioning of a society (here an organization), causing widespread human, material, or/and environmental losses, which exceed the ability of the affected community to cope using its own resources. Such situation may arise due to natural or man-made disasters that include Floods, Cyclones, Earthquakes, Droughts, Landslides, and avalanches to name a few and Terrorist attacks, sabotage, Road / rail accidents, industrial accidents due to explosion and fire.

7.4.1 Objective of Disaster Management Plan

Disaster Management Plan (DMP) is the process of preparing for mitigating measures, responding to and recovering from an emergency. The DMP is aimed at ensuring safety of life, protection of environment, protection of installation, restoration of production and salvage operations, in this same order of priorities.

For effective implementation of the DMP, it should be widely circulated, and personnel training should be provided through rehearsals/drills.

The DMP should reflect the probable consequences of the undesired event due to deteriorating conditions or through 'Knock on' effects. Further the management should be able to demonstrate that their assessment of the consequences uses good supporting evidence and is based on available and reliable information, incident data from internal and external sources, and, if necessary, the reports of outside agencies.

The objective of the industrial DMP is to make use of the combined resources of the plant and the outside services to achieve the following:

- Affect the rescue and medical treatment of causalities.
- Safeguard other people.
- Minimize damage to property and the environment.
- Initially contain and ultimately bring the incident under control.
- Provide authoritative information to the news media.
- Secure the safe rehabilitation of affected areas.
- Preserve relevant records and equipment for the subsequent inquiry into the cause and circumstances of the emergency.
- In effect, it is to optimize the operational efficiency to rescue, rehabilitate and render medical help and restore normalcy.

It is impossible to predict the time and nature of disaster that might strike and its severity. However, an effective DMP i.e., preplanned procedures involving proper utilization of in-house as well as outside resources will certainly help in minimizing the losses and resume the working conditions as soon as possible.

Accordingly, an Emergency Plan to be prepared and made available to all stakeholders.

- Mutual Aid Scheme like MARG (mutual aid resource group) or DCG (district crisis group) should be prepared for getting extended help to each other (organizations) in case of emergency and disastrous situation.
- To check the complete coordination and understanding preparedness level, mock drills / exercise to be conducted regularly.

7.5 Occupational Health Study

There are no chances of occurring diseases, due to mining of stone. Stone mining activities such as excavation and loading unloading require precautions since it create respiratory problems among mine workers. Excessive inhalation of dust is a serious health concern. To avoid respiratory problem from dust necessary protection should be taken.

A systematic programme for medical check-up at regular intervals will be done in an Occupational Health Study conducted by Simsang Ch. Marak.

Possible Impacts:

- The mines worker will be mostly exposed to heat and humidity mainly during summer season.
- The direct effects of heat exposure are heating exhaustion, heat stroke and heat cramps; The indirect effects are decreased efficiency, increased fatigue and enhanced accident rates.
- Heat and humidity are encountered in hot and humid condition when temperatures and air temperatures increase in summer time up to 45° C or above in the river bed mining area.
- During the high windy days in summer the dust could be the problems for eyes like itching and watering of eyes.
- Respiratory disorder may cause due to continuous exposure to dust during excavation, loading and transportation.

Mitigation Measures:

- During the summer season proper drinking water facility will be provided for the mines worker so that they will remain hydrated and avoid sun stroke
- First aid facility will made available and easily accessible to all the workers in case of emergency.
- Mines workers will be provided with PPEs like dust masks, goggles and ear muffs.
- Periodic medical examinations will be provided for all workers.

7.6 Social Impact Assessment

Considering the Socio-economic Environment, the impacts are being depicted in both positive and negative forms. However, this support is also mentioned to strengthen the Socio-economic Parameters:

Table 7.1 Social Impact Assessment

Sl. No	Impact Parameter	Positive Impact (Predicted)	Negative Impact (Predicted)
1.	Human Settlement	There will be no Rehabilitation and Resettlement.	NIL
2	Livelihood	• No loss of existing livelihoods. Direct or indirect is expected to occur. • Additional non-agricultural livelihood opportunities are expected both directly and as spinoffs. • Most of the worker are employed from local areas only	NIL
3	Employment Generation	• No loss of existing employment due to the proposed expansion project is expected. • However, local people will be given preference. • Indirect employment to during construction as a sequel to income multiple effect and induced growth during mining phase	• NIL
4	Incomes and Revenues	• Improvement of incomes of locals engaged in tertiary	• NIL

		businesses by an average 10 % through induced spending. • The successful commissioning and running of the proposed mining project will attract more industrial investments which in turn will benefit the community.	
5	Demographics	• The population levels of the Study villages are not likely to change in any significant manner. • The lifestyles of people are expected to improve in tune with the rise in incomes and improvement in infrastructure facilities. The skill sets of the residents are expected to improve in keeping with the emerging employment opportunities.	• NIL
6	Community Health	Health of people residing in buffer zone/Study area is not likely to be impacted adversely considering the nature of emissions and the state-of-the-art Environment Management Plan.	• If mitigation measure pertaining with Pollution are not appropriately carried out or addressed, it may raise community health issue. Inadequate health care facilities make the community vulnerable.
7	Education	Educational Institutions within the buffer zone/Study area is likely to be strengthened with High School Transformational Project (smart class, science lab, etc.) partnering with Govt. of Meghalaya flagship project.	Limited High schools and Educational Institutes catering professional Courses are minimal in the Study Area

8	Physical Infrastructure	• Road in the area is expected to be strengthened. Provision for Drinking Water and Community Centre for development may be some of the CSR initiatives.	If massive Increase in vehicular traffic may lead to higher incidence of road accidents.
9	Social Infrastructure	• Improvement in housing stock and educational facilities could be expected in the long run as industrialization in the area gains acceleration. Quality of Life (QoL) is considered to get boosted.	• NIL

Chapter 8 – Project Benefits

8.1 Improvement in Physical Infrastructure

The lease area is located in the agriculturally based district of the state. In this locality a good number of people are engaged in agricultural work. The mining project in the locality helps in improvement of the physical infrastructure like roads, vehicles for public transportation, water and sanitation facility, house and safety equipment for the mine workers etc.

8.2 Improvement in Social Infrastructure

There will be positive impact in socio-economic area due to increased economic activities, creation of new employment opportunities, infrastructural development and better educational and health facilities. Increasing literacy and education is one of the important parameters of social development. Concern for education is increasing due to the setting up of extensive educational facilities, a major part of which has been shared by the company.

8.3 Employment Potential – Skilled, Semi-Skilled and Unskilled

The employment potential will ameliorate economic conditions of these families directly and provide employment to many other families indirectly who are involved in business and service-oriented activities. The employment of local people in primary and secondary sectors of project shall upgrade the prosperity of the region. These will in turn improves the socioeconomic conditions of the area.

The total including temporary and permanent manpower requirement for the proposed mining operation is 26. Locals will be hired as much as possible to minimize the influx of people in the area. This project operation will provide livelihood to the poorest section of the society.

Table 8.1 Employment Potential

Serial No	Designation	Working forces per day (1 shift basis)
1	Mining Mate	1
2	Blaster Helper (Auxiliary M.M)	1
3	Storekeeper	1
4	Attendance Clerk cum Register Keeper	1
5	Quarry Munshi	1

6	Compressor Operator	1
7	Wagon Driller	1
8	Excavator Operator	1
9	Tipper Operator	2
10	Rock Break Operator	1
11	Water Tanker Driver	1
12	Miners (Semi-skilled, inclusive of absentees & leaves)	7
13	Unskilled	7
	Total	**26**

8.4 Other Tangible Benefits

- Cultural, recreation and aesthetic facilities will also improve.
- Improvement in communication, transport, education, community development and medical facilities.
- Overall change in employment and income opportunity
- Greenbelt/plantation activities will be done.

Chapter 9 – Environmental Cost Benefit Analysis

9.1 Introduction

As per EIA Notification 2006 & its subsequent amendments, this Chapter on the 'Environmental Cost Benefit Analysis' is applicable only if it is recommended at the Scoping stage. The scope of the project is defined by the TOR Letter was granted to the project by SEIAA, Meghalaya on 25.07.2024 vide Letter. No. ML/SEAC/SEIAA/PP/WGH/27/2024. Environmental Cost Benefit Analysis not recommended in the same.

Chapter 10 – Environmental Management Plan

10.1 Objective

An Environmental Management Plan (EMP) identifies administrative aspects for ensuring that mitigation measures are implemented and monitoring their effectiveness.

This EMP focuses on direct impacts, which have been identified as having substantial impacts on the environment and identifies the following:

- Actions that will be taken to avert, lower or manage environmental impacts during development and operation.
- If it is not possible to specify the aforesaid, EMP identifies the level of environmental performance that will be expected during the operation.
- Improvement in quality of life of local community of the area, because of increased productivity of personnel, improvement in education, medical & health care, drinking water supply, vocational training etc.

10.2 Environmental Policy

Shri Simsang Ch. Marak has formulated this Environment Policy, to ensure adequate Environmental, Health & Safety Management system to:

- Have full awareness of all Environmental and Factory legislation in India and ensure that regulatory requirements are met including conditions/ stipulations/ norms of Environment Clearance, Consent to Establish & Consent to Operate
- Monitor the implementation of the policy by carrying out periodic audits of compliance with full reporting to the Partners and when appropriate, introduce remedial measures.
- Selection of less-polluting/Eco-friendly technology, waste minimization, reuse/recycling and the reduction of energy consumption.
- Maintain transparency in matters of Environmental compliances and CER activities.
- Regular review of the operation as per conditions laid in the environmental orders and practice.
- All infringement/deviation/violation of the environmental or forest norms/conditions will be brought to notice of Partners through the GM.
- Deviations from the policy and cases of violation of environmental laws or other public authority shall be reported to Partners and corrective as well as preventive action taken and records maintained in writing.

- Intimation of the deviation and the Corrective actions/Preventive measures taken will be given to the concerned authorities through the six-monthly compliance report.

10.3 EMP Implementation & Monitoring

The officers of the Environment Management Cell department will meet frequently to assess the progress and analyses the data collected during the preceding month.

Table 10.1 – Activities to be monitored

Activities	Inspection Methods
Land Erosion	Regular observation for checking land erosion in hill slopes/dump slopes.
Drainage	The effectiveness of drainage system depends upon proper cleaning of all drains and sumps. Any blockage due to sitting or accumulation of loose material will be checked on a regular basis. Stone pitching, brick mounds etc., on drains shall also be monitored
Re-vegetation and Greenbelt development	Schedule planned for green belt development to be checked after every year and any alternation required will be implemented. Post plantation status will be regularly checked in every season.
Emissions and air quality	Dust prevention and control action are to be taken at work zones. To monitor the effectiveness of dust control and compare background levels of airborne dust with conditions downwind, and back this up with an adequate meteorological measurement. Monitoring shall be carried out for particulate matter, Sulphur dioxide, Nitrogen oxide and carbon monoxide.
Occupational Health	Facilities for checking levels of dust in the workplace will be provided. Each group of mine workers will be monitored for health at regular intervals by a specialist.
Socio-Economic Development	The environment department will be in regular touch with surrounding villages to monitor the implementation of various development schemes made by the mine authorities. They will also consider any immediate requirement, which can be taken care of.
Dump Management	Temporary plantation of grass species on the dump to minimize the impact of wind/ rainwater on the dump

10.4 Environment Management during Operation Phase

EMP matrix during operation phase has been listed below:

Table 10.2 Environment Management during Operation Phase

Components	Aspect	Potential Impacts	Mitigation Measure
Air	Air Quality	• Transportation activity. Drilling & Blasting	• Dust suppression consisting of water sprinkling. • Greenbelt and plantation along transport road. • Wet drilling & Controlled blasting will be practiced.
Noise & Vibration	Noise Levels & Vibration	• Vehicular movement. • Drilling • Blasting	• Periodic monitoring of work zone. • Controlled blasting will be practiced.
Water	Surface and Groundwater resources	None	None

10.5 Greenbelt Development Plan

A green belt will be developed around transport/approach route to mitigate fugitive emissions in the form of dust which will be generated during transportation of minerals. 550 trees during plan period will be planted along the route to prevent lateral pollution dispersion.

10.6 Environment Management Plan (EMP) Budget

Sl. No.	Category	Capital Cost (Rs)	Recurring Cost (Rs)
1	Water Sprinkling & Dust Suppression System	-	80,000
2	Plantation (@ Rs. 500 per plant) 598 x 500 = 2,99,000 (Includes fertilizer, pesticides, maintenance)	2,99,000	40,000
3	Environment Monitoring (One Day Monitoring)	0.0	24,000

	• Ambient air (3 points) 24 hrs – Rs. 5000 • Surface Water (Per sample) – Rs. 1500 • Ground Water (Per sample) – Rs. 1500 • Noise (3 points) 24 hrs – Rs. 2000 • Stack Monitoring (D.G. Set) – Rs. 2000 Total – Rs. 12,000 (per season) At least two season in a year – Rs. 12,000 x 2 = Rs. 24,000		
Total		**2,99,000**	**1,44,000**

Chapter 11 - Summary & Conclusion

11.1 Introduction

11.1.1 Name of the Project

The proposal is for production of 9,638.2 Cum Boulder Stone through semi-mechanised opencast mining method with spread over 1.68 acres (0.68 ha.) in village Matcha-Nokpante, P.O. – Dhanua, P.S. – Tura, District – West Garo Hills, State – Meghalaya.

The proposed project is a mining proposal under schedule 1(i) (a) "Mining of Minerals" of the EIA notification 2006 and its amendments. It falls under Category B1 (minor mineral). The method of mining adopted will be an opencast semi-mechanized method.

11.1.2 Location of the Project

The Project is located in the village Matcha-Nokpante, P.O. – Dhanua, P.S. – Tura, District – West Garo Hills, State – Meghalaya by Shri Simsang Ch. Marak. Matcha-Nokpante Stone Mine is situated near about 74 km SW away from Mendipathar Railway Station. The nearest National Highway is NH127-B 0.17km in the West direction. The Nearest airport is Lokpriya Gopinath Airport, Assam at a distance of 170 km in NE direction. Tura, the district headquarter is at a distance of 33 km in SE direction.

11.2 Project Description

The total Geological reserve is 3,95,114 tons. Out of which Mineable reserve in the lease area at present is estimated at 2,72,205 tons. The proposed production target is 25,637.7 TPA and the anticipated life of the mines is approximately 4.14 years on the proposed production rate.

The current proposal is a fresh application for environment clearance. The proposed project falls under Schedule 1(a)(i) "Mining of Minerals", Category B1 of the EIA notification 2006 and its amendments thereof.

11.3 Requirement

Table 11.1 Requirements for the Project

Land Details	1.68 Acre (0.68 ha)
Water Requirements	7.38 KLD
Power Requirement	NA
Fuel Requirement	HSD – 676 Liters/day (202.8 KL/year)
Manpower Requirement	26

<table>
<tr><td>Explosive requirement</td><td colspan="4">23 kg/Day</td></tr>
<tr><td>Machinery Requirement</td><td colspan="4"><table>
<tr><td>No.</td><td>Type</td><td>Nos.</td><td>Size/Capacity</td></tr>
<tr><td>1</td><td>Wagon Drill</td><td>1</td><td>100 mm dia</td></tr>
<tr><td>2</td><td>Excavator</td><td>1</td><td>0.9 m^3</td></tr>
<tr><td>3</td><td>Compressor</td><td>1</td><td>300 cfm</td></tr>
<tr><td>4</td><td>Diesel Pump</td><td>1</td><td>For Water Pumping</td></tr>
<tr><td>5</td><td>Tippers</td><td>2</td><td>10 T</td></tr>
<tr><td>6</td><td>Rock Breaker</td><td>1</td><td>For rock breaking</td></tr>
<tr><td>7</td><td>Water Tanker</td><td colspan="2">For Water Sprinkling</td></tr>
</table></td></tr>
</table>

11.4 Mining Methodology

The proposed method of mining is Opencast Semi-Mechanized Mining method along with drilling & blasting. For fragmentation and dislodging the hard, massive stone bed and rock, blasting is required. The operations like drilling of shot hole, sorting of ore and breaking at the size will be done mechanically by deploying 100mm dia Wagon drilling to drill and blast holes having burden and spacing 3 m x 3.5 m in staggered grid pattern. To avoid fly rock problem at the edge of hill light charged muffle blasting shall be under taken.

11.5 Mitigation Measures

Air Environment

Dust generation during drilling of shot holes, haul road, smoke from vehicles shall be controlled by following practices:

- Dust extractor or wet drilling will be followed to control dust at source of emission during drilling.
- Sharp drill bits will be used for drilling and regrinding will be done periodically to reduce the dust generation.
- Controlled blasting to reduce dust emission and reduction in NOx emission
- All machineries and transport vehicles will be properly maintained and pollution check will be done once in a year to keep the emissions from machineries and vehicle under control.

- Water sprinkling will be done on haul road to control emission of dust while transporting minerals and waste. Provision for water spray by tankers on 'kaccha' road shall be done.
- Water sprinkling at loading area.
- Tree plantation along the haul roads & approach road will be done. A total of 550 trees would be planted.
- Use of personal protective equipment like dust mask.

Ambient air pollution monitoring will be carried out.

Water Environment

- Mining is planned to above the ground water table. Therefore, pumping of ground water from mine pit does not arise in this mine. The rain water during rainy season is proposed to settle in a pit and shall be use for dust suppression and plantation. Excess water, if any shall be discharged in natural stream after settling of suspended particles in the pit. Pump having required capacity will be installed to lift accumulated rain water from working pit and pumped to the settling tank.
- Garland drain shall be made around the Waste dump and the rain water shall be collected in garland drain and allowed to settle in a small pit for settling suspended particles before allowing discharge to natural drainage system.
- For domestic waste water Septic Tank with Soak Pit shall be provided, discharge from Soak Pit, if any shall be used for plantation.

It shall be ensured that quality of drinking water for the worker is hygienic and good sanitation system shall be made available.

Noise Environment

- Generation of noise during blasting shall be controlled by delay blasting and use of adequate charge per blast.
- Diesel powered machineries, which is major source of noise in open cast mining shall be properly maintained. Attention shall be paid towards rigorous maintenance of the silencer of the diesel engines.
- Protective devices shall be provided for use of persons employed in the vicinity of high noise areas.
- With the adoption of controlled blasting techniques, the ground vibrations will be minimized.
- Plantation around the lease boundary will cut the noise levels.

Solid Waste Management

- Gradation of dump shall be done automatically as coarser materials go to the bottom and finer at the top and therefore drain of rain water flow freely to the bottom without endangering the stability of dump.
- Stabilization of dump with top soil and tree plantation shall make the dump more stable on long. Dump should be terraced for every 5 m height and stabilized
- 1m height parapet shall be constructed for dumps more than 6 m height along the toe to prevent and control wash out from dumps entering into natural system through rain water
- Garland drainage around dump shall prevent under wash of dump by hydrostatic pressure to be developed by surface water and control wash outs and collapse.

Rehabilitation and Resettlement Measures

There will be no Rehabilitation and Resettlement.

11.6 Baseline Environmental Data

Baseline Monitoring Period: March 2024 – May 2024

Table 11.2 – Baseline Data (Mar 2024 – May 2024)

Type	Parameter
AAQ Parameter at 8 locations	PM_{10} = 66.4 µg/m^3 to 60.2 µg/m^3 $PM_{2.5}$ = 36.7 µg/m^3 to 30.2 µg/m^3 SO_2 = 13.6 µg/m^3 to 9.1 µg/m^3 NO_x = 17.6 µg/m^3 to 11.1 µg/m^3
Noise quality at 8 locations	Daytime 53.1 to 40.6 dB(A) Night-time 42.8 to 40.1 dB(A)
Surface water at 2 locations	pH – 6.88 to 6.72 TDS – 274 to 259 mg/l Sulphate – 30.5 to 28.4 mg/l Fluoride – 0.291 to 0.268 mg/l
Ground water at 8 locations	pH – 7.25 to 6.85 TDS – 383 to 312 mg/l Sulphate – 35.2 to 22.7 µS/cm
Soil at 8 locations	pH – 7.24 – 6.45 Potassium – 135 to 114 mg/kg Nitrogen – 286 to 245 mg/kg

11.7 Environment Management Plan

Sl. No.	Category	Capital Cost (Rs)	Recurring Cost (Rs)
1	Water Sprinkling & Dust Suppression System	-	80,000
2	Plantation (@ Rs. 500 per plant) 598 x 500 = 2,99,000 (Includes fertilizer, pesticides, maintenance)	2,99,000	40,000
3	Environment Monitoring (One Day Monitoring) • Ambient air (3 points) 24 hrs – Rs. 5000 • Surface Water (Per sample) – Rs. 1500 • Ground Water (Per sample) – Rs. 1500 • Noise (3 points) 24 hrs – Rs. 2000 • Stack Monitoring (D.G. Set) – Rs. 2000 Total – Rs. 12,000 (per season) At least two season in a year – Rs. 12,000 x 2 = Rs. 24,000	0.0	2.03
Total		**2,99,000**	**1,44,000**

11.8 Conclusion

The current proposal Matcha-Nokpante Stone Mine is a mining project located in the village- Matcha-Nokpante, P.O. – Dhanua, P.S. – Tura, District – West Garo Hills, State – Meghalaya by Shri Simsang Ch. Marak. Baseline study and various discussions on probable impacts of all the operational activity, it has been concluded that this project will have more positive impact and will generate the revenue and employment in the area. On the above facts and baseline study, the proposed activity is recommended for the commencement with proper mitigation measure as suggested. This Project will provide several benefits to the nearby Villages by a proper planning and management. This project will employ most of the worker from nearby villages. Only supervisor Staff will be hired from outside.

Chapter 12 - Disclosure of Consultant

12.1 Introduction

Sathi Planners Pvt. Ltd. (SPPL) engaged in the business of preparation of Mine Plans, Pre-feasibility Reports for Mining Projects, Environmental Reports, Forest Diversion proposals, Mine Survey including topographical survey, Geological Reserve Estimation, Cost modelling of Mining Operations and providing services for obtaining Environmental and other statutory clearances in the field of Mining and Highway Projects.

SPPL Headquarter is in Kanke Road, Ranchi and Site Offices are at Kolkata, West Bengal, at Dumka, Jharkhand, at Patna, Bihar, at Agartala, Tripura and at Tura, Meghalaya. The organization brings together a unique team of professionals both senior retired officers from reputed Government & Private Organisations with vast knowledge and experience in their respective field and young technical & support staff from various disciplines who are committed to offer valued added expert services. Our team structure is designed to empowering our employees so that decisions can be made quicker & efficiently.

12.2 Services of Sathi Planners Pvt. Ltd.

M/s Sathi Planners Pvt. Ltd. is engaged in the business of followings:

- Environmental Impact Assessment (EIA), Environmental Management Plan (EMP), Environmental Compliance, Mining Plan, Social Impact Assessment,
- Preparation of Mine Plans for Mining Projects (Coal and Non-Coal both)
- Preparation of District Survey Reports
- Preparation of Detailed Project Report /Pre-feasibility Reports for Mining and Highway Projects
- Forest Diversion Proposals
- Providing Services for Surveys
- Geological Estimation
- Environmental Quality Monitoring

12.3 Recognition

Sathi Planners Pvt. Ltd. (SPPL) is accredited by NABET for preparation of Category# 'A' EIA Reports for Mining Projects (Open Cast and Underground both) and Category# 'B' Highway Projects.

SPPL is ISO-9001:2015 Certified Company and empaneled in following States for providing services for EIA Study, DSR, DGPS/Total Station Survey, Mine Plan Preparation-

- Jharkhand
- West Bengal
- Meghalaya
- Bihar
- Tripura

12.4 Key Management Personnel of Sathi Planners Pvt. Ltd.

Name	Qualification	Experience (Years)
Mr. Abhijit Bardhan	Chief Executive Officer	12 Yrs.
Mr. Biswajit Bardhan	Admin Head, Chartered Engineer (I), B.E., M. Tech. (Software Engg.), Life Member of Mining Engineers' Association of India	6 Yrs.
Prof. (Dr.) S. C. Santra	Advisor, Professor in Environment Science (Rtd.), University of Kalyani	46 Yrs.
Mr. R. C. Shrivastava	Advisor, Prof. & Head, Dept. of Env. Sanitation & Sanitary Engg. (Retd.), All India Institute of Hygiene & Public Health, Kolkata	47 Yrs.
Mr. A.K. Sinha	General Manager EIA Coordinator-Mining, First Class Coal Mine Manager's Competency Certificate from DGMS & QP	42 Yrs.
Prof. (Dr.) D. K. Khan	General Manager, Professor in Environment Science (Rtd.), University of Kalyani	45 yrs.

Name	Qualification	Experience (Years)
Mr. K M Khare	EIA Coordinator, Dy. General Manager (Rtd.), Steel Authority of India Limited	41 Yrs.
Mr. Santhosh Mandal	EIA Coordinator, Sr. Environment Consultant, MS (Geology & Disater Mitigation)	15 yrs.
Mr. Kisun Oraon	First Class Coal Mine Manager's Competency Certificate from DGMS, Dhanbad	35 Yrs.
Mr. Malay Kumar Mukhopadhyay	M. Sc. (Applied Geology), Retired from Bharat Refractories Limited as Senior Geologist, Life Member/Fellow of Geological Survey of India, Indian Ceramic Society, National Science Congress.	40 Yrs.
Miss. Mamta Kumari Sinha	M. Sc. (Geology), Ranchi University.	5 yrs.

12.5 Certificate of Sathi Planners Pvt. Ltd.

QUALITY COUNCIL OF INDIA
Creating an Ecosystem for Quality

National Accreditation Board for Education and Training

Certificate of Accreditation

Sathi Planners Private Limited, Ranchi

Lake Avenue, Behind Cambrian Public School, Kanke Road, Ranchi-834008, Jharkhand

*The organization is accredited as **Category-B** under the QCI-NABET Scheme for Accreditation of EIA Consultant Organization, Version 3: for preparing EIA-EMP reports in the following Sectors –*

S.No	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1	Mining of minerals including opencast	1	1 (a) (i)	A

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in RAAC minutes dated April 12, 2022 and supplementary minutes Nov 15, 2022 posted on QCI-NABET website.

The Accreditation shall remain in force subject to continued compliance to the terms and conditions mentioned in QCI-NABET's letter of accreditation bearing no QCI/NABET/ENV/ACO/22/2598 dated Dec 06, 2022. The accreditation needs to be renewed before the expiry date by Sathi Planners Private Limited, Ranchi following due process of assessment.

Sr. Director, NABET
Dated: Dec 06, 2022

Certificate No.
NABET/EIA/2225/RA 0264

Valid up to
Feb 14, 2025

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

ANNEXURE 1

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

Shri. Sachin Gavade, IFS
Divisional Forest Officer
No. B/16/VII/620-623

Dated Tura, the 13/4 Feb., 2020.

To: Shri. Simsang Ch. Marak,
Vill: Rebongara, P.O. Dhamua,
West Garo Hills, Meghalaya.

Sub: Renewal of Letter of Intent (LoI) – Reg.

Ref: No. B/16/VII/2924 dated 11.10.2017.

With reference to the subject cited above, it is to inform you that the earlier issued Letter of Intent (LoI) under Meghalaya Minor Mineral Concession Rules, 2016 for grant of mining lease, for the quarry site of **0.68** Ha area located at Matcha Nokpante P.O. Dhamua, West Garo Hills, Meghalaya vide letter under reference is being renewed for period of 6 (six) months from the date of issue of this letter.

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

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

No. A/16/VII/ **Dated Tura, the Feb., 2020.**

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

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

No. B/16/VII/ **Dated Tura, the Feb., 2020.**

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.

APPROVED

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

MALAY KUM[illegible]HOPADHYAY
RQP Reg. No. F[illegible] / 105 / 2003 / A
C/O-SATHI PLANNERS PVT. LTD.

ANNEXURE 2

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

No.DMO-W / MP / 49 / 2020 / 106, **Dated Williamnagar, the** 20/12/23

To,

SHRI SIMSANG CH. MARAK,
Village Rochonpara,
P.O Dhanua, P.S Tura,
West *Garo Hills, Meghalaya.*

Sub: **Approval of Scheme Mining Plan in respect of Mining Lease on Matcha-Nokpante Stone Mine over an area of 0.68 hectares located at Matcha-Nokpante, P.O Dhanua, P.S Tura, West Garo Hills, Meghalaya.**

Sir,

In exercise of the power conferred under Rule 10(a) & 19(1) of Amended Meghalaya Minor Mineral Concession Rules, 2016 read with Govt. Notification No.MG.49/2011/Pt-I/58, dt. 01.03.2019, the undersigned hereby approves the abovementioned Scheme Mining Plan with the following conditions:

(i) The Scheme Mining Plan is approved without prejudice to any other law applicable to the mine area from time to time made by the Central Government, State Government or any other authority and without prejudice to any order or direction from any court of competent jurisdiction.

(ii) The proposals shown on the plates and/or given in the document is based on the lease map/sketch submitted by the applicant/lease and is applicable from the date of approval.

(iii) It is clarified that the approval of Scheme Mining Plan does not in any way imply the approval of the State Government in terms of any other provision of the Meghalaya Minor Mineral Concession Rules, 2016 or Act and Rules relating to Mines and Minerals framed by Central Government and any other laws including Forest and Labour Laws.

(iv) The Approving Authority does not undertake verification of the mining lease boundary on the ground and does not undertake any responsibility regarding the correctness of the boundaries of the precise area as furnished by the applicant/lessee.

(v) At any stage, if it is observed/found that the information furnished data incorporated in the document are incorrect or misrepresent facts, the approval of the document shall be revoked with immediate effect.

(vi) If this approval conflicts with any other law or court order/direction under any statue, it shall be revoked immediately.

(vii) The granting authority may verify the Mining Lease boundary of the applied area.

Enclo : 2(two copies of approved Scheme Mining Plan).

Yours faithfully,

(Yoomiki Kyndiah)
Divisional Mining Officer,
East Garo Hills, Williamnagar.

Contd...2/-

ANNEXURE 3

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

No.DMO-W / MP / 49 / 2020/ 57 Dated Williamnagar, 10th July 2020

To,

Shri. Simsang Ch. Marak,
Village: Rochonpara, P.O. Dhanua,
West Garo Hills District, Meghalaya

Sub: Approval of Mining Plan in respect of Mining Lease on boulder stone over an area of 0.68 hectares located at Rochonpara (Matcha Nokpante), P.O. Dhanua, PS:Tura, West Garo Hills District, Meghalaya

Sir,

In exercise of the power conferred under Rule 10(a) & 19(1) of Amended Meghalaya Minor Mineral Concession Rules, 2016 read with Govt. Notification No.MG.49/2011/Pt-I/58, dt. 01.03.2019, the undersigned hereby approves the abovementioned Mining Plan with the following conditions:

(i) The mining Plan is approved without prejudice to any other law applicable to the mine area from time to time made by the Central Government, State Government or any other authority and without prejudice to any order or direction from any court of competent jurisdiction.

(ii) The proposals shown on the plates and/or given in the document is based on the lease map/sketch submitted by the applicant/lease and is applicable from the date of approval.

(iii) It is clarified that the approval of Mining Plan does not in any way imply the approval of the State Government in terms of any other provision of the Meghalaya Minor Mineral Concession Rules, 2016 or Act and Rules relating to Mines and Minerals framed by Central Government and any other laws including Forest and Labour Laws.

(iv) The Approving Authority does not undertake verification of the mining lease boundary on the ground and does not undertake any responsibility regarding the correctness of the boundaries of the precise area as furnished by the applicant/lessee.

(v) At any stage, if it is observed/found that the information furnished data incorporated in the document are incorrect or misrepresent facts, the approval of the document shall be revoked with immediate effect.

(vi) If this approval conflicts with any other law or court order/direction under any statue, it shall be revoked immediately.

(vii) The granting authority may verify the Mining Lease boundary of the applied area.

Enclo: 2(two copies of approved Mining Plan)

Yours faithfully,

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

10/07/2020

Contd...2/-

ANNEXURE 4

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

No.DMO-W / MP / 15 / 2023 / 116, Dated Williamnagar, the 19/1/24

"TO WHOM IT MAY CONCERN"

It is hereby certified that as on date, the approved Mining Plan indicated below are located within a distance of 500 meters from the periphery of the approved Mining Plan in respect of the applied Mining Lease on Boulder Stone over an area of 0.68 Ha located at **Matcha Nokpante, P.O Dhanua, P.S Tura, West Garo Hills District, Meghalaya belonging to Shri Simsang Ch. Marak of Rochonpara, P.O Dhanua, West Garo Hills District, Meghalaya.**

Sl. No.	Mining Plan approved in favour of	(Area) & Location	Mineral	Distance from the approved Mining Plan.
1.	2.	3.	4.	5.
1.	Shri Kejendro D. Sangma	1.10 Ha. Rochonpara, West Garo Hills, Meghalaya.	Boulder Stone	455 M
2.	Smti Tangkame D. Marak	10 Ha. Rochonpara, West Garo Hlls, Meghalaya.	Boulder Stone	446 M
3.	Smti Marsilla Ch. Sangma	1.10 Ha. Rochonpara, West Garo Hills, Meghalaya.	Stone Mine	280 M
4.	Smti Amrita Sangma	1.83 Ha Jewali Rochonpara, West Garo Hills, Megh.	Stone Mine	204 M
5.	Shri Ivayle Mickdenov Ch. Sangma	10 Ha. Rochonpara, West Garo Hills, Meghalaya.	Boulder Stone	240 M

(Yoomiki Kyndiah)
Divisional Mining Officer,
East Garo Hills, Williamnagar.

19/1/24

ANNEXURE 5

Meghalaya State Pollution Control Board
Forests & Environment Department, Government of Meghalaya
'ARDEN' Lumpyngngad, Shillong-793014
Website: http://megspcb.gov.in

mspcb

No.MSPCB/ONLINE/RCTO(R-1)/WGHD/2021/2021-22/ 1

Dated Shillong, the 1st November, 2021

RENEWAL OF CONSENT TO OPERATE

Consent under Section 25/26 of the Water (Prevention & Control of Pollution) Act, 1974, as amended and under Section 21 of the Air (Prevention & Control of Pollution) Act, 1981, as amended (to be referred as Water Act and Air Act respectively)

CONSENT TO OPERATE granted to **M/s STONE QUARRY OF MATCHANOKPANTE** of **Shri. Simsang Ch. Marak** for operating a stone quarry having an area of **0.80 Ha** with a production capacity **32707 TPA**, located at **Rochonpara, West Garo Hills** District of Meghalaya with a Project cost of ₹ 42,74,000/- (Rupees forty two lakhs seventy four thousand) only vide No. MPCB/TB-ONLINE/RCTO(GH)/2020-21/23 dated 15th June 2020 which expired on 31st May 2021 is hereby renewed under the following terms and conditions:

I. General Conditions:

1. This Consent has been accorded based on the particulars furnished by the applicant on behalf of to **M/s STONE QUARRY OF MATCHANOKPANTE**, and subject to addition of further or more conditions if so warranted by subsequent developments. The Consent will automatically become invalid if any change or alteration or deviation is made in actual practice;

2. This Consent is valid for a period up to **31st MAY, 2022** unless otherwise suspended or revoked.

3. This Consent may be modified, suspended or revoked by the Board in whole or in part during its term for cause including, but not limited to the following:-
   (a) Violation of any Term and Condition of this Consent;
   (b) Obtaining the Consent by misrepresentation or failure to disclose fully all relevant facts;
   (c) A change in any condition that requires temporary or permanent reduction or elimination of the authorized discharge/emission;

4. This Consent does not convey any property right in either real or personal property or any exclusive privileges, nor does it authorizes any injury to private property or any invasion of personal rights, nor any infringement of Central State or Local Laws or Regulation;

5. No air, water and soil pollution shall be created by the Industry beyond the prescribed permissible limits;

6. To maintain the environment and ecology of the area, development of green belt by planting selected species of trees, the height of which should not be less than 5 (five) metres when matured and at a spacing of 1 (One) metre should be made invariably at an area of 15 ha around the mine and 2.0 ha around the colony;

7. The Company shall comply with all the environment protection measures and safeguards recommended in the approved mining plan;

8. The caves should be preserved, if encountered in the area shall have to be reported to the Board immediately.

II. Specific Conditions:

A. Prevention & Control of Water Pollution:

The following measures should be taken up by the industry for prevention and control of water pollution:

1. Check dams/tailing dams should be provided wherever necessary to prevent the direct discharge of mine's effluent/run off etc. into the natural water courses.

2. Facilities should be maintained for utilizing the water collected in the dams for spraying of the mine, haul roads, etc. but not to discharge directly into the natural streams without proper treatments so as to conform to the prescribed effluent standards.

3. Dumping of overburden, mine spoils etc. should be properly made in identified and demarcated sites. Such dumping sites should be on impervious and stable ground to avoid percolation of contaminations into the water table and for prevention of landslides.

4. Proper planning should be made so that the dumps are to be done in steps for better stabilization and the dumping sequence should be planned in such a way that plantation over the dumps can be done simultaneously with dumping.

5. Continuous compacting of the dumps should be done to ensure its stability.

6. Sedimental basin below the overburden dumps including plantation and vegetation over the dumps should be maintained to prevent siltation of the natural water courses.

7. Facilities should be maintained for storing the top soil separately so that the same be utilised for afforestation/plantation over the dumps and excavated mines pits.

8. Water quality monitoring on the natural water courses both upstream & downstream of the quarry should be done once in every six months i.e. lean season and part monsoon and submit the report to the Board.

B. Prevention and Control of Air & Noise Pollution:

1. Setting up & operation of at least three ambient air quality monitoring station with 120^0 angle between stations for monitoring the ambient air quality including micro meteorological data should be done immediately. Selection of station should be done in consultation with this Board.

2. The Ambient Air Quality within the Plant premises and surrounding areas should be maintained within the National Ambient Air Quality Standards prescribed below:-

Sl. No.	Pollutants	Time Weighted average	Concentration in Ambient Air (Industrial, Residential, Rural Areas) $\mu g/m^3$
1.	SO_2	Annual 24 hours	50 80
2.	NO_2	Annual 24 hours	40 80

[illegible] in para 2 above in consultation with the Mining Plan consultant and

3.	Particulate Matter, PM_{10} (size less than 10 µm)	Annual 24 hours	60 100
4.	Particulate Matter, $PM_{2.5}$ (size less than 2.5 µm)	Annual 24 hours	40 60

3. A well equipped mechanical workshop should be maintained for proper maintenance of heavy earth movable machineries (HEMM). Fuel/air burning ratio of all the HEMM is to be maintained at an optimum condition so as to reduce air pollution from the exhaust emission of these machineries.

4. Regular checking of the exhaust emission from HEMM should be conducted by using requisite instruments for the purpose.

5. If dry drilling is to be employed, appropriate dust collectors should be provided to control the concentration of suspended particulate matters in the emission.

6. Plantation along the haul roads to reduce dust retention in the air should be maintained.

7. Proper maintenance, lubrication etc. of all moving machineries should be maintained and all engines should be provided with high efficiency silencers.

8. Primary blasting methods should be chosen in such a way so as to have a minimum impact of noise and vibration on the environment.

9. Usage of hydraulic rock breaker for boulder breaking instead of conventional secondary blasting to minimize noise pollution should be adopted as far as practicable.

10. Adequate measures taken should be made to minimize the air blast so that the blast size is kept at the optimum for less noise.

11. Periodic monitoring of noise and vibration level should be conducted by following prescribed norms & measuring instruments for the purpose.

12. The optimum stemming column is to be maintained so that explosives are blasted in confinement stage.

13. The industry shall take adequate measures for control of noise from all sources so as to comply with the Standards below:

LIMIT in dB (A) LEQ	
DAY TIME (6:00AM-9:00PM)	NIGHT TIME (9:00PM-6:00AM)
75	70

14. It is mandatory under the provisions of the Water (Prevention and Control of Pollution) Act, 1974 as amended and the Air (Prevention and Control of Pollution) Act, 1981 as amended, any Officer empowered by the Board on its behalf shall have without interruption, the right at any time to enter the factory/unit for inspection, collection of sample for analysis and may call for any information as deemed necessary. Denying this right will cause withdrawal of the Consent Order.

13. A detailed report on compliance to the terms and conditions as laid down in this *Consent to Operate* shall have to be submitted along with the application for renewal of the Consent and Environmental Statement in Form V.

MEMBER SECRETARY
Meghalaya State Pollution Control Board
Shillong

Copy to: -

1. The Member Secretary, SEIAA, Shillong, for favour of information.
2. The Director of Mineral Resources, Meghalaya, Shillong, for favour of information.
3. The Divisional Forest Officer, West & South West Garo Hills (T) Division, Tura, for favour of information and necessary action.
4. M/s Stone Quarry of Matchanokpante of C/o Shri. Simsang Ch. Marak, Rochonpara, P.S. Dhanua, West Garo Hills District.
5. Guard File RCTO 2021

ANNEXURE 6

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

Shri. Sachin Gavade, IFS
Divisional Forest Officer
No. B/16/VII/ 846 54

Dated Tura, the 5th March, 2019

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

To: Shri. Simsang Ch Marak
Rochonpara - Village
Dhanua, West Garo Hills

Sub: Grant of Mining Lease for extraction of stone boulder for the area of 0.68 Ha located at Matcha Nokpante, Dhanua , West Garo Hills District -Reg.

Ref: Your application for the grant of Mining Lease dated 29th August 2017

With reference to the subject cited above, it is to inform that the office of undersigned has verified all the documents submitted by you vide letter under reference for grant of mining lease wherein it has been observed that all conditions stipulated in the Letter of Intent (LoI) issued to you by the office of undersigned vide Letter No. B/16/VII/2924 dated 11th October, 2017 has been met.

2. However, based on the boundary verification report submitted by the Asst. Conservator of Forest the area of the mining lease to be granted has been finalized as **0.68 ha** bounded by the following GPS co-ordinates.

Pillar No	Latitude	Longitude
1	N 25° 41'22.11"	E 89° 56' 19.46"
2	N 25° 41'24.06"	E 89° 56' 22.50"
3	N 25° 41'25.86"	E 89° 56' 21.79"
4	N 25° 41'24.10"	E 89° 56' 18.38"

3. Hence in exercise of the power conferred under Rule 5(2) of the Meghalaya Minor Mineral Concession Rules, 2016 (referred to as "MMMCR" henceforth) and in pursuance to the G.O. No. FOR/135/2015/661 dated 16/11/2006, a mining lease for the period of 10 (Ten) years for mining of Stone boulders on the area of 0.68 Ha located at Matcha Nokpante, P.O - Dhanua, West Garo Hills District is being granted to you subject to the following conditions:

A. A Lease Deed in form E annexed to the said rules shall be executed by the PP within a period of 3 (Three) months from date of grant of Mining Lease failing which this order of grant of mining lease shall be deemed to have been revoked in line with Rule 21 of the MMMCR.

B. Mining shall be done in accordance with approved Mining Plan and as per the Lease Deed executed under Rule 21 of the MMMCR.

C. The PP shall be required to make necessary changes in the Mining Plan in line with the observations made in Para 2 above in consultation with the Mining Plan consultant and after getting the approval of the competent authority in this regard, the same shall

ANNEXURE 7

GOVERNMENT OF MEGHALAYA
DIRECTORATE OF MINERAL RESOURCES
SHILLONG.

No/DMR/MM/135/2017/12 Dated Shillong, the 12\05\2020

To,

Shri. Simsang Ch. Marak,
Village: Rochonpara, P.O.Dhanua,
West Garo Hills.

Sub: Application for Rectification and Surrender of Previous Approved Mining Plan.

Sir,

In inviting a reference to your letter No. Nil dated 17th March, 2020 on the subject cited above, it is to inform that you are hereby allowed to surrender your approved mining plan over an area 0.80 ha. at Matcha Nokpante, P.O-Dhanua, P.S-Tura, West Garo Hills District, Meghalaya. The earlier approval letter No. DMR/MM/135/2017/555 dated 4th July, 2018 now stands null and void.

This is for your information and necessary action.

Yours faithfully,

(P.Ch.Marak)
(Mining Engineer)
Directorate of Mineral Resources
Meghalaya:::Shillong.

Memo. No.DMR/MM/30/2019/ Dated Shillong, the 2020

Copy to:

1. The Controller General, Indian Bureau of Mines, Govt. of India Ministry of Mines, Indira Bhavan, Civil Lines, Nagpur – 440 102 for information and necessary action.
2. The Director General of Mines Safety, Dhanbad, Jharkhand - 826016 for information and necessary action.
3. The Secretary to the Govt. of Meghalaya, Mining & Geology Department, Shillong for information and necessary action.
4. The Principal Chief Conservator of Forest, Meghalaya, Shillong for information and necessary action.
5. The Commissioner of Labour, Meghalaya, Shillong for information and necessary action.
6. The Chairman, Meghalaya State Pollution Control Board, Lumpyngngad, Shillong for information and necessary action.
7. The Deputy Commissioner, West Garo Hills District for information.
8. The Divisional Forest Officer (Territorial) West, South & South Garo Hills, Tura
9. The Divisional Mining Officer, Williamnagar.
10. The RQP for information.

Mining Engineer
Directorate of Mineral Resources
Meghalaya:::Shillong

ANNEXURE 8

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

Shri. Sachin Gavade, IFS
Divisional Forest Officer

No. B/16/VII/620-623 **Dated Tura, the 13/14 Feb., 2020.**

To: Shri. Simsang Ch. Marak,
Vill: Rohonpara, P.O. Dhanua,
West Garo Hills, Meghalaya.

Sub: Renewal of Letter of Intent (LoI) – Reg.

Ref: No. B/16/VII/2924 dated 11.10.2017.

With reference to the subject cited above, it is to inform you that the earlier issued Letter of Intent (LoI) under Meghalaya Minor Mineral Concession Rules, 2016 for grant of mining lease, for the quarry site of **0.68** Ha area located at Matcha Nokpante P.O. Dhanua, West Garo Hills, Meghalaya vide letter under reference is being renewed for period of 6 (six) months from the date of issue of this letter.

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

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

No. A/16/VII/ **Dated Tura, the Feb., 2020.**

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

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

No. B/16/VII/ **Dated Tura, the Feb., 2020.**

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-West
Garo Hills (T) Division, Tura.

MES

ANNEXURE 9

DISTRICT ENVIRONMENT IMPACT ASSESSMENT AUTHORITY
WEST GARO HILLS, MEGHALAYA

No.WGH/DEIAA/EC/2017/10 Dated Tura, the 23rd October, 2018.

From: The Member Secretary,
District Environment Impact Assessment Authority (DEIAA),
West Garo Hills, Tura.

To: Shri. SIMSANG CH.MARAK, VILLAGE-ROCHONPARA, P.O:DHANUA,
DISTRICT-WEST GARO HILLS, STATE - MEGHALAYA.

Subject: Environment Clearance for STONE QUARRY AT MATCHA NOKPANTE ,P.O:DHANUA, P.S:TURA, DISTRICT - WEST GARO HILLS, MEGHALAYA.

Sir,

1. This has reference to your application dated 23/07/2018 seeking prior Environmental Clearance for the above project and submission of the approved mining plan to the DEIAA, West Garo Hills District, Tura, Meghalaya. The Project is classed as B2 based on the lease area of 1.98 Acres (0.80 H A) and the end use of the mineral as mentioned by the PP in the PFR (for use in construction works). After due consideration of the relevant documents submitted by the project proponent along with the application viz., Form IM, PFR, the Approved mining plan & on field verification by the DEAC, West Garo Hills, the committee has come to a unanimous decision and has recommended the case to the DEIAA, West Garo Hills for grant of Environmental Clearance to the project , Vide letter No.WGH/DEAC/Site-visit/2017-2018/5 dated Tura, the 17th Sept., 2018.

2. It is noted that the land for the proposed stone mining is a private land as per lease deed registered at the office of the Sub –Registrar, West Garo Hills , Tura between Smt. Phalme Marak (Lessor) and Shri. Simsang Ch. Marak (Lessee), and it is a Non- Forest Land as declared by the Divisional Forest Officer, West, South & South-West Garo Hills (Territorial) Division, Tura Vide his letter No.B/16/VII/NOC/MMCR/2207-213 Dated Tura, the 17th August, 2017. The Directorate of Mineral Resources, Govt. Of Meghalaya approved the mining Plan for this purpose vide their letter No.DMR/MM/135/2017/555 Dated Shillong, the 04th July,2018.

3. The proposed mine lease area of 1.98 Acres(0.80 Ha) is located at Matcha Nokpante, P.O; Dhanua, P.S.Tura, West Garo Hills District, Meghalaya. The Latitudes and longitudes of the site is (1) N. 25°41'21.06" & E. 89°56'20.94" (2) N. 25°41'22.08" & E. 89°56'20.56" (3) N.25°41'24.18" & E. 89°56'23.1" (4) N.25°41'22.92" & E. 89°56'22.38" respectively. The proposed area forms a part of the south- western slopes of the east-west trending Tura Range and is covered with typical moderately dissected low hills, elevation of which ranges

ANNEXURE 11

1000 Rs

INDIA NON JUDICIAL

१000रु. Rs 1000

भारत

एक हजार रुपये ONE THOUSAND RUPEES

REGD. DEED NO ......

SL. NO ...... DT ......

DEED OF LEASE

This agreement of lease is made on this the 5th day of June, 2017

BETWEEN

1) **SMT. PHALME MARAK**, Aking Nokma of Rochonpara Aking No. III-26 (26), P.O Dhanua, P.S. Tura, District West Garo Hills, Meghalaya, hereinafter called the **'LESSOR'** and party of the first part.

AND

2) **SHRI SIMSANG CH. MARAK, S/O Shri Saljeng Sangma**, resident of Rochinpara, P.O Dhanua, P.S Tura, Dist. West Garo Hills, Meghalaya, hereinafter called the **'LESSEE'** and party of the second part.

WHEREAS, the LESSOR is registered Aking Nokma of Rochonpara Aking Land, P.O Dhanua, Dist. West Garo Hills, Meghalaya, under Aking No. III-26(6), and he decided to offer a plot of land to the LESSEE measuring about 5 (five) bighas for extraction of stone quarry unit thereon on lease for the contract period of 10 (ten) years and the LESSEE also agreed the take the plot of land for the purpose of stone quarry under the said plot of land for which the LESSEE will construct necessary sheds and construction etc thereon.

Contd 2/

REGISTERED

D.C. Office, Tura
District Registrar

APPROVED

Divisional Mining Office
East Garo Hills, Williamnagar

(2) Simsang ch Marak

1000Rs

INDIA NON JUDICIAL

१000रु.

Rs 1000

सत्यमेव जयते

भारत

एक हजार रूपये ONE THOUSAND RUPEES

That, the landed property is completely free from all encumbrances.

AND WHEREAS, to draw a "Formal Deed of Lease" according to law and the same is to be registered and accordingly the PARTIES hereto are now reducing the terms and conditions as agreed upon by them in writing as here-under.

NOW THIS DEED WITNESSES AS FOLLOWS:-

That in pursuance of the said agreement and in consideration of the rent hereby reserved and of the several covenants of the PARTIES hereinafter contained the LESSOR have demised unto the LESSEE the said landed property situated at above shown location, and the same is standing in the physical and geographical possession of the LESSOR to have and hold the same to the LESSEE with effect from 5th day of June, 2017, for the period of 10 (ten) years subject to renewal for further period at the option of the LESSEE after the expiry of the period of lease and on the terms and condition as agreed upon.

APPROVED

Divisional Mining Officer
West Garo Hills, Williamnagar

D.C. Office, Tura
District Registrar

Contd.....3.

(1) Fatime Marak

Fatime Marak
Nokma III-26 (B)
Rochonpara A.king
West Garo Hills.

(2) Bimsang ch. Marak

1000Rs.

[3]

The parties hereto covenant with each other as follows:-

1. That, the LEASE hereby created shall be for a period of 10 (ten) years commencing from 5th day of June, 2017.

2. That, the annual rent of the leased plot of land is fixed @ Rs. 20,000/- (Rupees twenty thousand) only which is directly or indirectly payable to the LESSOR.

3. That the said landed property hereby demised shall run, managed and absolutely controlled by the LESSEE and the same shall not be further leased by the LESSEE to any third party without any prior consent of the LESSOR.

APPROVED

Divisional Mining Officer
East Garo Hills, Williamnagar.

Contd 4/-

REGISTARED
D.C. Office, Tura.
District Registrar.

(1) Phalme Marak
Phalme Marak
Nokma II, 25 (6)
Rochonpara A'king
West Garo Hills.

(2) Brimsang Ch Marak

APPROVED

Divisional Mining Officer
East Garo Hills, Williamnagar

[4]

4. That the LESSEE shall have the right to erect or construct any kind of shed, house, quarter, go-down, structure etc. and to install any machinery on the landed premises.

5. That the LESSEE shall have the right to take electric connection directly or use the existing connection or get the existing connection transferred in its name from the concerned authority and the consent of the LESSOR for such connection shall be deemed to have been given by virtue of this Deed of Lease.

6. That the LESSEE paying the rent regularly and performing the several covenants hereinafter mentioned shall peaceably hold and enjoy the said land without any claim or demand and interruption or disturbances by the LESSOR or any person or persons claiming through under or in trust for the LESSOR.

7. That the LESSOR hereby undertake and assure the LESSEE that during the continuation of the lease, they shall render all possible help and assistance to the LESSEE in dealing the stone quarry smoothly

Contd......5/

REGISTARED
C. Office, Tura
District Registrar

(1) Phaimni Marak

(2) [illegible] Marak

1000Rs.

8. That henceforth the LESSEE shall have the right and shall be at liberty to use and occupy the said plot of land and shall not do or use the SAID landed property or any part thereof for any illegal, immoral or anti-social purposes.

9. That after expiry of the fixed term the lessee will willingly surrender the possession of the property to the LANDLORD because he is the PHYSICAL OWNER of the landed property being the Aking Nokma.

APPROVED

Divisional Mining Officer
East Garo Hills, Williamnagar.

Contd......6/-

REGISTARED
D. C. Office, Tura
District Registrar.

(2) [signature]

(1) Phalme Marak
Phalme Marak
Nokma III-26 (6)
Rochonpara A.king
West Garo Hills.

1000Rs

INDIA NON JUDICIAL

१000रु.

R$ 1000

सत्यमेव जयते

भारत

एक हज़ार रूपये ONE THOUSAND RUPEES

[6]

SCHEDULE OF THE SAID LAND REFERRED TO ABOVE

All that the piece and parcel of the plot of land measuring an area of (five) bigha at Rochonpara Nokma Aking Land No. III-26 (6), situated at Rochonpara, P.O Dhanua, Dist. West Garo Hills, Meghalaya, bounded as under:

APPROVED

Divisional Mining Officer
East Garo Hills, Williamnagar

Contd 7/

D.C. Office, Tura
District Registrar.

(1) Phalme Marak

Nokma III-26 (6)
Rochonpara A.King
West Garo Hills

(2) Bingsang Ch Marak

1000Rs

[7]

Land situated at Matcha Nokpante under Rochonpara Nokma Aking Land No.III-26(6).

North	:	Nokma Aking of Rochonpara
South	:	Nokma Aking of Rochonpara
East	:	Nokma Aking of Rochonpara
West	:	Nokma Aking of Rochonpara

IN WITNESS WHEREOF, the parties hereto have signed this DEED OF LEASE on this the 5th day of June, 2017, in presence of Witnesses

WITNESSES :-

1.

2. Sangma Ch Marak
S/O Dilip K Sangma
R/O Rochonpara po. Akamma
P.S. Tura

3. Saliana Sangma
S/O L-Shilling Marak
R/O Rochonpara P.O. Akamma
P.S. Tura

Phisme Marak
Nokma III-26 (6)
Rochonpara Aking
West Garo Hills

Signature of the LESSOR

Signature of the LESSEE

APPROVED

Deputy Commissioner & Ex-Officio
District Registrar

Division. Mining Officer
West Garo Hills, Williamnagar

ANNEXURE 12

GARO HILLS AUTONOMOUS DISTRICT COUNCIL, TURA

Office of the A·king Nokma

Rochonpaya A·king No. III - 26 (6)

District : West Garo Hills.

Ref. No. objection

Date : 14/3/2017

Anga Shri Gellon Sangma Rochonpaya A.kingni Nokma anga angni a.kingni ningo donggipa biap nafiha Nokpanteni mo.ongko bikote ba Quanny Kulie chana gila Mr. Simsang ch Marak-na onenga. S/o Saljeng Sangma of Rochonpaya p/o Dhanua Dist, West Garo Hills Meghalaya.
Anga ia biapko angni hadnang hahani badi jikhal aro chaa depante bakna nangnime see onenga. angni iako see onanio danangba badi dongjawa.

Sakinang:

1 Jinjin ch Marak

2 Tettison ch. Marak

3 Saljeng ch Sangma

Iako see onenggipa
Rochonpayani Nokma
Shri Gellon Sangma

G. Sangma
Pa G. Ch. Sangma
Nokma III-26 (6)
Rochonpara A·king
West Garo Hills.

ANNEXURE 13

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 **31-07-2017**, in respect of the land located at **Matcha Nokpante, P.O. Dhanua, P.S. Hallydyganj, 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°41'22.11"	E.89°56'19.46"	4	N.25°41'24.10"	E.89°56'18.38"
2	N.25°41'24.06"	E.89°56'22.50"	5		
3	N.25°41'25.86"	E.89°56'21.79"	6		

The applicant, **Shri Simsang Ch. Marak of Village: Rochonpara, P.O. & P.S. Dhanua, 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.

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

No. A/16/VII/NOC/MMMCR/ Dated Tura, August, 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

No. B/16/VII/NOC/ MMMCR/ 2267-213 Dated Tura, 17 August, 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. Shri Simsang Ch. Marak of Village: Rochonpara, P.O. & P.S. Dhanua, West Garo Hills, Meghalaya for kind information and necessary action.

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

सत्यमेव जयते

File No: ML/SEAC/SEIAA/PP/WGH/27/2024

Government of India

Ministry of Environment, Forest and Climate Change

(Issued by the State Environment Impact Assessment Authority(SEIAA), MEGHALAYA)

***

Dated **25/07/2024**

To,

SIMSANG MARAK
MATCHA-NOKPANTE STONE MINE
ROCHONPARA, WEST GARO HILLS, MEGHALAYA - 794104
stonematcha234@gmail.com

Subject: Grant of Terms of Reference under the provision of the EIA Notification 2006-regarding.

Sir/Madam,

This is in reference to your application for Grant of Terms of Reference under the provision of the EIA Notification 2006-regarding in respect of project MATCHA-NOKPANTE STONE MINE submitted to Ministry vide proposal number SIA/ML/MIN/466510/2024 dated 29/03/2024.

2. The particulars of the proposal are as below :

(i) TOR Identification No.	TO24B0108ML5165320N
(ii) File No.	ML/SEAC/SEIAA/PP/WGH/27/2024
(iii) Clearance Type	TOR
(iv) Category	B1
(v) Project/Activity Included Schedule No.	1(a) Mining of minerals
(vii) Name of Project	MATCHA-NOKPANTE STONE MINE
(viii) Name of Company/Organization	SIMSANG MARAK
(ix) Location of Project (District, State)	WEST GARO HILLS, MEGHALAYA
(x) Issuing Authority	SEIAA
(xii) Applicability of General Conditions	no
(xiii) Applicability of Specific Conditions	yes

3. In view of the particulars given in the Para 1 above, the project proposal interalia including Form-1(Part A and B) were submitted to the Ministry for an appraisal by the State Expert Appraisal Committee (SEAC) in the Ministry under the provision of EIA notification 2006 and its subsequent amendments.

4. The above-mentioned proposal has been considered by State Environment Impact Assessment Authority(SEIAA) in the meeting held on 25/06/2024. The minutes of the meeting and all the Application and documents submitted [(viz.

Form-1 Part A, Part B, Part C EIA, EMP)] are available on PARIVESH portal which can be accessed by scanning the QR Code above.

5. The brief about the salient features of the project along with environment settings, as submitted by the Project proponent in Form-1 (Part A, B and C)/EIA & EMP Reports/presented during SEIAA are as given below.

6. The Project Proponent, Shri. Simsang Ch. Marak submitted an online application for re-appraisal and grant of fresh Term of Reference vide proposal No.SIA/ML/MIN/466510/2024 for Matcha Nokpante Stone Mine for mining of boulderstone for an area of 0.68 hectare to be used for construction purposes. The project falls under Schedule l (a) of category B2 of EIA Notification 2006. The mining lease area is located at Rochonpara (Matcha Nokpante), P.O: Dhanua, PS: Tura, West Garo Hills District, Meghalaya.
   The proposed land is on lease for a period of 10 years vide Deed of Lease which was executed on the 5th June 2017 and certified by the District Registrar, Tura, West Garo Hills, Meghalaya.
   The applied area is a Non Forest Land which was confirmed by the Divisional Forest Officer, West, South & South-West Garo Hills (T) Division, Tura vide letter No.B/16/VII/NOC/MMMCR/2207-213 dated Tura, the 17th August, 2017 and renewed Letter of Intent vide letter No.B/16/VII/620-623, dated Tura, the 13th February, 2020 respectively.
   The project proponent obtained a cluster certificate from the Divisional Mining Officer, East Garo Hills, Williamnagar vide letter No.DMO-W/MP/15/2023/1166 dated Williamnagar, the 19th January 2024 which states that there are (5) five approved mining plans lying within 500 meters from the applied mining lease area. Hence the applied mining area falls under cluster category since the total area of these six mines is summed up to 24.71 hectares.
   The project proponent submitted modification of Mining Plan with Progressive Mine Closure Plan approved by the Divisional Mining Officer, East Garo Hills, Williamnagar vide letter No.DMOW/MP/49/2020/57 dated Williamnagar, the 10th July 2020. The Mining Plan has been prepared to extract boulder stone at the rate of 25637.7 Tonnes per year with a project cost of Rs.62.7 lakhs and the operations will be open cast, semi-mechanized method of mining.
   As per the approved mining plan, the anticipated life of mine is 4.41 years or say approximately 4 years.
   The project was already awarded Environmental Clearance by the District Environment Impact Assessment Authority, West Garo Hills District, Tura vide letter No.WGH/DEIAA/EC/2017/10 dated Tura the 23rd October 2018 and also obtained a detailed statement of production for a period of five years from the Divisional Forest Officer, West & South-West Garo Hills (T) Division, Tura vide letter No.B/16/VII/279 dated Tura, the 14th February, 2024.

7. The SEIAA, in its meeting held on 25/06/2024, based on information & clarifications provided by the project proponent and after detailed deliberations recommended the proposal for grant of Terms of Reference under the provision of EIA Notification, 2006 and as amended thereof subject to stipulation of specific and general conditions as detailed in Annexure (2).

8. The SEIAA has examined the proposal in accordance with the Environment Impact Assessment (EIA) Notification, 2006 & further amendments thereto and after accepting the recommendations of the State Expert Appraisal Committee (SEAC) hereby decided to grant Terms of Reference for instant proposal of M/s. SIMSANG MARAK under the provisions of EIA Notification, 2006 and as amended thereof.

9. The Ministry reserves the right to stipulate additional conditions, if found necessary.

10. The Terms of Reference to the aforementioned project is under provisions of EIA Notification, 2006. It does not tantamount to approvals/consent/permissions etc. required to be obtained under any other Act/Rule/regulation. The Project Proponent is under obligation to obtain approvals /clearances under any other Acts/ Regulations or Statutes, as applicable, to the project.

11. This issues with the approval of the Competent Authority.

Copy To

The Principal Chief Conservator of Forests and HoFF Meghalaya, Shillong, for information.
The Secretary to the Govt. Meghalaya, Forests & Environment Department, Shillong, for information.
The Principal Chief Conservator of Forests, Territorial, Meghalaya, Shillong for information.
The Deputy Director General of Forests (C), Regional Office, N.E.Z, Ministry of Environment, Forests & Climate Change (MoEF&CC), Law-u-sib, Lumbatngen, Sawlad, Near M.T.C. workshop, Shillong- 793 021, for information and necessary action.

The Secretary to the Govt. of Meghalaya, Mining & Geology Dept., Shillong for information.
The Deputy Commissioner, West Garo Hills, Tura for information and necessary action.
The Divisional Forest Officer, West, South and South West Garo Hills (T) Division, Tura for information and necessary action.
The Divisional Mining Officer, East Garo Hills, Williamnagar for information.
The Member Secretary, Meghalaya Pollution Control Board, 'Arden', Lumpyngngad, Shillong – 793 014 for information and necessary action.
The Member Secretary, State Expert Appraisal Committee, Meghalaya for information.

Annexure 1

Specific Terms of Reference for (Mining Of Minerals)

1. Specific Condition

S. No	Terms of Reference
1.1	Site photographs together with photographs and other related details of site visits by resource persons of NABET accredited consultant of project proponent, with their names and profession/designation, together with date(s) of visit, date(s) of data collection including names of instrument/machine actually used in the field, during preparation of EIA report, is to be clearly highlighted in the EIA/EMP report.
1.2	Boundary pillars with the height not less than 2.5 feet above the ground level and 1.5 feet below ground and minimum 8 inches on all face of pillar should be erected.
1.3	GPS coordinates of each pillar should be carved/painted clearly on the pillars with red colour.

Standard Terms of Reference for (Mining of minerals)

1.

S. No	Terms of Reference
1.1	An EIA-EMP Report shall be prepared for peak capacity (…..MTPA)operation in an ML/project area of.....ha based on the generic structure specified in Appendix III of the EIA Notification, 2006.
1.2	An EIA-EMP Report would be prepared for peak capacity operation to cover the impacts and environment management plan for the project specific activities on the environment of the region, and the environmental quality encompassing air, water, land, biotic community, etc. through collection of data and information, generation of data on impacts including prediction modeling for..... MTPA of stone production based on approved project/Mining Plan for.....MTPA. Baseline data collection can be for any season (three months) except monsoon.
1.3	Propoer KML file with pin drop and coordinate of mine at 500-1000 m interval be provided
1.4	A Study area map of the core zone (project area) and 10 km area of the buffer zone (1: 50,000 scale) clearly delineating the major topographical features such as the land use, surface drainage pattern including rivers/streams/nullahs/canals, locations of human habitations, major constructions including railways, roads, pipelines, major industries, mines and other polluting sources. In case of ecologically sensitive areas such as Biosphere Reserves/National Parks/WL Sanctuaries/ Elephant

S. No	Terms of Reference
	Reserves, forests (Reserved/Protected), migratory corridors of fauna, and areas where endangered fauna and plants of medicinal and economic importance found in the 15 km study area should be given. The above details to be furnished in tabular form also
1.5	Map showing the core zone delineating the agricultural land (irrigated and un-irrigated, uncultivable land as defined in the revenue records, forest areas (as per records), along with other physical features such as water bodies, etc should be furnished.
1.6	A contour map showing the area drainage of the core zone and 25 km of the study area (where the water courses of the core zone ultimately join the major rivers/streams outside the lease/project area) should also be clearly indicated in the separate map.
1.7	Catchment area with its drainage map of 25 km area within and outside the mine shall be provided with names, details of rivers/ riverlet system and its respective order. The map should clearly indicate drainage pattern of the catchment area with basin of major rivers. Diversion of drains/ river need eloboration in form of lengthe, quantity and quality of water to be diverted
1.8	(Details of mineral reserves, geological status of the study area and the seams to be worked, ultimate working depth and progressive stage-wise working scheme until the end of mine life should be provided on the basis of the approved rated capacity and calendar plans of production from the approved Mining Plan. Geological maps and sections should be included. The Progressive mine development and Conceptual Final Mine Closure Plan should also be shown in figures. Details of mine plan and mine closure plan approval of Competent Authority should be furnished for green field and expansion projects.
1.9	Details of mining methods, technology, equipment to be used, etc., rationale for selection of specified technology and equipment proposed to be used vis-à-vis the potential impacts should be provided.
1.10	Impact of mining on hydrology, modification of natural drainage, diversion and channeling of the existing rivers/water courses flowing though the ML and adjoining the lease/project and the impact on the existing users and impacts of mining operations thereon.
1.11	A detailed Site plan of the mine showing the proposed break-up of the land for mining operations such as the quarry area, OB dumps, green belt, safety zone, buildings, infrastructure, CHP, ETP, Stockyard, township/colony (within and adjacent to the ML), undisturbed area -if any, and landscape features such as existing roads, drains/natural water bodies to be left undisturbed along with any natural drainage adjoining the lease /project areas, and modification of thereof in terms of construction of embankments/bunds, proposed diversion/re-channelling of the water courses, etc., approach roads, major haul roads, etc should be indicated.
1.12	Original land use (agricultural land/forestland/grazing land/wasteland/water bodies) of the area should be provided as per the tables given below. Impacts of project, if any on the land use, in particular, agricultural land/forestland/grazing land/water bodies falling within the lease/project and acquired for mining operations should be analyzed. Extent of area under surface rights and under mining rights should be specified. Area under Surface Rights S.N ML/Project Land use Area under Surface Rights(ha) Area Under Mining Rights(ha) (ha) Area under Both (ha)

S. No	Terms of Reference
	1 Agricultural land 2 Forest Land 3 Grazing Land 4 Settlements 5 Others (specify) S.N. Details Area (ha) 1 Buildings 2 Infrastructure 3 Roads 4 Others (specify) Total
1.13	Study on the existing flora and fauna in the study area (10km) should be carried out by an institution of relevant discipline. The list of flora and fauna duly authenticated separately for the core and study area and a statement clearly specifying whether the study area forms a part of the migratory corridor of any endangered fauna should be given. If the study area has endangered flora and fauna, or if the area is occasionally visited or used as a habitat by Schedule-I species, or if the project falls within 15 km of an ecologically sensitive area, or used as a migratory corridor then a Comprehensive Conservation Plan along with the appropriate budgetary provision should be prepared and submitted with EIA-EMP Report; and comments/observation from the CWLW of the State Govt. should also be obtained and furnished.
1.14	One-season (other than monsoon) primary baseline data on environmental quality - air (PM10, PM2.5, SOx, NOx and heavy metals such as Hg, Pb, Cr, As, etc), noise, water (surface and groundwater), soil - along with one-season met data coinciding with the same season for AAQ collection period should be provided. The detail of NABL/ MoEF&CC certification of the respective laborartory and NABET accreditation of the consultant to be provided.
1.15	Map (1: 50, 000 scale) of the study area (core and buffer zone) showing the location of various sampling stations superimposed with location of habitats, other industries/mines, polluting sources, should be provided. The number and location of the sampling stations in both core and buffer zones should be selected on the basis of size of lease/project area, the proposed impacts in the downwind (air)/downstream (surface water)/groundwater regime (based on flow). One station should be in the upwind/upstream/non-impact/non-polluting area as a control station. The monitoring should be as per CPCB guidelines and parameters for water testing for both ground water and surface water as per ISI standards and CPCB classification wherever applicable. Observed values should be provided along with the specified standards.
1.16	For proper baseline air quality assessment, Wind rose pattern in the area should be reviewed and accordingly location of AAMSQ shall be planned by the collection of air quality data by adequate monitoring stations in the downwind areas. Monitoring location for collecting baseline data should cover overall the 10 km buffer zone i.e. dispersed in 10 km buffer area. In case of expansion, the displayed data of CAAQMS and its comparison with the monitoring data to be provided
1.17	A detailed traffic study along with presence of habitation in 100 mts distance from both side of road, the impact on the air quality with its proper measures and plan of action with timeline for

S. No	Terms of Reference
	widening of road. The project will increase the no. of vehicle along the road which will indirectly contribute to carbon emission so what will be the compensatory action plan should be clearly spell out in EIA/ EMP report.
1.18	The socio-economic study to conducted with actual survey report and a comparative assessment to be provided from the census data should be provided in EIA/ EMP report also occupational status & economic status of the study area and what economically project will contribute should be clearly mention. The study should also include the status of infrastructural facilities and amenities present in the study area and a comparative assessment with census data to be provided and to link it with the initialization and quantification of need based survey for CSR activities to be followed.
1.19	The Ecology and biodiversity study should also indicate the likely impact of change in forest area for surface infrastructural development or mining activity in relation to the climate change of that area and what will be the compensatory measure to be adopted by PP to minimize the impact of forest diversion.
1.20	Baseline data on the health of the population in the impact zone and measures for occupational health and safety of the personnel and manpower for the mine should be submitted.
1.21	Impact of proposed project/activity on hydrological regime of the area shall be assessed and report be submitted. Hydrological studies as per GEC 2015 guidelines to be prepared and submitted
1.22	Impact of mining and water abstraction from the mine on the hydrogeology and groundwater regime within the core zone and 10 km buffer zone including long-term monitoring measures should be provided. Details of rainwater harvesting and measures for recharge of groundwater should be reflected in case there is a declining trend of groundwater availability and/or if the area falls within dark/grey zone.
1.23	Study on land subsidence including modeling for prediction, mitigation/prevention of subsidence, continuous monitoring measures, and safety issues should be carried out.
1.24	Detailed water balance should be provided. The break up of water requirement as per different activities in the mining operations, including use of water for sand stowing should be given separately. Source of water for use in mine, sanction of the Competent Authority in the State Govt. and impacts vis-à-vis the competing users should be provided.
1.25	PP shall submit design details of all Air Pollution control equipment (APCEs) to be implemented as part of Environment Management Plan vis-à-vis reduction in concentration of emission for each APCEs
1.26	PP shall propose to use LNG/CNG based mining machineries and trucks for mining operation and transportation of boulderstone. The measures adopted to conserve energy or use of renewable sources shall be explored
1.27	PP to evaluate the green house emission gases from the mine operation/ washery plant and corresponding carbon absorption plan.
1.28	PP shall explore the use of vent gases as generated from under ground Mine for use of energy generation/ in house energy consumption

S. No	Terms of Reference
1.29	Site specific Impact assessment with its mitigation measures, Risk Assessment and Disaster Preparedness and Management Plan should be provided.
1.30	Impact of choice of mining method, technology, selected use of machinery and impact on air quality, mineral transportation etc, Impact of blasting, noise and vibrations should be provided.
1.31	Impacts of mineral transportation within the mining area and outside the lease/project along with flow-chart indicating the specific areas generating fugitive emissions should be provided. Impacts of transportation, handling, transfer of mineral and waste on air quality, generation of effluents from workshop etc, management plan for maintenance of HEMM and other machinery/equipment should be given. Details of various facilities such as rest areas and canteen for workers and effluents/pollution load emanating from these activities should also be provided.
1.32	Details of various facilities to be provided to the workers in terms of parking, rest areas and canteen, and effluents/pollution load resulting from these activities should also be given.
1.33	The number and efficiency of mobile/static water jet, Fog cannon sprinkling system along the main mineral transportation road inside the mine, approach roads to the mine/stockyard/siding, and also the frequency of their use in impacting air quality should be provided.
1.34	Impacts of CHP, if any on air and water quality should be given. A flow chart showing water balance along with the details of zero discharge should be provided.
1.35	Conceptual Final Mine Closure Plan and post mining land use and restoration of land/habitat to the pre- mining status should be provided. A Plan for the ecological restoration of the mined out area and post mining land use should be prepared with detailed cost provisions. Impact and management of wastes and issues of re-handling (wherever applicable) and backfilling and progressive mine closure and reclamation should be furnished.
1.36	Adequate greenbelt shall be provided with details of species selected and survival rate Greenbelt development should be undertaken particularly around the transport route and CHP.
1.37	Cost of EMP (capital and recurring) should be included in the project cost and for progressive and final mine closure plan.
1.38	Details of R&R. Detailed project specific R&R Plan with data on the existing socio- economic status of the population (including tribals, SC/ST, BPL families) found in the study area and broad plan for resettlement of the displaced population, site for the resettlement colony, alternate livelihood concerns/employment for the displaced people, civic and housing amenities being offered, etc and costs along with the schedule of the implementation of the R&R Plan should be given.
1.39	CSR Plan along with details of villages and specific budgetary provisions (capital and recurring) for specific activities over the life of the project should be given.
1.40	Corporate Environment Responsibility:
1.41	a) The Company must have a well laid down Environment Policy approved by the Board of Directors.

S. No	Terms of Reference
1.42	b) The Environment Policy must prescribe for standard operating process/procedures to bring into focus any infringements/deviation/violation of the environmental or forest norms/conditions.
1.43	c) The hierarchical system or Administrative Order of the company to deal with environmental issues and for ensuring compliance with the environmental clearance conditions must be furnished.
1.44	d) To have proper checks and balances, the company should have a well laid down 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.
1.45	e) Environment Managament Cell and its responsibilities to be clearly spleel out in EIA/ EMP report
1.46	f) In built mechanism of self-monitoring of compliance of environmental regulations should be indicated.
1.47	Status of any litigations/ court cases filed/pending on the project should be provided.
1.48	PP shall submit clarification from PCCF that mine does not falls under corridors of any National Park and Wildlife Sanctuary with certified map showing distance of nearest sanctuary.
1.49	Copy of clearances/approvals such as Forestry clearances, Mining Plan Approval, mine closer plan approval. NOC from Flood and Irrigation Dept. (if req.), etc. wherever applicable.
1.50	Details on the Forest Clearance should be given as per the format given: Total ML Project Area (ha) / Total Forest land (ha) If more than one provide details of each FC / Date of FC / Extent of Forest Land / Balance area for which FC is yet to be obtained / Status of appl For diversion of forest land
1.51	In case of expansion of the proposal, the status of the work done as per mining plan and approved mine closure plan shall be detailed in EIA/ EMP report
1.52	Details on Public Hearing should cover the information relating to notices issued in the newspaper, proceedings/minutes of Public Hearing, the points raised by the general public and commitments made by the proponent and the time bound action proposed with budgets in suitable time frame. These details should be presented in a tabular form. If the Public Hearing is in the regional language, an authenticated English Translation of the same should be provided.
1.53	PP shall carry out survey through drone highlighting the ground reality for atleast 10 minutes
1.54	Detailed Chronology of the project starting from the first lease deed alloted/Block allotment/ Land acquired to its No. of renewals, CTO /CTE with details of no. renewals, previous EC(s) granted details and its compliance details, NOC details from various Govt bodies like Forest NOC(s), CGWA permissions, Power permissions, etc as per the requisites respectively to be furnished in tabular form.

S. No	Terms of Reference
1.55	The first page of the EIA/ EMP report must mention the peak capacity production, area, detail of PP, Consultant (NABET acrreditation) and Laboratory (NABL / MoEF & CC certification)
1.56	The compliances of ToR must be properly cited with respective chapter section and page no in tabular form and also mention sequence of the respective ToR complied within the EIA-EMP report in all the chapter,s section.

Additional Terms of Reference

N/A

Annexure 2

Details of Products & By-products

Name of the product /By-product	Product / By-product	Quantity	Unit	Mode of Transport / Transmission	Remarks (eg. CAS number)
boulder stone	boulder stone	25637.7	Tons per Annum (TPA)	Road	

Signature Not Verified

Digitally Signed by : Badonlang Wahlang IFS
Member Secretary, SEIAA

Date: 26/07/2024

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ULR NO – TC510924000001094F

Ambient Air Quality Monitoring

Report Release Date	: 29.05.2024	Sample Ref. No.(ARF)	: EC/ARF/29/240392
Test Report No	: EC/TR/51F/MA618	Source of Sample	: Stone Quarry
Type of Sample	: Suspended Dust & Gases	Sampling Date	: 03.03.24 to 25.05.24
Sample Collected by	: Eco care	Period of Analysis	: 27.05.24 to 28.05.24
Sample Details	: Ambient Air	Sample Condition	: Sealed & Preserved
Name & Address	: **SHRI SIMSANG CH. MARAK MATCHA-NOKPANTE STONE MINE VILLAGE-ROCHONPARA, P.O- DHANUA, P.S.-TURA DIST.- WEST GARO HILLS, STATE-MEGHALAYA**	Remarks	: ----
		Sample Drawn By	: ECO CARE
		Sampling Procedure	: EC/SOP/03/01
		Deviation if any	: None

Sampling Location: (A-1) – Mine Site (Matcha-Nokpante Stone Mine) – Lat- 25°41'23.45"(N), Long- 89°56'19.47"(E)

Test Method	EPA CFR40(pt50), Appendix 1	IS 5182:Part 23:2006	IS 5182:Part 2:2001	IS 5182:Part 6:2006
Limit as per NAAQS	60	100	80	80
Date	$PM_{2.5}$ µg/m^3	PM_{10} µg/m^3	SO_2 µg/m^3	NO_x µg/m^3
03.03.24	33.5	64.2	11.4	16.3
04.03.24	32.6	62.5	10.2	15.6
05.03.24	34.2	63.1	12.4	17.4
06.03.24	36.5	63.6	11.2	15.2
07.03.24	32.4	65.3	11.3	16.2
19.03.24	33.3	63.1	10.5	14.6
20.03.24	32.9	65.2	12.6	16.4
21.03.24	34.7	66.4	10.6	15.3
10.04.24	35.4	63.1	10.5	13.7
11.04.24	35.1	63.2	13.4	15.2
12.04.24	34.5	64.2	11.6	15.6
13.04.24	33.8	62.8	12.4	16.4
24.04.24	32.6	64.4	11.2	15.3
25.04.24	34.1	61.5	12.3	16.4
26.04.24	36.4	62.4	10.4	12.5
10.05.24	35.4	65.2	10.5	16.4
11.05.24	32.4	63.2	11.4	15.2
12.05.24	34.5	64.3	12.5	16.4
13.05.24	33.6	63.5	12.2	17.2
20.05.24	33.6	63.6	11.3	16.2
21.05.24	33.1	62.8	11.6	14.3
22.05.24	36.7	62.3	11.2	15.2
23.05.24	33.3	62.5	10.6	12.4
24.05.24	35.1	63.4	12.8	17.2
25.05.24	32.5	64.2	11.5	16.5

1. Test values are reported based on the samples received.
2. Sample(s) will be destroyed after 7 days from date of issues of the Test Report subject to nature of Preservation. Sample will be preserved as per the standard method.
3. The Test report shall not be reproduced, without the written approval of laboratory.

Prepared By

Authorized Signatory

Dr. Mousumi Pal
Ph.D.(Env.), Scientist
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Ambient Air Quality Monitoring

Report Release Date	: 29.05.2024	Sample Ref. No.(ARF)	: EC/ARF/29/240392
Test Report No	: EC/TR/51F/MA618	Source of Sample	: Stone Quarry
Type of Sample	: Suspended Dust & Gases	Sampling Date	: 03.03.24 to 25.05.24
Sample Collected by	: Eco care	Period of Analysis	: 27.04.24 to 28.05.24
Sample Details	: Ambient Air	Sample Condition	: Sealed & Preserved
Name & Address	: **SHRI SIMSANG CH. MARAK MATCHA-NOKPANTE STONE MINE VILLAGE-ROCHONPARA, P.O- DHANUA, P.S.-TURA DIST.- WEST GARO HILLS, STATE-MEGHALAYA**	Remarks	: ----
		Sample Drawn By	: ECO CARE
		Sampling Procedure	: EC/SOP/03/01
		Deviation if any	: None

Test Method	NDIR SPECTROSCOPY							
Limit as per NAAQS	2							
Date	CO mg/m^3							
Location	A1	A2	A3	A4	A5	A6	A7	A8
03.03.24	0.135	0.136	0.132	0.134	0.134	0.132	0.132	0.134
04.03.24	0.136	0.134	0.132	0.132	0.132	0.132	0.132	0.132
05.03.24	0.135	0.136	0.136	0.132	0.132	0.134	0.136	0.134
06.03.24	0.135	0.132	0.133	0.133	0.136	0.136	0.136	0.134
07.03.24	0.136	0.133	0.134	0.134	0.134	0.135	0.132	0.132
19.03.24	0.134	0.136	0.136	0.133	0.133	0.133	0.133	0.135
20.03.24	0.132	0.135	0.132	0.132	0.132	0.132	0.134	0.134
21.03.24	0.136	0.134	0.135	0.135	0.135	0.135	0.135	0.133
10.04.24	0.134	0.134	0.134	0.131	0.131	0.136	0.133	0.133
11.04.24	0.133	0.135	0.132	0.132	0.134	0.134	0.134	0.134
12.04.24	0.141	0.134	0.131	0.131	0.131	0.131	0.131	0.132
13.04.24	0.136	0.136	0.136	0.132	0.132	0.132	0.135	0.135
24.04.24	0.135	0.138	0.133	0.133	0.133	0.131	0.131	0.131
25.04.24	0.132	0.141	0.131	0.131	0.131	0.131	0.136	0.134
26.04.24	0.132	0.136	0.138	0.135	0.135	0.133	0.133	0.133
10.05.24	0.132	0.136	0.131	0.131	0.133	0.133	0.133	0.132
11.05.24	0.142	0.142	0.142	0.142	0.142	0.138	0.132	0.132
12.05.24	0.136	0.133	0.131	0.133	0.133	0.133	0.133	0.134
13.05.24	0.135	0.135	0.132	0.132	0.132	0.136	0.136	0.136
20.05.24	0.134	0.136	0.136	0.134	0.134	0.134	0.134	0.134
21.05.24	0.137	0.138	0.133	0.133	0.133	0.133	0.133	0.136
22.05.24	0.133	0.137	0.131	0.132	0.135	0.134	0.136	0.132
23.05.24	0.132	0.135	0.135	0.135	0.135	0.135	0.133	0.133
24.05.24	0.135	0.134	0.133	0.131	0.136	0.132	0.132	0.134
25.05.24	0.137	0.134	0.131	0.135	0.134	0.132	0.132	0.134

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A1	**Mine Site (Matcha-Nokpante Stone Mine) – Lat- 25°41'23.45"(N), Long- 89°56'19.47"(E)**
A2	**Mine Site (Matcha-Nokpante Stone Mine) – Lat - 25°41'24.68 " (N), Long- 89°56'21.70 "(E)**
A3	**Bangtimari Kalimandir, Lat- 25°40'58.60"(N); Long- 89°56'7.77" (E)**
A4	**Rambholapara, Lat- 25°41'20.89" (N), Long- 89°55'55.68" (E)**
A5	**Pipulbari Bazzar, Lat- 25°39'28.61" (N), Long- 89°56'56.58" (E)**
A6	**PipulbariPt.IV, Lat-25°40'33.30" (N), Long- 89°55'25.31" (E)**
A7	**Gachuabari, Lat- 25°39'9.74" (N), Long- 89°55'41.15" (E)**
A8	**Hatsingimari, Lat- 25°43'14.85" (N), Long- 89°53'46.04" (E)**

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ULR NO – TC510924000001095F

Ambient Air Quality Monitoring

Report Release Date	: 29.05.2024	Sample Ref. No.(ARF)	: EC/ARF/29/240392
Test Report No	: EC/TR/51F/MA619	Source of Sample	: Stone Quarry
Type of Sample	: Suspended Dust & Gases	Sampling Date	: 03.03.24 to 25.05.24
Sample Collected by	: Eco care	Period of Analysis	: 27.05.24 to 28.05.24
Sample Details	: Ambient Air	Sample Condition	: Sealed & Preserved
Name & Address	: **SHRI SIMSANG CH. MARAK MATCHA-NOKPANTE STONE MINE VILLAGE-ROCHONPARA, P.O- DHANUA, P.S.-TURA DIST.- WEST GARO HILLS, STATE-MEGHALAYA**	Remarks	: ----
		Sample Drawn By	: ECO CARE
		Sampling Procedure	: EC/SOP/03/01
		Deviation if any	: None

Sampling Location: (A-2) – Mine Site (Matcha-Nokpante Stone Mine) – Lat - 25°41'24.68 " (N), Long- 89°56'21.70 "(E)

Test Method	EPA CFR40(pt50), Appendix 1	IS 5182:Part 23:2006	IS 5182:Part 2:2001	IS 5182:Part 6:2006
Limit as per NAAQS	60	100	80	80
Date	$PM_{2.5}$ µg/m³	PM_{10} µg/m³	SO_2 µg/m³	NO_x µg/m³
03.03.24	34.3	62.4	11.5	15.3
04.03.24	32.6	64.5	10.3	16.6
05.03.24	34.4	63.3	12.1	15.4
06.03.24	34.1	63.5	12.6	13.5
07.03.24	32.4	62.4	10.2	16.2
19.03.24	33.5	64.1	10.2	17.6
20.03.24	36.4	64.2	11.6	14.3
21.03.24	34.7	63.4	11.6	12.6
10.04.24	35.2	63.1	10.5	16.5
11.04.24	36.6	63.4	13.3	17.2
12.04.24	34.5	64.4	12.6	15.2
13.04.24	32.5	63.2	10.8	16.4
24.04.24	34.3	63.4	11.2	14.5
25.04.24	34.1	66.3	10.4	14.2
26.04.24	33.6	62.5	11.4	15.8
10.05.24	35.5	65.2	12.5	17.3
11.05.24	32.4	63.1	11.1	14.2
12.05.24	34.5	64.1	10.4	16.5
13.05.24	36.2	65.5	12.2	15.3
20.05.24	35.2	63.3	10.5	14.3
21.05.24	36.7	64.4	11.4	15.3
22.05.24	34.1	62.5	12.3	16.2
23.05.24	35.3	62.5	11.5	14.4
24.05.24	32.5	63.5	10.2	15.2
25.05.24	35.3	65.4	12.2	15.4

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ULR NO – TC510924000001096F

Ambient Air Quality Monitoring

Report Release Date	: 29.05.2024	Sample Ref. No.(ARF)	: EC/ARF/29/240392
Test Report No	: EC/TR/51F/MA620	Source of Sample	: Stone Quarry
Type of Sample	: Suspended Dust & Gases	Sampling Date	: 03.03.24 to 25.05.24
Sample Collected by	: Eco care	Period of Analysis	: 27.05.24 to 28.05.24
Sample Details	: Ambient Air	Sample Condition	: Sealed & Preserved
Name & Address	: **SHRI SIMSANG CH. MARAK MATCHA-NOKPANTE STONE MINE VILLAGE-ROCHONPARA, P.O- DHANUA, P.S.-TURA DIST.- WEST GARO HILLS, STATE-MEGHALAYA**	Remarks	: ----
		Sample Drawn By	: ECO CARE
		Sampling Procedure	: EC/SOP/03/01
		Deviation if any	: None

Sampling Location: (A-3) – Bangtimari Kalimandir, Lat- 25°40'58.60"(N); Long- 89°56'7.77" (E)

Test Method	EPA CFR40(pt50), Appendix 1	IS 5182:Part 23:2006	IS 5182:Part 2:2001	IS 5182:Part 6:2006
Limit as per NAAQS	60	100	80	80
Date	$PM_{2.5}$ µg/m³	PM_{10} µg/m³	SO_2 µg/m³	NO_x µg/m³
03.03.24	31.2	60.2	09.5	12.3
04.03.24	31.4	63.5	10.3	12.6
05.03.24	32.4	63.3	10.1	15.4
06.03.24	33.1	62.5	11.2	13.5
07.03.24	31.3	62.4	10.2	14.2
19.03.24	30.5	61.1	09.2	12.6
20.03.24	32.6	65.3	11.4	12.3
21.03.24	31.2	63.4	10.6	12.2
10.04.24	35.2	62.1	11.4	14.5
11.04.24	32.6	60.2	11.3	13.2
12.04.24	34.2	61.4	12.2	15.1
13.04.24	30.3	63.5	12.5	16.4
24.04.24	34.3	63.4	10.2	11.3
25.04.24	32.1	63.3	10.4	14.2
26.04.24	31.5	62.2	10.2	16.2
10.05.24	33.5	62.2	09.5	14.3
11.05.24	33.4	63.1	11.1	14.5
12.05.24	34.5	62.3	13.3	12.5
13.05.24	35.3	65.5	10.2	15.3
20.05.24	35.2	63.3	10.5	16.2
21.05.24	33.5	62.4	11.2	15.3
22.05.24	32.4	62.1	13.3	13.5
23.05.24	35.3	62.5	11.1	14.2
24.05.24	30.5	64.3	12.2	15.2
25.05.24	31.3	61.2	11.5	14.1

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3. The Test report shall not be reproduced, without the written approval of laboratory.

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ISO 9001:2015 Certified, OHSAS 45001:2018 Certified

ULR NO – TC510924000001097F

Ambient Air Quality Monitoring

Report Release Date	: 29.05.2024	Sample Ref. No.(ARF)	: EC/ARF/29/240392
Test Report No	: EC/TR/51F/MA621	Source of Sample	: Stone Quarry
Type of Sample	: Suspended Dust & Gases	Sampling Date	: 03.03.24 to 25.05.24
Sample Collected by	: Eco care	Period of Analysis	: 27.05.24 to 28.05.24
Sample Details	: Ambient Air	Sample Condition	: Sealed & Preserved
Name & Address	: **SHRI SIMSANG CH. MARAK MATCHA-NOKPANTE STONE MINE VILLAGE-ROCHONPARA, P.O- DHANUA, P.S.-TURA DIST.- WEST GARO HILLS, STATE-MEGHALAYA**	Remarks	: ----
		Sample Drawn By	: ECO CARE
		Sampling Plan & Procedure	: EC/SOP/03/01
		Deviation if any	: None

Sampling Location: (A-4) – Rambholapara, Lat- 25°41'20.89" (N), Long- 89°55'55.68" (E)

Test Method	EPA CFR40(pt50), Appendix 1	IS 5182:Part 23:2006	IS 5182:Part 2:2001	IS 5182:Part 6:2006
Limit as per NAAQS	60	100	80	80
Date	$PM_{2.5}$ µg/m³	PM_{10} µg/m³	SO_2 µg/m³	NO_x µg/m³
03.03.24	32.6	62.3	11.2	12.3
04.03.24	31.4	63.5	10.4	13.6
05.03.24	31.3	63.1	09.2	15.2
06.03.24	32.1	62.2	11.2	12.5
07.03.24	32.3	62.3	11.2	11.2
19.03.24	30.2	64.1	10.3	12.3
20.03.24	31.6	65.3	11.4	12.3
21.03.24	30.2	63.5	09.6	12.2
10.04.24	30.4	63.1	10.5	12.1
11.04.24	32.6	60.3	11.3	13.2
12.04.24	31.2	61.4	11.6	15.1
13.04.24	30.5	63.2	12.5	14.2
24.04.24	32.3	64.4	10.2	11.3
25.04.24	32.1	63.3	11.3	14.2
26.04.24	31.5	62.3	10.2	13.4
10.05.24	34.7	62.2	12.5	14.3
11.05.24	33.4	63.5	11.2	11.2
12.05.24	34.3	61.3	10.3	12.5
13.05.24	32.3	62.5	10.2	15.3
20.05.24	35.2	63.1	12.2	12.2
21.05.24	33.5	63.4	11.2	15.3
22.05.24	33.6	62.2	11.5	13.4
23.05.24	35.3	64.5	12.1	11.3
24.05.24	30.5	64.3	12.3	15.2
25.05.24	32.2	61.2	13.5	13.1

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ULR NO – TC510924000001098F

Ambient Air Quality Monitoring

Report Release Date	: 29.05.2024	Sample Ref. No.(ARF)	: EC/ARF/29/240392
Test Report No	: EC/TR/51F/MA622	Source of Sample	: Stone Quarry
Type of Sample	: Suspended Dust & Gases	Sampling Date	: 03.03.24 to 25.05.24
Sample Collected by	: Eco care	Period of Analysis	: 27.05.24 to 28.05.24
Sample Details	: Ambient Air	Sample Condition	: Sealed & Preserved
Name & Address	: **SHRI SIMSANG CH. MARAK MATCHA-NOKPANTE STONE MINE VILLAGE-ROCHONPARA, P.O- DHANUA, P.S.-TURA DIST.- WEST GARO HILLS, STATE-MEGHALAYA**	Remarks	: ----
		Sample Drawn By	: ECO CARE
		Sampling Plan & Procedure	: EC/SOP/03/01
		Deviation if any	: None

Sampling Location: (A-5) - Pipulbari Bazzar, Lat- 25°39'28.61" (N), Long- 89°56'56.58" (E)

Test Method	EPA CFR40(pt50), Appendix I	IS 5182:Part 23:2006	IS 5182:Part 2:2001	IS 5182:Part 6:2006
Limit as per NAAQS	60	100	80	80
Date	$PM_{2.5}$ µg/m³	PM_{10} µg/m³	SO_2 µg/m³	NO_x µg/m³
03.03.24	30.5	62.3	11.2	13.2
04.03.24	31.1	62.2	10.4	11.6
05.03.24	31.3	61.1	09.3	12.2
06.03.24	32.1	62.2	10.2	12.5
07.03.24	32.5	62.8	11.2	11.5
19.03.24	31.2	63.1	10.5	14.3
20.03.24	31.6	62.3	11.4	12.3
21.03.24	30.3	63.5	10.6	12.2
10.04.24	32.4	63.4	10.5	15.4
11.04.24	30.6	64.3	11.7	13.2
12.04.24	31.4	61.4	12.6	15.3
13.04.24	30.5	63.3	12.5	11.2
24.04.24	30.3	64.4	10.2	11.3
25.04.24	32.2	65.3	11.2	14.4
26.04.24	31.5	62.4	10.2	13.4
10.05.24	30.7	62.2	12.5	12.3
11.05.24	33.4	63.5	09.7	11.6
12.05.24	31.7	60.5	10.3	12.5
13.05.24	32.3	62.5	10.2	11.5
20.05.24	32.2	63.1	09.8	12.2
21.05.24	34.5	62.7	11.2	15.1
22.05.24	33.3	62.2	11.5	14.4
23.05.24	31.3	61.1	10.5	11.3
24.05.24	32.5	64.3	12.3	15.5

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ULR NO – TC510924000001099F

Ambient Air Quality Monitoring

Report Release Date	: 29.05.2024	Sample Ref. No.(ARF)	: EC/ARF/29/240392
Test Report No	: EC/TR/51F/MA623	Source of Sample	: Stone Quarry
Type of Sample	: Suspended Dust & Gases	Sampling Date	: 03.03.24 to 25.05.24
Sample Collected by	: Eco care	Period of Analysis	: 27.05.24 to 28.05.24
Sample Details	: Ambient Air	Sample Condition	: Sealed & Preserved
Name & Address	: **SHRI SIMSANG CH. MARAK MATCHA-NOKPANTE STONE MINE VILLAGE-ROCHONPARA, P.O- DHANUA, P.S.-TURA DIST.- WEST GARO HILLS, STATE-MEGHALAYA**	Remarks	: ----
		Sample Drawn By	: ECO CARE
		Sampling Plan & Procedure	: EC/SOP/03/01
		Deviation if any	: None

Sampling Location: (A-6) –PipulbariPt.IV, Lat-25°40'33.30" (N), Long- 89°55'25.31" (E)

Test Method	EPA CFR40(pt50), Appendix 1	IS 5182:Part 23:2006	IS 5182:Part 2:2001	IS 5182:Part 6:2006
Limit as per NAAQS	60	100	80	80
Date	$PM_{2.5}$ µg/m³	PM_{10} µg/m³	SO_2 µg/m³	NO_x µg/m³
10.03.24	33.2	61.5	11.2	11.3
11.03.24	31.1	62.2	10.5	11.2
12.03.24	32.3	61.3	12.3	12.2
13.03.24	32.4	63.5	10.7	13.5
14.03.24	32.5	62.1	11.2	11.4
25.03.24	30.2	63.2	10.5	11.3
26.03.24	31.6	62.3	11.3	12.3
27.03.24	30.7	64.5	09.6	12.7
16.04.24	31.4	63.4	10.2	12.4
17.04.24	30.6	64.6	11.4	13.2
18.04.24	31.5	62.4	11.6	15.6
19.04.24	30.5	63.3	12.5	13.2
28.04.24	33.3	64.4	10.2	11.3
29.04.24	32.4	65.5	11.2	14.2
30.04.24	31.5	64.4	10.3	13.4
01.05.24	32.7	62.2	12.5	12.3
02.05.24	33.4	63.5	09.5	14.3
03.05.24	33.2	65.5	10.3	12.5
04.05.24	32.3	62.3	10.2	11.4
05.05.24	30.2	63.1	09.1	13.2
15.05.24	31.1	63.2	13.2	15.1
16.05.24	33.5	62.2	11.2	14.6
17.05.24	34.3	61.5	09.5	12.3
18.05.24	32.5	61.3	10.3	15.3

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ULR NO – TC510924000001100F

Ambient Air Quality Monitoring

Report Release Date	: 29.05.2024	Sample Ref. No.(ARF)	: EC/ARF/29/240392
Test Report No	: EC/TR/51F/MA624	Source of Sample	: Stone Quarry
Type of Sample	: Suspended Dust & Gases	Sampling Date	: 03.03.24 to 25.05.24
Sample Collected by	: Eco care	Period of Analysis	: 27.05.24 to 28.05.24
Sample Details	: Ambient Air	Sample Condition	: Sealed & Preserved
Name & Address	**: SHRI SIMSANG CH. MARAK MATCHA-NOKPANTE STONE MINE VILLAGE-ROCHONPARA, P.O- DHANUA, P.S.-TURA DIST.- WEST GARO HILLS, STATE-MEGHALAYA**	Remarks	: ----
		Sample Drawn By	: ECO CARE
		Sampling Plan & Procedure	: EC/SOP/03/01
		Deviation if any	: None

Sampling Location: (A-7) – Gachuabari, Lat- 25°39'9.74" (N), Long- 89°55'41.15" (E)

Test Method	EPA CFR40(pt50), Appendix 1	IS 5182:Part 23:2006	IS 5182:Part 2:2001	IS 5182:Part 6:2006
Limit as per NAAQS	60	100	80	80
Date	$PM_{2.5}$ µg/m³	PM_{10} µg/m³	SO_2 µg/m³	NO_x µg/m³
10.03.24	32.2	61.5	09.2	11.3
11.03.24	31.5	62.2	09.2	13.2
12.03.24	34.3	63.4	11.3	12.3
13.03.24	32.4	64.5	10.5	13.5
14.03.24	34.5	62.1	11.2	11.6
25.03.24	30.2	63.2	10.5	13.3
26.03.24	31.3	62.3	11.3	12.3
27.03.24	32.7	61.5	09.3	11.5
16.04.24	31.4	63.4	10.2	12.4
17.04.24	30.2	64.2	11.4	13.2
18.04.24	31.5	62.4	09.6	13.6
19.04.24	35.5	61.3	12.3	13.5
28.04.24	33.3	64.4	10.2	11.3
29.04.24	32.4	65.7	11.5	14.2
30.04.24	31.5	64.4	10.3	13.4
01.05.24	32.3	62.2	09.5	14.6
02.05.24	31.4	63.5	09.5	11.3
03.05.24	33.2	64.5	10.4	12.5
04.05.24	34.3	62.2	10.2	11.4
05.05.24	32.2	63.1	09.1	15.2
15.05.24	31.4	63.2	13.4	15.1
16.05.24	33.5	62.2	10.2	12.6
17.05.24	34.3	65.2	09.5	12.3
18.05.24	33.2	61.5	10.3	15.2

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ULR NO – TC510924000001101F

Ambient Air Quality Monitoring

Report Release Date	: 29.05.2024	Sample Ref. No.(ARF)	: EC/ARF/29/240392
Test Report No	: EC/TR/51F/MA625	Source of Sample	: Stone Quarry
Type of Sample	: Suspended Dust & Gases	Sampling Date	: 03.03.24 to 25.05.24
Sample Collected by	: Eco care	Period of Analysis	: 27.05.24 to 28.05.24
Sample Details	: Ambient Air	Sample Condition	: Sealed & Preserved
Name & Address	: **SHRI SIMSANG CH. MARAK MATCHA-NOKPANTE STONE MINE VILLAGE-ROCHONPARA, P.O- DHANUA, P.S.-TURA DIST.- WEST GARO HILLS, STATE-MEGHALAYA**	Remarks	: ----
		Sample Drawn By	: ECO CARE
		Sampling Plan & Procedure	: EC/SOP/03/01
		Deviation if any	: None

Sampling Location: (A-8) - Hatsingimari, Lat- 25°43'14.85" (N), Long- 89°53'46.04" (E)

Test Method	EPA CFR40(pt50), Appendix 1	IS 5182:Part 23:2006	IS 5182:Part 2:2001	IS 5182:Part 6:2006
Limit as per NAAQS	60	100	80	80
Date	$PM_{2.5}$ µg/m³	PM_{10} µg/m³	SO_2 µg/m³	NO_x µg/m³
10.03.24	32.2	61.5	10.3	12.5
11.03.24	31.5	61.2	11.2	13.2
12.03.24	32.3	63.4	11.3	11.3
13.03.24	32.6	61.5	09.2	11.2
14.03.24	31.5	62.2	11.2	13.6
25.03.24	31.2	63.2	10.5	12.4
26.03.24	32.3	61.3	12.5	11.3
27.03.24	33.2	61.7	10.3	11.5
16.04.24	31.4	63.4	10.2	12.4
17.04.24	30.2	63.2	11.7	11.3
18.04.24	34.5	62.3	13.6	12.6
19.04.24	35.5	61.3	12.3	13.5
28.04.24	32.1	63.4	10.2	11.5
29.04.24	32.4	65.2	09.2	12.2
30.04.24	31.5	64.4	10.3	13.4
01.05.24	35.3	61.2	11.5	11.2
02.05.24	31.4	63.4	09.3	14.3
03.05.24	33.7	64.5	12.4	14.5
04.05.24	34.3	62.5	10.2	11.1
05.05.24	31.2	62.1	12.5	12.2
15.05.24	31.4	63.2	13.4	15.1
16.05.24	33.2	62.6	13.2	13.3
17.05.24	35.3	65.2	12.5	12.3
18.05.24	31.5	63.5	10.7	12.4

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ULR NO – TC510924000001102F

Noise Quality Monitoring Report

Report Release Date	: 29.05.2024	Sample Ref. No.(ARF)	: EC/ARF/29/240392
Test Report No	: EC/TR/51F/MA626	Source of Sample	: Stone Quarry
Type of Sample	: Sound Level	Sampling Date	: 03.03.24 to 25.05.24
Sample Collected by	: Eco care	Period of Analysis	: ----
Sample Details	: Ambient Noise	Sample Condition	: Sealed & Preserved
Name & Address	: **SHRI SIMSANG CH. MARAK MATCHA-NOKPANTE STONE MINE VILLAGE-ROCHONPARA, P.O- DHANUA, P.S.-TURA DIST.- WEST GARO HILLS, STATE-MEGHALAYA**	Remarks	: ----
		Sample Drawn By	: ECO CARE
		Sampling Plan	: EC/SOP/03/01
		Deviation if any	: None

Sampling Location	NOISE LEVEL		
	Leq Day	Leq Night	Leq D-N
1. Mine Site (Matcha-Nokpante Stone Mine) Lat - 25°41'23.45"(N), 89°56'19.47"(E)	51.6 dB(A)	40.1 dB(A)	11.4 dB(A)
2.Mine Site (Matcha-Nokpante Stone Mine) Lat - 25°41'24.68 " (N), Long- 89°56'21.70 "(E)	52.3 dB(A)	41.6 dB(A)	12.2 dB(A)
3.BangtimariKalimandir Lat: 25°40'58.62" (N) Long: 89°56'7.81" (E)	52.4 dB(A)	40.8 dB(A)	10.5 dB(A)
4.Rambholapara Lat: - 25°41'20.89" (N) Long: 89°55'55.68" (E)	52.6dB(A)	40.6 dB(A)	10.9 dB(A)
5. PipulbariBazzar Lat: 25°39'28.58" (N) Long89°56'56.57" (E)	53.1 dB(A)	40.4 dB(A)	11.5 dB(A)
6. PipulbariPt.IV Lat:25°40'33.36" (N) Long: 89°55'25.26" (E)	51.2 dB(A)	41.4 dB(A)	12.3 dB(A)
7.Gachuabari Lat: 25°39'9.74" (N) Long: 89°55'41.15" (E)	52.6 dB(A)	40.6 dB(A)	11.2 dB(A)
8. Hatsingimari Lat: 25°43'14.86" (N) Long: 89°53'46.13"(E)	53.0 dB(A)	42.8 dB(A)	11.6dB(A)

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ULR NO – TC510924000001103F

GROUND WATER TEST REPORT

Report Release Date	: 29.05.2024	Sample Ref. No.(ARF)	: EC/ARF/29/240392
Test Report No	: EC/TR/51F/MA627	Source of Sample	: Stone Quarry
Type of Sample	: Water	Sampling Date	: 03.03.24 to 25.05.24
Sample Collected by	: Eco care	Period of Analysis	: 27.05.24 to 28.05.24
Sample Details	: Ground Water	Sampling Location	: As Below
Name & Address	: **SHRI SIMSANG CH. MARAK MATCHA-NOKPANTE STONE MINE VILLAGE-ROCHONPARA, P.O- DHANUA, P.S.-TURA DIST.- WEST GARO HILLS, STATE-MEGHALAYA**	Sample Condition	: Sealed & Preserved
		Sample Stamped as	: "SPPL/GW- 1 to GW- 4"
		Sample Drawn By	: ECO CARE
		Remarks	: ----
		Sampling Procedure	: EC/SOP/03/01
		Deviation if any	: None

Sampling Location: 1. (GW -1): Dhanua, Lat- 25°40'25.96" (N), Long- 89°56'14.85" (E)
2. (GW -2): Bangtimari, Lat- 25°41'16.14" (N), Long- 89°55'22.66"(E)
3. (GW -3): Bangtimari Kalimandir, Lat- 25°40'58.55"(N), Long- 89°56'9.02"(E)
4. (GW -4): Rambholapara, Lat- 25°41'20.83" (N), Long- 89°55'55.62" (E)

Sl. No	Parameters	Test Method (APHA 23rd Edition)	Standards (IS:10500)	UoM	GW - 1	GW - 2	GW - 3	GW - 4
1	pH (at 25°C)	IS 3025 (P-11):1983, RA 2017	6.5-8.5	--	7.03	6.86	7.01	6.89
2	Electrical Conductivity	IS 3025 (P-11):1983, RA 2017	--	µS/cm	503	532	640	632
3	Color	APHA 24th Ed. 2120 B	5 Max	Hazen	<5.0	<5.0	<5.0	<5.0
4	Turbidity	IS 3025 (P-10):1984, RA 2017	1 Max	NTU	<1.0	<1.0	<1.0	<1.0
5	Total Dissolved Solids (TDS)	IS 3025 (P-16):1984, RA 2017	500 Max	mg/L	312	325	378	383
6	Total Hardness (as $CaCO_3$)	IS 3025 (P-21):2009, RA 2019	200 Max	mg/L	128.5	142.2	134.8	162.4
7	Calcium (as Ca^{+2})	IS 3025 (P-40):1991, RA 2019	75 Max	mg/L	36.4	39.6	37.2	42.6
8	Magnesium (as Mg^{+2})	IS 3025 (P-46):1994, RA 2019	30 Max	mg/L	9.1	10.5	10.1	13.6
9	Total Alkalinity (as $CaCO_3$)	IS 3025 (P-23):1986, RA 2019	200 Max	mg/L	92.5	86.2	84.3	98.4
10	Chloride (as Cl^-)	IS 3025 (P-32):1988, RA 2019	250 Max	mg/L	26.8	25.2	22.1	20.4
11	Chlorine Residual (as Cl_2)	APHA 24th Ed. 4500 Cl B	0.2 Min	mg/L	<0.5	<0.5	<0.5	<0.5
12	Fluoride (as F^-)	IS 3025 (P-60):2008, RA 2019	1 Max	mg/L	0.1277	0.1145	0.1293	0.1233
13	Sulphate (as SO_4^{-2})	IS 3025 (P-24):1986, RA 2019	200 Max	mg/L	26.8	32.4	35.2	30.6
14	Nitrate (as NO_3)	IS 3025 (P-34):1988, RA 2019	45 Max	mg/L	5.02	3.56	4.57	3.15
15	Iron (as Fe)	IS 3025 (P-53):2003, RA 2019	1 Max	mg/L	0.108	0.134	0.198	0.104
16	Arsenic (as As)	APHA 24th Ed. 3114 B	0.01 Max	mg/L	<0.01	<0.01	<0.01	<0.01
17	Total Chromium (as Cr)	APHA 24th Ed. 3111 B	0.05 Max	mg/L	<0.03	<0.03	<0.03	<0.03

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GROUND WATER TEST REPORT

Report Release Date	: 29.05.2024	Sample Ref. No.(ARF)	: EC/ARF/29/240392
Test Report No	: EC/TR/51F/MA627	Source of Sample	: Stone Quarry
Type of Sample	: Water	Sampling Date	: 03.03.24 to 25.05.24
Sample Collected by	: Eco care	Period of Analysis	: 27.05.24 to 28.05.24
Sample Details	: Ground Water	Sampling Location	: As Below
Name & Address	**: SHRI SIMSANG CH. MARAK MATCHA-NOKPANTE STONE MINE VILLAGE-ROCHONPARA, P.O- DHANUA, P.S.-TURA DIST.- WEST GARO HILLS, STATE-MEGHALAYA**	Sample Condition	: Sealed & Preserved
		Sample Stamped as	: "SPPL/GW- 1 to GW- 4"
		Sample Drawn By	: ECO CARE
		Remarks	: ----
		Sampling Procedure	: EC/SOP/03/01
		Deviation if any	: None

Sampling Location: **1. (GW -1): Dhanua, Lat- 25°40'25.96" (N), Long- 89°56'14.85" (E)**
2. (GW -2): Bangtimari, Lat- 25°41'16.14" (N), Long- 89°55'22.66"(E)
3. (GW -3): Bangtimari Kalimandir, Lat- 25°40'58.55"(N), Long- 89°56'9.02"(E)
4. (GW -4): Rambholapara, Lat- 25°41'20.83" (N), Long- 89°55'55.62" (E)

Sl. No	Parameters	Test Method (APHA 23rd Edition)	Standards (IS:10500)	UoM	GW - 1	GW - 2	GW - 3	GW - 4
1	Cyanide	APHA 24th Ed. 4500 B	0.05 Max	mg/L	<0.01	<0.01	<0.01	<0.01
2	Phenolic Compound	APHA 24th Ed. 5530 C	0.001 Max	mg/L	<0.001	<0.001	<0.001	<0.001
3	Total Coliform	APHA 24th Ed. 9221 D	Shall not be detected	MPN/ 100ml	Not Detected	Not Detected	Not Detected	Not Detected
4	Escherichia coli	APHA 24th Ed. 9221 D	Shall not be detected	MPN/ 100ml	Absent	Absent	Absent	Absent

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ULR NO – TC510924000001104F

GROUND WATER TEST REPORT

Report Release Date	: 29.05.2024	Sample Ref. No.(ARF)	: EC/ARF/29/240392
Test Report No	: EC/TR/51F/MA628	Source of Sample	: Stone Quarry
Type of Sample	: Water	Sampling Date	: 03.03.24 to 25.05.24
Sample Collected by	: Eco care	Period of Analysis	: 27.05.24 to 28.05.24
Sample Details	: Ground Water	Sampling Location	: As Below
Name & Address	: **SHRI SIMSANG CH. MARAK MATCHA-NOKPANTE STONE MINE VILLAGE-ROCHONPARA, P.O- DHANUA, P.S.-TURA DIST.- WEST GARO HILLS, STATE-MEGHALAYA**	Sample Condition	: Sealed & Preserved
		Sample Stamped as	: "SPPL/GW- 5 to GW- 8"
		Sample Drawn By	: ECO CARE
		Remarks	: ----
		Sampling Procedure	: EC/SOP/03/01
		Deviation if any	: None

Sampling Location: **1. (GW -5): Pipulbari Bazzar, Lat- 25°39'28.68" (N), Long- 89°56'56.37" (E)**
2. (GW -6): Pipulbari Pt.IV, Lat- 25°40'33.17" (N), Long89°55'25.40"(E)
3. (GW -7): Gachuabari, Lat- 25°39'9.46"(N), Long- 89°55'41.29"(E)
4. (GW -8): Hatsingimari, Lat- 25°43'14.78" (N), Long- 89°53'45.72" (E)

Sl. No	Parameters	Test Method (APHA 23rd Edition)	Standards (IS:10500)	UoM	GW - 5	GW - 6	GW - 7	GW - 8
1	pH (at 25°C)	IS 3025 (P-11):1983, RA 2017	6.5-8.5	--	6.92	7.18	7.25	6.85
2	Electrical Conductivity	IS 3025 (P-11):1983, RA 2017	--	µS/cm	595	548	652	580
3	Color	APHA 24th Ed. 2120 B	5 Max	Hazen	<5.0	<5.0	<5.0	<5.0
4	Turbidity	IS 3025 (P-10):1984, RA 2017	1 Max	NTU	<1.0	<1.0	<1.0	<1.0
5	Total Dissolved Solids (TDS)	IS 3025 (P-16):1984, RA 2017	500 Max	mg/L	369	318	381	352
6	Total Hardness (as $CaCO_3$)	IS 3025 (P-21):2009, RA 2019	200 Max	mg/L	135.4	145.2	140.5	131.2
7	Calcium (as Ca^{+2})	IS 3025 (P-40):1991, RA 2019	75 Max	mg/L	43.8	46.7	38.8	40.9
8	Magnesium (as Mg^{+2})	IS 3025 (P-46):1994, RA 2019	30 Max	mg/L	6.3	6.9	10.6	7.1
9	Total Alkalinity (as $CaCO_3$)	IS 3025 (P-23):1986, RA 2019	200 Max	mg/L	82.5	88.5	90.8	84.2
10	Chloride (as Cl^-)	IS 3025 (P-32):1988, RA 2019	250 Max	mg/L	25.6	20.4	19.8	24.7
11	Chlorine Residual (as Cl_2)	APHA 24th Ed. 4500 Cl B	0.2 Min	mg/L	<0.5	<0.5	<0.5	<0.5
12	Fluoride (as F^-)	IS 3025 (P-60):2008, RA 2019	1 Max	mg/L	0.1124	0.1242	0.1176	0.1311
13	Sulphate (as SO_4^{-2})	IS 3025 (P-24):1986, RA 2019	200 Max	mg/L	31.5	22.7	30.1	24.2
14	Nitrate (as NO_3)	IS 3025 (P-34):1988, RA 2019	45 Max	mg/L	3.47	3.38	3.72	4.71
15	Iron (as Fe)	IS 3025 (P-53):2003, RA 2019	1 Max	mg/L	0.107	0.121	0.123	0.117
16	Arsenic (as As)	APHA 24th Ed. 3114 B	0.01 Max	mg/L	<0.01	<0.01	<0.01	<0.01
17	Total Chromium (as Cr)	APHA 24th Ed. 3111 B	0.05 Max	mg/L	<0.03	<0.03	<0.03	<0.03

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GROUND WATER TEST REPORT

Report Release Date	: 29.05.2024	Sample Ref. No.(ARF)	: EC/ARF/29/240392
Test Report No	: EC/TR/51F/MA628	Source of Sample	: Stone Quarry
Type of Sample	: Water	Sampling Date	: 03.03.24 to 25.05.24
Sample Collected by	: Eco care	Period of Analysis	: 27.05.24 to 28.05.24
Sample Details	: Ground Water	Sampling Location	: As Below
Name & Address	: **SHRI SIMSANG CH. MARAK MATCHA-NOKPANTE STONE MINE VILLAGE-ROCHONPARA, P.O- DHANUA, P.S.-TURA DIST.- WEST GARO HILLS, STATE-MEGHALAYA**	Sample Condition	: Sealed & Preserved
		Sample Stamped as	: "SPPL/GW- 5 to GW- 8"
		Sample Drawn By	: ECO CARE
		Remarks	: ----
		Sampling Procedure	: EC/SOP/03/01
		Deviation if any	: None

Sampling Location: **1. (GW -5): Pipulbari Bazzar, Lat- 25°39'28.68" (N), Long- 89°56'56.37" (E)**
2. (GW -6): Pipulbari Pt.IV, Lat- 25°40'33.17" (N), Long89°55'25.40"(E)
3. (GW -7): Gachuabari, Lat- 25°39'9.46"(N), Long- 89°55'41.29"(E)
4. (GW -8): Hatsingimari, Lat- 25°43'14.78" (N), Long- 89°53'45.72" (E)

Sl. No	Parameters	Test Method (APHA 23rd Edition)	Standards (IS:10500)	UoM	GW - 5	GW - 6	GW - 7	GW - 8
18	Cyanide	APHA 24th Ed. 4500 B	0.05 Max	mg/L	<0.01	<0.01	<0.01	<0.01
19	Phenolic Compound	APHA 24th Ed. 5530 C	0.001 Max	mg/L	<0.001	<0.001	<0.001	<0.001
20	Total Coliform	APHA 24th Ed. 9221 D	Shall not be detected	MPN/100ml	Not Detected	Not Detected	Not Detected	Not Detected
21	Escherichia coli	APHA 24th Ed. 9221 D	Shall not be detected	MPN/100ml	Absent	Absent	Absent	Absent

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Soil Quality Monitoring & Analysis Report

Report Release Date	: 29.05.2024	Sample Ref. No.(ARF)	: EC/ARF/29/240392
Test Report No	: EC/TR/51F/MA629	Source of Sample	: Stone Quarry
Type of Sample	: Soil	Sampling Date	: 03.03.24 to 25.05.24
Sample Collected by	: Eco care	Period of Analysis	: 27.05.24 to 28.05.24
Sample Details	: Soil	Sample Condition	: Sealed & Preserved
Name & Address	: **SHRI SIMSANG CH. MARAK MATCHA-NOKPANTE STONE MINE VILLAGE-ROCHONPARA, P.O- DHANUA, P.S.-TURA DIST.- WEST GARO HILLS, STATE-MEGHALAYA**	Remarks	: ----
		Sample Drawn By	: ECO CARE
		Deviation if any	: None

SL No.	Parameters	Protocol	UoM	Sampling Location			
				Mine Site (Matcha-Nokpante Stone Mine)	Mine Site (Matcha-Nokpante Stone Mine)	Bangtimari Kalimandir	Rambholapara
1	pH	IS 2720 (P-26):1987	--	7.12	7.22	6.86	6.92
2	Appearance	Soil Testing India 2011	--	Light Brown	Dark Brown	Dark Brown	Light Brown
3	Conductivity	IS 14467:2002	µS/cm	1586	1529	1687	1615
4	Water holding capacity	Soil Testing India 2011	%	32.5	36.4	34.1	32.4
5	Bulk Density	Soil Testing India 2011	gm/cc	1.39	1.36	1.27	1.39
6	Moisture	IS 2720 (P-2):2011	%	22.3	24.5	20.6	26.0
7	Permeability	Soil Testing India 2011	cm/hr	13.8	11.1	10.2	11.9
8	Porosity	Soil Testing India 2011	% v/v	48	52	48	52
9	Organic Matter	IS 2720 (P-22):1972	%	1.05	1.12	1.04	1.15
10	Total Alkalinity	Soil Testing India 2011	mg/kg	257.5	265.4	268.8	272.4
11	Available Phosphorus	Soil Testing India 2011	kg/ha	16.5	16.8	16.6	16.7
12	Available Nitrogen	IS 14684:1999	kg/ha	286	245	246	271
13	Total Sodium	Soil Testing India 2011	mg/kg	34.1	36.7	34.8	32.4
14	Available Potassium	Soil Testing India 2011	kg/ha	124	118	115	126
15	Chloride	Soil Testing India 2011	mg/kg	24.3	25.6	28.1	22.5
16	Iron	APHA-3030D APHA-3111B	mg/kg	4.22	4.28	3.97	4.25
17	Sulphur	Soil Testing India 2011	mg/kg	7.6	8.4	9.7	8.4
18	Boron	Soil Testing India 2011	mg/kg	<0.5	<0.5	<0.5	<0.5
19	Texture	Soil Testing India 2011		Sandy Clay Loam	Sandy Clay Loam	Sandy Clay Loam	Sandy Clay Loam
	Sand		%	54.0	56.1	55.8	57.5
	Silt		%	23.4	19.8	21.5	18.4
	Clay		%	22.6	24.1	22.7	24.1

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Soil Quality Monitoring & Analysis Report

Report Release Date	: 29.05.2024	Sample Ref. No.(ARF)	: EC/ARF/29/240392
Test Report No	: EC/TR/51F/MA630	Source of Sample	: Stone Quarry
Type of Sample	: Soil	Sampling Date	: 03.03.24 to 25.05.24
Sample Collected by	: Eco care	Period of Analysis	: 27.05.24 to 28.05.24
Sample Details	: Soil	Sample Condition	: Sealed & Preserved
Name & Address	: **SHRI SIMSANG CH. MARAK MATCHA-NOKPANTE STONE MINE VILLAGE-ROCHONPARA, P.O- DHANUA, P.S.-TURA DIST.- WEST GARO HILLS, STATE-MEGHALAYA**	Remarks	: ----
		Sample Drawn By	: ECO CARE
		Deviation if any	: None

Sl. No	Parameters	Protocol	UoM	Sampling Location			
				Pipulbari Bazzar	Pipulbari Pt. IV	Gachuabari	Hatsingimari
1	pH	IS 2720 (P-26):1987	--	6.45	7.18	7.24	6.81
2	Appearance	Soil Testing India 2011	--	Dark Brown	Brown	Dark Brown	Dark Brown
3	Conductivity	IS 14467:2002	µs/cm	1768	1625	1603	1750
4	Water holding capacity	Soil Testing India 2011	%	35.3	31.2	38.2	37.5
5	Bulk Density	Soil Testing India 2011	gm/cc	1.32	1.28	1.30	1.25
6	Moisture	IS 2720 (P-2):2011	%	19.8	22.7	20.2	22.4
7	Permeability	Soil Testing India 2011	cm/hr	12.1	12.7	10.2	13.2
8	Porosity	Soil Testing India 2011	% v/v	44	55	42	45
9	Organic Matter	IS 2720 (P-22):1972	%	1.17	1.12	1.02	1.16
10	Total Alkalinity	Soil Testing India 2011	mg/kg	259.5	280.8	276.6	284.5
11	Available Phosphorus	Soil Testing India 2011	kg/ha	16.3	16.9	17.1	17.3
12	Available Nitrogen	IS 14684:1999	kg/ha	252	274	251	272
13	Total Sodium	Soil Testing India 2011	mg/kg	32.5	30.6	33.8	31.5
14	Available Potassium	Soil Testing India 2011	kg/ha	114	129	135	133
15	Chloride	Soil Testing India 2011	mg/kg	27.4	28.1	31.6	30.8
16	Iron	APHA-3030D APHA-3111B	mg/kg	3.86	4.44	3.92	4.15
17	Sulphur	Soil Testing India 2011	mg/kg	8.8	7.9	8.4	8.2
18	Boron	Soil Testing India 2011	mg/kg	<0.5	<0.5	<0.5	<0.5
19	Texture	Soil Testing India 2011		Sandy Clay Loam	Sandy Clay Loam	Sandy Clay Loam	Sandy Clay Loam
	Sand		%	56.1	59.8	54.2	54.8
	Silt		%	16.2	14.1	17.3	18.5
	Clay		%	27.7	26.1	28.5	26.7

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ULR NO – TC510924000001105F

SURFACE WATER TEST REPORT

Report Release Date	: 29.05.2024	Sample Ref. No.(ARF)	: EC/ARF/29/240392
Test Report No	: EC/TR/51F/MA631	Source of Sample	: Stone Quarry
Type of Sample	: Water	Sampling Date	: 03.03.24 to 25.05.24
Sample Collected by	: Eco care	Period of Analysis	: 27.05.24 to 28.05.24
Sample Details	: Surface Water	Sampling Location	: As Below
Name & Address	: **SHRI SIMSANG CH. MARAK MATCHA-NOKPANTE STONE MINE VILLAGE-ROCHONPARA, P.O- DHANUA, P.S.-TURA DIST.- WEST GARO HILLS, STATE-MEGHALAYA**	Sample Condition	: Sealed & Preserved
		Sample Stamped as	: "SPPL/SW- 1 to SW- 2"
		Sample Drawn By	: ECO CARE
		Remarks	: ----
		Sampling Procedure	: EC/SOP/03/01
		Deviation if any	: None

Sampling Location; 1. (SW-1): Brahmaputra River (upstream), Lat- 25°43'58.64" (N), Long-89°52'5.49"(E)
2. (SW-2): Brahmaputra River (downstream), Lat- 25°42'32.69" (N), Long- 89°48'59.36" (E)

Sl. No	Parameters	Test Method (APHA 23rd Edition)	UoM	SW1	SW2
1	pH (at 25°C)	IS 3025 (P-11):1983, RA 2017	--	6.88	6.72
2	Electrical Conductivity	IS 3025 (P-11):1983, RA 2017	µS/cm	392	424
3	Color	APHA 24th Ed. 2120 B	Hazen	<5.0	<5.0
4	Turbidity	IS 3025 (P-10):1984, RA 2017	NTU	1.6	1.8
5	Total Dissolved Solids (TDS)	IS 3025 (P-16):1984, RA 2017	mg/L	259	274
6	Total Hardness (as $CaCO_3$)	IS 3025 (P-21):2009, RA 2019	mg/L	68.2	70.1
7	Calcium (as Ca^{+2})	IS 3025 (P-40):1991, RA 2019	mg/L	21.2	20.5
8	Magnesium (as Mg^{+2})	IS 3025 (P-46):1994, RA 2019	mg/L	3.7	4.6
9	Total Alkalinity (as $CaCO_3$)	IS 3025 (P-23):1986, RA 2019	mg/L	70.5	75.2
10	Chloride (as Cl^-)	IS 3025 (P-32):1988, RA 2019	mg/L	15.4	12.1
11	Chlorine Residual (as Cl_2)	APHA 24th Ed. 4500 Cl B	mg/L	<0.5	<0.5
12	Fluoride (as F^-)	IS 3025 (P-60):2008, RA 2019	mg/L	0.268	0.291
13	Sulphate (as SO_4^{-2})	IS 3025 (P-24):1986, RA 2019	mg/L	28.4	30.5
14	Nitrate (as NO_3)	IS 3025 (P-34):1988, RA 2019	mg/L	1.27	1.13
15	Iron (as Fe)	IS 3025 (P-53):2003, RA 2019	mg/L	0.242	0.218
16	Arsenic (as As)	APHA 24th Ed. 3114 B	mg/L	<0.01	<0.01
17	Total Chromium (as Cr)	APHA 24th Ed. 3111 B	mg/L	<0.03	<0.03

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SURFACE WATER TEST REPORT

Report Release Date	: 29.05.2024	Sample Ref. No.(ARF)	: EC/ARF/29/240392
Test Report No	: EC/TR/51F/MA631	Source of Sample	: Stone Quarry
Type of Sample	: Water	Sampling Date	: 03.03.24 to 25.05.24
Sample Collected by	: Eco care	Period of Analysis	: 27.05.24 to 28.05.24
Sample Details	: Surface Water	Sampling Location	: As Below
Name & Address	: **SHRI SIMSANG CH. MARAK MATCHA-NOKPANTE STONE MINE VILLAGE-ROCHONPARA, P.O- DHANUA, P.S.-TURA DIST.- WEST GARO HILLS, STATE-MEGHALAYA**	Sample Condition	: Sealed & Preserved
		Sample Stamped as	: "SPPL/SW- 1 to SW- 2"
		Sample Drawn By	: ECO CARE
		Remarks	: ----
		Sampling Procedure	: EC/SOP/03/01
			: None

Sampling Location; 1. (SW-1): Brahmaputra River (upstream), Lat- 25°43'58.64" (N), Long-89°52'5.49"(E)
2. (SW-2): Brahmaputra River (downstream), Lat- 25°42'32.69" (N), Long- 89°48'59.36" (E)

Sl. No	Parameters	Test Method (APHA 23rd Edition)	UoM	SW1	SW2
18	Cyanide	APHA 24th Ed. 4500 B	mg/L	<0.01	<0.01
19	Phenolic Compound	APHA 24th Ed. 5530 C	mg/L	<0.001	<0.001
20	Total Coliform	APHA 24th Ed. 9221 D	MPN/100ml	12	18
21	Escherichia Coli	APHA 24th Ed. 9221 D	MPN/100ml	<2.0	<2.0

1. Test values are reported based on the samples received.
2. Sample(s) will be destroyed after 7 days from date of issues of the Test Report subject to nature of Preservation. Sample will be preserved as per the standard method.
3. The Test report shall not be reproduced, without the written approval of laboratory.

Prepared By

ECO CARE ASANSOL

Authorised Signatory

Dr. Mousumi Pal
Ph.D.(Env.), Scientist
Authorised Signatory