

Mar,
2023

DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT AND ENVIRONMENTAL MANAGEMENT PLAN

Mining Of Magnesite & Dunite Over an Area 622.69 Ha.

**VILLAGE: THATHAIYANGERPATTI, MOONGILPADI, KARUPPUR, VELLAKKALPATTI,
MALLAMOOPANPATTI, TALUK – OMALUR & SALEM, DISTRICT- SALEM, Tamil
Nadu.**

STUDY PERIOD: MARCH TO MAY, 2021 COLLECTED BY: VARDAN ENVIRO Labs

[The proposed project is listed under Schedule 1 (a) Mining of Minerals under the Schedule of EIA
Notification, 2006 and categorized as Category A]

PROJECT PROPONENT

M/s SAIL Refractory Company Limited (SRCL)

P.B.No.565, Suramangalam, Salem-636 005, Tamil Nadu

ENVIRONMENT CONSULTANT

VARDAN ENVIRONET

(QCI/NABET ACCREDITED NO. NABET/EIA/2023/SA0158)

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REVIEW AND REVISION HISTORY

History of revisions of the present report:

Table I: History of the Revisions

S. No.	Rev.	Date	Modifications	Remarks
1.	Rev. 00 Draft	20.03.2023	Draft EIA /EMP Report	Report has been prepared by Vardan Environet and all comments of reviewers have been incorporated in the Draft EIA/EMP Report.

Table II: Record of Review

Rev.	Date	Description	Approval
Rev.00Draft	20.03.2023	Draft EIA/EMP Report	Mr. R.S. Yadav (Managing Partner)
-	-	The draft EIA EMP report has been prepared by Mr. Anshul Yadav (EIA coordinator) and assisted by team members.	

This Report has been prepared by **Vardan EnviroNet** on behalf of and for the use of M/s SAIL Refractory Company Limited (SRCL) with due consideration and skill as per our general terms and conditions of business and terms of agreement with M/s SAIL Refractory Company Limited (SRCL).



DISCLAIMER

Vardan EnviroNet has taken all reasonable precautions in the preparation of this report as per its auditable quality plan. Vardan EnviroNet also believes that the facts presented in the report are accurate as on the date it was written. However, it is impossible to dismiss absolutely, the possibility of errors or omissions. Vardan EnviroNet therefore specifically disclaims any liability resulting from the use or application of the information contained in this report. The information is not intended to serve as legal advice related to the individual situation.



NABET ANNEXURE – VII

Declaration by Experts contributing in report preparation for Mining of Magnesite & Dunitite by M/s SAIL Refractory Company Limited (SRCL located at Villages Thathaiyangerpatti, Moongilpadi, Karuppur, Vellakkalpatti, Mallamoopanpatti, Taluk-Omalur & Salem, District-Salem (Tamil Nadu).

Declaration by Experts contributing:

I, hereby, certify that I was part of the EIA team in the following capacity that developed the above EIA.

EIA Co-ordinator:

Name : Mr. Anshul Yadav

Signature & Date : 



Period of involvement : **17.08.2021– Till date**






Contact information : Plot no.-82 A, Sector-5 IMT Manesar, Gurugram, Haryana





Contact no: 9953147268






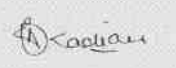
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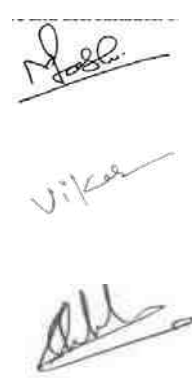

Functional Area Experts (FAEs):

S. No.	Functional Areas	Name of the Expert/s	Involvement	Signature & Date
1.	AP	Mr. K.M Khare	<ol style="list-style-type: none">1. Measurement of meteorological data2. Selecting locations of sampling stations3. Monitoring/ supervision of field team for collection of ambient air quality data, collection and preservation of the samples4. Identification of probable impacts of the different air emissions from the mines5. Identifying suitable Mitigation measures	
2.	WP	Mr. K.M Khare	<ol style="list-style-type: none">1. Designing sampling network for ground and surface water2. Supervision/monitoring of water samples including preservation of samples	

			<ol style="list-style-type: none"> 3. Preparation of water balance, suggesting water conservation measures, etc. 4. Identification of effluent streams and suggesting treatment methods 5. Identification of probable impacts of effluent/waste water discharges in to the receiving environment /water bodies. 	
3.	SHW	<p>FAE - Mrs. Niraj Kumari Parihar</p> <p>FAA – Sonu Sharma</p>	<ol style="list-style-type: none"> 1. Identification of hazardous waste, solid waste, and their disposal and mitigation measure. 	 Sonu Sharma
4.	SE	Ms. Shilpa Mishra	<ol style="list-style-type: none"> 1. Conducting baseline socio-economic surveys 2. Extrapolation of census data to project an up-to-date status including selected ground validation of the same 3. Conduct social needs assessment studies 4. Evaluation of socio-economic status of both tribal and non-tribal areas 5. Review of Rehabilitation and Resettlement (R & R) studies 	
5.	EB	<p>FAE - Mr. Niteesh Kumar</p> <p>TM – Adarsh Bhardwaj</p> <p>FAA – Vikash</p>	<ol style="list-style-type: none"> 1. Preparation of resource inventory (flora and fauna) of the project area and study area 2. Conducting ecological/ wildlife surveys and preparation of status reports for rare, endangered and threatened species of animals and plants and also species protected under national laws 3. Preparation of biodiversity study report and wild life conservation plan 4. Preparation of eco system services report 5. Suggesting mitigation measures such as green belt 	  

			development	
6.	HG	FAE - Mr. R.S. Yadav FAA – Md. Istiyak	<ol style="list-style-type: none"> 1. Review of surface hydrological studies conducted including nala diversion study report 2. Designing of ground water table measurement and monitoring network, computation of ground water recharge, flow rate and direction. 3. Plotting of ground water contours. 4. Analysis and description of aquifer characteristics e.g. permeability, transmissivity, storage coefficient etc., estimation of groundwater potential and recharge phenomenon, determination of impact of withdrawal of groundwater. 5. Preparation of ground water impact assessment, comprehensive hydrogeology report and groundwater modelling report 	 
7.	GEO	FAE - Mr. R.S. Yadav FAA – Md. Istiyak	<ol style="list-style-type: none"> 1. Review of Geological Report conducted for mineral exploration 2. Review of Mining Plan 3. Review of Geology and Geo morphological analysis/ description. 4. Review of Stratigraphy/Lithology. 5. Vibration analysis in relation to mining operations. 6. Review of geological maps. 7. Review of Mining plan incorporating environmental aspects like top soil preservation, waste dump management, reclamation/rehabilitation of mined out areas, run off management etc. 8. Carrying out environmental 	 

			impacts assessment and suggesting mitigation measures during mining and mine closure stage	
8.	AQ	FAE - Mrs. Surbhi Makhwana TM – Manoj Kumar Saini	<ol style="list-style-type: none"> 1. Developing micro meteorological data for use in modeling 2. Collecting and using secondary data on meteorology for modeling 3. Application of models in prediction of dispersion of pollutants, plotting of isopleths of GLCs representing incremental pollution levels, worst case scenarios on suitable maps showing both, the sources of pollution as well as the environmentally sensitive receptors. 	 
9.	NV	FAE – Mr. K.M Khare TM – Shubham Tyagi	<ol style="list-style-type: none"> 1. Developing a monitoring network and supervision for collection of samples related to noise/ vibration levels using specific instruments, processing and analysis of data 2. Prediction of noise/ vibration isopleths using relevant models 3. Probable impacts of noise and vibrations on the surrounding environment 4. Suggesting control of noise emanating from mining operations, vehicles, machines, etc. 5. Design and optimization of noise/vibration attenuation devices. 	 
10.	LU	FAE – Mr. Ankur Agarwal TM – Ankit Singh	<ol style="list-style-type: none"> 1. Generation and analysis of data related to land use pattern 2. Developing land use map of urban, semi-urban, rural, mixed areas, forest area, etc. using GIS 	 

			<ol style="list-style-type: none"> 3. GIS based land use analysis and development 4. Integration of land use related data/ information for assessing environmental impacts 	
11.	RH	<p>FAE - Mr. Milind Joshi</p> <p>FAA – Vikash</p> <p>TM – Shubham Tyagi</p>	<ol style="list-style-type: none"> 1. Identification of hazardous prone areas 2. Environment risk evaluation 3. Preparation of on-site Emergency Preparedness Plan 4. Preparation of off-site Disaster Management Plan 	
12.	SC	<p>FAE – Sameer Vilasrao Deshpande</p> <p>TM – Adarsh Bhardwaj</p>	<ol style="list-style-type: none"> 1. Sampling, analysis and characterization of soil 2. Assessment of fertility/ productivity of soil, nutrient availability 3. Assessment of impact of gaseous, liquid and solid pollutants on soil 4. Management of soil salinity 5. Remediation of soil pollution/contaminated soils 6. Controlling degradation of soil 7. Suggesting Soil Conservation measures. 	

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

I, R.S. Yadav, hereby, confirm that the above-mentioned case of Magnesite & Dunite Mine by M/s SAIL Refractory Company Limited (SRCL), at Villages Thathaiyangerpatti, Moongilpadi, Karuppur, Vellakkalpatti, Mallamooanpatti, Taluk- Omalur & Salem, District-Salem (Tamil Nadu).

I, hereby, certify that I was a part of the EIA team in the following capacity that developed the above EIA.

I also confirm that I shall be fully accountable for any mis-leading information mentioned in this statement.

Name: **R.S.Yadav**



Signature

Designation: **Managing Partner**

Name of the EIA Consultant Organization: Vardan EnviroNet, QCI/NABET Accredited Environment Consultancy

NABET Certificate No. & Issue Date: NABET/EIA/2023/SA 0158 valid up to 05.05.2023.



Compliance to ToR Conditions

Point wise compliance of ToR issued by MoEF&CC

S. No.	ToR Conditions	Coverage in the EIA report
Specific Terms of Reference		
1	The State Government/SPCB to take action against the project proponent under the provisions of section 19 of the Environment (Protection) Act, 1986, and further no consent to operate to be issued till the project is granted EC.	SRCL has submitted an application to initiate credible action against SRCL under Section 19 of EP Act 1986. Relevant documents are attached as Annexure XIII .
2	The project proponent shall be required to submit a bank guarantee equivalent to the amount of remediation plan and natural and community resource augmentation plan with the SPCB prior to the grant of EC. The quantum shall be recommended by the EAC and finalized by the regulatory authority. The bank guarantee shall be released after successful implementation of the EMP, followed by recommendations of the EAC and approval of the regulatory authority.	SRCL will submit the bank guarantee to SPCB towards the amount suggested by SRCL and approved by EAC for remediation plan and natural and community resource augmentation plan (RPNCRAP) during final recommendation of the project.
3	Assessment of ecological damage with respect to air, water, land and other environmental attributes. The collection and analysis of data shall be done by an environmental laboratory duly notified under the Environment (Protection) Act, 1986, or an environmental laboratory accredited by NABL, or a laboratory of a Council	Assessment of ecological damage with respect to air, water, land and other environmental attributes has been carried out and covered in Chapter 13. The collection and analysis of data has been done by an environmental laboratory accredited by NABL and NABET





Draft EIA Report for Mining of Magnesite & Dunite over an area 622.69 Ha, located at Villages Thathaiyangerpatti, Moongilpadi, Karuppur, Vellakkalpatti, Mallamooanpatti, Taluk- Omalur & Salem, District-Salem (Tamil Nadu) By M/s SAIL Refractory Company Limited (SRCL).

S. No.	ToR Conditions	Coverage in the EIA report
	of Scientific and Industrial Research (CSIR) institution working in the field of environment.	accredited consultant i.e M/s Vardan EnviroNet.
4	Preparation of EMP comprising remediation plan and natural and community resource augmentation plan corresponding to the ecological damage assessed and economic benefits derived due to violation.	EMP comprising Remediation plan and natural and community resource augmentation plan (RPNCRAP) is prepared including ecological damage assessed and economic benefits derived due to violation. The details are covered in Chapter 13.
5	The remediation plan and the natural and community resource augmentation plan to be prepared as an independent chapter in the EIA report by the accredited consultants.	The remediation plan and the natural and community resource augmentation plan to be prepared as an independent chapter and covered as Chapter 13 in the EIA report by NABET accredited consultant i.e. M/s Vardan EnviroNet.
6	The PP is required to conduct public hearing as per EIA notification, 2006	Noted, this draft EIA report is submitted for public hearing to SPCB and the outcome of public hearing will be incorporated in Final EIA report.
7	One season base line data is to be collected and reported in the EIA/EMP report	Primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna and socio-economic condition has been collected for March to May 2021 and compiled data is described in Chapter 3, Item No 3.4.2 to 3.4.11, date wise primary data of Air, noise level, water quality, and soil is attached as Annexure VIII to XI . Site specific meteorology data has been collected for March to May 2021 and the summary is incorporated in Chapter 3, Table No 3.4 in EIA report. The location of Air Monitoring stations was selected to represent the whole of the study area. The predominant wind direction blowing in the study area is from NE direction and wind rose for





S. No.	ToR Conditions	Coverage in the EIA report
		<p>the same is given in Figure 3.2, in EIA report. The monitoring location selections criteria are given in the Table no 3.5 in EIA report. During the selection of monitoring location sensitive receptor have also been considered and accordingly ambient air location no 5 & 6 were selected as sensitive location as the area is located near to the forest. One monitoring location i.e. Keeraipappampadi (A8) has been selected in the pre-dominant Downwind direction.</p> <p>Three monitoring location i.e. Project Site (A1 & A2) and Mettupati (A3) are selected within the 500m radius of the lease area.</p> <p>Mineralogical composition of PM₁₀ particularly for Free silica is incorporated in Table No 3.9 of Chapter 3.</p>
8	Mine plan approved by Indian Bureau of Mines to be submitted.	Mining plan has been approved by Office of Regional Controller of mines, Indian Bureau of Mines vide letter number TN/SLM/MG&DU/ROMP/-1589 MDS dated 30/07/2020 for period 2020-21 to 2024-25.
9	DGMS permission is to be submitted for blasting at project site, if any.	DGMS permission for blasting is attached as Annexure XIV .
10	The PP should also address the all the issues raised during public hearing along with commitments made and with fund provision to address above issues in tabular form to be submitted along with EIA/EMP report	All the issues raised during public hearing along with commitments made and with fund provision to address above issues in tabular form will be incorporated along with action plan in the EIA report after completion of public hearing.
11	Detailed hydrological study to be carried out in core and buffer zone of the project as per GEC	Hydrological study is covered in Chapter 3, Item No 3.4.9 in chapter 3.





Draft EIA Report for Mining of Magnesite & Dunite over an area 622.69 Ha, located at Villages Thathaiyangerpatti, Moongilpadi, Karuppur, Vellakkalpatti, Mallamoopanpatti, Taluk- Omalur & Salem, District-Salem (Tamil Nadu) By M/s SAIL Refractory Company Limited (SRCL).

S. No.	ToR Conditions	Coverage in the EIA report
	2015 guidelines	
12	In case of violation of above undertaking, the ToR/Environmental Clearance shall be liable to be terminated forthwith	Noted.
13	Budget of remediation plan and natural and community resource augmentation plan corresponding to the ecological damage shall be completed within three years and to be prepared accordingly	Noted.
14	The Action Plan on the compliance of the recommendations of the CAG as per Ministry's Circular No. J 11013/71/2016-IA. I (M), dated 25.10.2017 needs to be submitted at the time of appraisal of the project and included in the EIA/EMP Report.	Attached as Annexure XV .
15	Valid mine lease documents in the name of M/s Steel Authority of the India Limited (SAIL) shall be submitted.	Transfer of lease in the name of SRCL is under process and the same has been confirmed by Deputy Director, Department of mines and Geology vide letter no RC. N0.45/2018/Mine A/Mag-1 on dated 24.09.2018, RC.N0.174/2018/Mine A on 22.02.2019 and 20.03.2020. Industries, Investment Promotion and Commerce (MMA.1) Department, Secretariat, Chennai - 600 009, Tamil Nadu vide their letter No 10839/MMA.1/2019-2 Dated: 02.11.2022 issued Letter of Intent to SAIL Refractory Company Limited in respect of the mining lease granted in G.o.(Ms).No.853, dated 05.06. 1979. Please refer Annexure IV .





Draft EIA Report for Mining of Magnesite & Dunite over an area 622.69 Ha, located at Villages Thathaiyangerpatti, Moongilpadi, Karuppur, Vellakkalpatti, Mallamooanpatti, Taluk- Omalur & Salem, District-Salem (Tamil Nadu) By M/s SAIL Refractory Company Limited (SRCL).

S. No.	ToR Conditions	Coverage in the EIA report
16	The details regarding observations raised by the Sub-Committee (Violation), MOEF&CC during site visit and clarifications with reply given by the PP should also be incorporated in the EIA/EMP report at relevant chapters	The details incorporate at relevant chapters.
Standard Terms of reference		
1.	Year-wise production details since 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994. It may also be categorically informed whether there had been any increase in production after the EIA Notification, 1994 came into force w.r.t. the highest production achieved prior to 1994. A copy of the document in support of the fact that the proponent is the rightful lessee of the mine should be given.	Year-wise production from the mines since 1990-91 to 2016-17 is given at Table 2.1 in Chapter 2. The details of past production is authenticated by Department of Geology and Mining, Salem, Tamil Nadu vide letter no Roc.45/2018/ Mines A/Mag-1 on dated 1.11.2018 and Roc.333/2017/ Mines A on dated 8.05.2017, is attached as Annexure II . Industries, Investment Promotion and Commerce (MMA.1) Department, Secretariat, Chennai - 600 009, Tamil Nadu vide their letter No 10839/MMA.1/2019-2 Dated: 02.11.2022 issued Letter of Intent to SAIL Refractory Company Limited in respect of the mining lease granted in G.o.(Ms).No.853, dated 05.06. 1979. Please refer Annexure IV .
2.	All documents including approved mine plan, EIA and public hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management and mining technology and should be in the name of the lessee.	Noted, Transfer of lease in the name of SRCL is under process and the same has been confirmed by Deputy Director, Department of mines and Geology vide letter no RC.N0.45/2018/Mine A/Mag-1 on dated 24.09.2018, RC.N0.174/2018/Mine A on 22.02.2019 and 20.03.2020. Industries, Investment Promotion and Commerce (MMA.1) Department, Secretariat, Chennai - 600 009, Tamil Nadu vide their letter No 10839/MMA.1/2019-2 Dated: 02.11.2022 issued Letter of Intent to SAIL Refractory Company Limited in respect of the mining lease granted in G.o.(Ms).No.853, dated 05.06. 1979. Please refer Annexure IV .





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S. No.	ToR Conditions	Coverage in the EIA report
3.	All documents including approved mine plan, EIA and public hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management and mining technology and should be in the name of the lessee.	Noted, Transfer of lease in the name of SRCL is under process and the same has been confirmed by Deputy Director, Department of mines and Geology vide letter no RC.N0.45/2018/Mine A/Mag-1 on dated 24.09.2018, RC.N0.174/2018/Mine A on 22.02.2019 and 20.03.2020. Industries, Investment Promotion and Commerce (MMA.1) Department, Secretariat, Chennai - 600 009, Tamil Nadu vide their letter No 10839/MMA.1/2019-2 Dated: 02.11.2022 issued Letter of Intent to SAIL Refractory Company Limited in respect of the mining lease granted in G.o.(Ms).No.853, dated 05.06. 1979. Please refer Annexure IV .
4.	All corner coordinates of the mine lease area, superimposed on a High-Resolution Imagery/Toposheet should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).	All corners of the coordinates of ML area are superimposed on a High Resolution Sol Toposheet/ OSM 58 E/13, 58 E/14, 58 I/1 & 58 I/2, and details are given in Figure 2.4, in chapter 2. Imagery of the proposed area clearly shows the land use and other ecological features of the study area (core and buffer zone) for Land use and High-resolution Imagery FCC maps are prepared with use of RS-GIS Technique, are attached as Figure 3.13 and 3.14 in Chapter 3.
5.	Does the company have a well laid down Environment Policy approved by its Board of Directors? If so, it may be spell out in the EIA report with description of the prescribed operating process procedures to bring into focus any infringement/deviation/violation of the environmental or forest norms conditions? The hierarchical system or administrative order of the	The proponent company is having a well laid down Environment Policy (Integrated Management System) duly approved by its Board of Directors. Copy of the policy is given as Figure 10.2 in Chapter 10. Operating Process/procedures to bring into focus any Infringement/deviation/violation of the environmental or forest norms/ conditions is also given in section 10.3 in Chapter 10.





S. No.	ToR Conditions	Coverage in the EIA report
	Company to deal with the environmental issues and for ensuring compliance with the EC conditions may also be given. The system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the Company and / or shareholders or stakeholders at large may also be detailed in the EIA report.	The hierarchical system or administrative order of the Company to deal with the environmental issues and for ensuring compliance of EC conditions is given in Figure No 10.1 of Chapter 10. The system of reporting of non-compliances/ violations of environmental norms is given in section 10.3 of Chapter 10.
6.	Issues relating to Mine Safety, including subsidence study in case of underground mining and slope study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided.	Mines safety for workers working at the site is ensured and safety measures related to risks during mining activity, natural disasters, etc. is covered in the EIA Report. The details of the same is given in Chapter 7, Item No 7.3.7 & 7.4 in Chapter 7. The proposed project is for open cast mining hence subsidence study is not applicable. Currently mining operation is stop. The Slope study and Blasting study will be carried out once operation at mine commence and will be submitted to MOEF&CC.
7.	The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc. should be for the life of the mine/ lease period.	Study area comprises of 10 Km radius around the mine lease boundary. Map showing 10 Km radius of the ML area has been furnished in the Chapter 2; Figure No 2.2. All the data collection, monitoring reports, analysis, impact assessment mitigation measures contained in the EIA/EMP Report are for 10 km zone around the mining lease.
8.	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and	Land Use of the study area delineating forest area, agricultural land, grazing land, water bodies, human settlements and other ecological features and etc. has been incorporated in Item No 3.4.7 in Chapter 3 of the EIA/EMP report. Same is also given





S. No.	ToR Conditions	Coverage in the EIA report																																						
	<p>other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and Post-operational phases and submitted. Impact, if any, of change of land use should be given.</p>	below																																						
		<table border="1"> <thead> <tr> <th>Land Use Classification</th> <th>Area in Hectare</th> <th>Area in %</th> </tr> </thead> <tbody> <tr> <td>Agriculture Land</td> <td>21550</td> <td>41.68</td> </tr> <tr> <td>Air Strip</td> <td>53</td> <td>0.10</td> </tr> <tr> <td>Built up</td> <td>10542</td> <td>20.39</td> </tr> <tr> <td>Forest</td> <td>14209</td> <td>27.48</td> </tr> <tr> <td>Industrial Area</td> <td>537</td> <td>1.04</td> </tr> <tr> <td>Mining Area</td> <td>1563</td> <td>3.02</td> </tr> <tr> <td>Open Scrub</td> <td>1483</td> <td>2.87</td> </tr> <tr> <td>Plantation</td> <td>1412</td> <td>2.73</td> </tr> <tr> <td>Waste land</td> <td>65</td> <td>0.13</td> </tr> <tr> <td>Waterbody</td> <td>291</td> <td>0.56</td> </tr> <tr> <td>Total</td> <td>51705</td> <td>100.00</td> </tr> </tbody> </table>	Land Use Classification	Area in Hectare	Area in %	Agriculture Land	21550	41.68	Air Strip	53	0.10	Built up	10542	20.39	Forest	14209	27.48	Industrial Area	537	1.04	Mining Area	1563	3.02	Open Scrub	1483	2.87	Plantation	1412	2.73	Waste land	65	0.13	Waterbody	291	0.56	Total	51705	100.00	Area in Hectare	Area in %
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		Existing land use, land use at the end of plan period and at conceptual sated of the mining lease area is given in Item No 2.13, Table No 2.25 in Chapter 2. Post mining land use plan is given at Table 2.25 in Chapter 2.																																						
9.	Details of the land for any Over Burden Dumps	No land for any overburden dumping has been envisaged outside																																						





Draft EIA Report for Mining of Magnesite & Dunite over an area 622.69 Ha, located at Villages Thathaiyangerpatti, Moongilpadi, Karuppur, Vellakkalpatti, Mallamooanpatti, Taluk- Omalur & Salem, District-Salem (Tamil Nadu) By M/s SAIL Refractory Company Limited (SRCL).

S. No.	ToR Conditions	Coverage in the EIA report
	outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given.	the Lease. Entire Overburden/waste generated from the mine has been planned to be dumped inside the existing mine lease area.
10.	A Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests, the site may be inspected by the State Forest Department along with the Regional Office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the Expert Appraisal Committees.	No forest land is involved in the lease area, as approved review of mining plan the land is classified as Revenue, unassessed waste land. The certificate from state Forest Department is attached as Annexure XVI .
11.	Status of forestry clearance for the broken-up area and virgin forestland involved in the Project including deposition of net present value (NPV) and compensatory afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.	Not applicable. The certificate from state Forest Department is attached as Annexure XVI .
12.	Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.	Not Applicable.





S. No.	ToR Conditions	Coverage in the EIA report
13.	The vegetation in the RF/ PF areas in the study area, with necessary details, should be given.	Detail of vegetation in the study area is described at Item No 3.4.10 in Chapter 3.
14.	A study shall be got done to ascertain the impact of the Mining Project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly detailed mitigative measures required, should be worked out with cost implications and submitted.	Ecology and biodiversity Study has been carried out by the Ecology and Biodiversity Expert (NABET/QCI Approved) in and around the lease area to study the wild life of the area, impacts on ecology & biodiversity and its mitigation measures described in Item No 4.9 of Chapter 4. Schedule-I species was found in the study area, a conservation budget will be spent on conservation of Schedule – I species once approved.
15.	Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Tiger/ Elephant Reserves/ (existing as well as proposed), if any, within 10 km of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the State Wildlife Department/ Chief Wildlife Warden under the Wildlife (Protection) Act, 1972 and copy furnished.	There is no National Parks, Sanctuaries, Biosphere Reserves, and Wildlife Corridors, Tiger / Elephant Reserves / (existing as well as proposed) within 10 km of the study area. Certificate and Authenticated Map from Principal Chief Conservator of Forests and Chief Wildlife Warden (FAC), Tamil Nadu & Letter from Forest department, Salem Forest Division, Salem obtained in this regard is attached as Annexure XVI .
16.	A detailed biological study of the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] shall be carried out. Details of flora and fauna, duly authenticated, separately for core and buffer zone should be	A detailed biological study (10 km radius of the periphery of the mine lease) was conducted by Ecology and Biodiversity Expert List of Flora and Fauna separately for core and buffer zone has been prepared based on primary survey. List of Flora is given in Table 3.28 and List of Fauna is given in Table 3.30 of Chapter 3.





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S. No.	ToR Conditions	Coverage in the EIA report
	furnished based on such primary field survey, clearly indicating the Schedule of the fauna present. In case of any scheduled-I fauna found in the study area, the necessary plan for their conservation should be prepared in consultation with State Forest and Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.	Schedule-I species was found in the study area, a conservation budget will be spent on conservation of Schedule – I species once approved.
17.	Proximity to Areas declared as 'Critically Polluted' or the Project areas likely to come under the 'Aravali Range', (attracting court restrictions for mining operations), should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the SPCB or State Mining Dept. Should be secured and furnished to the effect that the proposed mining activities could be considered.	Not applicable, as the project site is neither falling in proximity to area declared as Critically Polluted nor falling in Aravali Range.
18.	Similarly, for coastal projects, A CRZ map duly authenticated by one of the authorized agencies demarcating LTL, HTL, CRZ area, location of the mine lease w.r.t. CRZ, coastal features such as mangroves, if any, should be furnished. (Note: The Mining Projects falling under CRZ would also need to obtain approval of the concerned Coastal Zone Management Authority).	Not Applicable.
19.	R&R Plan/compensation details for the Project	R&R is not Applicable. Survey was carried out in study area to





S. No.	ToR Conditions	Coverage in the EIA report
	<p>Affected People (PAP) should be furnished. While preparing the R&R Plan, the relevant State/ National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need-based sample survey, family-wise, should be undertaken to assess their requirements, and action program prepared and submitted accordingly, integrating the sectoral program of line departments of the State Government. It may be clearly brought out whether the village located in the mine lease area will be shifted or not. The issues relating to shifting of Village including their R&R and socio-economic aspects should be discussed in the report.</p>	<p>assess the requirement (details are given in 3.4.11.4) and activities suggested which are given in section 8.6 of Chapter 8.</p>
20.	<p>One season (non-monsoon) [i.e., March-May (Summer Season); October-December (post monsoon season); December-February (winter season)] primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and EMP Report. Site-specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the pre-dominant Downwind</p>	<p>Primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna has been collected for March to May 2021 and compiled data is described in Chapter 3, Item No 3.4.2 to 3.4.10, dated wise primary data of Air, noise level, water quality, and soil is attached as Annexure VIII to XI. Site specific meteorology data has been collected for March to May 2021 and the summary is incorporated in Chapter 3, Table No 3.4 of EIA report.</p> <p>The location of Air Monitoring stations was selected to represent the whole of the study area. The predominant wind direction blowing in the study area is from NE direction and the wind rose for the same is given in Figure 3.2 of Chapter 3. The monitoring</p>





S. No.	ToR Conditions	Coverage in the EIA report
	<p>direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the predominant downwind direction. The mineralogical composition of PM₁₀, particularly for free silica, should be given.</p>	<p>location selections criteria are given in the Table no 3.5 of Chapter 3. During the selection of monitoring location sensitive receptor have also been considered and accordingly ambient air location no 5 & 6 were selected as sensitive location as the area is located near to the forest. One monitoring location i.e. Keeraipappampadi (A8) has been selected in the pre-dominant Downwind direction.</p> <p>Three monitoring location i.e. Project Site (A1 & A2) and Mettupati (A3) are selected within the 500m radius of the lease area.</p> <p>Mineralogical composition of PM₁₀ particularly for Free silica is incorporated in Table No 3.9 of Chapter 3.</p>
21.	<p>Air quality modeling should be carried out for prediction of impact of the project on the air quality of the area. It should also take into account the impact of movement of vehicles for transportation of mineral. The details of the model used and input parameters used for modeling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind roses showing predominant wind direction may also be indicated on the map.</p>	<p>Air quality modeling was carried out by using AERMOD software (based on Gaussian Dispersion Modeling) for prediction of impact of the project on the air quality of the area. Impact due mining operations including movement of vehicles for transportation of mineral on the air quality has been calculated and calculation criteria is given in the Item No 4.4.3.3 of Chapter 4. The maximum cumulative GLC of for PM₁₀ is 90.33 ug/m³ and PM_{2.5} is 51.55 ug/m³.</p> <p>The air quality contours showing on a location map clearly indicating the location of the site, location of sensitive receptors, and habitation indicated on the map and the GLC of all the located is given in Figure 4.1 to Figure 4.5 of Chapter 4.</p> <p>The predominant wind direction recorded during study period was from NE Direction as per Wind rose diagram and the same is given in Figure No 3.2 of Chapter 3.</p>
22.	<p>The water requirement for the Project, its availability and source should be furnished. A</p>	<p>Water requirement for the project is 90 KLD which will be met</p>





S. No.	ToR Conditions	Coverage in the EIA report
	detailed water balance should also be provided. Fresh water requirement for the Project should be indicated.	through the bore well at site and through mine water. Water Balance is given in Table 2.23 in Chapter 2 of EIA report. SRCL has made application for ground water withdrawal which is attached as Annexure VII .
23.	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.	SRCL has made application for ground water withdrawal which is attached as Annexure VII .
24.	Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided.	Proposed plantation will increase the water holding capacity and help in recharging of ground water. Details of rainwater harvesting is given in Item No 4.5.5 in Chapter 4.
25.	Impact of the project on the water quality, both surface and groundwater, should be assessed and necessary safeguard measures, if any required, should be provided.	Impact on surface water is given in the Item No 4.5.2, of Chapter 4. Impact on ground water is given in the Item No 4.5.3, of Chapter 4.
26.	Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect groundwater table, a detailed Hydro Geological Study should be undertaken and Report furnished. Necessary permission from Central Ground Water Authority for working below ground water and for pumping of ground water should also be obtained and	The Water table is found at a depth of 55m during summer and 52m (285 to 290 m RL) during rainy season. The depth of water table fluctuation is verified by observing the water levels in the above seasons in the nearby wells. Plan Period & Conceptual period <ul style="list-style-type: none">• Maximum Depth of Working: 349m RL in Red Hills (Block-I)• Maximum Depth of Working: 330m RL in Block-II From above it is clear that working will not intersect ground water table





S. No.	ToR Conditions	Coverage in the EIA report
	copy furnished.	
27.	Details of any stream, seasonal or otherwise, passing through the lease area and modification /diversion proposed, if any, and the impact of the same on the hydrology should be brought out.	No stream, seasonal or otherwise, passing through the lease area hence no stream modification/ diversion has been proposed due to proposed mining activity.
28.	Information on site elevation, working depth, groundwater table etc. Should be provided both in AMSL and bgl. A schematic diagram may also be provided for the same.	The Water table is found at a depth of 55m during summer and 52m (285 to 290 m RL) during rainy season. Site Elevation: 340 m RL to 420 m RL Plan Period & Conceptual period <ul style="list-style-type: none"> • Maximum Depth of Working: 349m RL in Red Hills (Block-I) • Maximum Depth of Working: 330m RL in Block-II From above it is clear that working will not intersect ground water table
29.	A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the project.	A time bound Progressive Greenbelt Development Plan has been prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and given in the Item No 4.11 in Chapter 4. Phase-wise plan of plantation indicating the area to be covered under plantation and the species to be planted is given in Table 4.21, Table 4.22 and Figure 4.10 of Chapter 4.
30.	Impact on local transport infrastructure due to the Project should be indicated. Projected increase in truck traffic as a result of the Project in the present road network (including those outside the	Traffic density survey has been carried out and Impact on local transport due to the proposed project has been assessed as per Indian Road Congress Guidelines IRC 64-1990, detail for the same is given in Item no 3.4.6 of Chapter 3.





S. No.	ToR Conditions	Coverage in the EIA report
	Project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be covered.	Impact on the local transport due to increase in truck traffic due to the proposed project is give at Table 3.22 and 3.23 of Chapter 3. There will not be much impact on the local transport, as PCU/day will be increased from the current traffic Scenario 6548 to 6914 after the proposed expansion, whereas NH 7/ NH 44 has 15000 PCU/day capacities. Thus, the road is capable of handling the increased transportation.
31.	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA report.	Infrastructure required for such mines like office, stores, canteen, First-aid station, shelter, latrine and bath rooms would be available as per the Mines Rules, 1961 as a welfare amenities for mine Labourers.
32.	Conceptual post mining land use and Reclamation and Restoration of mined out areas (with plans and with adequate number of sections) should be given in the EIA report.	Post mining land use plan is given at Table 2.25 of Chapter 2.
33.	A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given.	<p>A time bound Progressive Greenbelt Development Plan has been prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and given in the Item No 4.11 in Chapter 4.</p> <p>Phase-wise plan of plantation indicating the area to be covered under plantation and the species to be planted is given in Table 4.21, Table 4.22 and Figure 4.10 of Chapter 4.</p> <p>Greenbelt has already been developed on 54.31.90 ha area of lease till date.</p>





S. No.	ToR Conditions	Coverage in the EIA report
34.	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP.	The impact of occupational health of employee and proper preventive measures incorporated in Chapter 7 in section No 7.4 and budgetary provision for the same is given in the Table No 7.4 in Chapter 7. Details of pre-placement medical examination and periodical medical examination schedules is given in Table 7.3 of Chapter 7.
35.	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.	Implication of the project and related activities of the project on the general population shall be systematically assessed through medical camps in the villages. Details are given in given in the Section 7.4 in Chapter 7. A budget of Rs. 24 lakhs (Table 7.4) have been kept for OH&S and the detail of proposed remedial measures is described in section 7.4.1, 7.4.2 and 7.4.3 in Chapter 7 of this EIA/EMP report.
36.	Measures of socio-economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.	PP has carries out community Development Programme like education, health, infrastructure development, sanitation and hygiene, drinking water, etc. for villages in study area. Proposed project will provide the employment opportunity to the local community hence project will have positive impact on t he surrounding local community.
37.	Detailed environmental management plan to mitigate the environmental impacts which, should inter-alia include the impacts of change of land use, loss of agricultural and grazing land, if any, occupational health impacts besides other impacts specific to the proposed Project.	Environment Management Plan is given in Chapter 10.





Draft EIA Report for Mining of Magnesite & Dunite over an area 622.69 Ha, located at Villages Thathaiyangerpatti, Moongilpadi, Karuppur, Vellakkalpatti, Mallamooanpatti, Taluk- Omalur & Salem, District-Salem (Tamil Nadu) By M/s SAIL Refractory Company Limited (SRCL).

S. No.	ToR Conditions	Coverage in the EIA report
38.	Public hearing points raised and commitment of the project proponent on the same along with time bound action plan to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project.	Will be incorporated after completion of Public Hearing.
39.	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the project should be given.	No.
40.	The cost of the project (capital cost and recurring cost) as well as the cost towards implementation of EMP should clearly be spelt out.	The Cost of Project is 3.0 crore. Cost on Environmental Monitoring is 16.08 Lakh per year details is given in Table 6.5 in chapter 6. Cost on OH&S is 24.00 lakhs details are given in Table 7.4 in Chapter 7. The environment management cost is Rs. 203.95 lakhs as a capital cost and Rs. 45 lakhs for recurring expenditure. Details are given in Table 10.2 in chapter 10.
A.	All documents to be properly referenced with index and continuous page numbering.	Complied.
B.	Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources should be indicated.	Noted.





Draft EIA Report for Mining of Magnesite & Dunite over an area 622.69 Ha, located at Villages Thathaiyangerpatti, Moongilpadi, Karuppur, Vellakkalpatti, Mallamoopanpatti, Taluk- Omalur & Salem, District-Salem (Tamil Nadu) By M/s SAIL Refractory Company Limited (SRCL).

S. No.	ToR Conditions	Coverage in the EIA report
C.	Where the documents provided are in language other than English, an English translation should be provided.	Noted.
D.	The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall be filled and submitted.	Noted.
E.	While preparing the EIA report, the instructions for the proponents and instructions for the Consultants issued by MoEF vide O.M. No. J-11013/41/2006-IA.II (I) dated 4th August, 2009, which are available on the website of this Ministry, should be followed.	Noted.
F.	Changes, if any made in the basic scope and project parameters (as submitted in Form-1 and the PFR for securing TOR) should be brought to the attention of MoEF & CC with reasons for such changes and the permission should be sought, as the TOR may also have to be altered. Post Public Hearing changes in structure and content of the Final EIA/EMP (other than modifications arising out of the P.H. process) will entail conducting the PH again with the revised documentation.	Noted.
G.	As per the circular no.J-11011/618/2010-IA.II (I) dated 30.5.2012, you are requested to submit certified report of the status of compliance of the	Not Applicable.





Draft EIA Report for Mining of Magnesite & Dunite over an area 622.69 Ha, located at Villages Thathaiyangerpatti, Moongilpadi, Karuppur, Vellakkalpatti, Mallamoopanpatti, Taluk- Omalur & Salem, District-Salem (Tamil Nadu) By M/s SAIL Refractory Company Limited (SRCL).

S. No.	ToR Conditions	Coverage in the EIA report
	conditions stipulated in the environment clearance for the existing operations of the project by the Regional Office of Ministry of Environment & Forests, if applicable.	
19	The EIA report should also include (i) surface plan of the area indicating contours of main topographic features, drainage and mining area, (ii) geological maps and sections and (iii) sections of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area	Details are covered in mining plan.
20	The prescribed ToRs would be valid for a period of four years for submission of the EIAIEMP reports as per the O.M.no.J-11013/41/2006-IA.II(I) dated 22.3.2010, 22.08.2014, 08.10.2014 and 07.11.2014.	Noted.
21	After preparing the draft EIA (as per the generic structure prescribed in Appendix-III of the EIA Notification, 2006) covering the abovementioned issues, the proponent will get the public hearing conducted and take further necessary action for obtaining environmental clearance in accordance with the procedure prescribed under the EIA Notification, 2006	Noted.





1. INTRODUCTION

1.1 INTRODUCTION

SAIL Refractory Company Limited (SRCL) is the wholly owned subsidiary of Steel Authority of India Limited (SAIL). SAIL is the largest steel-making company in India and one of the seven Maha Ratna's of the country's Central Public Sector Enterprises.

SRCL's range of products includes: Magnesite bricks such as - Magnesite-chrome bricks; Chrome-magnesite bricks; Magnesite-carbon bricks; Bulk & monolithics; Dunite & dunite fractions & Ground calcined magnesite. SRCL's products are used by all SAIL steel plants, Rail Wheel Factory, Metal & Steel Factory, Bharat Heavy Electricals Ltd, Hindustan Copper Ltd, JSW Steel Co. Ltd, etc.

SRCL has mine lease for Mining of Magnesite & Dunite with Mine Lease Area 622.69 Ha in Villages-Thathaiyangerpatti, Moongilpadi, Karuppur, Vellakkalpatti, Mallamoopanpatti of Taluk- Omalur & Salem, District-Salem, Tamil Nadu.

Earlier, the mining lease was granted to M/s Burn Standard Company Ltd. (BSCL, A Govt. of India Undertaking) Salem-636005, Tamil Nadu for a period of 20 years vide G.O. No. 853 dated 05.06.1979, over an extent of 622.69 Ha and the lease deed was executed on 21.04.1980 for a period of 20 years and expires on 20.04.2000. Then, supplementary lease deed was executed on 20.3.1989 for exploitation of Dunite in addition to magnesite. The application for renewal of mining lease was made by M/s Burn Standard Company Ltd. as per norms on 14.4.1999, i.e. one year before the expiry of mining lease and mining was continued under deemed condition with valid Consent to Operate (CTO) from Tamil Nadu Pollution Control Board.

Ministry of Heavy Industries & Public Enterprises, Gol, vide memo dated 17.11.2011 transferred the Refractory unit of M/s BSCL at Salem with all assets, and liabilities to M/s Steel Authority of the India Limited (SAIL). Accordingly, M/s Steel Authority of the India Limited (SAIL) owned the entire lease and Refractory Plant and named the unit as SAIL Refractory Company Limited (SRCL) w.e.f. 16.12.2011. After taking over SRCL also continued mining with valid Consent to Operate from Tamil Nadu Pollution Control Board.

Earlier SRCL has applied for transfer of lease in the name of SRCL and the same was confirmed by Deputy Director, Department of mines and Geology vide letter no RC.No.45/2018/Mines A/Mag-1 on dated 24.09.2018, RC.N0.174/2018/Mine A on 22.02.2019 and 20.03.2020.





Draft EIA Report for Mining of Magnesite & Dunite over an area 622.69 Ha, located at Villages Thathaiyangerpatti, Moongilpadi, Karuppur, Vellakkalpatti, Mallamoopanpatti, Taluk - Omalur & Salem, District-Salem (Tamil Nadu) By M/s SAIL Refractory Company Limited (SRCL).

Now, Industries, Investment Promotion and Commerce (MMA.1) Department, Secretariat, Chennai - 600009, Tamil Nadu vide their letter No 10839/MMA.1/2019-2 Dated: 02.11.2022 issued Letter of Intent to SAIL Refractory Company Limited in respect of the mining lease granted in G.o.(MS).No.853, dated 05.06. 1979.

The present proposal is for obtaining environment clearance for mining of minerals Magnesite & Dunite within mine Lease Area 622.69 Ha, in Villages– Thathaiyangerpatti, Moongilpadi, Karuppur, Vellakkalpatti, Mallamoopanpatti of Taluk- Omalur & Salem, District-Salem (Tamil Nadu) proposed by M/s SAIL Refractory Company Limited (SRCL).

1.2 PURPOSE OF THE REPORT

The proposed project is listed under activities 1(a) Mining of Minerals under the Schedule of EIA Notification, 2006 as amended till date and categorized as Category-A (Under Violation). As per the notification, the projects necessitate prior environmental clearance from Ministry of Environment Forest & Climate Change, ***the proposed project has violated the EIA notification as the mining has been operating without Environmental Clearance since the inception of mining lease and during renewal of lease in year 2000, which is violation of EIA notification 1994. The mine was operated based on Consent to Operate (CTO) from Tamil Nadu Pollution Control Board since 1991.***

Now, Project Proponent has followed due course of procedure for obtaining Environmental Clearance. As a part of the procedure, application to MOEF&CC for obtaining Terms of References (TOR) for conducting the EIA study was submitted online initially in the non-coal mining on 31.01.2017, later on proposal was resubmitted as per S.O. 804 (E) dated 14.03.2017 online vide proposal No. IA/TN/MIN/64734/2017 dated 19.05.2017.

SRCL has requested TNPCB vide letter dated 18.05.2017 to revoke the CTO issued to the mine to consider the proposal under the provision of S.O. 804 (E) dated 14.03.2017 by MOEF&CC. TNPCB inspected the site and observed that no mining activity is carried out in the lease and revoke the Consent to operate vide order T7/TNPCB/F-0950/RL/SLM/2013 dated 19.07.2017. The mining activity has not been carried out since 10.01.2017

The proposal was recommended for issue of Terms of reference for EIA study in the 44th EAC for the proposal involving violation of EIA Notification, 2006 held on 18.02.2021.

Terms of References (ToR) for the project was granted by Ministry of Environment, Forest & Climate Change (MoEF&CC) File letter 23-166/2018-IA.III(V) dated 17.09.2021 (Attached as **Annexure-I**). The EIA/EMP Report has been prepared as





per the Terms of References (ToR). The baseline data has been collected during period March to May, 2021.

The objective of the EIA study report is to take stock of the prevailing quality of the environment, assess the impacts of mining project on environment and to plan appropriate environment management plan to minimize the adverse impacts. In addition, the objective is also to assess the damage caused to various receptor due to violation and suggest remediation plan and community resource augmentation plan. The following major objectives have been kept in view:

- Assessment of the existing status of environment;
- Assessment of the impacts due to operation of the project;
- Suggestion of mitigation measures for pollution control;
- Action plan for implementation of suggested measures;
- Monitoring programme to assess efficacy of the environmental control measures;
- Assessment of financial considerations for suggested environmental control plans;
- Assessment of damage due to the violation and suggest remediation plan and community resource augmentation plan
- Clearances from statutory authorities.

1.3 IDENTIFICATION OF PROJECT & PROJECT PROPONENT

1.3.1 The Project

SRCL has Mine Lease for Mining of Magnesite and Dunite at the Red Hill Mines (Mine Lease Area 622.69 Ha, Production Capacity 26, 43,936 MTPA ROM) at Village Thathaiyangerpatti, Moongilpadi, Karuppur, Vellakkalpatti, Mallamoopanpatti Taluk Omalur & Salem, District Salem, Tamil Nadu

As per the Review of Mining Plan along with Progressive Mine Closure Plan a total mineral reserve and resources are 23.95 million tonnes of Magnesite and 16.423 million Tonnes of Dunite and Mineable reserve 0.745 million tonnes of Magnesite and 0.654 million tonnes of Dunite.

The approval of review of mining plan TN/SLM/MG&DU/ROMP-1589 MDS dated 30.07.2020 for period of 2020-21 to 2024-25 envisages for mining ROM (2631452 TPA), Magnesite (115010 TPA), Dunite (67102 TPA) of mineable reserves within the area where the reserves are proved.

The lease area is divided into four Blocks namely:

- Block-I (Red Hills),**
- Block-II (Sandal wood area and RH Extension),**
- Block-III (K.West & K.Main)**





Block-IV (West Hills)

The total area of the block I, II, III and IV is categorized as:

- Block - I having an area of 108.49 Ha with pit area under mining of 32.81 Ha and two overburden dumps of total 30.03 Ha,
- Block - II having an area of 229.30 Ha with pit area under mining covering 110.46 Ha and overburden dump area 54.14 Ha.
- Block III having an area of 196.75 Ha, with pit area under mining covering 28.77 Ha area and overburden dump area 71.52.50 Ha.
- Block IV having 88.15 Ha area with pit area under mining covering 4.31 Ha and 14.86 Ha Dump area.

Total Mining Lease area 622.69 Ha having area under mining 176.35 ha and overburden dump area 170.55.50 ha.

Now the company is concentrating its work more on Red Hills block (Block-I) and Sandal wood area (Block- II) for the next five years period from 2020-21 to 2024-25

1.3.2 The Project Proponent

• Applicant

Mining lease was originally granted to M/s Burn Standard Company Ltd. (BSCL, A Govt. of India Undertaking). The mining lease hold area along with refractory unit of BSCL at Salem was transferred by M/s Burn Standard Company Ltd. with all assets, and liabilities to M/s Steel Authority of the India Limited (SAIL). M/s Steel Authority of the India Limited (SAIL) owned the entire lease and Refractory Plant and named the unit as SAIL Refractory Company Limited (SRCL) w.e.f. 16.12.2011. SRCL has made the application for EC for the said mining operation in the lease.

• Board of Directors

M/s Sail Refractory Company Limited (SRCL) is a public limited company (A Government of India undertaking). The company is having good knowledge and experience in Magnesite and Dunite mining.

1. Thiru. Anirban Das Gupta -	Chairman
2. Shri V.K. Pandey	Director
3. Shri. Praveen Nigam	Director
4. Shri.P.K. RATH	Director





Draft EIA Report for Mining of Magnesite & Dunite over an area 622.69 Ha, located at Villages Thathaiyangerpatti, Moongilpadi, Karuppur, Vellakkalpatti, Mallamoopanpatti, Taluk - Omalur & Salem, District-Salem (Tamil Nadu) By M/s SAIL Refractory Company Limited (SRCL).

Contact details of the Project Proponent are given below:

Company Name	: M/s. SAIL REFRACTORY COMPANY LIMITED (SRCL)
Authorized Representative	Mr Vishal Shukla , C.O.O
Mailing Address	: P.B.No.565, Suramangalam, Salem-636 005.
E-mail	: sailrefractory@gmail.com
Telephone	: +91 94079 81794
Fax No.	: 0427 2341407

1.4 BRIEF DESCRIPTION NATURE, SIZE & LOCATION OF THE PROJECT

The project proponent has applied for mining of Magnesite and Dunite in the lease area of 622.69 ha. The proposed mining operation will be carried out as opencast other than fully mechanized method by deploying HEMM and formation of benches with drilling and blasting.

1.4.1 Location of the Project

The proposed project is located at Village- villages – Thathaiyangerpatti, Moongilpadi, Karuppur, Vellakkalpatti, Mallamoopanpatti of Taluk- Omalur & Salem, District-Salem (Tamil Nadu) situated between latitudes $11^{\circ} 41' 19.86645''$ N to $11^{\circ} 44' 55.08940''$ N and longitudes $78^{\circ} 05' 10.30542''$ E to $78^{\circ} 08' 51.75760''$ E & is covered under the Survey of India toposheet no. 58-I/02 (Figure 1.1).





Draft EIA Report for Mining of Magnesite & Dunite over an area 622.69 Ha, located at Villages Thathaiyangerpatti, Moongilpadi, Karuppur, Vellakkalpatti, Mallamoopanpatti, Taluk - Omalur & Salem, District-Salem (Tamil Nadu) By M/s SAIL Refractory Company Limited (SRCL).

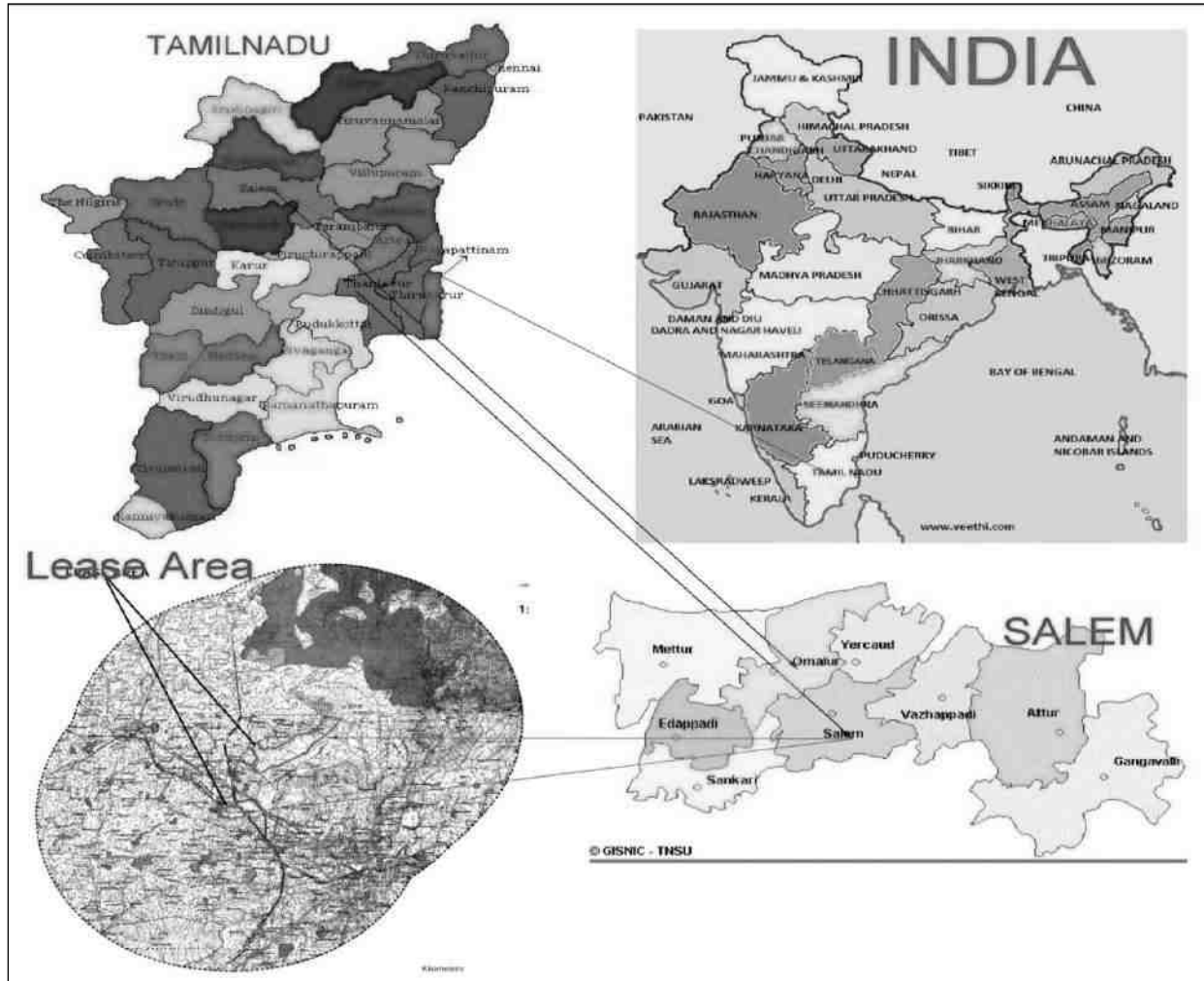


Figure 1.1: Location of Project Site





Table 1.1: Environmental Setting of the Project

S. No.	Particulars	Details																																												
1.	Project	Mining of Magnesite and Dunite (Mine Lease Area 622.69 Ha, Production Capacity 26,43,936 MTPA ROM) at Village Thathaiyangerpatti, Moongilpadi, Karuppur, Vellakkalpatti, Mallamoopanpatti Taluk Omalur & Salem, District Salem, Tamil Nadu																																												
2.	Mining lease area	622.69 Ha																																												
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7.	Elevation	345 to 420 m RL																																												
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S. No.	Particulars	Details					
		Block 4		300 m, NW			
11.	Nearest airport	Salem Airport ~7.00 Km, NNW					
12.	Nearest Town/City	Salem - Block (1-3) ~10 Km, SE (Block 4) ~ 6 Km, SE					
13.	Nearest water bodies	Sarbanga Nadi 7 Km W Tirumanaimuttar River 2.5 in E					
14.	Reserve Protected Forest	S.No	Name of the Forest	Distance & Direction	S. No	Name of the Forest	Distance & Direction
		1	Nagarmalai RF	1.1Km, E	7.	Maryland RF	9.6 NE
		2	Kumubalpatti RF	100 m, NE	8.	Sanyasi Malai	9 Km, NE
		3.	Kanjeri RF	6.7Km, N	9.	Attur Ghat Extension	9.2 Km, N
		4.	Pannikaradu RF	3.2Km, N	10	Attur Ghat	9.2 Km, N
		5.	Kanjamali RF	6.8 KM. SW	11.	Kanjeri Extension	9.3 Km, N
		6.	Kapputu RF	4.8 km, E			
15.	Other historical and archaeological places	None within 10 km radius					
16.	Ecology sensitive/ Protected areas as per Wild Life Protection Act 1972 (National Park/ Wild life Sanctuary/ Bio-sphere reserves)	There is no Wildlife Sanctuary, Biosphere Reserves, Tiger Reserves, Wildlife Corridors, etc. within 10 km radius.					
17.	Defense installations	None within 10 km radius from ML boundary					
18.	Industries	None within 10 km radius from ML boundary					
19.	Critically polluted area	None					
20.	Transmission line	None					
21.	Seismic zone	Zone-III as per IS-1893 (Part-1)-2002					





1.4.2 Nature of the Project

The proposed project is listed under activity 1(a), Mining of Minerals under the Schedule of EIA Notification, 2006 as amended till date and categorized as Category- A

1.4.3 Size of the Project

Total Mining Lease area of the project is 622.69 Ha. The total mineral reserves and resources have been estimated as follows:

Table 1.2: Mineral Reserves and resources

Mineral Reserves and Resources	Total Mineral reserves Magnesite (Million Tonnes)	Total Mineral Reserves of Dunite @ 30% (Million Tonnes)
Total Mineral Reserves (Mineable) Proved	0.745	0.654
Total Mineral Resources (Probable)	22.79	15.402
Mineral Resources (Mineral Resources Loss in Benches)	0.201	0.168
Mineral Resources Loss in 7.5m Safety Barrier	0.214	0.200
Total Mineral Reserves and Resources	23.95	16.423

Source: Approved Review of Mining Plan

1.4.4 Importance of the Project to the Country & Region

Magnesite Mineral is an essential raw material for manufacturing refractory materials used by Iron & Steel Industry. This is a rare mineral available in Salem region of Tamil Nadu state and also found in other states like Uttarakhand, Karnataka and Jammu & Kashmir. Magnesite of Salem region is relatively low in calcium oxide. Salem Magnesite reserves are famous worldwide for its Cryptocrystalline structure, which is best suited for manufacturing refractory bricks. The above said project plays significant role in meeting the refractory requirements of Iron & Steel industry.

Dunite and Pyroxinite are preferred as flux to dolomite as a source of MgO in sintering and also in Iron & steel Industry. Dunite is also useful in construction industry, Dunite rocks are used for construction of aggregates, construction of roads etc. Dunite is having refractory properties and plays a significant role in Refractory Industry. This is also a rare mineral mainly available in Salem region of Tamil Nadu





State and also found in Karnataka. Generally, Magnesite and Dunite are minerals which coexists while mining.

1.5 SCOPE OF THE STUDY

The Environmental Impact Assessment (EIA) study is aimed to identify and analyze the aspects that effect the environment within the Mine Lease Area (Core -Zone) and 10 km radius around the Mine Lease Area (Buffer-Zone). The project scope includes detailed characterization of various environmental components like air, noise, water, land and socio-economic within the study area.

The objectives set for carrying out this EIA study based on the requirements that fulfill the EIA Notification 2006 and its subsequent amendments.

1.5.1 Terms of Reference of EIA Study Prescribed by MoEF&CC

Terms of References (ToR) for the project was granted by Ministry of Environment, Forest & Climate Change (MoEF&CC) File letter 23-166/2018-IA.III(V) dated 17.09.2021 (Attached as **Annexure-I**).

1.5.2 Baseline Data Generation, Field Studies

The EIA/EMP report has been prepared on the basis of one full season baseline environmental data monitored during March to May, 2021 by M/s. Vardan Enviro Lab, NABL Accredited Lab, in accordance with the EIA Notification, 2006 issued by the Ministry of Environment Forests and Climate Change, Govt. of India and CPCB, New Delhi.

The monitored baseline data includes micro meteorological parameters, ambient air quality, noise levels, surface & ground water quality and soil characteristics. Site survey has been conducted for studying the flora & fauna, socio-economic conditions including public consultation, land use, hydrology and hydrogeology, ecology, traffic density etc. Secondary information has been collected from several agencies and departments, both under State and Central Government.

The collected data have been analyzed in detail for identifying, predicting and evaluating the environmental impacts of the proposed project. Potential impacts on environment have been assessed and suitable environmental management plan has been formulated. SRCL has engaged Vardan EnviroNet, as consultant for formulation of EIA / EMP study report for the mine.

1.5.3 Secondary Information Collection

Secondary baseline information on water resources, geology, hydrology and hydrogeology, demography was collected from the following sources:

- India Meteorological Department (IMD) (1981-2010)





- Geological Survey of India (GSI)
- Botanical Survey of India
- Office of Divisional Forest Officer
- Census of India (Demographic data)
- CGWB, Ministry of Water Resources, Govt. of India.
- National Bureau of Soil Survey & Land use Planning.

1.5.4 Report Coverage

This EIA Report is prepared in accordance with the EIA Notification, 2006 as amended till date and has been divided into thirteen chapters (in addition to the Executive Summary). The report contains information on the existing environment and evaluates the predicted environmental and socio-economic impacts of the proposed activities of the mine. A detailed coverage of background environmental quality, pollution sources, anticipated environmental impacts (including socio-economic impacts) and mitigation measures, environmental monitoring programme, additional studies, project benefits, environmental monitoring plan and all related aspects, damage assessment and remediation plan and natural and community resource augmentation plan have been covered in this report as briefed hereunder:

Chapter 1 – Introduction

Chapter 2 – Project Description

Chapter 3– Description of the Environment

Chapter 4 – Anticipated Environmental Impacts and Mitigation Measures

Chapter 5 – Analysis of Alternatives (Technology and Site)

Chapter 6 – Environmental Monitoring Program

Chapter 7 – Additional Studies

Chapter 8 – Project Benefits

Chapter 9 – Environmental Cost Benefit Analysis

Chapter 10 – Environmental Management Plan

Chapter 11 – Summary and Conclusion

Chapter 12 – Disclosure of Consultant

Chapter 13- Damage Assessment, remediation plan and natural and community resource augmentation plan

1.6 LAWS APPLICABLE TO THIS PROJECT

The Acts and Rules applicable to this project along with roles and responsibilities of the project proponent are given in the **Table 1.3** below:





Draft EIA Report for Mining of Magnesite & Dunite over an area 622.69 Ha, located at Villages Thathaiyangerpatti, Moongilpadi, Karuppur, Vellakkalpatti, Mallamoopanpatti, Taluk- Omalur & Salem, District-Salem (Tamil Nadu) By M/s SAIL Refractory Company Limited (SRCL).





Table 1.3: Acts and Rules Applicable to the Project

Legal Channel	Responsible Ministries/Bodies	Objective of Legislation	Roles & Responsibilities
The Water (Prevention & Control of Pollution) Acts 1974/ Rules 1975	CPCB, SPCB	The prevention and control of water pollution and also maintaining or restoring the wholesomeness of water	<ul style="list-style-type: none"> o Not to discharge any effluent, not confirming to standards, prescribed by SPCB into any stream, well, sewers or land. o Not to discharge air pollutant(s) in excess of standards, prescribed by the State PCB. o Obtain 'Consent to Establish' prior to establish any process, operation or treatment system. o Obtain 'Consent to Operate' prior to operation of system which is likely to discharge effluent. o Apply for renewal of the 'Consent to Operate' before the expiry. o Comply with conditions as prescribed under consents.
The Air (Prevention & Control of Pollution) Acts 1981/ Rules 1982	CPCB, SPCB	The prevention, control and abatement of air pollution	
The Environment (Protection) Acts 1986/ Rules 1986 The Environmental Impact Assessment (EIA) Notification, 2006	MoEF&CC, CPCB, SPCB	Protection and Improvement of the Environment	<ul style="list-style-type: none"> o Prevent discharge or emission of environment pollutants in excess of the prescribed standards. o Submit 'Environmental Statement' every year. o Obtain prior "Environmental Clearance' from MoEF&CC in case of new project or for Modernization / Expansion.
Hazardous and Other Wastes (Management and Trans boundary Movement) Rules,	MoEF&CC, CPCB, SPCB	Management & Handling of hazardous wastes in line with the Basel convention	<ul style="list-style-type: none"> o It is the responsibility of the occupier to identify the hazardous wastes in their units and ensure proper handling and disposal o PP to take all steps to contain contamination, prevent accident and limit consequences on human





Legal Channel	Responsible Ministries/Bodies	Objective of Legislation	Roles & Responsibilities
2016			<ul style="list-style-type: none"> being and environment o Obtain authorization from SPCB and comply with the conditions. o Maintain records of Hazardous Waste generated in Form-3 and submit yearly return for generation, treatment, recycling, disposal etc., to SPCB in Form-4 o Used Oil to be send / sold to the registered recycler, re-processor, registered authorized facility o Shall be transported in accordance with the rule. o Site storage is allowed for 90 days only
Batteries (Management and Handling) Rules, 2001.	SPCB, CPCB and MoEF&CC	To control the hazardous waste generation (lead waste) from used lead acid batteries	<ul style="list-style-type: none"> o It is the responsibility of the generator to ensure, used batteries are not disposed of in any manner other than depositing with dealer, manufacturer, importer, re-conditioner registered recycler or at designated collection centre o Submit half yearly return for disposal of used batteries to State PCB by 30th June & 31st December, every year o In case of auction, ensure batteries are auctioned to the registered recycler only o File half yearly return for the auction o Maintain record for such auction
E-Waste (Management) Rules, 2016	SPCB, CPCB and MoEF&CC	To recycle /manage the electronic waste from the industry	<ul style="list-style-type: none"> o Consumers or bulk consumers of electrical and electronic equipment listed in Schedule I shall ensure that e-waste generated by them is





Legal Channel	Responsible Ministries/Bodies	Objective of Legislation	Roles & Responsibilities
			<p>channelized through collection centre or dealer of authorised producer or dismantler or recycler or through the designated take back service provider of the producer to authorised dismantler or recycler;</p> <ul style="list-style-type: none">o Bulk consumers of electrical and electronic equipment listed in Schedule I shall maintain records of e-waste generated by them in Form-2 and make such records available for scrutiny by the concerned State Pollution Control Board;o Consumers or bulk consumers of electrical and electronic equipment listed in Schedule I shall ensure that such end-of-life electrical and electronic equipment are not admixed with e-waste containing radioactive material as covered under the provisions of the Atomic Energy Act, 1962 (33 of 1962) and rules made there under;o Bulk consumers of electrical and electronic equipment listed in Schedule I shall file annual returns in Form-3, to the concerned State Pollution Control Board on or before the 30th day of June following the financial year to which that return relates. In case of the bulk consumer with multiple offices in a State, one annual return combining information from all the offices shall be filed to the concerned State Pollution Control Board on or before the 30th day of June following the financial year to which that return relates





Legal Channel	Responsible Ministries/Bodies	Objective of Legislation	Roles & Responsibilities
The Solid Waste Management Rules, 2016	CPCB, SPCB	To manage/ utilize the generated solid waste without damaging the environment and surroundings	<ul style="list-style-type: none"> Segregate waste in to three streams, Wet (Biodegradable), Dry (Plastic, Paper, metal, wood, etc.) and do mestic hazardous wastes (diapers, napkins, empty containers of cleaning agents, mosquito repellents, etc.) and han dover segregated wastes to authorized rag-pickers or waste collectors or local bodies.
Noise Pollution (Regulation and Control) Rules, 2000 and its amendments	CPCB, SPCB, MoEF&CC	To maintain the noise levels with respect to the place/equipment/ industry	<ul style="list-style-type: none"> Noise Quality Monitoring & submission of reports on weekly/monthly basis. Providing Ear plugs and Muffs to the workers working in noise prone areas. Dampening the source noise level or making the noise characteristics less annoying by providing suitable enclosures and barriers.
The Central Motor Vehicle Rules, 1989	Ministry of Shipping, Road Transport and Highways	To consolidate and amend the law relating to motor vehicles including to regulate the transportation of dangerous goods with a view to prevent loss of life or damage to the environment	<ul style="list-style-type: none"> Ensure compliance to safety provisions in the transport vehicle carrying dangerous and hazardous substances inside works Display of emergency information panels at front, back and both side of vehicle Every transporter to ensure safe transportation of dangerous/ hazardous goods. Earthing chain for grounding, any prevalent static charge. All motor vehicle entering the works shall have properly maintained brakes, lights, signal system for brakes, blinkers and registration number displayed,





Draft EIA Report for Mining of Magnesite & Dunite over an area 622.69 Ha, located at Villages Thathaiyangerpatti, Moongilpadi, Karuppur, Vellakkalpatti, Mallamoopanpatti, Taluk- Omalur & Salem, District-Salem (Tamil Nadu) By M/s SAIL Refractory Company Limited (SRCL).

Legal Channel	Responsible Ministries/Bodies	Objective of Legislation	Roles & Responsibilities
			and valid Pollution under Control Certificate.
Mineral Concession Rules, 1960 & Mineral Concession Rules, 2016.	IBM	Guidelines for mining of minerals in the lease area	<ul style="list-style-type: none"> Mineral will be extracted as per the mining plan approved by IBM.
Mines & Minerals Development & Regulation (Amendment) Act 1957 & MMDR (Amendment) Act 2015	DMG/IBM	Regulation of mines and the development of minerals	<ul style="list-style-type: none"> Development Restoration and Rehabilitation fund will be spent as per Mines & Minerals Development & Regulation Act 2015
Mineral (Mining by Govt. Company) amended under Rule 17A, MMDR Act, 2015,	DMG/IBM	The mining lease is deemed to be granted for period of 50 years	<ul style="list-style-type: none">
Wildlife protection Act 1972	Forest Department, PCCF	Protection of plants and animal species	<ul style="list-style-type: none"> Wildlife conservation plan has been prepared to protect the Schedule species in the study area.





2. PROJECT DESCRIPTION

The proposed project is for mining of Magnesite and Dunite (Mine Lease Area 622.69 Ha, Production Capacity 26,43,936 MTPA ROM) at Village Thathaiyangerpatti, Moongilpadi, Karuppur, Vellakkalpatti, Mallamoopanpatti Taluk Omalur & Salem, District Salem, Tamil Nadu. The Review of Mining Plan along with Progressive Mine Closure Plan approved for production capacity of ROM: 2631452 TPA, Magnesite: 115010 TPA and Dunite: 67102 TPA by Office of Regional Controller of mines, Indian Bureau of Mines vide letter number TN/SLM/MG&DU/ROMP/-1589 MDS dated 30/07/2020 for period 2020-21 to 2024-25.

This chapter deals with the lease details, geology of the mining lease area, evaluation of the deposit, estimation of reserves, method of mining, mining machineries, year wise RoM extraction details, details on infrastructure, various sources of pollution and the measures to control.

2.1 TYPE OF PROJECT

The proposed project is listed under activity 1(a) Mining of Minerals of Schedule of EIA Notification, 2006 as amended till date, falls under category 'A' and requires prior environmental clearance from Ministry of Environment, Forest & Climate Change.

This is violation case as per S.O. 804 (E) dated 14.03.2017 under EIA notification 2006. Mine has violate the EIA notification 1994 as the mining was carried out without obtaining EC since the inception of mining lease and during renewal of lease in year 2000. The mine was operated based on Consent to Operate (CTO) from Tamil Nadu Pollution Control Board since 1991. Mining activity has not been carried out since 10.01.2017.

2.1.1 History of the Mine Lease (Existing Production Detail)

Earlier, the mining lease was granted to M/s Burn Standard Company Ltd. (BSCL, A Govt. of India Undertaking) Salem-636005, Tamil Nadu for a period of 20 years vide G.O. No. 853 dated 05.06.1979, over an extent of 622.69 Ha and the lease deed was executed on 21.04.1980 for a period of 20 years and expires on 20.04.2000. Then, supplementary lease deed was executed on 20.3.1989 for exploitation of dunite in addition to magnesite. The application for renewal of mining lease was made by M/s Burn Standard Company Ltd. as per norms on 14.4.1999, i.e. one year before the expiry of mining lease and mining was continued under deemed condition with valid Consent to Operate (CTO) from Tamil Nadu Pollution Control Board.





Draft EIA Report for Mining of Magnesite & Dunite Mine, over an area 622.69 Ha, located at Villages Thathaiyangerpatti, Moongilpadi, Karuppur, Vellakkalpatti, Mallamoopanpatti, Taluk- Omalur & Salem, District-Salem (Tamil Nadu) By M/s SAIL Refractory Company Limited (SRCL).

Ministry of Heavy Industries & Public Enterprises, Gol, vide memo dated 17.11.2011 transferred the Refractory unit of M/s BSCL at Salem with all assets, and liabilities to M/s Steel Authority of the India Limited (SAIL). Accordingly, M/s Steel Authority of the India Limited (SAIL) owned the entire lease and Refractory Plant and named the unit as SAIL Refractory Company Limited (SRCL) w.e.f. 16.12.2011. After taking over SRCL also continued mining with valid Consent to Operate from Tamil Nadu Pollution Control Board. Mining activity has not been carried out since 10.01.2017.

Industries, Investment Promotion and Commerce (MMA.1) Department, Secretariat, Chennai - 600 009, Tamil Nadu vide their letter No 10839/MMA.1/2019-2 Dated: 02.11.2022 issued Letter of Intent to SAIL Refractory Company Limited in respect of the mining lease granted in G.o.(Ms).No.853, dated 05.06. 1979.

As the mine was operational, year-wise production from the mines is given below in **Table 2.1**. The details of past production is authenticated by Department of Geology and Mining, Salem, Tamil Nadu vide letter no Roc.45/2018/ Mines A/Mag-1 on dated 1.11.2018 and Roc.333/2017/ Mines A on dated 8.05.2017. The letters are attached as **Annexure-II**.

Table 2.1: Annual Production from 1990-91 to 2016-17

Year	Magnesite in (TPA)	Dunite (TPA)
1990-1991	84000	NIL
1991-1992	100000	NIL
1992-1993	76000	NIL
1993-1994	62000	13929
1994-1995	61000	7000
1995-1996	46000	14000
1996-1997	50000	7000
1997-1998	58000	5500
1998-1999	57000	5500
1999-2000	48000	4250
2000-2001	39500	9000
2001-2002	35900	9000
2002-2003	32500	11000
2003-2004	61000	16000
2004-2005	75500	8000
2005-2006	69000	20000





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Year	Magnesite in (TPA)	Dunite (TPA)
2006-2007	68000	33000
2007-2008	89000	23000
2008-2009	135000	28000
2009-2010	64100	22000
2010-2011	85000	30000
2011-2012	68960	37870
2012-2013	80000	23000
2013-2014	75000	15000
2014-2015	65000	13600
2015-2016	58000	12800
2016-2017	42000	1500

Source: Certified Production Data of DGM Office, Salem

2.2 NEED OF THE PROJECT

Magnesite Mineral Ore is an essential raw material for manufacturing refractory materials used by Iron & Steel Industry. This is a rare mineral available in Salem region of Tamil Nadu state and also found in other states like Uttarakhand, Karnataka and Jammu & Kashmir. Magnesite of Salem region is relatively low in calcium oxide. Salem Magnesite reserves are famous worldwide for its Cryptocrystalline structure, which is best suited for manufacturing refractory bricks. The above said project plays significant role in meeting the refractory requirements of Iron & Steel industry.

Dunite and Pyroxinite are preferred as flux to dolomite as a source of MgO in sintering and also in Iron & steel Industry. Dunite is also useful in construction industry, Dunite rocks are used for construction of aggregates, construction of roads etc. Dunite is having refractory properties and plays a significant role in Refractory Industry. This is also a rare mineral mainly available in Salem region of Tamil Nadu State and also found in Karnataka. Generally Magnesite and Dunite are minerals which coexists while mining.

2.3 LOCATION OF PROJECT (MAPS SHOWING GENERAL LOCATION, SPECIFIC LOCATIONS, PROJECT BOUNDARY AND PROJECT SITE LAYOUT)

The proposed project is located at Village- villages – Thathaiyangerpatti, Moongilpadi, Karuppur, Vellakkalpatti, Mallamoopanpatti of Taluk- Omalur & Salem, District-Salem (Tamil Nadu) situated between latitudes $11^{\circ} 41' 19.86645''$ N to 11°





Draft EIA Report for Mining of Magnesite & Dunite Mine, over an area 622.69 Ha, located at Villages Thathaiyangerpatti, Moongilpadi, Karuppur, Vellakkalpatti, Mallamoopanpatti, Taluk- Omalur & Salem, District-Salem (Tamil Nadu) By M/s SAIL Refractory Company Limited (SRCL).

44' 55.08940" N and longitudes 78° 05' 10.30542" E to 78° 08' 51.75760" E & is covered under the Survey of India toposheet no. 58-I/02.

The boundary coordinates of the ML area are given in **Table 2.2**.

The Lease area is situated 6km from Salem towards Bangalore highway, whereas former is situated about 11km from Salem town. The area is approachable by a panchayat road from Karuppur towards Vellakkalpatti road.

Site Photographs is shown in **Figure 2.1**. Topographic Map and Coordinate map and Google map is shown in **Figure 2.2, Figure 2.3 & Figure 2.4** respectively.

Table 2.2: Latitude and Longitude of the project site

Pillar No	Latitude	Longitude
Block I		
1	11° 44' 48.4800" N	78° 08' 51.8820" E
2	11° 44' 44.8417" N	78° 08' 47.2945" E
3	11° 44' 34.8462" N	78° 08' 40.7193" E
4	11° 44' 27.1500" N	78° 08' 35.6568" E
5	11° 43' 59.9027" N	78° 08' 04.4050" E
116	11° 44' 23.1936" N	78° 08' 03.0323" E
117	11° 44' 22.9308" N	78° 08' 03.7066" E
118	11° 44' 22.5187" N	78° 08' 03.6592" E
119	1° 44' 22.1432" N	78° 08' 05.3276" E
120	11° 44' 27.0471" N	78° 08' 08.2269" E
121	11° 44' 27.7096" N	78° 08' 07.0383" E
122	11° 44' 28.4433" N	78° 08' 07.3375" E
123	11° 44' 30.0012" N	78° 08' 07.9728" E
124	11° 44' 32.2584" N	78° 08' 10.0860" E
125	11° 44' 32.0644" N	78° 08' 10.6556" E
126	11° 44' 32.5752" N	78° 08' 11.2351" E
127	11° 44' 33.0324" N	78° 08' 12.8940" E
128	11° 44' 33.6588" N	78° 08' 13.0128" E
129	11° 44' 33.9360" N	78° 08' 12.3324" E





Draft EIA Report for Mining of Magnesite & Dunite Mine, over an area 622.69 Ha, located at Villages Thathaiyangerpatti, Moongilpadi, Karuppur, Vellakkalpatti, Mallamoopanpatti, Taluk- Omalur & Salem, District-Salem (Tamil Nadu) By M/s SAIL Refractory Company Limited (SRCL).

Pillar No	Latitude	Longitude
130	11° 44' 35.6388" N	78° 08' 13.5384" E
131	11° 44' 37.6548" N	78° 08' 13.9596" E
132	11° 44' 37.6713" N	78° 08' 15.0152" E
133	11° 44' 43.5804" N	78° 08' 15.8136" E
134	11° 44' 46.9500" N	78° 08' 18.4308" E
135	11° 44' 49.5488" N	78° 08' 22.2002" E
136	11° 44' 52.3124" N	78° 08' 27.9830" E
137	11° 44' 55.2264" N	78° 08' 31.9776" E
Block II		
5	11° 43' 59.9027" N	78° 08' 04.4050" E
6	11° 43' 57.9612" N	78° 08' 01.6152" E
7	11° 43' 56.5791" N	78° 07' 59.8743" E
8	11° 43' 54.2064" N	78° 07' 58.0152" E
9	11° 43' 39.3293" N	78° 07' 50.2911" E
10	11° 43' 24.3192" N	78° 07' 22.4400" E
11	11° 43' 22.1347" N	78° 07' 16.7047" E
12	11° 43' 14.5092" N	78° 07' 04.3428" E
76	11° 43' 53.4331" N	78° 07' 00.4124" E
77	11° 43' 52.8450" N	78° 07' 02.4329" E
78	11° 43' 54.9105" N	78° 07' 03.9949" E
79	11° 43' 57.7577" N	78° 07' 05.1391" E
80	11° 43' 57.5980" N	78° 07' 06.0243" E
81	11° 43' 57.9936" N	78° 07' 06.3264" E
82	11° 43' 57.2196" N	78° 07' 07.9932" E
83	11° 43' 59.4062" N	78° 07' 08.8956" E
84	11° 44' 00.2817" N	78° 07' 10.0974" E
85	11° 44' 01.1094" N	78° 07' 10.7212" E
86	11° 44' 01.4964" N	78° 07' 11.1360" E





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Pillar No	Latitude	Longitude
87	11° 44' 00.9642" N	78° 07' 15.5428" E
88	11° 44' 03.8782" N	78° 07' 16.4505" E
89	11° 44' 03.8364" N	78° 07' 16.8888" E
90	11° 44' 04.8797" N	78° 07' 21.1731" E
91	11° 44' 05.4900" N	78° 07' 21.8988" E
92	11° 44' 07.1424" N	78° 07' 23.9400" E
93	11° 44' 09.2888" N	78° 07' 24.2525" E
94	11° 44' 09.8744" N	78° 07' 24.5983" E
95	11° 44' 10.2529" N	78° 07' 25.2128" E
96	11° 44' 10.5096" N	78° 07' 25.5300" E
97	11° 44' 10.8819" N	78° 07' 25.7212" E
98	11° 44' 11.0832" N	78° 07' 26.0760" E
99	11° 44' 10.9084" N	78° 07' 26.5345" E
100	11° 44' 12.8436" N	78° 07' 28.3512" E
101	11° 44' 16.1052" N	78° 07' 32.1636" E
102	11° 44' 17.4553" N	78° 07' 31.7797" E
103	11° 44' 17.1637" N	78° 07' 32.5621" E
104	11° 44' 16.4076" N	78° 07' 32.5375" E
105	11° 44' 16.7028" N	78° 07' 34.1796" E
106	11° 44' 17.6051" N	78° 07' 34.7513" E
107	11° 44' 18.1824" N	78° 07' 36.0948" E
108	11° 44' 18.3048" N	78° 07' 40.0584" E
109	11° 44' 20.3597" N	78° 07' 44.2042" E
110	11° 44' 21.4157" N	78° 07' 48.2534" E
111	11° 44' 21.0624" N	78° 07' 52.2984" E
112	11° 44' 20.5044" N	78° 07' 53.9544" E
113	11° 44' 22.7300" N	78° 07' 55.4601" E
114	11° 44' 22.7067" N	78° 07' 56.3369" E





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Pillar No	Latitude	Longitude
115	11° 44' 23.2819" N	78° 07' 56.3216" E
116	11° 44' 23.1936" N	78° 08' 03.0323" E
Block III		
13	11° 43' 14.3529" N	78° 07' 03.9985" E
14	11° 43' 10.8444" N	78° 06' 56.2716" E
15	11° 43' 07.7424" N	78° 06' 46.7604" E
16	11° 42' 57.3444" N	78° 06' 36.9540" E
17	11° 42' 58.9824" N	78° 06' 21.0060" E
18	11° 43' 02.7372" N	78° 06' 22.3560" E
19	11° 43' 06.0005" N	78° 06' 14.2565" E
20	11° 43' 07.5633" N	78° 06' 15.1062" E
21	11° 43' 07.3308" N	78° 06' 16.3332" E
22	11° 43' 09.7578" N	78° 06' 17.4912" E
23	11° 43' 12.7149" N	78° 06' 18.0714" E
24	11° 43' 14.3760" N	78° 06' 13.6692" E
25	11° 43' 19.8912" N	78° 06' 17.2152" E
26	11° 43' 22.0256" N	78° 06' 18.2250" E
27	11° 43' 29.3496" N	78° 06' 20.3174" E
28	11° 43' 29.3113" N	78° 06' 20.5302" E
29	11° 43' 32.4696" N	78° 06' 21.4776" E
30	11° 43' 35.2308" N	78° 06' 16.9236" E
31	11° 43' 38.4128" N	78° 06' 18.5661" E
32	11° 43' 39.7236" N	78° 06' 15.4908" E
33	11° 43' 41.5193" N	78° 06' 15.9767" E
34	11° 43' 41.6034" N	78° 06' 15.5911" E
35	11° 43' 43.9066" N	78° 06' 16.2503" E
36	11° 43' 44.2500" N	78° 06' 13.6114" E
37	11° 43' 43.9878" N	78° 06' 13.5174" E





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Pillar No	Latitude	Longitude
38	11° 43' 45.5808" N	78° 06' 11.1888" E
39	11° 43' 51.6962" N	78° 06' 13.5117" E
40	11° 43' 51.0996" N	78° 06' 14.6952" E
41	11° 43' 52.5262" N	78° 06' 15.3951" E
42	11° 43' 53.0768" N	78° 06' 14.7119" E
43	11° 43' 57.8361" N	78° 06' 18.4200" E
44	11° 43' 57.6086" N	78° 06' 19.0650" E
45	11° 44' 00.1050" N	78° 06' 19.8312" E
46	11° 44' 00.2198" N	78° 06' 20.5203" E
47	11° 43' 59.1401" N	78° 06' 20.7089" E
48	11° 43' 59.2514" N	78° 06' 21.7656" E
49	11° 44' 00.4321" N	78° 06' 21.6525" E
50	11° 44' 00.6679" N	78° 06' 23.7613" E
51	11° 43' 56.7708" N	78° 06' 24.4625" E
52	11° 43' 53.3172" N	78° 06' 30.0528" E
53	11° 43' 52.6692" N	78° 06' 30.0240" E
54	11° 43' 48.9691" N	78° 06' 24.8949" E
55	11° 43' 47.1468" N	78° 06' 26.7480" E
56	11° 43' 47.2675" N	78° 06' 27.5928" E
57	11° 43' 46.3840" N	78° 06' 28.0364" E
58	11° 43' 48.7848" N	78° 06' 32.5224" E
59	11° 43' 49.3212" N	78° 06' 32.7348" E
60	11° 43' 48.6939" N	78° 06' 34.4804" E
61	11° 43' 45.8400" N	78° 06' 33.4584" E
62	11° 43' 46.7982" N	78° 06' 37.1801" E
63	11° 43' 47.3665" N	78° 06' 37.9385" E
64	11° 43' 47.0903" N	78° 06' 38.1043" E
65	11° 43' 47.3632" N	78° 06' 39.2424" E





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Pillar No	Latitude	Longitude
66	11° 43' 49.9142" N	78° 06' 43.3304" E
67	11° 43' 50.8577" N	78° 06' 43.9796" E
68	11° 43' 47.7546" N	78° 06' 54.1421" E
69	11° 43' 47.9859" N	78° 06' 55.3851" E
70	11° 43' 47.9214" N	78° 06' 56.3866" E
71	11° 43' 48.9338" N	78° 06' 56.7114" E
72	11° 43' 48.7884" N	78° 06' 58.1580" E
73	11° 43' 50.8196" N	78° 06' 58.7831" E
74	11° 43' 51.1716" N	78° 06' 59.0400" E
75	11° 43' 51.5380" N	78° 06' 58.6961" E
76	11° 43' 53.4331" N	78° 07' 00.4124" E
77	11° 43' 52.8450" N	78° 07' 02.4329" E
78	11° 43' 54.9105" N	78° 07' 03.9949" E
79	11° 43' 57.7577" N	78° 07' 05.1391" E
80	11° 43' 57.5980" N	78° 07' 06.0243" E
81	11° 43' 57.9936" N	78° 07' 06.3264" E
82	11° 43' 57.2196" N	78° 07' 07.9932" E
83	11° 43' 59.4062" N	78° 07' 08.8956" E
84	11° 44' 00.2817" N	78° 07' 10.0974" E
85	11° 44' 01.1094" N	78° 07' 10.7212" E
86	11° 44' 01.4964" N	78° 07' 11.1360" E
87	11° 44' 00.9642" N	78° 07' 15.5428" E
88	11° 44' 03.8782" N	78° 07' 16.4505" E
89	11° 44' 03.8364" N	78° 07' 16.8888" E
90	11° 44' 04.8797" N	78° 07' 21.1731" E
91	11° 44' 05.4900" N	78° 07' 21.8988" E
92	11° 44' 07.1424" N	78° 07' 23.9400" E
93	11° 44' 09.2888" N	78° 07' 24.2525" E





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Pillar No	Latitude	Longitude
94	11° 44' 09.8744" N	78° 07' 24.5983" E
95	11° 44' 10.2529" N	78° 07' 25.2128" E
96	11° 44' 10.5096" N	78° 07' 25.5300" E
97	11° 44' 10.8819" N	78° 07' 25.7212" E
98	11° 44' 11.0832" N	78° 07' 26.0760" E
99	11° 44' 10.9084" N	78° 07' 26.5345" E
100	11° 44' 12.8436" N	78° 07' 28.3512" E
101	11° 44' 16.1052" N	78° 07' 32.1636" E
102	11° 44' 17.4553" N	78° 07' 31.7797" E
103	11° 44' 17.1637" N	78° 07' 32.5621" E
104	11° 44' 16.4076" N	78° 07' 32.5375" E
105	11° 44' 16.7028" N	78° 07' 34.1796" E
106	11° 44' 17.6051" N	78° 07' 34.7513" E
107	11° 44' 18.1824" N	78° 07' 36.0948" E
108	11° 44' 18.3048" N	78° 07' 40.0584" E
109	11° 44' 20.3597" N	78° 07' 44.2042" E
110	11° 44' 21.4157" N	78° 07' 48.2534" E
111	11° 44' 21.0624" N	78° 07' 52.2984" E
112	11° 44' 20.5044" N	78° 07' 53.9544" E
113	11° 44' 22.7300" N	78° 07' 55.4601" E
114	11° 44' 22.7067" N	78° 07' 56.3369" E
115	11° 44' 23.2819" N	78° 07' 56.3216" E
Block IV		
1	11° 41' 20.3424" N	78° 05' 40.2252" E
2	11° 41' 20.3748" N	78° 05' 35.4876" E
3	11° 41' 20.7204" N	78° 05' 33.7380" E
4	11° 41' 20.7708" N	78° 05' 32.4600" E
5	11° 41' 20.6340" N	78° 05' 31.4772" E





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Pillar No	Latitude	Longitude
6	11° 41' 21.4836" N	78° 05' 27.6288" E
7	11° 41' 22.9020" N	78° 05' 27.6828" E
8	11° 41' 23.5494" N	78° 05' 25.0689" E
9	11° 41' 20.8508" N	78° 05' 23.6655" E
10	11° 41' 21.9349" N	78° 05' 21.9781" E
11	11° 41' 23.8262" N	78° 05' 20.1251" E
12	11° 41' 25.6380" N	78° 05' 19.9824" E
13	11° 41' 26.2068" N	78° 05' 17.0052" E
14	11° 41' 26.5383" N	78° 05' 15.7989" E
15	11° 41' 22.7670" N	78° 05' 14.3539" E
16	11° 41' 23.2044" N	78° 05' 13.4988" E
17	11° 41' 24.0144" N	78° 05' 11.2344" E
18	11° 41' 25.0919" N	78° 05' 11.4667" E
19	11° 41' 25.9854" N	78° 05' 12.1906" E
20	11° 41' 27.1752" N	78° 05' 12.7104" E
21	11° 41' 28.2372" N	78° 05' 10.4064" E
22	11° 41' 29.7204" N	78° 05' 10.8672" E
23	11° 41' 28.5684" N	78° 05' 13.4232" E
24	11° 41' 30.4404" N	78° 05' 13.4088" E
25	11° 41' 31.6140" N	78° 05' 11.3316" E
26	11° 41' 33.0324" N	78° 05' 11.9004" E
27	11° 41' 35.2597" N	78° 05' 12.9840" E
28	11° 41' 35.5560" N	78° 05' 11.9616" E
29	11° 41' 41.1237" N	78° 05' 16.9510" E
30	11° 41' 40.1644" N	78° 05' 18.8541" E
31	11° 41' 41.5737" N	78° 05' 19.7702" E
32	11° 41' 42.3711" N	78° 05' 20.4936" E
33	11° 41' 42.7441" N	78° 05' 21.3029" E





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Pillar No	Latitude	Longitude
34	11° 41' 43.0137" N	78° 05' 21.7871" E
35	11° 41' 43.2117" N	78° 05' 24.2298" E
36	11° 41' 43.7973" N	78° 05' 24.4469" E
37	11° 41' 43.9925" N	78° 05' 26.2364" E
38	11° 41' 44.6653" N	78° 05' 28.4632" E
39	11° 41' 45.1108" N	78° 05' 28.6483" E
40	11° 41' 44.6665" N	78° 05' 31.4451" E
41	11° 41' 44.9313" N	78° 05' 31.5821" E
42	11° 41' 45.0272" N	78° 05' 34.7541" E
43	11° 41' 44.6115" N	78° 05' 34.6971" E
44	11° 41' 44.3503" N	78° 05' 36.0698" E
45	11° 41' 45.2758" N	78° 05' 36.3220" E
46	11° 41' 45.2464" N	78° 05' 36.6970" E
47	11° 41' 46.4568" N	78° 05' 37.2228" E
48	11° 41' 46.4172" N	78° 05' 38.5440" E
49	11° 41' 46.2876" N	78° 05' 38.4504" E
50	11° 41' 45.3300" N	78° 05' 42.3240" E
51	11° 41' 45.3444" N	78° 05' 44.8980" E
52	11° 41' 45.1608" N	78° 05' 46.1652" E
53	11° 41' 45.5260" N	78° 05' 47.0135" E
54	11° 41' 42.5399" N	78° 05' 49.1439" E
55	11° 41' 36.8228" N	78° 05' 52.7900" E
56	11° 41' 30.5563" N	78° 05' 56.7102" E
57	11° 41' 25.8020" N	78° 05' 54.4733" E
58	11° 41' 22.8432" N	78° 05' 53.3245" E
59	11° 41' 22.5842" N	78° 05' 49.6069" E
60	11° 41' 22.9673" N	78° 05' 47.9337" E
61	11° 41' 22.9637" N	78° 05' 45.9663" E





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Pillar No	Latitude	Longitude
62	11° 41' 23.2362" N	78° 05' 41.4393" E

Source: Approved Mining plan

2.3.1 Human Settlement in the Study Area

38 villages exist within the study area of the mining.





Figure 2.1: Site Photographs





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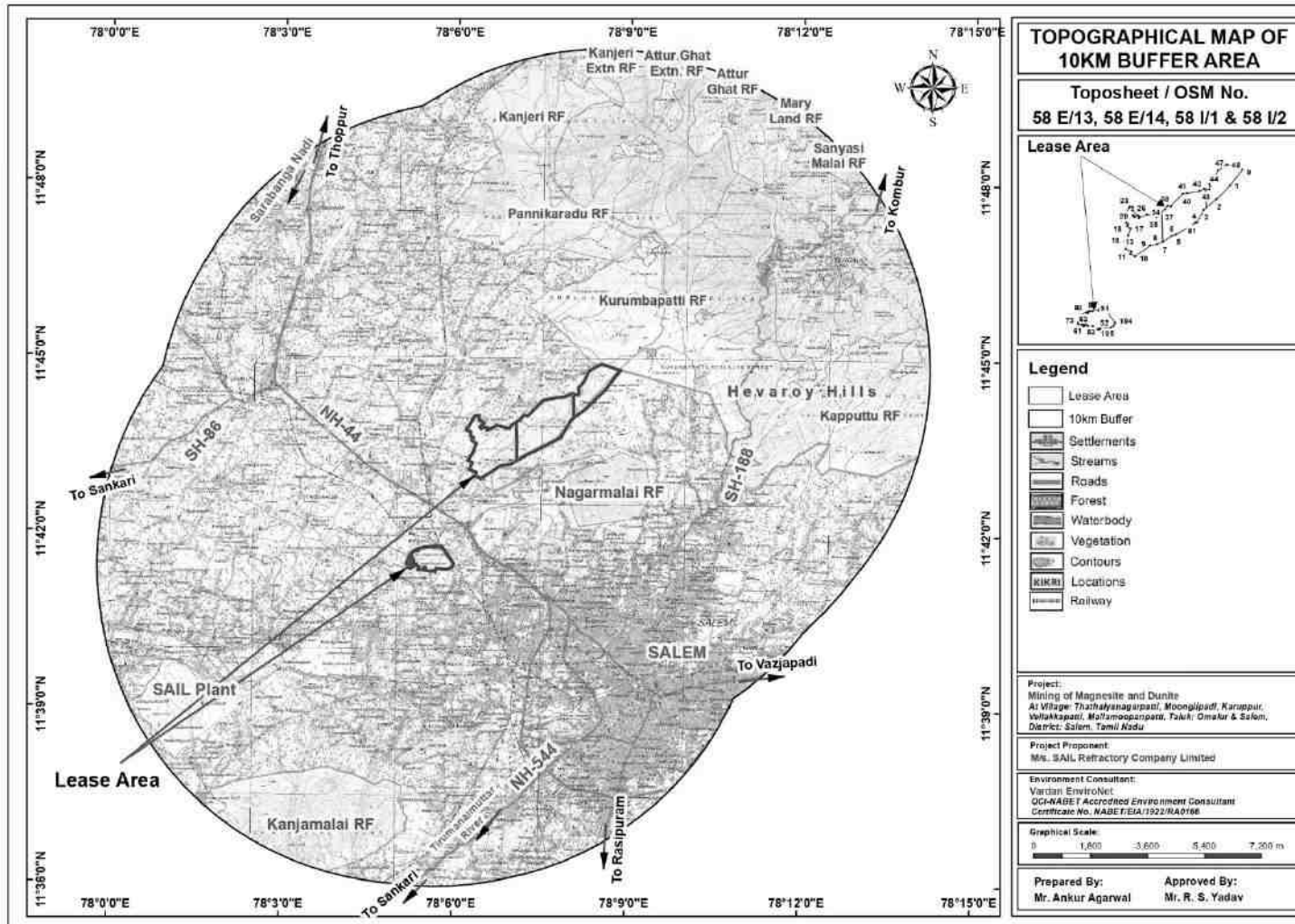


Figure 2.2: Topographical Map of Study Area



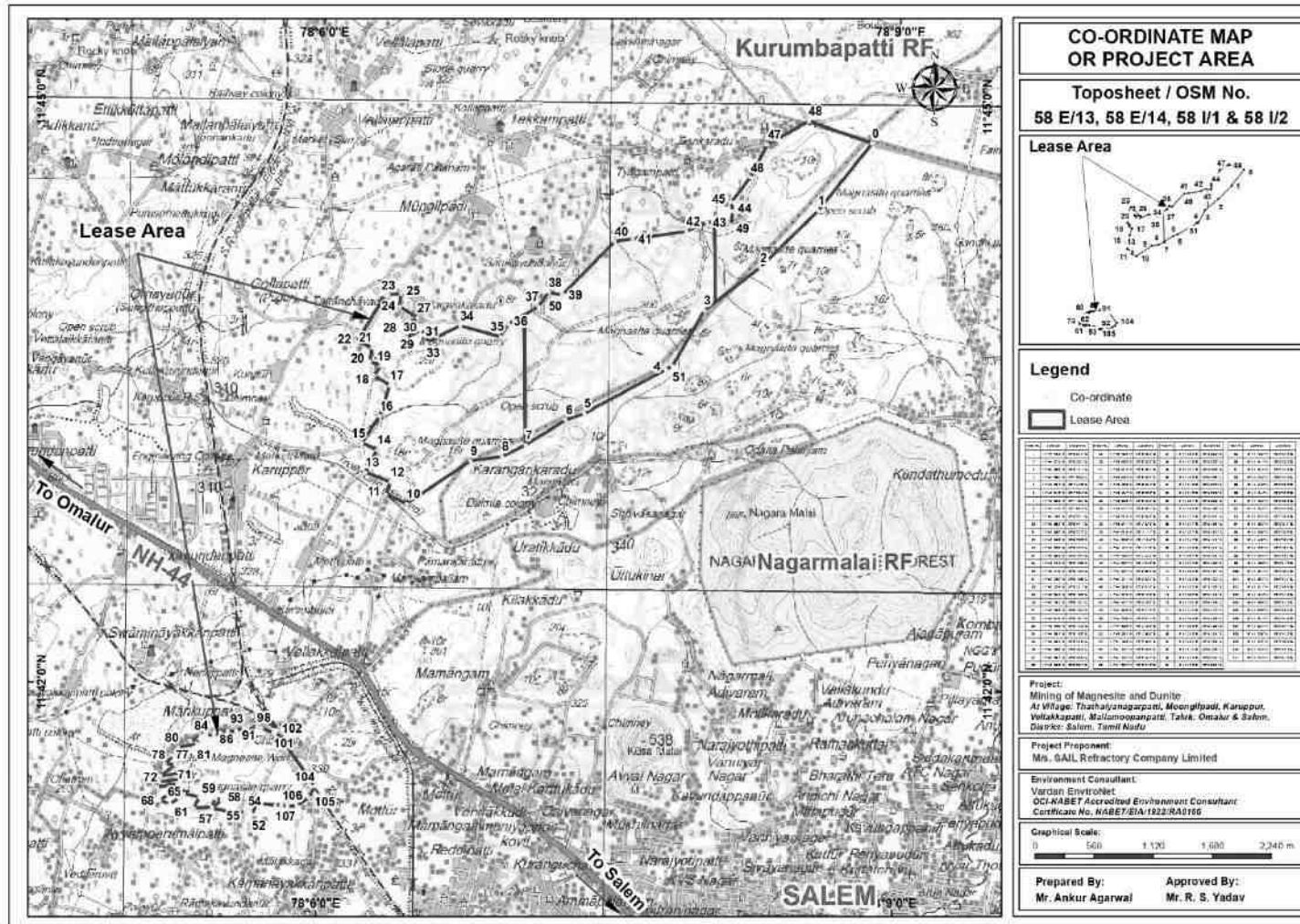


Figure 2.3: Coordinate Map





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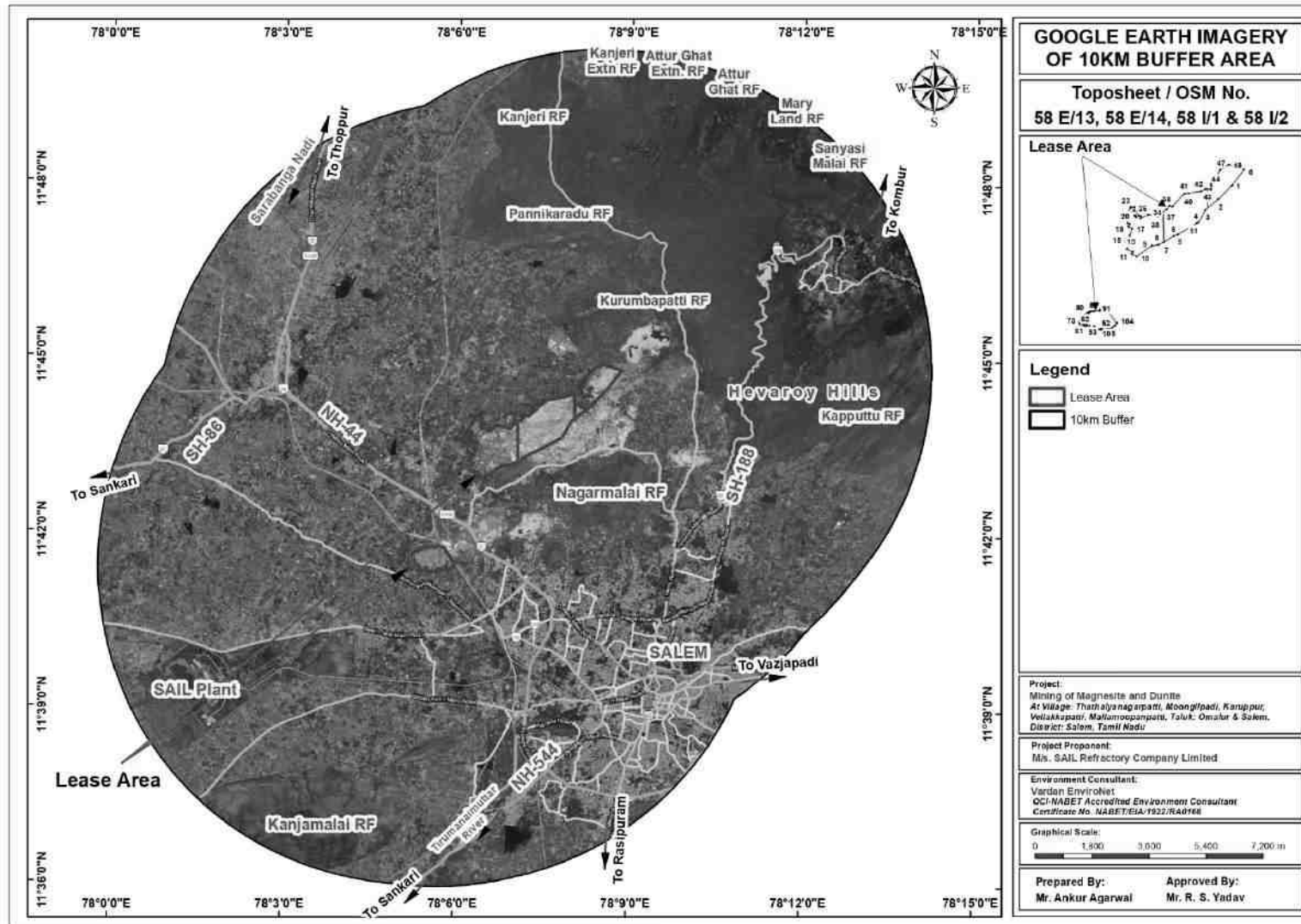


Figure 2.4: Google Earth Imagery of 10 KM Buffer Area





2.4 SIZE/MAGNITUDE OF OPERATION

2.4.1 Proposed Operation

As per the Review of Mining Plan along with Progressive Mine Closure Plan total mineral reserve and resources are 23.95 million tonnes of Magnesite and 16.423 million Tonnes of Dunite and Mineable reserve 0.745 million tonnes of Magnesite and 0.654 million tonnes of Dunite.

Review of Mining Plan along with Progressive Mine Closure Plan envisages for mining ROM (2631452 TPA), Magnesite (115010 TPA), Dunite (67102 TPA) and maximum reject (2463066 TPA) of mineable reserves within the area where the reserves are proved

The salient features of the Mine are as given in **Table 2.3:**

Table 2.3: Salient Features of the Proposed Mine

S. No.	Description	Particulars
1.	Mine lease area	622.69 Ha
2.	Forest Area	Not Applicable
3.	Lease Validity	Up to 20.04.2029
4.	Approval of Mining Plan	Approved by Office of Regional Controller of mines, Indian Bureau of Mines vide letter number TN/SLM/MG&DU/ROMP/-1589 MDS dated 30/07/2020 for period 2020-21 to 2024-25
5.	Type of mine	Opencast Mine
6.	Method of mining	Other than Fully Mechanized Opencast Mining method, excavators will be deployed for the excavation, development of benches, loading and for the formation of roads. Mining operation is carried out by engaging both jack hammers and wagon drills. Heavy blasting will be done as and when required, besides regular blasting will be carried out with jackhammer drilling. Loading and transport of the ROM will be done by Hydraulic excavator and tippers. But the collection, segregation, dressing and stacking of ore size as Lumps (> 75mm), Smalls (25-75mm) and Jelly (10-25mm) are done by manual means
7.	Existing Status of Mine	Mining activity has been stopped since 10.01.2017
8.	Proposed Capacity	ROM: 2643936 TPA Magnesite: 115071 TPA Dunite: 67104 TPA





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S. No.	Description	Particulars					
9.	Expected life of mine	About 10 years (Based on details exploration life of mine can change)					
10.	Production MT (for the planned period, first five years)	Year	Tentative excavation , MT	Magnesite, MT	Dunite, MT	Waste, MT	Ore to Waste Ration
		Block I					
		20-21	178938	10736	6710 2	114520	1:1.47
		21-22	178852	10731	6707 0	114465	1:1.47
		22-23	178922	10735	6709 6	114510	1:1.47
		23-24	237944	13089	6695 4	171292	1:2.14
		24-25	471068	22416	6700 1	395052	1:4.41
		Block II					
		20-21	1993884	104274	-	1889610	1:18.12
		21-22	1851532	96660	-	1754872	1:18.15
		22-23	2452530	103974	-	2348556	1:22.59
		23-24	1653124	98160	-	1554964	1:15.84
		24-25	1903200	89856	-	1813344	1:20.18
		11.	Ore to Waste ratio (t/t)	1:2.26 (Block I), 1:18.99 (Block II)			
12.	Total Mineral Reserve and resources	Magnesite: 23.95 million tonnes Dunite:16.423 million tonnes					
13.	Mineable reserves	Magnesite: 0.745 million tonnes Dunite:0.654 million tonnes					
14.	Working Regime	300 days / one Shift per day / 8 hours per Shift					
15.	Bench height / bench width	6 m/6 m					
16.	Overburden to be generated	Nil					
17.	Topsoil to be generated	Nil					





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S. No.	Description	Particulars
18.	Ultimate pit slope	45 ⁰
19.	Ultimate working depth at the end of plan period	Block II: 48m
20.	No. of waste dumps at the end of plan period	Block I: 12 Nos. of Waste dump (11 is existing & 1 proposed) Block II: 28 Nos. of Waste dump (23 is existing & 5 proposed) Block III: 25 Nos. of Waste dump (25 is existing) Block IV: 13 Nos. of Waste dump (13 is existing)
21.	Average Employment Potential	Total: 434 persons
22.	Power requirement	Transformer: 200 KVA from TNEB (Tamil Nadu Electricity Board) 45 KVA DG Set
23.	Water requirement	Source: Through Bore wells & Mine Water Domestic Water Requirement: 10 m ³ /day Dust Suppression water requirement: 30 m ³ /day Water requirement for Plantation: 50 m ³ /day Total Requirement: 90 m³/day
24.	Fuel consumption	HSD: 2, 50, 000 Liter /year Lube OIL: 7000 Lit/Year
25.	Explosive Requirement	1057 kg/Day
26.	Transportation	Within Lease After drilling & blasting, excavated material will shifted to spoil bank through trippers 15 tonnes capacity. Outside Lease The magnesite and dunite minerals from spoil bank will be transported to SRCL factory hired trucks of 10 tonnes capacity.
27.	Project Cost	Rs. 3.0 crore

Source: Approved Review of Mining Plan

2.5 STATUS OF STATUTORY PERMISSIONS

2.5.1 Lease Deed

Earlier, the mining lease was granted to M/s Burn Standard Company Ltd. (BSCL, A Govt. of India Undertaking) Salem-636005, Tamil Nadu for a period of 20 years vide





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G.O. No. 853 dated 05.06.1979, over an extent of 622.69 Ha and the lease deed was executed on 21.04.1980 for a period of 20 years and expires on 20.04.2000 (Lease document and renewal application attached **Annexure III**). Then, supplementary lease deed was executed on 20.3.1989 for exploitation of dunite in addition to magnesite (Attached as **Annexure III**). The application for renewal of mining lease was made by M/s Burn Standard Company Ltd. as per norms on 14.4.1999, i.e. one year before the expiry of mining lease and mining was continued under deemed condition with valid Consent to Operate (CTO) from Tamil Nadu Pollution Control Board.

Ministry of Heavy Industries & Public Enterprises, Gol, vide memo dated 17.11.2011 transferred the Refractory unit of M/s BSCL at Salem with all assets, and liabilities to M/s Steel Authority of the India Limited (SAIL) (**Attached as Annexure IV**). Accordingly, M/s Steel Authority of the India Limited (SAIL) owned the entire lease and Refractory Plant and named the unit as SAIL Refractory Company Limited (SRCL) w.e.f. 16.12.2011. After taking over SRCL also continued mining with valid Consent to Operate from Tamil Nadu Pollution Control Board.

Earlier SRCL has applied for transfer of lease in the name of SRCL, and the same was confirmed by Deputy Director, Department of mines and Geology vide letter no RC. NO. 45/2018/Mines A/Mag-1 on dated 24.09.2018, RC. No.174/2018/Mine A on 22.02.2019 and 20.03.2020 & District Collectorate Office letter dated 17.03.2020. The letters are (**Attached as Annexure IV**).

Now, Industries, Investment Promotion and Commerce (MMA.1) Department, Secretariat, Chennai - 600 009, Tamil Nadu vide their letter No 10839/MMA.1/2019-2 Dated: 02.11.2022 issued Letter of Intent to SAIL Refractory Company Limited in respect of the mining lease granted in G.o.(Ms).No.853, dated 05.06. 1979. **Attached as Annexure IV**

2.5.2 Mining Plan

After taken over by SRCL, the Second Scheme of Mining & PMCP for the period 2010-11 to 2014-15 was approved by the Indian Bureau of Mines, Chennai vide letter No.TN/SLM/MG/MS-1021/MDS, dated: 09.07.2014 and it was valid up to 31.03.2015.

The Review of Mining Plan & PMCP for the period 2015-16 to 2019-20 was approved by the Indian Bureau of Mines, Chennai vide letter No.TN/SLM/MG/MS1366/MDS, dated 29.08.2016.

Modified Mining Plan & PMCP for the period 2018-19 to 2019-20 was approved by the Indian Bureau of Mines, Chennai vide letter No.TN/SLM/MP/MG&DU-2051.MDS, dated 12.11.2018 and it was valid up to 31.03.2020.





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Review of Mining Plan along with Progressive Mine Closure Plan under Rule 17 (2) has been approved for production capacity of ROM: 2631452 TPA, Magnesite: 115010 TPA and Dunite: 67102 TPA by Office of Regional Controller of mines, Indian Bureau of Mines vide letter number TN/SLM/MG&DU/ROMP/-1589 MDS dated 30/07/2020 for period 2020-21 to 2024-25. The Approval letter is **(Attached as Annexure V)**

2.5.3 Environment Clearance

SRCL has submitted online application for obtaining Environment clearance initially in the non-coal mining on 31.01.2017, later on proposal was resubmitted as per S.O. 804 (E) dated 14.03.2017 online vide proposal No. IA/TN/MIN/64734/2017 dated 19.05.2017. Terms of References (ToR) for the project was granted by Ministry of Environment, Forest & Climate Change (MoEF&CC) File letter 23-166/2018-IA.III (V) dated 17.09.2021.

2.5.4 Consents from State Pollution Control Board

TNPCB revoke the Consent to operate granted under the Water (Prevention and Control of Pollution) Act, 1974, the Air (Prevention and Control of Pollution) Act, 1981 vide order T7/TNPCB/F-0950/RL/SLM/2013 dated 19.07.2017 under the provision of S.O. 804 (E) dated 14.03.2017 the revoke order is **attached as Annexure VI**.

Consent to operate to resume the mining activity will be obtained after receipt of Environment clearance form MOEF&CC.

2.6 IMPLEMENTATION SCHEDULE

Expansion of the proposed mine is subjected to the grant of Environmental Clearance and other requisite statutory clearances for proposed facility, which is expected to be obtained during FY 2023-24.

2.7 GEOLOGY OF AREA

2.7.1 Physiography & Drainage

The mining lease area is a subdued topography with elevation ranges from 420m - 345m above MSL. No river or pond or any other water bodies are located nearby except a seasonal odai track. General gradient is due west in 1: 100. Seasonal crops like maize, cotton are very common

There is no water body like river or pond or lakes are found around 500m from the lease hold area. No pumping is required to pump out ground water as the mining is not going to intersect ground water.





2.7.1.1 Regional Geology

The South Indian shield is composed of Archaean and Proterozoic rocks. It is a classical region for the study of different stages of crustal evolution and is also one of the extensively studied Pre-cambrian terrains in the world. The South Indian shield is flanked by the Mesozoic, Tertiary and Quaternary sediments to the east and west. It is truncated by the Godavari graben towards north and partially masked by the late Proterozoic basins (Cuddapah, Kaladgi, Badami and Bhima) towards northeast and Cretaceous to Tertiary flood basalts (Deccan Traps) towards north-west. Salem district is having different variety of rock formations like peninsular gneisses, Charnockites, Younger granites, Pegmatites and ul tramafic rocks like Dunites, Peridotites and mafic rocks like pyroxenites

The ultramafic rocks generally show evidence of greater weathering in comparison to the adjacent gneissic country rocks. With respect to the study area the depth of weathering in dunite extends up to 40 mts., while in the gneissic country rocks; it ranges from 5 to 15 mts. The degree of weathering in these rocks is controlled by irregular fracture patterns. The regional ground water table is confined to the sum of weathering. The weathered soils of ultramafic rocks like dunite and peridotite show yellowish red color. Potassium-rich rocks show mostly spheroidal weathering. Many well sections show spheroidal boulders.

Most prominent deposit of magnesite is located in Chalk hills of Salem spreads 17 sq. km. Magnesite in this area occurs as criss-cross veins traversing serpentinous dunite. The veins vary in length from a fraction of a meter to 10's of meter and thickness from less than a centimeter to as much as 1m. The regional stratigraphic sequence is given in **Table 2.4**.

Table 2.4: Regional Stratigraphic Sequence

Age	Nature and Characteristics
Recent	Thin reddish soil
Archean	Dunite, Olivine Gabbro, Pyroxenite Ultramafic Rocks Peninsular Gneiss, Hornblende-Gneiss, Biotite-gneiss & Charnockites

Source: Approved Review of Mining Plan

2.7.1.2 Local Geology

The area exhibits a subdued topography with small hillocks and plains. Ridges are found along the periphery of the ultramafic belt with sunken saucer like shape at the middle. There is no vegetation in the magnesite bearing areas except green belts





around the chalk hills area due to huge ground water potential and rich soil cover. Chalk hills area forms a major catchment area for rainfall for ground water percolation.

Regional geology: the ultramafic intrusive comprises magnetite bearing dunite, peridotite and shonkinite. The two ultramafic bodies occur as intrusive and are separated by gneissic country in between. The ultramafic bodies display enechelon pattern in ENE-WSW direction parallel to the foliation trend of adjoining gneisses.

The charnockites and gneisses forms the major country rocks, into which the dykes, ultramafics, potassic rock, quartz veins and pegmatite are intruded successively. The ultramafic rocks are altered into magnesite veins along the fractures of the dunite and peridotite due to emanation of carbon dioxide and carbonate solutions supplied by younger intrusive

Geological plan & Geological section is given in **Plate IV and IV A** respectively.

2.8 RESERVES ESTIMATION AND LIFE OF MINE

The estimation of mineral reserves is done by cross sections method. For Reserve calculation the length and width of the deposit is as shown in the Geological plan & cross sections. The bulk density has been reckoned as 2.0 for magnesite and 2.5 for dunite mineral.

On the basis of available exploration data mineral reserve and resource has been estimated. A safety barrier of 7.5 m width all along inside the lease area has been kept as per the provisions of the statutes. The average analysis of mineral from lease area is given in **Table 2.5**

Table 2.5: Mineral Analysis from Lease

Parameter	MAGNESITE		DUNITE	
	Refractory Grade in the mine	Non-Refractory Grade in the mine	Available Grade in the mine	
			Grade I	Grade II
MgO	45% -46%	<45%	48.85	38.37
CaO	1%	>1%	0.7	0.98
Al ₂ O ₃ + Fe ₂ O ₃	<1%	>1%	12.68	13.68
SiO ₂	2-6%	8.5 – 15%	37.12	39.12
LOI	44%-41%	>45	0.65	7.65

Source: Approved Review of Mining Plan

Category wise updated reserves with grade are given in **Table 2.6**.





Table 2.6: Reserves as Per UNFC Classification (As on 29.01.2020)

S. No	Categorization of Mineral	Block I - IV			Total (MT)
		Rich	Moderate	Poor	
1	Mineral Reserve (111) in MT				
	Magnesite	509794	214023	21707	745524
	Dunite	654350	-	-	654350
	Waste	7463292	5136549	1063619	13663460
2	Mineral Resources (MT)				
	Under Probable (222)				
	Magnesite	12534851	8386814	1866778	22788443
	Dunite	15401916	-	-	15401916
	Waste	190156576	201283524	91472136	482912236
	Under bench loss (211)				
	Magnesite	154367	36616	10123	201106
	Dunite	168401	-	-	168401
	Waste	2283704	878782	496039	3658525
	Under Safety (222)				
	Magnesite	152933	31500	30310	214743
	Dunite	200250	-	-	200250
	Waste	2235743	756000	1485200	4476943

Source: Approved Review of Mining Plan

2.8.1 Mineral Reserve and Resources

Details of Reserve/Resources is given in Table 2.7.

Table 2.7: Reserve/Resources

Mineral Reserves and Resources	Total Mineral reserves Magnesite (Million Tonnes)	Total Mineral Reserves of Dunite @ 30% (Million Tonnes)	UNFC Code
Total Mineral Reserves (Mineable) i) Proved (G1, F1&E1 axes)	0.745	0.654	111





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Mineral Reserves and Resources	Total Mineral reserves Magnesite (Million Tonnes)	Total Mineral Reserves of Dunite @ 30% (Million Tonnes)	UNFC Code
Total Mineral Resources Probable (G1, F1 & E1 axes)	22.79	15.402	222
Mineral Resources Mineral Resources Loss in Benches (G2, F1&E1 axes)	0.201	0.168	211
Mineral Resources Mineral Resources Loss in 7.5m Safety Barrier (G2, F2&E2 axes)	0.214	0.200	222
Geological Inferred (G3, F3 & E3 axes)	NIL	NIL	333
Total Mineral Reserves and Resources	23.950	16.423	

Source: Approved Review of Mining Plan

2.8.2 Life of Mine

Life of mine is about 10 years, based on detailed exploration life of mine may change.

2.9 TECHNOLOGY AND PROCESS DESCRIPTION

2.9.1 Mining Methodology

The Mine comes under Category-A (other than Fully Mechanized category) as per the IBM guidelines. The mining will be done by Opencast mining method excavators will be deployed for the excavation, development of benches, loading and for the formation of roads. Mining operation is carried out by engaging both jack hammers and wagon drills. Heavy blasting will be done as and when required, besides regular blasting will be carried out with jackhammer drilling.

2.9.1.1 Working Regime

No. of working days per year : 300 Days/year

No. of working shifts/day : 1 shift/day

Working Hours per shift : 8 Hours/shift





2.9.1.2 Mine Design Parameters

The proposed height of bench will be is 6 meters with 6 meters minimum working width with 60° slopes. Year wise proposed mine working up to end of plan period (Table 2.8).

Table 2.8: Year-Wise Proposed Mine Working up to the End of Plan Period

Year	Section	Reduce level (m)	Mineralization	Pit Dimension (m)		
				L	W	D
Block I						
2020-21	AB-X1-Y1	420-418	Rich	50	14	2
		418-415		50	48	3
		415-409		50	41	6
		414-409		268	9	5
		409-403		50	30	6
		409-403		268	25	6
		403-397		50	11	6
		403-401		105.5	19	2
2021-22	AB-X1-Y1	403-401	Rich	162.5	19	2
		401-397		268	25	4
		397-391		268	25	6
		391-388		268	19	3
		388-385		13	25	3
2022-23	AB-X1-Y1	388-385	Rich	255	25	3
		385-379		268	19	6
		379-373		268	19	6
		373-371		268	12	2
		371-367		28	25	4
2023-24	AB-X1-Y1	371-367	Rich	268	25	4
		367-361		268	19	6
		361-355		140	38	6





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Year	Section	Reduce level (m)	Mineralization	Pit Dimension (m)		
				L	W	D
	AB-X1-Y1	355-352	Moderate	268	25	3
	AB-X2-Y2	409-403		200	8	6
2024-25	AB-X1-Y1	361-355	Rich	128	38	6
		355-352		268	25	3
		352-349		267	50	3
	AB-X2-Y2	403-397	Moderate	200	4	6
		397-391		50	36	6
		393-391		200	22	2
		391-385		50	24	6
		391-385		200	26	6
		385-383		200	31	2
		383-379		200	25	4
		379-375		200	19	4
		375-373		200	24	2
	373-371	200	18	2		
	AB-X3-Y3	411-409		50	49	2
		409-403		50	33	6
		403-397		50	14	6
	Block II					
20220-21	X7-Y7-AB	363-357	Moderate	303	40	2
		357-351		303	63	5
		351-345		303	19	6
	X9-Y9-AB	Above 372		215	25	2
		372-366		215	18	6
	X10-Y10-CD	362-356		184	25	2
356-350		184	66	6		





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Year	Section	Reduce level (m)	Mineralization	Pit Dimension (m)		
				L	W	D
	X7-Y7-AB	350-344	Rich	184	103	6
		369-363		303	17	6
		363-357		303	40	5
		357-351		303	127	5
		351-345		303	181	6
2021-22	X7-Y7-AB	351-345	Rich	303	32	6
	X9-Y9-AB	354-348		215	51	6
		348-342		215	39	6
		342-336		215	65	6
		336-330		215	148	6
	X10-Y10-CD	356-350	184	33	4	
		350-344	184	67	6	
		344-338	184	16	6	
	X11-Y11-CD	370-364	Moderate	200	25	1
		364-358		200	81	5
		358-352		200	93	6
		352-346		200	136	6
	2022-23	X10-Y10-CD	344-338	Rich	184	24
338-332			184		109	6
X11-Y11-CD		352-346	Moderate	200	16	6
X12-Y12-CD		369-363		181	49	5
		345-339		181	68	6
X13-Y13-EF		371-365		220	25	4
		365-359		220	53	6
		359-353		220	140	6
		353-347		220	142	6





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Year	Section	Reduce level (m)	Mineralization	Pit Dimension (m)		
				L	W	D
2023-24		347-341		220	189	6
		341-335		220	173	6
	X12-Y12-CD	345-339	Moderate	181	20	6
	X13-Y13-EF	341-335		220	3	6
	X11-Y11-CD	370-364	Rich	200	25	5
		358-352		200	26	5
		352-346		200	58	4
		346-340		200	115	6
		340-334		200	121	6
		369-363		181	24	4
	X12-Y12-CD	363-357	181	110	6	
		357-351	181	124	6	
		351-345	181	137	6	
2024-25	X13-Y13-EF	371-365	Rich	220	75	4
		365-359		220	79	6
		359-353		220	131	6
	X14-Y14-EF	384-378	Moderate	300	39	6
		378-372		300	72	6
		372-366		300	123	6
		366-360		300	104	6

Source: Approved Review of Mining Plan





2.9.2 Calendar Plan (Proposed production Detail)

Year-wise proposed production plan for 5 years in **Table 2.9:**

Table 2.9: Year-Wise Proposed Production Plan for 1st Five Years

Year	Volume (m ³)					ROM (MT)					Ore: Waste Ratio
	Total Tentative Excavation	Top soil	Magnesite @4% to 6%	Dunite @30%	Waste @64% to 90%	Total Tentative Excavation	Top soil	Magnesite @4% to 6%	Dunite @30%	Waste @64% to 90%	
	Block I										
2020-21	89469	-	5368	26841	57260	178938	-	10736	67102	114520	1:1.47
2021-22	89426	-	5366	26828	57233	178852	-	10731	67070	114465	1:1.47
2022-23	89461	-	5368	26838	57255	178922	-	10735	67096	114510	1:1.47
2023-24	118972	-	6544	26782	85646	237944	-	13089	66954	171292	1:2.14
2024-25	235534	-	11208	26800	197526	471068	-	22416	67001	395052	1:4.41
Total	622862	-	33854	134089	454920	1245724	-	67707	335222	909839	1:2.26
	Block II										
2020-21	996942	-	52137	-	944805	1993884	-	104274	-	1889610	1:18.12
2021-22	925766	-	44839	-	877436	1851532	-	96660	-	1754872	1:18.15
2022-23	1226265	-	51987	-	1174278	2452530	-	103974	-	2348556	1:22.59
2023-24	826562	-	49080	-	777482	1653124	-	98160	-	1554964	1:15.84
2024-25	951600	-	44928	-	906672	1903200	-	89856	-	1813344	1:20.18
Total	4927135	-	242972	-	4680673	9854270	-	492925	-	9361345	1:18.99

Source: Approved Review of Mining Plan





Year wise development & production plan and section for Block I & II is given at **Plate VA-VE1**, conceptual plan and section for block I & II is given in **Plate VIII & VIIIA** & conceptual plan and section for block III & IV is given in **Plate V & VA** respectively.

2.9.3 Drilling & Blasting

2.9.3.1 Drilling

The proposed drilling requirement for the mine is given below in **Table 2.10**:





Table 2.10: Details of drilling equipment

Type	Nos	Dia of Hole	Size/Capacity	Make	Motive power	HP
Wagon Drill	4	110 mm	10.5 kg/cm ² 450 cfm	Atlas Copco-3, SEKO BEC Pvt-1	Diesel	-
Jack hammer	6	32 mm	7 kg/cm ² XA 175	Atlas Copco	Diesel	45
Compressor	4	450 cfm	10.5 kg/cm ² 450 cfm	Khosla - 1 No Atlas Copco XA 176 - 1 No VT-6-1 No ELGI -2 No	Diesel	180

Source: Approved Review of Mining Plan

2.9.3.2 Blasting

Blasting will be done every day between 12 noon – 1 pm. Column charge will be used as base charge with boosters for deep hole blasting. Cord relay arrangements or Electric delay detonators are being proposed to reduce the charge per delay and hence limiting the peak particle velocity due to blast vibration would be minimum and to achieve high fragmentation in addition to control fly rock and back break

Blasting will be done to keep the bench height 6m. Deep hole blasting using Wagon drill, 110mm diameter followed by shot hole drilling over the magnesite veins are adopted to release the mineral from the host rock, the Dunite/ serpentinite. Powder factor of explosives for breaking such hard rock shall be in the order of 7 tonnes per kg of explosives. Blasting parameters adopted for deep holes are given below in **Table 2.11**.

Table 2.11: Details of drilling equipment

Description	Wagon drill	Jack hammer
Diameter of hole	110 mm	32 mm
Depth of the hole including sub grade	6.5 m	1-1.5 m
Spacing	3.0 m	1.0 m
Burden	2.5 m	0.9 m
Charge per hole	12.5 kg/hole or 2.08 kg/m	125 gm of 25 m dia cartridges
No of Deep holes to be drilled per day: 67 holes per day		





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Description	Wagon drill	Jack hammer
No of Short holes to be drilled per day: 1410 holes per day		

Source: Approved Review of Mining Plan

A. Explosive Required

The ROM requirements are 7400 tons/day, the Powder factor is 7 tonnes/kg of explosive inclusive of secondary blasting. Hence the daily requirement of explosives is $7400/7 = 1057$ kg/day.

B. Type of Explosive

Explosives used for efficient blasting with safe practice are given in **Table 2.12**

Table 2.12: Details of drilling equipment

Description	Class/Division	Type	Size
Nitrate Mixture	Class 2	Column charge and booster	83 mm and 25 mm diameter
Detonator OD, Delay & ED	Class 6	Ordinary and electric type	6.5 X 32

Source: Approved Review of Mining Plan

C. Secondary Blasting

Secondary blasting is a major blasting work in magnesite mines, because of engaging more labour distribution over mine working faces. Shot hole drills over magnesite vein area for breaking into lumps and smalls as required by the factory. About 1800 holes are drilled per day for production purposes.

D. Storage of Explosives

There are two Explosive magazines with following License numbers are available with explosives van for transport of explosives from magazine to site of blasting. The explosive Magazines are situated within the lease hold area of the company.

Table 2.13: Details of Explosive Magazine License with Storage Capacity

S. No	License No	High Explosives	Safety Fuse	D Cord	ED/OD
1	E/SC/TN/22/429 (E32627)	2672 kg	36000	6524	6000
2	E/SC/TN/22/430 (E32630)	1000 kg	10000	-	-
Total		3672 kg	46000	6524	6000

Source: Approved Review of Mining Plan

Storage Magazine are constructed as per required specification as stipulated in the Indian Explosives Act, (1984) and Explosives Rules 1983. Further, the Magazine is





under the control of a Magazine in-charge / Asst. Manager and Maintained properly as per the conditions laid down in the relevant Rules and MMR, 1961.

E. Transportation of Explosive

An explosive van will be used for transporting explosives from the magazines to the blasting site. The explosives van is being built as per the specifications laid down in the Explosives Rules, 1983 having specified body dimensions. Flooring, body paneling and lining, floors, fire screen and clearance for air space between body and cab etc. and provided with two chemical fire extinguishers.

2.9.4 Major Mining Equipment

Table 2.14: Major Mining Equipment (Existing & Proposed)

Equipment	Specification	Existing Fleet, Nos.	Fleet required to hired, Nos.
Excavator	Bucket Capacity: 4.2 cu. m	1	-
Excavator	Bucket Capacity: 3.2 cu. m	1	-
Rear Dumper	Capacity: 35 t	4	-
Bull Dozer	Capacity: 9.5 cu. m	3	-
Compressor	Capacity: 7.5 kg/cm	1	-
Compressor	Capacity: 10.5 kg/cm	2	-
Wagon Drill	Capacity: 4.5 MCH	4	-
Jack hammers	Dia: 32 mm	6	-
Power Generator	45 KVA	1	-
Welding Generator	18.7/7 KVB	1	-
Excavator	-	-	7
Tipper	-	-	15

Source: Approved Review of Mining Plan

2.9.5 Waste Generation and Management

2.9.5.1 Waste Generation Block I

Mined waste forms nearly 64% from ROM in rich mineralized area and 96% from ROM in moderate mineralized area. The anticipated waste during the present plan period is about 9, 09,839 tonnes. The generated waste during the present plan period is proposed to be dumped over the existing spoil dump situated in the center portion of the lease area is given in **Table 2.15**.





Table 2.15: Year-Wise Waste Generation and Dump dimension for plan period Block I

Year	Waste Generation, MT	Proposed Mineral Spoil Dump Dimension	Remarks
2020-21	114520	140 m X 120 m X 3.4 m (h)	Dumped over the existing Mineral spoil Dump-5
2021-22	114465	140 m X 120 m X 6.8 m (h)	
2022-23	114510	140 m X 120 m X 10.2 m (h)	
2023-24	171292	140 m X 120 m X 15.3 m (h)	
2024-25	395052	140 m X 120 m X 27.0 m (h)	
Total	909839		

Source: Approved Review of Mining Plan

Table 2.16: Waste Generation till life of mine Block I

Details	Waste Generation, MT
Existing Dump	13267985
Proposed Dump (Including Existing Plan Period)	5011200
Total	18279185

Source: Approved Review of Mining Plan

Table 2.17: Proposed Dump Dimension till life of mine Block I

Details	Quantity Waste, MT	Proposed Mineral Spoil Dump Dimension
Dump 1 (Dumped over the existing Mineral spoil Dump-5)	1747200	140 m X 120 m X 52 m (h)
Dump 1 (Dumped over the existing Mineral spoil Dump-2)	3264000	200 m X 160 m X 51 m (h)
Total	5011200	

Source: Approved Review of Mining Plan

2.9.5.2 Waste Generation Block II

Mined waste forms nearly 94-96% from ROM in the Block-II. The anticipated waste during the present plan period is about 93, 61,345 tonnes. The generated waste during the present plan period is proposed to be dumped on the northwestern portion of the lease area.





Table 2.18: Year-Wise Waste Generation and Dump dimension for plan period Block II

Year	Waste Generation, MT	Proposed Mineral Spoil Dump Dimension	Remarks
2020-21	1889610	315 m X 184 m X 8.15 m (h)	Dumped over North west portion of lease area
2021-22	1754872	315 m X 184 m X 8.15 m (h) 260 m X 155 m X 10.88 m (h)	
2022-23	2348556	315 m X 184 m X 8.15 m (h) 260 m X 155 m X 10.88 m (h) 208 m X 150 m X 18.81 m (h)	
2023-24	1554964	315 m X 184 m X 8.15 m (h) 260 m X 155 m X 10.88 m (h) 208 m X 150 m X 18.81 m (h) 208 m X 150 m X 12.45 m (h)	
2024-25	1813344	315 m X 184 m X 8.15 m (h) 260 m X 155 m X 10.88 m (h) 208 m X 150 m X 18.81 m (h) 208 m X 150 m X 12.45 m (h) 208 m X 150 m X 14.53 m (h)	
Total	9361345		

Source: Approved Review of Mining Plan

Table 2.19: Waste Generation till life of mine Block II

Details	Waste Generation, MT
Existing Dump	9965123
Proposed Dump	9361345
Total	19326468





Source: Approved Review of Mining Plan

Table 2.20: Proposed Dump Dimension till life of mine Block II

S.NO	Quantity Waste, MT	Proposed Mineral Spoil Dump Dimension
1	1889610	315 m X 184 m X 8.15m (h)
2	1754872	260 m X 155 m X 10.88 m (h)
3	2348556	208 m X 150 m X 18.81 m (h)
4	1554964	208 m X 150 m X 12.45 m (h)
5	1813344	208 m X 150 m X 14.53 m (h)
Total	9361345	

Source: Approved Review of Mining Plan

2.9.5.3 Waste Generation Block III

There is no proposal for excavation of ROM in Block-III of the lease area during the present plan period in the year (2020-21 to 2024-25). Hence the quantity of generation of waste during the present plan period in this Block does not arise.

Table 2.21: Waste Generation till life of mine Block III

Details	Waste Generation, MT	No of Dumps and Dump Dimension
Existing Dump	12799513	There are 25 existing dumps of various size in Block III
Proposed Dump	2300000	Proposed dump of 250 m X 200 m X 23 m (h)
Total	15099513	

Source: Approved Review of Mining Plan

2.9.5.4 Waste Generation Block IV

There is no proposal for excavation of ROM in Block-IV of the lease area during the present plan period in the year (2020-21 to 2024-25). Hence the quantity of generation of waste during the present plan period in this Block does not arise.

Table 2.22: Waste Generation till life of mine Block IV

Details	Waste Generation, MT	No of Dumps and Dump Dimension
Existing Dump	3616092	There are 13 existing dumps of various size in Block IV





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Details	Waste Generation, MT	No of Dumps and Dump Dimension
Proposed Dump	252108	Proposed dump of 800 m X 350 m X 0.45 m (h)
Total	3868200	

Source: Approved Review of Mining Plan

The slope of the dump is always maintained below 30° Proper haul roads and slopes are maintained in the dump for the transportation of vehicles.

2.10 USE OF MINERAL

2.10.1.1 Use of Magnesite

The Magnesite mineral produced in the mine will be used in the lessee's own captive plant for making light calcined Magnesite which is used as binding material in grinding wheel manufacturing industry. Dead burnt Magnesite is used as a Refractory material for the manufacture of Magnesite bricks and also Magnesite chromite bricks or Magnesite olivine bricks required in the basic open-hearth furnace in steel melting.

2.10.1.2 Use of Dunite

Dunite and Pyroxinite are preferred as flux to dolomite as a source of MgO in sintering and also in Iron & steel Industry. Dunite is also useful in construction industry, Dunite rocks are used for construction of aggregates, construction of roads etc. Dunite is having refractory properties and plays a significant role in Refractory Industry.

2.11 RESOURCE REQUIREMENT

2.11.1 Power Requirement

The power requirement of the mine will be met from Transformer: 200 KVA from TNEB (Tamil Nadu Electricity Board) & 45 KVA DG Set.

2.11.2 Water Requirement

Total water requirement is 90 KLD. This water will be supplied from the available bore holes present in the mining lease area. Water balance indicating source, consumption & extent of recycling is given below in **Table 2.23**.





Table 2.23: Water Requirement for Mining

Purpose	Water Demand, m ³ /day	Waste Water, m ³ /day	Disposal
Domestic Consumption	10	8	Septic tank/ soak pit
Plantation	50	-	-
Dust Suppression	30	-	-
Total	90		

2.11.2.1 Source of water

This water will be supplied from the available bore holes present in the mining lease area. Project proponent has submitted application for drawl of water from borewell. The application is attached as **Annexure VII**.

2.11.3 Manpower

Details of manpower requirement is given in (**Table 2.24**).

Table 2.24: Manpower Requirement

Category	Manpower, Nos.
Geologist	2
Assistant Manager Mines	2
Mine manager	2
Mines foreman	4
Staff	24
Labour – Skilled, semi-skilled and unskilled	400
Total	434

Source: Approved Review of Mining Plan

2.11.4 Proposed Investment

Total cost of the proposed mining project is estimated as **Rs. 3.0 crore**.

2.11.5 Site Services

Infrastructure required for mine like office, stores, canteen, First-aid station, shelter, latrine and bath rooms have been provided as per the Mines Rules, 1961 as a





welfare amenities for mine Labourers. Approach road is available from the main road to the site.

2.12 TRANSPORTATION

2.12.1 Mineral Transportation: Within Mining Lease

After drilling and blasting excavated material will shifted to spoil bank using trippers 15 tonnes capacity.

2.12.2 Outside Lease

The magnesite and dunite minerals will be transported to SRCL factory using hired trucks of 10 tonnes capacity.

2.13 LAND USE

The lease area conforms to the land use policy of the state. It has the approval from IBM. Class / type of different land uses as are given below in **Table 2.25**:

Table 2.25: Existing and Proposed land use of the Mining Area

Particulars	Existing Land-use	Land use at the end of Plan Period	Conceptual Land use
Excavated Area	175.08.00	176.35.00	176.9345
Waste dump	168.82.00	170.55.5	172.08
Mineral Storage	-	-	-
Top Soil Storage Area	-	-	-
Infrastructure	5.89	5.89	5.89
Roads	24.00	24.00	24.00
Green Belt & Afforestation	54.31.9	54.31.9	54.31.9
Total	428.109	431.11.4	
Statutory barrier	19.15	19.15	19.15
Others (Unutilized)	175.43.10	172.42.6	170.3165
Grand Total	622.69	622.69	622.69

Source: Approved Review of Mining Plan (Area at conceptual stage is by considering mining in Block I after plan period)





2.14 ASSESSMENT OF NEW & UNTESTED TECHNOLOGY FOR THE RISK OF TECHNOLOGICAL FAILURE

Process of production of mineral through open cast mining method and operation of mine are well proven technology all over the world.

2.15 DESCRIPTION OF MITIGATION MEASURE INCORPORATED IN TO THE PROJECT TO MEET ENVIRONMENTAL STANDARD, ENVIRONMENTAL OPERATING CONDITIONS OR OTHER EIA REQUIREMENTS

The equipment / facilities proposed below, are prescribed to meet the environmental standards and in most of the cases to keep below the prescribed standards. The environmental aspect, impact and proposed mitigation measures are given below in **Table 2.26**.

Table 2.26: Mitigation Measures for Pollution Control

Location	Pollution control facility
AIR POLLUTION	
Mining	
Drilling	Wet drilling facility Jack-hammer holes intermittently watered to avoid dust emission
Blasting	Mille second delay detonators, controlled blasting and adopting a proper geometry of blast holes.
Transportation of Mineral	Water sprinkling on haul road.
WATER POLLUTION	
General	
Treatment of Domestic Effluent	Through septic tank & soaking pits
Mining	
Surface run-off flowing into mine	Retaining Wall/Bunds at the toe of waste dumps Garland drains along with series of settling pits around excavated area and around toe of waste dumps
Pump-out water from Mine for domestic purpose	Mine water shall be utilized for plantation and dust suppression only
Pump-out water from Mine to drain and for Industrial use	Sedimentation Pond
To arrest the sediments and prevent silting of the water courses by the run-off during rain from OB Dumps	<ul style="list-style-type: none"> • Toe-walls / retaining walls with weep-holes at strategic stretches • Settling pits • Garland drains





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Location	Pollution control facility
NOISE POLLUTION	
Blasting	Proper design of blast and controlled Blasting will be adopted Regular monitoring of blast by seismograph
Control of Noise at the boundary of Mine	Plantation
WASTE MANAGEMENT	
Waste dump management	• Garland drains along with Settling tank will be provided
	• Retaining Wall at the Toe of the Waste Dump
	• Proper terracing of the dumps • Biological Reclamation
	• Slope stability





3. DESCRIPTION OF ENVIRONMENT

This chapter illustrates the description of the existing environmental status of the study area with reference to the major environmental attributes. The existing environmental setting is considered to establish the baseline conditions which are described with respect to physical environment, air environment, water environment, noise environment, vibration, traffic pattern and density, land environment, biological environment and socio-economic environment.

The monitoring of environmental parameters has been conducted within the core zone and buffer zone (10 km radial distance) from project site at Village- villages – Thathaiyangerpatti, Moongilpadi, Karuppur, Vellakkalpatti, Mallamooanpatti of Taluk- Omalur & Salem, District-Salem (Tamil Nadu), in accordance with the guidelines issued by the Ministry of Environment, Forests and Climate Change, CPCB, and SPCB, during the study period (March to May, 2021).

The impact identification always commences with the collection of baseline data such as Ambient Air Quality, Micro-Meteorological conditions, Ground and Surface Water Quality, Noise levels, Soil Quality, Land use pattern, Biological Environment, Socio-economic status, Demographic profile, Traffic density, Geology and Hydrology etc. within the study area of 10 km. radius.

This baseline environmental study reveals information on existing environmental scenario.

- Delineation of project site and study area.
- Delineation of the environmental components and methodology
- Delineation of study period.
- Delineation of the location of the Plant and description of its surroundings based on secondary data.

Based on the baseline data, environmental impact assessment is carried out, mitigation measures proposed and Environmental Management Plan is prepared.

3.1 STUDY AREA

Studies of various environmental parameters have been done within 10 km radius area of the Mining lease area. The impact identification always commences with the collection of baseline data such as Ambient Air Quality, Micro-Meteorology, Ground and Surface Water Quality, Noise levels, Soil Quality, Land use pattern, Biological Environment and Socio-economic aspects, Solid and Hazardous waste, Risk Assessment, Geology and Hydrology within the study zone of 10 km. radius.





3.2 STUDY PERIOD

The baseline environmental study has been carried out during pre-monsoon season i.e. March to May 2021 by M/s Vardan Envirolabs, NABL Accredited Lab, in accordance with the guidelines of EIA issued by the Ministry of Environment Forests and Climate Change, Govt. of India and CPCB, New Delhi. Secondary data was collected from different Government sources. The scope of the study has been done as per standard ToR letter.

3.3 COMPONENTS AND METHODOLOGY

The data was collected from both primary and secondary resources. The baseline information on micro-meteorology, ambient air quality, water quality, noise levels, soil quality are largely drawn from the data collected by M/s Vardan Envirolabs. Micro-meteorological data was recorded using an automatic weather station near site. Ecology and Social economic survey have been carried out by the expert of M/s Vardan EnviroNet. Apart from these, secondary data have been collected from nearest IMD Station at Salem. Census Handbook, Revenue Records, Statistical Department, Soil Survey and Land use Planning Organization, Forest Department, Central Ground Water Authority, etc.

The studies involved conducting field studies and analyzing various parameters that might be affected due to the expansion project and conducting socio-economic survey among the people. For reconnaissance survey the sampling locations were identified based on:

- Existing topography and meteorological conditions
- Location of human habitation and other sensitive areas present in the vicinity of the proposed project site.
- Representative areas for baseline conditions.
- Accessibility for sampling

The scoping and extent of data collection were formulated based on interdisciplinary team discussions, and professional judgement keeping in view of ToR issued by MoEF&CC. The baseline studies started with reconnaissance survey and site visits in the study area and the meteorological condition of the area for fixing the monitoring locations for collection of the primary data. Secondary data has been collected from various Government and others organizations. Various parameters surveyed and studied for the baseline study are tabulated below in **Table 3.1**:

Table 3.1: Environmental Components and Their Methodologies

S. No.	Environmental components	Parameters	Methodology
1	Air	Meteorology (Temp., RH,	USEPA (Meteorological





S. No.	Environmental components	Parameters	Methodology
		WS, WD, RF)	Monitoring guidance for regulatory modeling applications)
		Ambient Air Quality (PM ₁₀ , PM _{2.5} , SO ₂ , NO _x , CO)	IS-5182, CPCB (guidelines for measurement of Ambient Air Pollutants).
2	Water	Water Quality (Surface & Ground)	Standard limits: Surface-IS:2296 Ground-IS 10500 Sampling Methodology-IS: 3025
3	Noise	Ambient Noise Quality (L _{max} , L _{min} , L _{eq})	IS:9989(Assessment of noise with respect to community response)
4	Soil	Soil Quality (pH, EC, BD, Infiltration, Texture, SAR, Key nutrients, OM, OC, Fe, Zn and Cu)	Sampling Methodology and Analysis- IS: 2720
5	Land Use	Land use types, Land schedules, Satellite imagery	Bhuvan, NRSA
6	Ecology	Ecology studies (Floristic diversity, Terrestrial ecosystem sustainability, Green belt development, sinking capacity of pollutants)	Field Study / Secondary Data
7	Socio Economic	Demography and Occupational details, agricultural situation etc.	Census, District report Public Consultation by Questionnaire survey
8	Hydrology & Geology	Geological, hydrological, geomorphologic studies	Geological Survey of India
9	Traffic Study	PCU/hr., LOS	IRC 64:1990

3.4 ESTABLISHMENT OF BASELINE FOR VALUED ENVIRONMENTAL COMPONENTS, AS IDENTIFIED IN THE SCOPE

The scope of the study is as per ToR letter issued by MoEF&CC vide File no. 23-166/2018-IA.III (V) dated 17.09.2021.





3.4.1 Micro-Meteorological Data

Micro-meteorological data of the project site during the air quality survey period is an indispensable part of air pollution study. To understand, the micro-meteorology data has been collected from both secondary and primary sources:

3.4.1.1 Secondary Data

Historical data on meteorological parameters also plays an important role in identifying the general meteorological status of the region. The data collection in the field is compared with the historical data in order to identify changes, which may have taken place during the course of time.

The latest secondary data for 30 years (1981-2010) is procured from the IMD, Salem for observing parameters like Temperature, Relative Humidity, Rainfall, Wind Speed and Wind direction. The IMD data for Salem is given in the **Table 3.2**.

3.4.1.1.1 Temperature

During pre-monsoon season, the mean maximum temperature (April) was observed to be 37.8°C with the mean minimum temperature at 19.2°C (January). The mean maximum temperature in the monsoon season was observed to be 35°C in the month of June whereas the mean minimum temperature was observed to be 22.8°C in the month of September. During post monsoon, maximum temperature 32.1°C was observed in October and the lowest minimum temperature was observed 21.1°C during November. In winter season (December to February), the mean monthly maximum temperature at 34.7°C in February and the mean monthly minimum temperature at 19.2°C in January. The monthly variations of temperature are presented in **Table 3.2**.

3.4.1.1.2 Relative Humidity

The air is generally humid in this region during the entire year. The relative humidity at 08:30 hr. was observed with a maximum of 87% and a minimum of 22%, at 17:30 hr. The monthly variations in the relative humidity are presented in **Table 3.2**.

Table 3.2: Climatological Data Station: IMD- Salem

Month	Atmospheric Pressure (mb)		Temperature (°C)		Relative Humidity (%)		Rainfall (mm)
			Daily Mean Max	Daily Mean Min			
January	983.3	978.9	32.1	19.2	74	45	4.4
February	982.4	977.5	34.7	20.4	71	36	3.4
March	980.9	975.5	37	22.5	67	33	17.3





Month	Atmospheric Pressure (mb)		Temperature (°C)		Relative Humidity (%)		Rainfall (mm)
			Daily Mean Max	Daily Mean Min			
April	979	973.8	37.8	25	68	40	55.5
May	976.9	972.3	37.2	25	71	49	109.7
June	976	972.4	35	24.1	75	55	72.4
July	976.4	972.8	34	23.4	78	57	108
August	977.2	973.3	33.4	23	79	58	140.6
September	978.3	973.8	33.2	22.8	79	61	176.5
October	979.8	975.9	33.1	22.4	81	69	185.5
November	981.3	977.7	31	21.1	79	66	110.2
December	983.1	979.3	30.7	19.6	76	56	35
Total							1018.5

Source: IMD Climatological Normal 1981-2010

3.4.1.1.3 Atmospheric Pressure

The maximum pressure observed were 983.1mb at 08:30 hr. in the months of December. The minimum pressure observed were 972.3 mb at 17:30 during the month of May in summer season. The pressure levels are found to be fairly consistent over the region. The monthly variations in the pressure levels are presented in **Table 3.2**.

3.4.1.1.4 Rainfall

The average annual rainfall based on the 30 years of IMD data, was observed to be 1018.5 mm. The monsoon sets in the month of June and continues till November. The maximum amount of rainfall (185.5 mm) occurring in the month of October. Monthly variations in the rainfall for past 30 years are given in **Table 3.2**.

3.4.1.1.5 Wind Speed/Direction

Generally, light to moderate winds prevail throughout the year. The seasonal wind rose has been prepared on the basis of secondary data are presented in **Figure 3.1** the summary of wind pattern at IMD, Salem is given in **Table 3.3**.





Table 3.3: Summary of Wind Pattern-IMD Salem

Season	First Predominant Winds		Second Predominant Winds		Avg. Wind Speed (Km/hr)	Calm Condition (%)	
	Mor	Eve	Mor	Eve		Mor	Eve
March	NE (21%)	NE (30%)	E (10%)	E (26%)	4.5	59	27
April	NE (16%)	NE (19%)	SW (12%)	E (16%)	4.3	54	39
May	SW (22%)	SW (22%)	W (8%)	NE (13%)	4.1	54	42

Source: IMD Climatological Normal 1981-2010

3.4.1.2 Primary Data

3.4.1.2.1 Temperature

Maximum temperature of 40.4°C in the month of May and minimum temperature of 18.9 °C was recorded in March, during the study period.

3.4.1.2.2 Relative Humidity

During the period of observation, the relative Humidity recorded ranged from 33% to 71%. Maximum humidity was observed during the month of May.

3.4.1.2.3 Pressure

The maximum pressure observed were 962 mb in the months of March and the minimum pressure were observed 951mb in the month of April. The pressure levels are found to be fairly consistent over the region.

Table 3.4: Summary of the Meteorological Data Monitored at Site (Primary Data)

Month	Temperature (°C)		Relative Humidity (%)		Atmospheric Pressure (mb)	
	Max	Min	Max	Min	Max	Min
<i>March</i>	39.3	18.9	60	30	962	952
<i>April</i>	40.1	21.6	65	38	960	951
<i>May</i>	40.4	21.5	69	45	961	949

3.4.1.2.4 Wind Speed/Direction

The wind rose for the study period representing Pre-monsoon season is shown in the **Figure 3.2**. Wind rose diagram shows that predominant winds direction from NE followed by W.





3.4.1.3 Interpretation

The India Meteorological Department (IMD) records the data at twice a day viz. 08:30 hr. and 17:30 hr. while the site-specific data has been recorded at an hourly interval. On comparison of site-specific data collected during study period vis-à-vis the IMD data, the following observations are brought out:

- The variation in Relative Humidity (RH) could be because of the fact that the RH values considered for the site are for the present condition while the range of IMD, Salem data represents the average values for 30 years period.
- During the study period was observed that the predominant direction in NE followed by W. The data collected from the Salem IMD showing the wind direction from E followed by NE. The slight variation is found as the Salem data represents the average values for 30 years period.

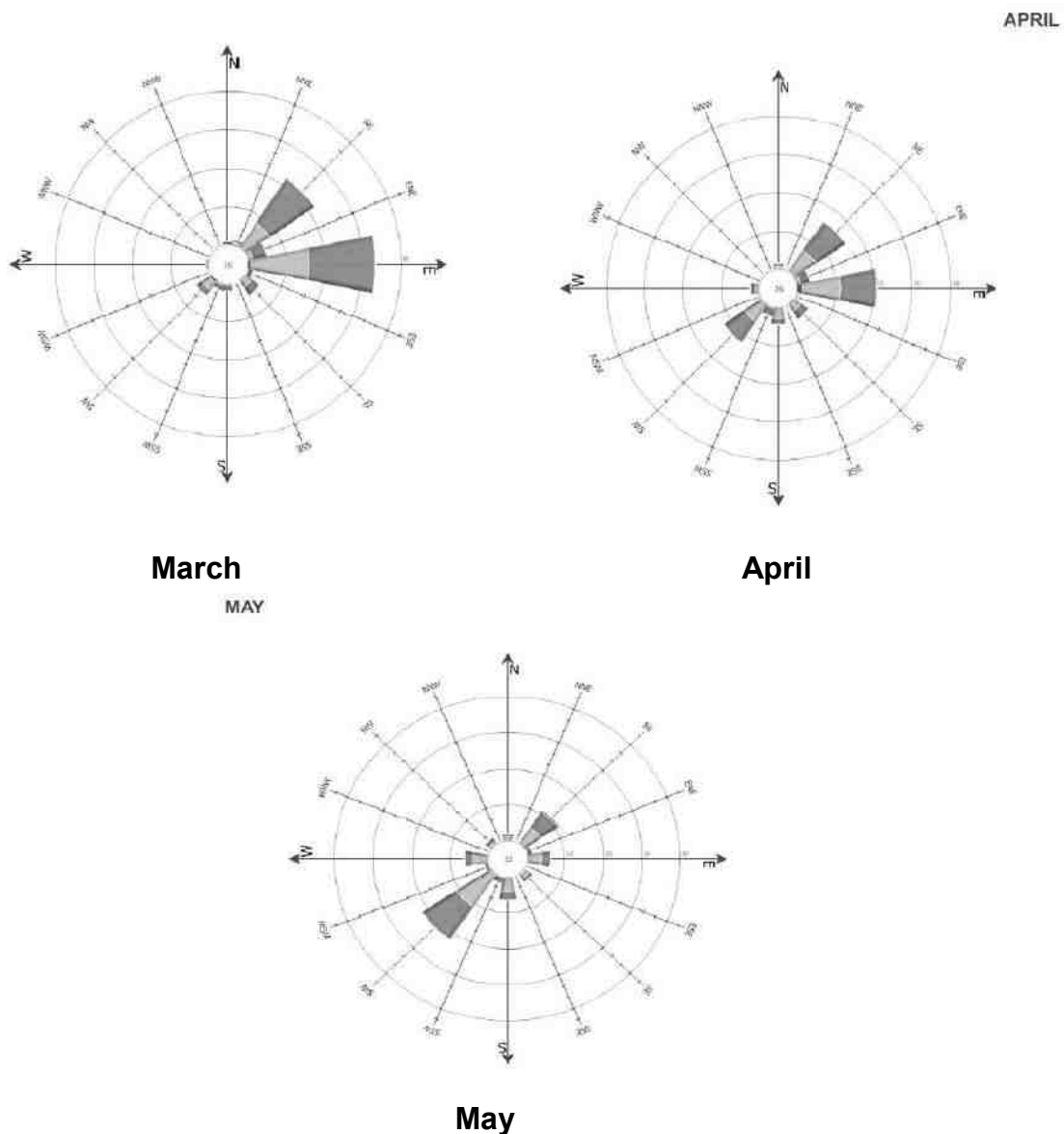


Figure 3.1: Wind Rose Diagram of Study Period (Secondary data)



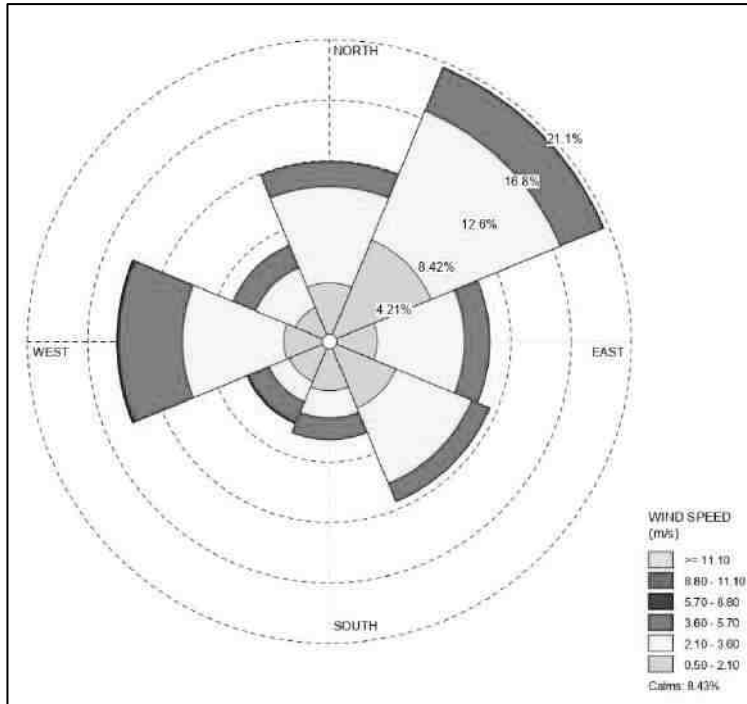


Figure 3.2: Wind Rose Diagram of Study Period (March to May 2021)

The wind rose diagrams indicate predominant wind directions from NE.

3.4.2 AIR ENVIRONMENT

The baseline air quality was established by monitoring major air pollutants like suspended particulate matter, Sulphur di-oxide, oxides of nitrogen, carbon monoxide and free silica at various locations near the project site. The prime objective of the ambient air quality study is to assess the existing air quality of the study area and to establish the existing ambient air quality within the study area and its conformity with NAAQS.

3.4.2.1 Selection of Sampling Locations

The sources of air pollution in the region are; mining activities (drilling, blasting, excavation, loading, transportation of excavated materials) and haul road dust emission.

The design of the monitoring network in the air quality surveillance program was based on the following considerations.

- Meteorological conditions on synoptic scale
- Topography of the study area
- Representation of project site
- Representation of cross-sectional distribution in the downward direction
- Influence of the existing sources if any, are to be kept at minimum





Eight (8) numbers of monitoring stations were set up to assess the existing air quality of the study area. Two stations were located within the project site (core zone) and the six others were outside (buffer zone) the proposed project site.

The locations of the monitoring stations are also based on the meteorological conditions of the study area like likeliness of pollution dispersion in areas located towards predominant wind directions, sensitive receptors in the study area like densely populated areas, forest area, river bodies, etc. Logistic considerations as ready accessibility, security, availability of reliable power supply, etc. were also examined while finalizing the monitoring locations. The Ambient Air Quality Monitoring locations have been presented in **Figure 3.3**.

Table 3.5: Ambient Air Quality Monitoring Stations

Station	Name	Latitude	Longitude	Distance / Direction (km)	Selection Criteria
A1	Project Site	11°43'40.6"N	78°06'43.1"E	--	Mine area
A2	Project Site	11°41'28.8"N	78°05'34.5"E	--	Mine area
A3	Mettupatti	11°42'40.5"N	78°06'30.1"E	0.4 Km, S	Cross wind direction 1 st predominant.
A4	Kullakavundunur	11°43'25.2"N	78°05'14.4"E	1.4 Km, W	Downwind direction of 2 nd predominant
A5	Kombaipatti	11°42'20.7"N	78°09'49.5"E	5.3 Km, E	Up wind direction of second predominant
A6	Gundur	11°44'43.1"N	78°11'58.4"E	6 Km, NE	upwind direction of 1 st predominant
A7	Pudur	11°46'32.0"N	78°05'41.6"E	6 Km, NW	downwind of second predominant
A8	Keeraipappa mpadi	11°40'48.0"N	78°02'42.2"E	4.5 Km, SW	Down Wind of first predominant





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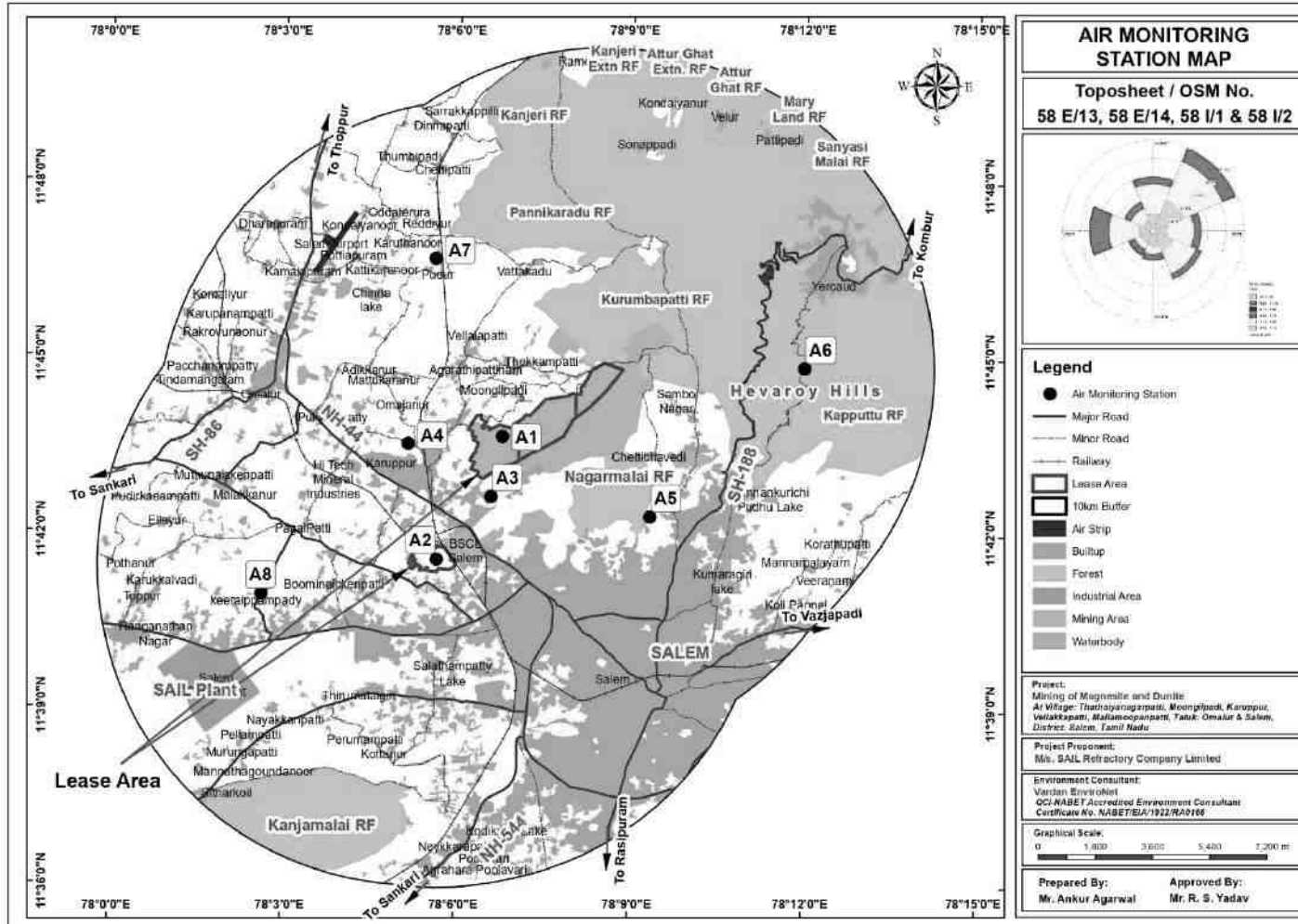


Figure 3.3: Ambient Air Quality Monitoring Locations



M/s Vardan EnviroNet

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3.4.2.2 Analytical Techniques for Air Quality Monitoring

The sampling and analysis of the required parameters were carried out as per IS: 5182 methodology entitled “Methods of Measurement of Air Pollution” and AWMA entitled “Methods of Air Sampling and Analysis.” Summary of the analytical techniques and their references are as given in **Table-3.6**.

Table 3.6: Techniques Adopted/Protocols for Ambient Air Quality Monitoring

S. No	Parameters	Techniques	Technical Protocol
1	Sulphur Dioxide (SO ₂)	West & Gaeke	IS:5182 (P2)
2	Nitrogen Dioxide (NO ₂)	Jacob & Hochheiser	IS:5182 (P6)
3	Particulate Matter PM ₁₀	Gravimetric	IS:5182 (P23)
4	Particulate Matter PM _{2.5}	Gravimetric	IS:5182 (P24)
5	Carbon-monoxide as CO	NDIR	IS: 5182 (P-10)

Source: Baseline Monitoring Report, M/s Vardan EnviroLab

3.4.2.3 Air Quality Monitoring

Ambient air quality analysis reports are appended below in Table 3.7 and attached as **Annexure VIII**. The graphical representations of the results are depicted in **Figure 3.4, 3.5, 3.6**

Table 3.7: Baseline Result for the Air Monitoring Locations

Pollutant	Location Codes	Max	Min.	Avg.	98 Percentile	NAAQS
PM ₁₀ (µg/m ³)	A-1	78.90	69.40	76.14	78.64	100
	A-2	78.60	72.10	76.17	78.444	
	A-3	82.10	73.50	78.14	82.048	
	A-4	85.90	77.30	80.74	85.5	
	A-5	84.10	71.30	79.15	83.85	
	A-6	79.10	73.10	76.62	78.95	
	A-7	80.80	73.20	76.86	80.65	
	A-8	76.50	70.00	74.10	76.45	
PM _{2.5} (µg/m ³)	A-1	41.50	34.00	39.03	41.45	60
	A-2	41.30	35.00	39.11	41.25	





Pollutant	Location Codes	Max	Min.	Avg.	98 Percentile	NAAQS		
	A-3	45.70	36.60	41.48	45.70			
	A-4	48.60	40.20	43.97	48.50			
	A-5	47.70	35.20	42.27	47.15			
	A-6	42.30	35.90	39.58	42.10			
	A-7	44.50	35.50	40.00	44.45			
	A-8	39.50	33.00	36.76	39.45			
	SO ₂ (µg/m ³)	A-1	12.8	7.5	10.71		12.64	80
		A-2	12.6	8.1	10.66		12.54	
A-3		14.9	9.2	12.01	14.58			
A-4		16.8	11	13.42	16.5			
A-5		15.9	8.5	12.52	15.5			
A-6		12.8	8.4	10.77	12.75			
A-7		13.8	8.2	10.89	13.65			
A-8		10.5	6	8.7	10.45			
NO _x (µg/m ³)	A-1	20.80	14.00	18.16	20.64	80		
	A-2	20.70	15.10	18.26	20.60			
	A-3	25.60	16.10	20.54	25.55			
	A-4	27.70	19.30	23.01	27.70			
	A-5	26.70	15.20	21.79	26.20			
	A-6	22.50	16.20	19.12	21.70			
	A-7	23.80	16.30	19.72	23.60			
	A-8	18.80	14.00	16.66	18.75			
CO (mg/m ³)	A-1	0.92	0.63	0.74	0.91	04		
	A-2	0.82	0.58	0.70	0.81			
	A-3	0.98	0.64	0.79	0.98			





Pollutant	Location Codes	Max	Min.	Avg.	98 Percentile	NAAQS
	A-4	1.26	0.53	0.80	1.18	
	A-5	1.02	0.74	0.89	1.02	
	A-6	0.90	0.61	0.77	0.88	
	A-7	1.10	0.74	0.89	1.08	
	A-8	1.00	0.71	0.90	1.00	

Source: Baseline Monitoring Report, M/s Vardan EnviroLab

Mineralogical Composition for PM₁₀ is “defined as the component of inhaled respirable dust small enough to reach the pulmonary or alveolar region of the lung”.

Table 3.8: Classification of RSPM

Classification	Type of particles	Size of Particles
PM ₁₀	Inhalable particles	≤ 10µm
PM _{2.5}	Fine particles	≤ 2.5µm

The Mineralogical Composition of RSPM / PM₁₀ is Given in Table Below.

Table 3.9: Mineralogical Composition of RSPM / PM₁₀

Sl. No.	IONS	Location							
		A1	A2	A3	A4	A5	A6	A7	A8
1	PM ₁₀ (µg/m ³)	78.3	74.0	75.6	80.1	82.4	77.5	74.3	72.9
2	Free silica %	3.1	2.6	2.7	3.2	3.3	3.0	2.8	2.6
3	Calcium (as Ca) (µg/m ³)	1.62	1.34	1.43	1.67	1.7	1.68	1.51	1.44
4	Magnesium (as Mg) (µg/m ³)	0.67	0.47	0.49	0.75	0.86	0.50	0.45	0.34
5	Nickel (as Ni) (ng/m ³)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
6	Lead (as Pb) (µg/m ³)	0.13	0.11	0.12	0.14	0.15	0.14	0.12	0.11

Source: Baseline Monitoring Report, M/s Vardan EnviroLab



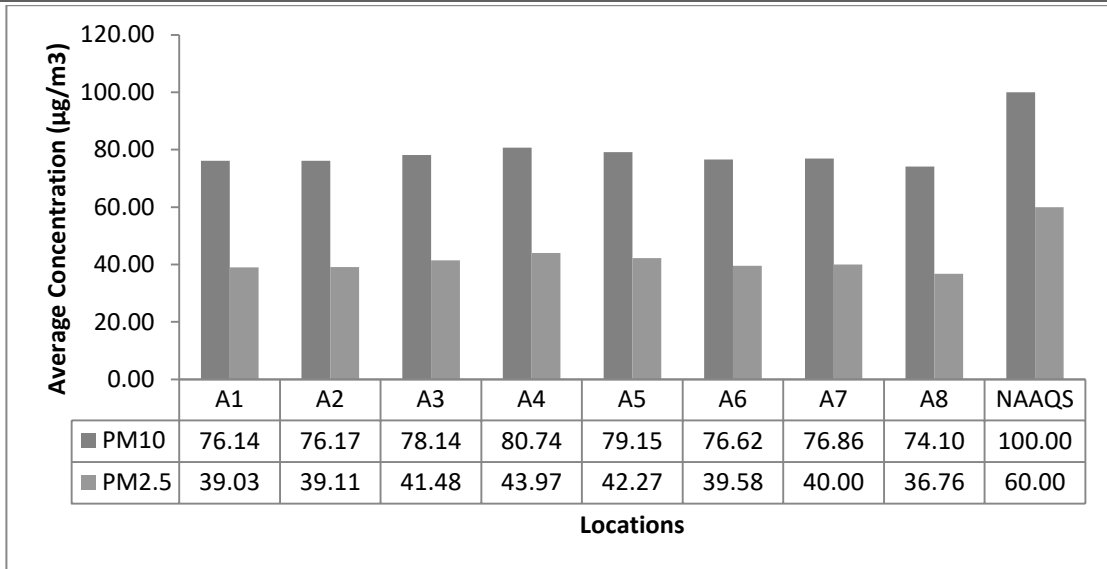


Figure 3.4: Graphical Representation of Particulate Pollutants

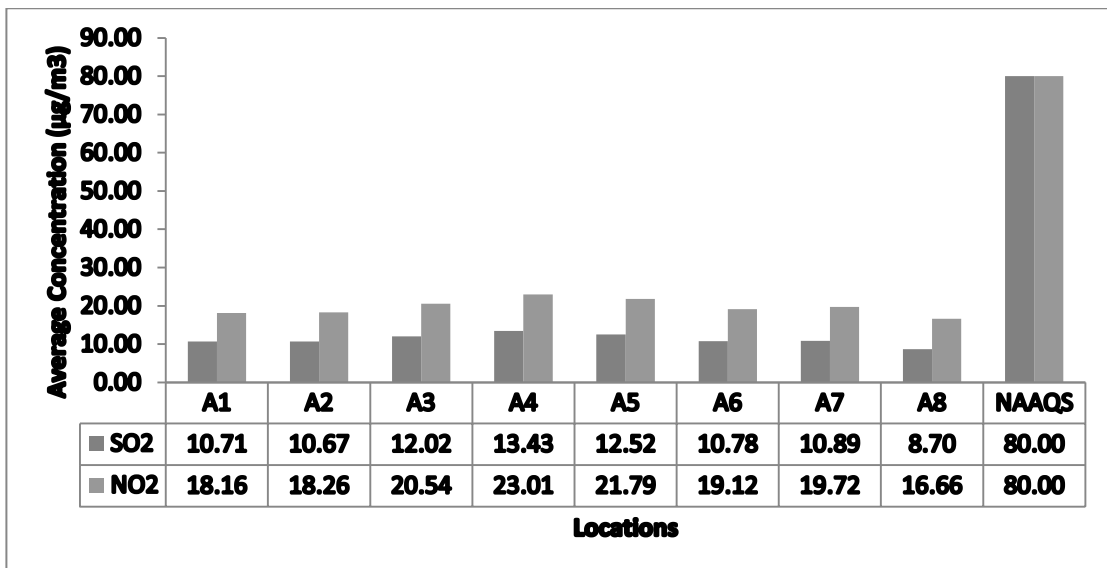


Figure 3.5: Graphical Representation of Gaseous Pollutants



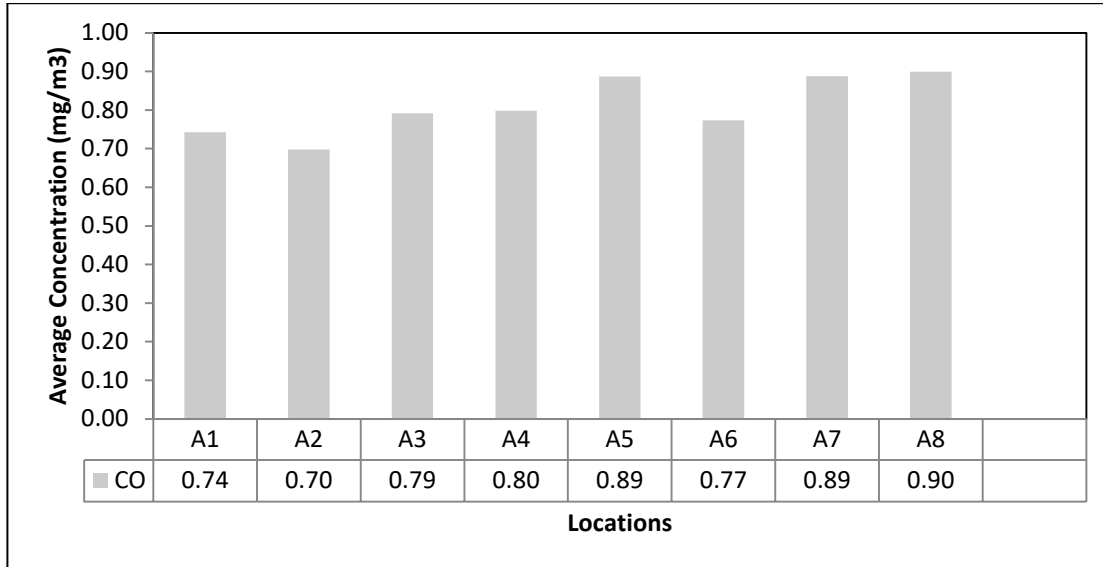


Figure 3.6: Graphical Representation of CO Pollutant

3.4.2.4 Interpretation of Data Obtained

The results of the monitored data indicate that the ambient air quality of the region in general is in conformity with the National Ambient Air Quality Standards with present level of activities. Ambient Air Quality Monitoring reveals that;

- The average value concentrations of PM₁₀ and PM_{2.5} for all the 8 AAQM stations were found between 74.10 to 80.74 µg/m³ and 36.76 to 43.97 µg/m³ respectively.
- The maximum average value for PM₁₀ is observed at Kullakavundunur (A4) station, as 80.74 µg/m³, however the minimum average value observed at Keeraipappampad (A8) station as 74.10 µg/m³ during the study period, as the area is residential and not major activities are there.
- The maximum average value for PM_{2.5} is observed at Kullakavundunur (A4) station, as 43.97 µg/m³, the minimum average value observed at Keeraipappampad (A8) station as 36.76 µg/m³ during the study period.
- The average value concentrations of SO₂ for all the 8 AAQM stations were found between 13.42 µg/m³ to 8.7 µg/m³ at Kullakavundunur (A4) and Keeraipappampad (A8) respectively.
- The average value concentrations of NO_x for all the 8 AAQM stations were found between 23.01 µg/m³ to 16.66 µg/m³ at Kullakavundunur (A4) and Keeraipappampad (A8) respectively.
- The average value concentrations of CO for all the 8 AAQM stations were found between 0.7 to 0.9 mg/m³ at project site and Keeraipappampad (A8) respectively.
- The % free silica for all the 8 AAQM stations were found between 2.6 to 3.3

To maintain the ambient air quality of the area within the NAAQS, the latest/ modern air pollution control facilities along with suitable EMP will be adopted, which is elaborated in detailed in **Chapter 4** of the report.





3.4.3 NOISE ENVIRONMENT

Noise levels were measured at eight (8) locations within the study area in **Table 3.10** and shown on map at **Figure 3.7**. Noise monitoring has been carried during day and night time and Leq values have then been computed hourly. Day time & Night time monitoring were conducted from 6 a.m. to 10 p.m. and from 10 p.m. to 6 a.m., respectively. Ambient noise levels were measured using integrated sound level meter (SLM) Lutron (SL-4001).

SLM was mounted on a tripod as per the standard methodology for noise measurements. Special care was taken for not making noise during the measurement and ensuring the least amount of reflective from our body to the meter. Noise levels were recorded at 8 locations by Sound Level Meter. Noise levels were recorded as per IS: 9989 entitled "Assessment of noise with respect to community response" methodology. Noise levels were recorded at approximately 1.5 meter above the ground level and about 3 m away from walls, buildings or other sound reflecting sources. Ambient Noise Monitoring Locations and analysis reports are appended below in the **Table 3.10 and 3.11** and attached as **Annexure IX**.

Table 3.10: Noise Level Monitoring Locations

Station	Name	Latitude	Longitude	Distance / Direction (km)	Selection Criteria
N1	Project Site	11°43'40.6"N	78°06'43.1"E	--	Mine area
N2	Project Site	11°41'28.8"N	78°05'34.5"E	--	Mine area
N3	Mettupatti	11°42'40.5"N	78°06'30.1"E	0.4 Km, S	Cross wind direction 1 st predominant.
N4	Kullakavundunur	11°43'25.2"N	78°05'14.4"E	1.4 Km, W	Downwind direction of 2 nd predominant
N5	Kombaipatti	11°42'20.7"N	78°09'49.5"E	5.3 Km, E	Up wind direction of second predominant
N6	Gundur	11°44'43.1"N	78°11'58.4"E	6 Km, NE	upwind direction of 1 st predominant
N7	Pudur	11°46'32.0"N	78°05'41.6"E	6 Km, NW	downwind of second predominant
N8	Keeraipappa mpadi	11°40'48.0"N	78°02'42.2"E	4.5 Km, SW	Down Wind of first





Station	Name	Latitude	Longitude	Distance / Direction (km)	Selection Criteria
					predominant

Source: Baseline Monitoring Report, M/s Vardan EnviroLab

Table 3.11: Noise Level Data (All Data is Expressed in dB(A))

S. No.	Locations	Lmax		Lmin		Leq		Ldn
		Day	Night	Day	Night	Day	Night	
1	Project Site	81.5	70.4	62.4	55.6	71.95	63.0	74.96
2	Project Site	80.5	71.5	61.7	51.9	72.6	64.65	75.80
3	Mettupatti	63.7	52.2	43.3	36.8	53.5	44.5	56.41
4	Kullakavundunur	61.5	52.7	44.5	35.9	52.86	43.10	53.71
5	Kombaipatti	58.6	49.8	42.6	36.1	50.6	42.45	48.10
6	Gundur	59.9	49.7	42.0	37.6	51.12	43.65	48.41
7	Pudur	57.2	51.6	47.3	36.2	52.25	42.81	54.75
8	Keeraipappampadi	58.8	48.3	40.6	34.8	49.7	41.96	56.08

Source: Baseline Monitoring Report, M/s Vardan EnviroLab

The environment setting of each noise monitoring location is shown in **Figure 3.7** below:





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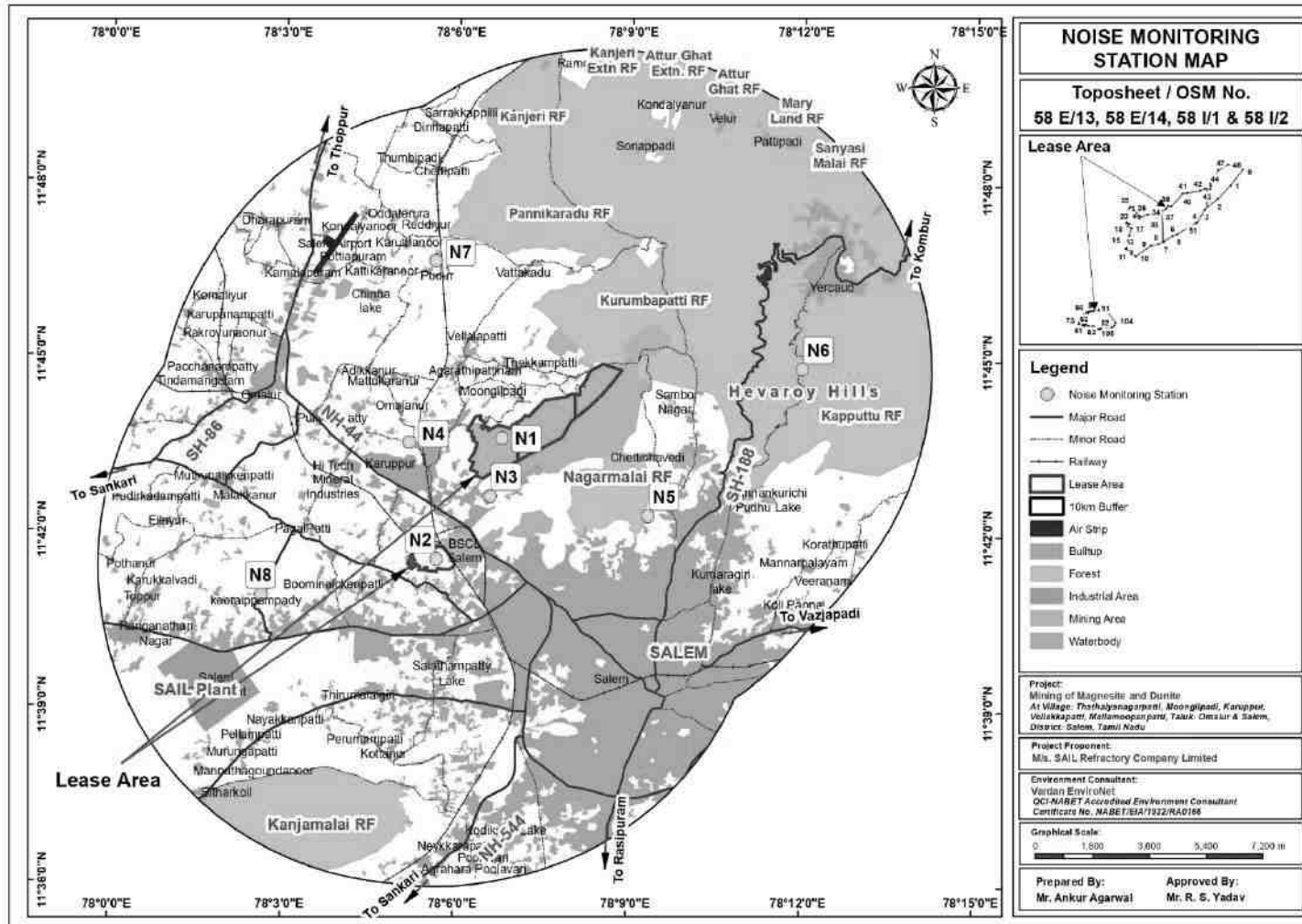


Figure 3.7: Noise Quality Monitoring Location Map





Noise Standards as per Noise Regulation (Pollution & Control) Rules, 2000 is as follows as **Table 3.12**:

Table 3.12: Noise Standards as per Noise Regulation (Pollution & Control) Rules, 2000

Category of Zones	Categorization of locations	Leq in dB(A)	
		Day	Night
Industrial/Mining	N1, N2	75	70
Residential	N3, N4, N7, N8	55	45
Silence Zone	N5, N6	50	40

Source: Baseline Monitoring Report, M/s Vardan EnviroLabs

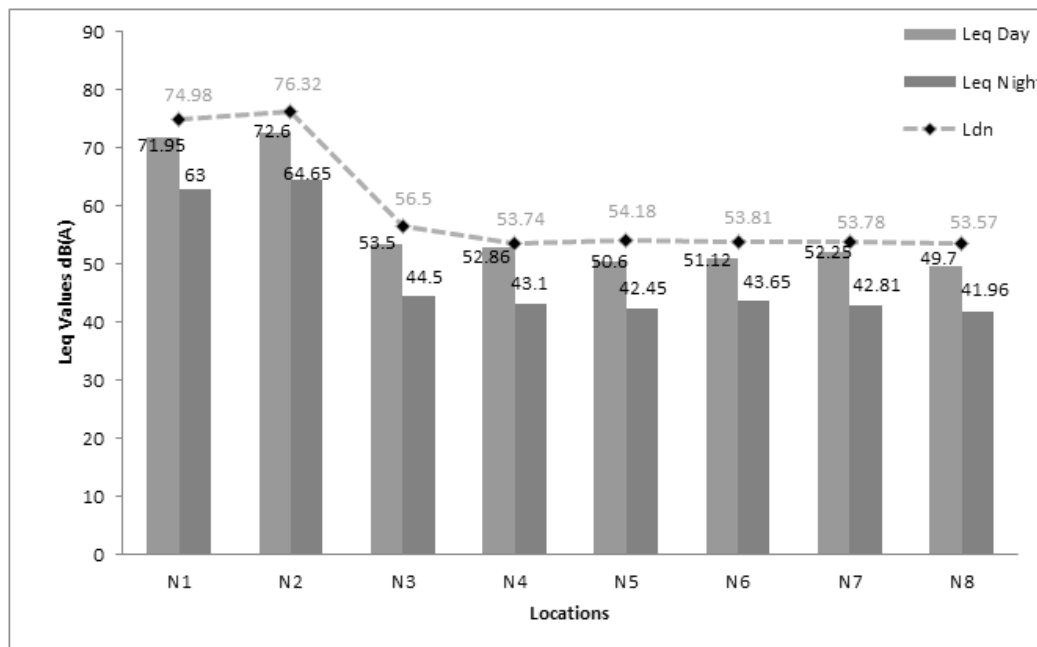


Figure 3.8: Equivalent Noise Levels at all Locations

3.4.3.1 Interpretation of Data obtained

- Out of all 8 locations measured for noise levels, the sample collected at Project Site -A (N1) was found to be on slightly higher side.
- The Leq values at this location for day and night time was observed to be 71.9 and 63.0 dB (A) respectively, which can be attributed to local prevailing environment (Mining, industrial, Railway siding and Highway). However, the recorded noise levels were found to be within the mining zone limits (75 dB (A)).
- Apart from this the noise levels recorded at Project Site -B (N2) were found to be of higher level, which can be attributed to presence of Mining, nearby highway and





railway sidings. However, these levels are found to be well within the permissible industrial limits (75 dB(A) for day time).

- The noise levels recorded at all locations were within the NAAQS limits.

3.4.4 WATER ENVIRONMENT

The impact has been assessed on randomly selected surface and groundwater sources falling within the impact zone. In order to assess the existing water quality, the Groundwater samples were collected from eight (8) different locations and Surface Water quality from eight (8) locations within the study area and analyzed as per the procedure specified in standard methods for examination of water and wastewater published by American Public Health Association and Bureau of Indian Standards (APHA/BIS). The groundwater samples were drawn from the hand pumps, open wells and bore well being used by the villagers for their domestic needs. Surface water sampling was carried out from ponds and lakes present within 10 km of the project site. The details of the locations are given in **Table 3.13**.

3.4.4.1 Methodology

Water Samples were collected from 16 locations out of which 8 for surface and 8 for ground water (**Figure 3.9**). Samples were collected as per IS: 3025 (Part-1) methodology. Necessary precautions were taken while collecting, preserving and transporting. All the parameters were analyzed as per “Methods of Sampling and Test (Physical and Chemical) for water and waste water” IS: 3025 and “Standard Methods for the Examination of Water and Wastewater” APHA. The results are then compared with the standards (IS: 10500 & IS: 2296) as per the quality of water. The ground water samples were drawn from the hand pumps, open wells & Borewells being used by the villagers for their domestic needs. Surface water sampling was carried out from ponds present within 10 km of the project site. Water quality analysis reports are appended below in the **Table 3.14 & 3.15** and attached as **Annexure X**.

Table 3.13: Water Sampling Locations

Stations	Name	Latitude	Longitude	Distance (km) & Direction
SW1	Pond Near Salethampatti	11°39'33.8"N	78°05'58.5"E	3 Km, S
SW2	Pond Near Karuppur	11°42'47.8"N	78°05'43.4"E	1 Km, SW
SW3	Lake Near Thiruvagoundanur	11°39'34.8"N	78°07'47.41E	4.5 Km, SE
SW4	Pond Near Kamalapuram	11°46'02.3"N	78°03'58.5"E	6 Km, NW





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Stations	Name	Latitude	Longitude	Distance (km) & Direction
SW5	Pond Near Kanumbalpat	11°46'36.9"N	78°07'21.5"E	3.5 Km, N
SW6	Lake Near Kombaikkadu	11°47'03.8"N	78°12'33.7"E	9.2 Km, NE
SW7	Pond Near Uthamasolapuram	11°36'35.7"N	78°06'55.5"E	9 Km, S
SW8	Pond Near Project Site	11°44'21.3"N	78°06'09.3"E	0.5 Km, NW
GW1	Project Site-A	11°43'40.6"N	78°06'43.1"E	-
GW2	Project Site-B	11°41'28.8"N	78°05'34.5"E	-
GW3	Mettupatti	11°42'40.5"N	78°06'30.1"E	0.4 Km, SE
GW4	Kullakavundanur	11°43'25.2"N	78°05'14.4"E	1.4 Km, W
GW5	Kombaipatti	11°42'20.7"N	78°09'49.5"E	5.3 Km, E
GW6	Gundur	11°44'43.1"N	78°11'58.4"E	6 Km, NE
GW7	Pudur	11°46'32.0"N	78°05'41.6"E	6 Km, NW
GW8	Keeraipappampadi	11°40'48.0"N	78°02'42.2"E	4.5 Km, SW

Source: Baseline Monitoring Report, M/s Vardan EnviroLabs



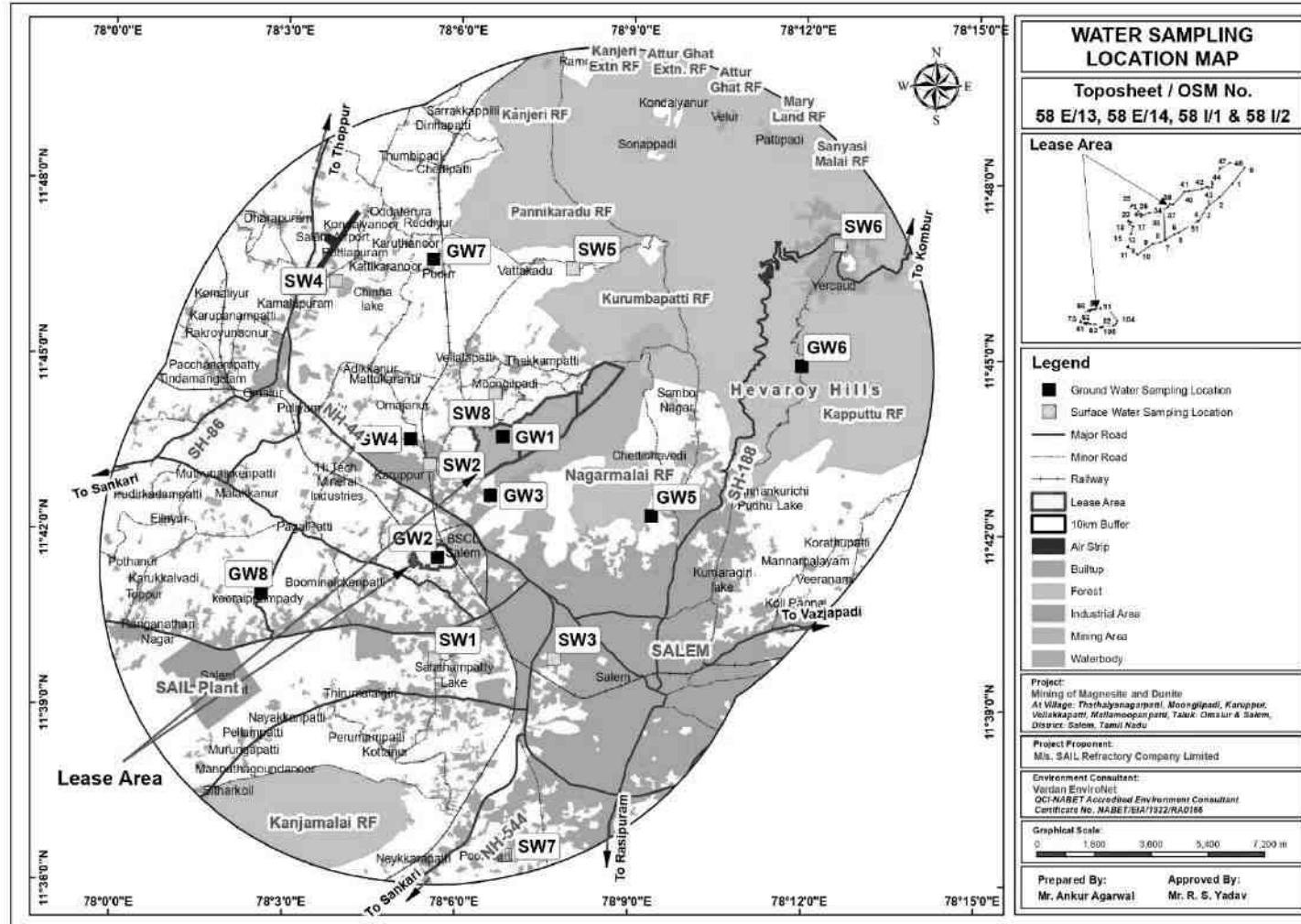


Figure 3.9: Map showing Water Sampling Locations





Table 3.14: Ground Water Quality Data

Sl. No	Parameter	Unit	GW1	GW2	GW3	GW4	GW5	Desirable Limit	Permissible Limit
Physical Parameter									
1.	pH at 25°C	-	7.62	7.77	7.50	7.42	7.67	6.5-8.5	NR
2.	Colour	Hazen	1.0	1.0	1.0	1.0	1.0	5	15
3.	Turbidity (**DL 1.0 NTU)	NTU	*BDL	*BDL	*BDL	*BDL	*BDL	1	5
4.	Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
5.	Taste	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
Inorganic Parameters									
6	Total Hardness (as CaCO ₃)	mg/l	356.75	345.23	378.46	352.17	308.45	200	600
7	Calcium (as Ca ⁺⁺)	mg/l	85.24	82.42	109.74	75.21	81.42	75	200
8	Total Alkalinity (as CaCO ₃)	mg/l	379.52	360.56	414.37	363.48	332.49	200	600
9	Chlorides (as Cl)	mg/l	102.14	95.00	99.42	105.02	115.23	250	1000
10	Magnesium (as Mg ⁺⁺)	mg/l	35.01	33.92	25.43	39.98	25.59	30	100
11.	Total Dissolved Solids	mg/l	649.00	615.00	697.00	628.00	649.00	500	2000





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12.	Sulphates (as SO ₄)	mg/l	63.24	61.25	66.48	58.46	75.36	200	400
13.	Fluoride (as F)	mg/l	0.65	0.63	0.69	0.85	0.46	1	1.5
14.	Nitrates (as NO ₃)	mg/l	23.15	22.45	27.31	23.41	23.94	45	NR
15.	Electrical Conductivity	µS/cm	999	947	107	966	999	-	-
16.	Phenolic Compounds (**DL 0.0004 mg/l)	mg/l	*BDL	*BDL	*BDL)	*BDL	*BDL	0.001	0.002
17.	Mineral Oil (**DL 0.05mg/l)	mg/l	*BDL	*BDL	*BDL	*BDL	*BDL	1.0	No Relaxation
18.	Anionic Detergents as MBAS (**DL 0.05 mg/l)	mg/l	*BDL	*BDL	*BDL	*BDL	*BDL	0.2	1.0
Trace Metals									
19.	Cyanide as CN (**DL 0.02 mg/l)	mg/l	*BDL	*BDL	*BDL	*BDL	*BDL	0.05	NR
20	Iron (as Fe)	mg/l	0.26	0.23	0.31	0.18	0.28	0.3	NR
21	Aluminium as Al (**DL 0.002 mg/l)	mg/l	*BDL	*BDL	*BDL	*BDL	*BDL	0.03	0.2
22	Boron (**DL 0.01 mg/l)	mg/l	*BDL	*BDL	*BDL	*BDL	*BDL	0.5	1.0





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23	Chromium as Cr (**DL 0.002 mg/l)	mg/l	*BDL	*BDL	*BDL	*BDL	*BDL	0.05	NR
24	Zinc as Zn	mg/l	1.35	1.32	1.38	1.24	1.39	5	15
25	Copper as Cu	mg/l	0.10	0.09	0.12	0.07	0.15	0.05	1.5
26.	Manganese (as Mn) (**DL 0.01 mg/l)	mg/l	*BDL	*BDL	*BDL	*BDL	*BDL	0.1	0.3
27	Cadmium as Cd (**DL 0.002 mg/l)	mg/l	*BDL	*BDL	*BDL	*BDL	*BDL	0.003	NR
28	Lead as Pb (**DL 0.002mg/l)	mg/l	*BDL	*BDL	*BDL	*BDL	*BDL	0.01	NR
29	Selenium as Se (**DL 0.001 mg/l)	mg/l	*BDL	*BDL	*BDL	*BDL	*BDL	0.01	NR
30	Arsenic as As (**DL 0.002 mg/l)	mg/l	*BDL	*BDL	*BDL	*BDL	*BDL	0.01	NR
31	Mercury as Hg (**DL 0.0005 mg/l)	mg/l	*BDL	*BDL	*BDL	*BDL	*BDL	0.001	NR
Microbiology									
32.	Total Coliform	MPN/100 ml	Absent	Absent	Absent	Absent	Absent	Shall not be detectable in any 100ml sample	
<i>Note: - *BDL-Below Detection Limit, **DL- Detection Limit</i>									

Source: Baseline Monitoring Report, M/s Vardan Envirolabs

Sl. No	Parameter	Unit	GW6	GW7	GW8	Desirable Limit	Permissible Limit
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Physical Parameter							
1.	pH at 25°C	-	7.55	7.57	7.61	6.5-8.5	NR
2.	Colour	Hazen	1.0	1.0	1.0	5	15
3.	Turbidity (**DL 1.0 NTU)	NTU	*BDL	*BDL	*BDL	1	5
4.	Odour	-	Agreeable	Agreeable	Agreeable	AG	AG
5.	Taste	-	Agreeable	Agreeable	Agreeable	AG	AG
Inorganic Parameters							
6	Total Hardness (as CaCO ₃)	mg/l	318.25	341.53	345.44	200	600
7	Calcium (as Ca ⁺⁺)	mg/l	84.42	101.62	98.53	75	200
8	Total Alkalinity (as CaCO ₃)	mg/l	344.21	355.46	370.42	200	600
9	Chlorides (as Cl)	mg/l	86.34	88.62	82.53	250	1000
10	Magnesium (as Mg ⁺⁺)	mg/l	26.20	21.38	24.20	30	100
11.	Total Dissolved Solids	mg/l	562.00	590.00	585.00	500	2000
12.	Sulphates (as SO ₄)	mg/l	44.52	46.00	41.58	200	400
13.	Fluoride (as F)	mg/l	0.74	0.57	0.77	1	1.5
14.	Nitrates (as NO ₃)	mg/l	18.66	24.41	23.56	45	NR
15.	Electrical Conductivity	µS/cm	864	908	899	-	-





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16.	Phenolic Compounds (**DL 0.0004 mg/l)	mg/l	*BDL	*BDL	*BDL	0.001	0.002
17.	Mineral Oil (**DL 0.05mg/l)	mg/l	*BDL	*BDL	*BDL	1.0	No Relaxation
18.	Anionic Detergents as MBAS (**DL 0.05 mg/l)	mg/l	*BDL	*BDL	*BDL	0.2	1.0
Trace Metal							
19.	Cyanide as CN (**DL 0.02 mg/l)	mg/l	*BDL	*BDL	*BDL	0.05	NR
20	Iron (as Fe)	mg/l	0.22	0.24	0.36	0.3	NR
21	Aluminium as Al (**DL 0.002 mg/l)	mg/l	*BDL	*BDL	*BDL	0.03	0.2
22	Boron (**DL 0.01 mg/l)	mg/l	*BDL	*BDL	*BDL	0.5	2.4
23	Chromium as Cr (**DL 0.002 mg/l)	mg/l	*BDL	*BDL	*BDL	0.05	NR
24	Zinc as Zn	mg/l	1.25	1.19	1.34	5	15
25	Copper as Cu	mg/l	0.08	0.06	0.13	0.05	1.5
26.	Manganese (as Mn) (**DL 0.01 mg/l)	mg/l	*BDL	*BDL	*BDL	0.1	0.3
27	Cadmium as Cd (**DL 0.002 mg/l)	mg/l	*BDL	*BDL	*BDL	0.003	NR
28	Lead as Pb (**DL 0.002mg/l)	mg/l	*BDL	*BDL	*BDL	0.01	NR





29	Selenium as Se (**DL 0.001 mg/l)	mg/l	*BDL	*BDL	*BDL	0.01	NR
30	Arsenic as As (**DL 0.002 mg/l)	mg/l	*BDL	*BDL	*BDL	0.01	NR
31	Mercury as Hg (**DL 0.0005 mg/l)	mg/l	*BDL	*BDL	*BDL	0.001	NR
Microbiology							
32.	Total Coliform	MPN/100 ml	Absent	Absent	Absent	Shall not be detectable in any 100ml sample	
<i>Note: - *BDL-Below Detection Limit, **DL- Detection Limit</i>							
<i>Source: Baseline Monitoring Report, M/s Vardan Envirolabs</i>							

Table 3.15: Surface Water Quality Data

S. No.	Parameters	Units	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8	As Per IS 10500:2012	
											Acceptable	Permissible
Physical Parameters												
1	pH at 25°C	-	7.8	7.75	7.53	7.47	7.65	7.54	7.7	7.8	6.5-8.5	NR
2	Colour	Hazen	10	13.0	9.00	11.0	8.0	10.0	10	12.0	5	15
3	Turbidity	NTU	34	45	39.45	41.0	32.0	27.0	30	43.0	1	5
4	Odour	-	AG	AG	AG	AG	AG	AG	AG	AG	AG	AG
Inorganic Parameters												





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5	Total Hardness (as CaCO ₃)	mg/l	740.82	679.0	721.00	662.15	650.00	641.00	642.00	723.00	200	600
6	Calcium (as Ca ⁺⁺)	mg/l	230.51	199.23	217.78	187.20	166.87	160.25	196.50	205.87	75	200
7	Total Alkalinity (as CaCO ₃)	mg/l	474.00	449.00	462.00	433.00	355.00	343.00	398.00	414.00	200	600
8	Chlorides (as Cl)	mg/l	223.82	200.21	210.96	188.61	205.25	195.34	155.26	234.72	250	1000
9	Residual free chlorine (**DL 0.15mg/l)	mg/l	*BDL	*BDL	*BDL	*BDL	*BDL	*BDL	*BDL	*BDL	0.2	1
10	Magnesium (as Mg ⁺⁺)	mg/l	40.26	44.21	43.17	47.41	56.78	58.61	36.87	50.87	30	100
11	Total Dissolved Solids	mg/l	1048.00	951.00	998.00	913.00	866.00	818.00	895.00	1006.00	500	2000
12	Total Suspended Solids	mg/l	51.00	43.00	47.00	53.00	49.00	45.00	61.00	62.00	-	-
13	Dissolved Oxygen	mg/l	6.5	5.8	6.1	5.7	5.1	5.3	5.5	6.1	-	-
14	Sulphates (as SO ₄)	mg/l	140.00	120.00	130.00	118.00	123.00	118.00	105.00	141.00	200	400
15	Fluoride (as F)	mg/l	0.56	0.41	0.48	0.48	0.31	0.25	0.49	0.50	1	1.5





16	Electrical Conductivity	mS/cm	1.61	1.46	1.53	1.40	1.33	1.25	1.37	1.54	-	-
17	Nitrates (as NO ₃)	mg/l	30.24	26.31	28.96	24.51	58.00	26.10	31.14	28.32	45	NR
18	Sodium (as Na)	mg/l	92.00	83.00	83.00	74.00	58.00	50.00	65.00	78.00	-	-
19	Potassium (as K)	mg/l	7.2	8.2	6.8	13.32	12.3	6.3	25.16	18.6	-	-
Pollutants												
20	B O D ₃ days 27 ⁰ C	mg/l	12.00	10.00	15.00	14.00	11.00	9.86	13.00	16.0	-	-
21	C O D	mg/l	43.00	39.00	58.00	52.00	40.00	34.00	46.00	62.0	-	-
22	Iron (as Fe)	mg/l	0.92	0.23	0.27	0.27	0.46	0.41	0.45	0.64	0.3	NR
23	Aluminium as Al (**DL 0.002 mg/l)	mg/l	*BDL	*BDL	*BDL	*BDL	*BDL	*BDL	*BDL	*BDL	0.03	0.2
24	Boron	mg/l	0.61	0.39	0.51	0.7	0.31	0.28	0.56	0.43	0.5	1.0
25	Chromium as Cr (**DL 0.002 mg/l)	mg/l	*BDL	*BDL	*BDL	*BDL	*BDL	*BDL	*BDL	*BDL	-	-
26	Phenolic Compounds (**DL 0.0004mg/l)	mg/l	*BDL	*BDL	*BDL	*BDL	*BDL	*BDL	*BDL	*BDL	0.001	0.002





27	Mineral Oil (**DL 0.05 mg/l)	mg/l	*BDL	*BDL	*BDL	*BDL	*BDL	*BDL	*BDL	*BDL	0.5	NR
28	Anionic Detergents as MBAS (**DL 0.05 mg/l)	mg/l	*BDL	*BDL	*BDL	*BDL	*BDL	*BDL	*BDL	*BDL	0.2	1.0
29	Zinc as Zn	mg/l	2.87	2.64	2.16	2.19	1.96	2.41	1.82	2.42	5	15
30	Copper as Cu	mg/l	0.09	0.19	0.14	0.15	0.11	0.16	0.10	0.18	0.05	1.5
31	Manganese (as Mn) (**DL 0.01 mg/l)	mg/l	*BDL	*BDL	*BDL	*BDL	*BDL	*BDL	*BDL	*BDL	0.1	0.3
32	Cadmium as Cd (**DL 0.002 mg/l)	mg/l	*BDL	*BDL	*BDL	*BDL	*BDL	*BDL	*BDL	*BDL	-	-
Microbiology												
33	Total Coliform	MPN/100 ml	1000	1600	1200	900	1600	1400	1000	1600	-	-
<i>Note: - *BDL-Below Detection Limit, **ND- None Detectable</i>												
<i>Source: Baseline Monitoring Report, M/s Vardan EnviroLabs</i>												





3.4.4.2 Interpretation of data

The analysis of the 8 nos. of Ground Water and 8 nos. of Surface Water samples are presented in **Table 3.14** and **Table 3.15** respectively and are compared with the standards for drinking water as per IS: 10500-2012 “Specifications for Drinking Water” and IS:2296 respectively.

3.4.4.2.1 Interpretation of Ground Water Quality

- The analysis results indicate that the pH ranges in between 7.42 to 7.77. The maximum pH was observed Site (GW2) and the minimum pH of 7.42 was observed at Kullakavundunur village (GW4).
- Total Dissolved Solids (TDS) concentrations were found to be ranging in between 562 to 697 mg/l, the maximum concentration was observed at Mettupatti village (GW3). The minimum concentration was observed at Gundur village (GW6).
- Total Hardness was observed to be ranging from 308.45 to 378.46 mg/l. The maximum hardness was recorded at Mettupatti village (GW3) and the minimum was recorded at Kombaipatti (GW5) respectively.
- Alkalinity of the samples lies between 332.49 mg/l to 414.37 mg/l. The maximum was at Mettupatti village (GW3) and the minimum value was found at Kombaipatti (GW5) respectively
- Chlorides were found to be in the range of 82.53 to 115.23 mg/L, the maximum concentration was observed at Kombaipatti village (GW5), and where as the minimum concentration was observed at Keeraipappampadi village (GW8) respectively.
- Sulphates were found to be in the range of 41.58 mg/l to 75.36 mg/l. The maximum value observed at Kombiapatti village (GW5), whereas the minimum value was observed at Near at Keeraipappampadi village (GW8) respectively.
- Bacteriological studies revealed the absence of Total coliform.
- In study area, water quality has been observed to vary considerably between the sampling locations. Mostly the parameters of groundwater quality fall within the permissible limits of drinking water standards.

3.4.4.2.2 Interpretation of Surface Water Quality

- The analysis results indicate that the pH ranges in between 7.47 to 7.8 which are well within the specified standard of 6.5 to 8.5. The maximum pH was observed at Pond near site (SW8) and the minimum pH of was observed at Pond near Kamalapuram village (SW4).
- Conductivity of the samples lies between 1.25 mS/cm to 1.61 mS/cm. The maximum value was found in Selathampatty (SW1) and the minimum value was found Pond near Kombaikkadu village (SW6).
- The Total Dissolved Solids (TDS) concentrations were found to be ranging in between 818 to 1048 mg/l, The maximum value was found in Selathampatty (SW1) and the minimum value was found Pond near Kombaikkadu village (SW6).





- Total Hardness was observed to be ranging from 641 to 740.82 mg/l, the maximum value was found in Selathampatty (SW1) and the minimum value was found Pond near Kombaikkadu village (SW6).
- Chlorides were found to be in the range of 155.26 mg/l to 234.72 mg/l, the maximum concentration was observed at near project site (SW8) and the minimum value was found Pond near Uthamasolapuram village (SW7).
- Sulphates were found to be in the range of 105 mg/l to 141 mg/l, the maximum concentration was observed at near project site (SW8) and the minimum value was found Pond near Uthamasolapuram village (SW7).
- Dissolved Oxygen were found to be in the range of 5.1 mg/l to 6.5 mg/l, the maximum concentration was observed at pond near Selathampatty village (SW1), and where as the minimum concentration was observed at pond near Near Kunumbalpatti RF (SW5).
- Total Coliform count is measured 900 to 1600 MPN/100ml.

3.4.5 Soil Environment

In order to establish the baseline status of soil characteristic, soil sampling is conducted in the study area based on the land classification.

3.4.5.1 Methodology

Soil sampling was carried out at 8 sites to understand the soil quality. Meticulous attention was paid to collect adequate amount of composite soil samples for analysis. After removing the surface vegetation cover, visible roots, plant litter, gravel, plastic materials and other foreign materials. Samples were collected by Agar at a depth of 50, 150 and 300 cm and mixed thoroughly and analyzed as a single unit sample. The samples were packed in dependable, waterproof zip lock pouch bag and was marked specifically, accurately and brought to the laboratory for testing. This will establish the baseline characteristics and facilitate to identify if any.

3.4.5.2 Data Analysis

The soil samples were collected from 8 locations around the 10 km radius of proposed expansion project. The samples were analyzed and the results were obtained. The detailed soil quality reports are given in **Annexure XI**. The samples were collected during pre-monsoon season from the selected locations (**Figure 3.10**). The monitoring locations and results of all the specified parameters at each location are given in **Table 3.16 and 3.17**. Site Photographs of baseline monitoring/sampling is attached as **Annexure XII**.





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Table 3.16: Soil Quality Monitoring Locations

Stations	Name	Latitude	Longitude	Distance (km) & Direction
S1	Project Site-A	11°43'40.6"N	78°06'43.1"E	-
S2	Project Site-B	11°41'28.8"N	78°05'34.5"E	-
S3	Mettupatti	11°42'40.5"N	78°06'30.1"E	0.4 Km, SE
S4	Kullakavundanur	11°43'25.2"N	78°05'14.4"E	1.4 Km, W
S5	Kombaipatti	11°42'20.7"N	78°09'49.5"E	5.3 Km, E
S6	Gundur	11°44'43.1"N	78°11'58.4"E	6 Km, NE
S7	Pudur	11°46'32.0"N	78°05'41.6"E	6 Km, NW
S8	Keeraipappampadi	11°40'48.0"N	78°02'42.2"E	4.5 Km, SW

Source: Baseline Monitoring Report, M/s Vardan EnviroLabs





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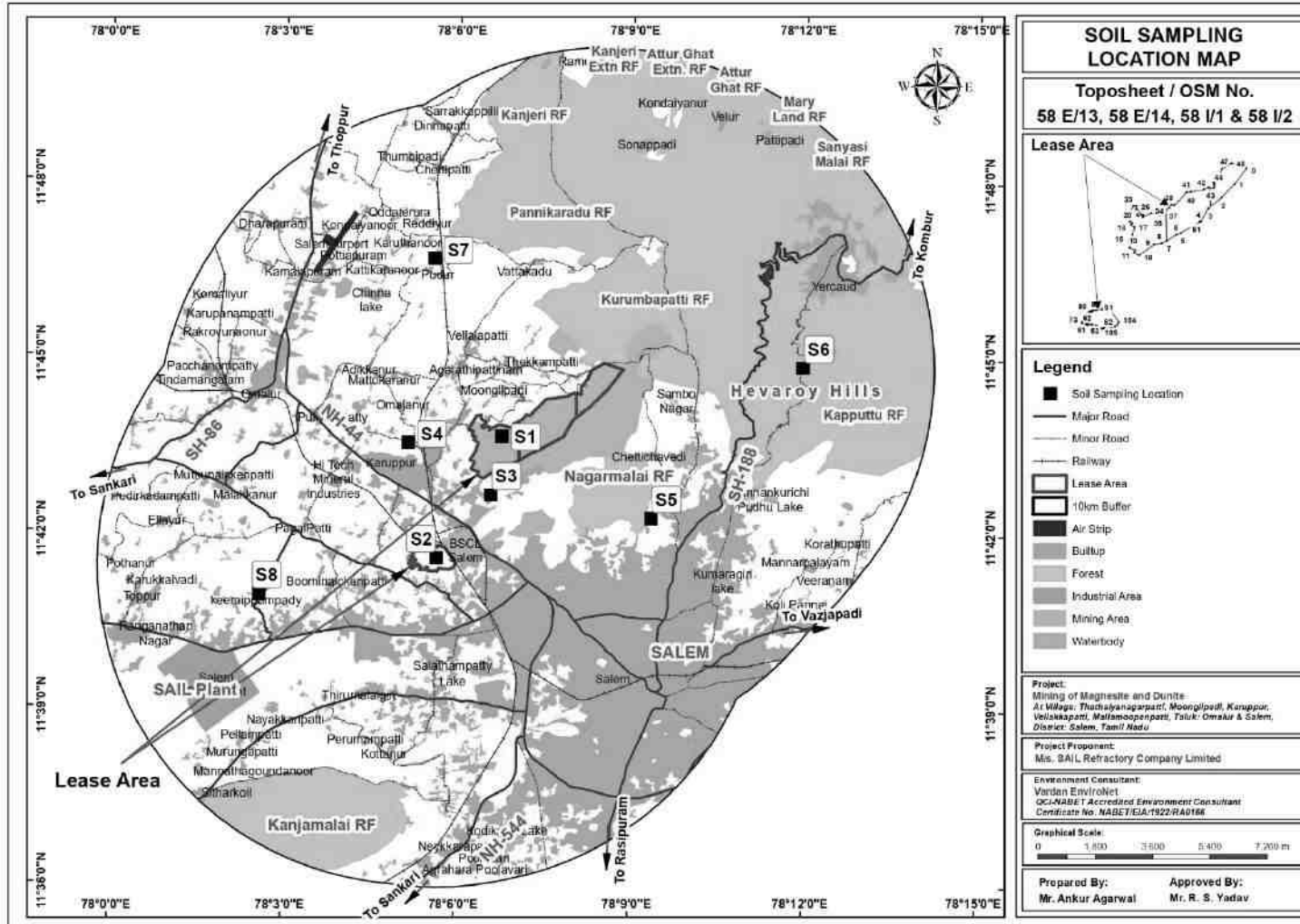


Figure 3.10: Soil Quality Monitoring Locations Map





Table 3.17: Soil Analysis Results

S No	Parameters	Unit	S1	S2	S3	S4	S5	S6	S7	S8
1	Color	--	Yellowish Brown	Yellowish Brown	Slightly yellow	Yellowish Brown	Blackish Brown	Blackish Brown	Yellowish Brown	Yellowish Brown
2	Soil Texture	--	Sandy Loam	Sandy Loam	Silty Loam	Silty Loam	Silty Loam	Silty Loam	Silty Loam	Silty Loam
3	pH (at 25 °C)	--	7.58	7.63	7.65	7.68	7.72	7.69	7.76	7.71
4	Conductivity	mS/cm	0.269	0.286	0.316	0.26	0.364	0.312	0.345	0.327
5	Water holding capacity	%	31.56	33.59	32.64	34.69	35.47	37.49	36.45	36.12
6	Bulk density	gm/cc	1.33	1.31	1.36	1.33	1.41	1.46	1.42	1.31
7	Chloride as Cl	mg/100g	34.79	36.79	38.16	40.58	41.63	44.63	49.67	47.15
8	Calcium as Ca	mg/100g	31.58	32.45	35.46	35.55	38.45	41.85	43.25	44.57
9	Sodium as Na	mg/kg	44.75	45.87	47.54	49.37	47.66	50.26	56.12	57.28
10	Potassium as K	kg/hect.	107.59	115	132	126	198	145.53	198	225
11	Organic Matter	%	0.31	0.46	0.54	0.49	0.59	0.62	0.55	0.7
12	Magnesium as Mg	mg/100g	14.68	17.44	20.47	13.69	16.48	19.11	17.55	18.11





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S No	Parameters	Unit	S1	S2	S3	S4	S5	S6	S7	S8
13	Available Nitrogen as N	kg./hec.	126	135	158.43	149.11	216.33	242.11	221.42	247
14	Available Phosphorus	kg./hec.	9.86	15.62	12.46	14.62	15.63	18.11	15.47	17.16
15	Zinc (as Zn)	mg/kg	0.19	0.25	0.76	0.69	1.02	1.46	0.86	1.26
16	Manganese (as Mn)	mg/kg	1.93	2.13	2.16	2.14	3.61	2.42	1.4	2.12
17	Lead (as Pb)	mg/kg	0.53	0.5	0.37	0.42	0.39	0.43	0.36	0.52
18	Cadmium (as Cd)	mg/kg	0.43	0.43	0.33	0.28	0.24	0.39	0.24	0.24
19	Chromium (as Cr)	mg/kg	0.24	0.22	0.21	0.19	0.18	0.26	0.18	0.15
20	Copper (as Cu)	mg/kg	0.93	0.87	0.68	0.59	0.76	0.83	0.77	0.78

Source: Baseline Monitoring Report, M/s Vardan EnviroLabs





3.4.5.3 Interpretation

- Based on the results obtained, it is evident that the soil samples are predominantly silty loam type.
- The pH of the soil samples ranged from 7.58 to 7.76 indicating that it is neutral in nature.
- The electrical conductance of the soil samples varied from 0.26 $\mu\text{S}/\text{cm}$ to 0.364 mS/cm based on the Conductivity results it can be concluded that the ionic content of the soil samples is within the limits. Bulk densities of the soil samples varied from 1.31 to 1.46 gm/cc .
- Available nitrogen in the soil samples varied from 126 Kg/ha to 247 Kg/ha .
- Available phosphorus in the region varied from 9.86 kg/ha to 18.11 kg/ha revealing the distribution from medium to average sufficient quantities.
- Available potassium levels in the samples ranged from 107.59 Kg/ha to 225 Kg/ha , which is indicating average quantities in the soil samples.
- Soluble chlorides in the region varied from 34.79 $\text{mg}/100\text{g}$ to 49.67 $\text{mg}/100\text{g}$. Organic matter concentrations ranged from 0.31% to 0.7 % on an average sufficient content is noticed in the soil samples.
- Based on particle sizes of the samples collected from the site, they are mostly falling in Silty loam category.
- The water holding capacity of soil collected from all the specific locations vary in the range from 31.56 to 37.49 %.

3.4.6 Traffic Study

Traffic analysis is a study carried out to predict the magnitude and impact that the proposed project may have on the existing transportation network. Traffic analysis can also be used to evaluate whether the existing transportation facility is appropriate or needs an improvement for the proposed developmental project.

During the operational phase, major additional traffic will be due to the movement employees and due to transportation of materials. Traffic study was performed to assess impact of the project on local transport infrastructure, by understanding the existing carrying capacity of the road in the vicinity of site, present traffic and additional traffic due to the proposed expansion. This will be compared with the carrying capacity of the road, as recommended by Indian Road Congress (IRC). The project site is connected with NH-7/NH 44, which is a two-row lane, and connecting Bangalore to Salem.

3.4.6.1 Traffic Survey

The traffic study was carried out for NH-7 for 24 hours which is near to the project site and is a medium for transportation of mineral. Traffic data was collected for one day (24 hours) by visual observation and counting of vehicles under following categories for traffic study of NH-7, viz, Car, Buses, trucks, Tractors, Two wheelers,





Three wheelers. Four skilled persons were deployed simultaneously at each station during each shift (morning and evening)- one person on each of the two directions for counting the traffic. At the end of each hour, fresh counting and recording was undertaken. Total numbers of vehicles per hour were determined.

3.4.6.2 Data Analysis

The traffic study was carried out for NH-7/NH 44 for 24 hours which is near to the project site and is a medium for transportation of mineral.

Table 3.18: Roads and Highways in the Study Area

Name of National Highway	Direction		Dispatched Ratio in Percentage
	Up	Down	
NH-7/NH 44	Bangalore	Salem	100

Source: Traffic Survey

3.4.6.3 Existing traffic scenario

The Level of Service (LOS) and the capacity of the Roadway segments computed is based on the Indian Roads Congress (IRC) standards sourced from Guidelines for Capacity of Urban Roads in Plain Areas IRC 64-1990.

Table 3.19: Summarized Traffic Data

Type of Vehicles	No. of Vehicles NH-7 / NH 44	Equivalent PCU	PCU/day
			NH-7/NH44
Trucks	1180	3	3540
Agriculture tractors/LCV	485	1.5	727.5
Bus	256	3	768
Cars	840	1	840
3-Wheeler	15	1	15
2-Wheeler	1315	0.5	657.5
Total PCU/day			6548

Source: Traffic Survey



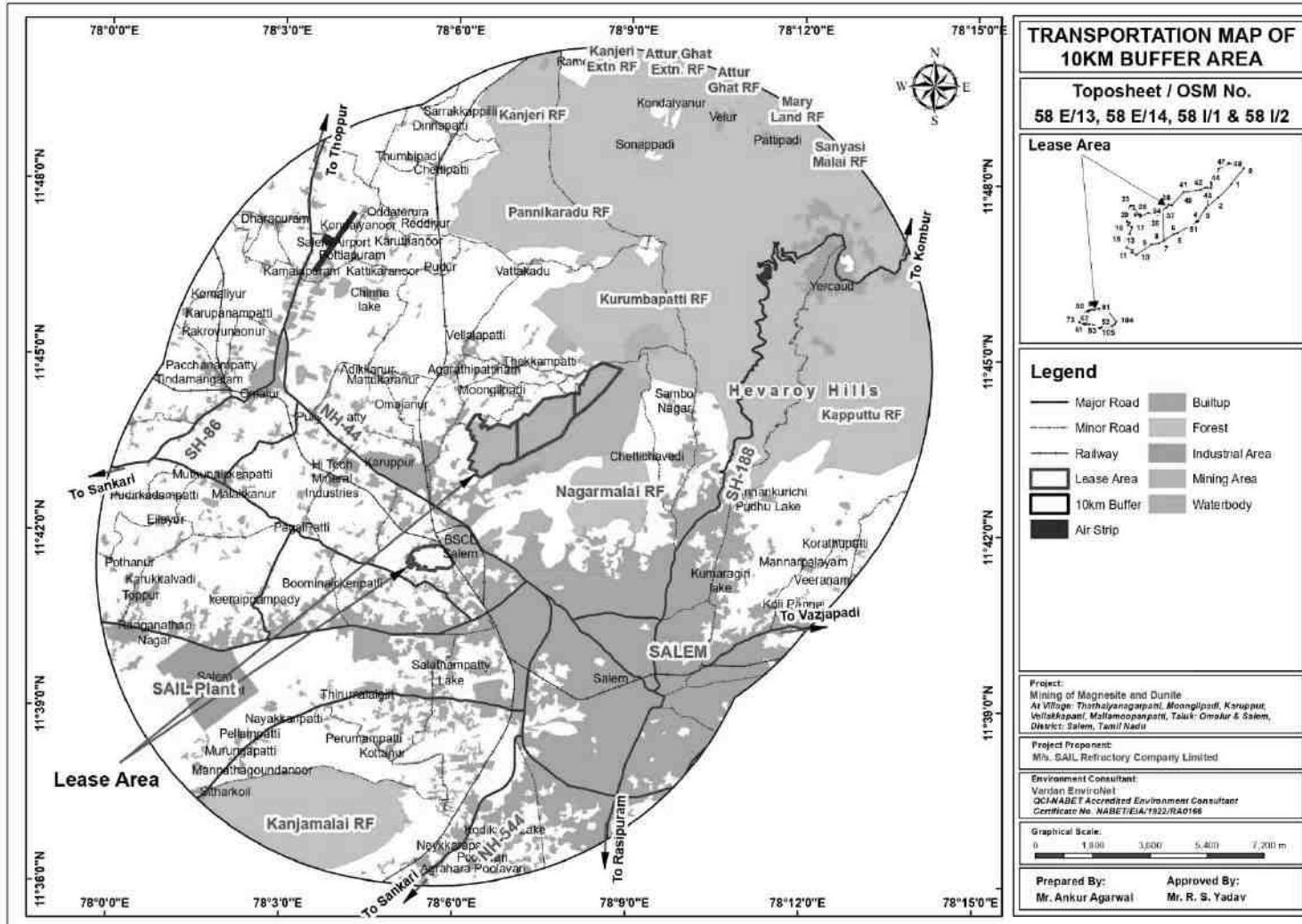


Figure 3.11: Transportation Map





Table 3.20: LOS Standards

V/C	LOS	Performance
0.0-0.2	A	Excellent
0.2-0.4	B	Very Good
0.4-0.6	C	Good/ Average/ Fair
0.6-0.8	D	Poor
0.8-1.0	E	Very Poor

Table 3.21: Existing Traffic Scenario and LOS

Type of Road	Existing Volume (PCU/day)	Capacity in (PCU/day)	V/C Ratio	LOS
NH-7 /NH44	6548	15000	0.43	C

Source: Traffic Survey

Table 3.22: Proposed traffic Scenario and LOS

During Mine Operation		
E	Total Mineral to be Dispatched	115071 TPA Magnesite & 67104 TPA Dunite
F	No. of working days	300
G	Transportation of mineral	607.25 MT/day
H	Truck Capacity	10/20 Tons
I	Number of trucks deployed/day (61 x 1 trips/day x 2 up/down)	122
J	Total PCU/day	366

Source: Traffic Survey

Increase in PCU/day due to proposed project is given below in **Table 3.23**.

Table 3.23: Existing and Increase in PCU/day

No	Road	Existing	Proposed Volume (V)	Capacity (C)	Modified V/C Ratio	LOS
Existing	NH-7/NH 44	6548	-	15000	0.43	C
Proposed	NH-7 /NH 44	6548	6548+ 366= 6914	15000	0.46	C

Source: Traffic Survey





3.4.6.4 Interpretation

- Due to the mine project the traffic density will increase as the entire mineral will be transported through the NH-7 the value of LOS will remain same as good.

3.4.7 Land Use and Land Cover

3.4.7.1 Tools and Resources

The Land use Land cover study was out using Digital Image Processing and Digital Image Interpretation techniques. The Image Processing and Geographical Information Systems software will be used for the Spatial Analysis. In order to meet the project requirements, Vardan EnviroNet acquired the high-resolution satellite data of the study area from National Remote Sensing Centre (NRSC). Basic Details of the Purchased data are as follows:

Satellite: IRS P6 Resourcesat-2

Sensor: LISS III MX

Spatial Resolution: 28m

No. of Bands = 3

Map Projection = UTM

Ellipsoid = WGS_84

Datum= WGS84

False Easting = 500000.000000

False Northing = 0.000000

UTM Zone No = 44

3.4.7.2 Pre-processing of Satellite Data

In the present study geo-coded Ortho-rectified IRS P-6 LISS-III MX satellite image (**Figure 3.13**) having a resolution of 28 meters was procured from NRSC. This data is received from Linear Imaging and Self Scanning Sensor (LISS) and is acquired in three spectral bands namely visible and near infrared (B2, B3 and B4).

All the processing was done on ERDAS Imagine and Arc GIS software. A hybrid classification approach was adopted for the purpose. Supervised classification has been performed on the imagery to delineate land use/land cover classes. A total of 36 classes were taken initially and later merged into 10 land use/land cover classes.

The IRS P-6 LISS-III MX data geometrically corrected with respect to Survey of India topo-sheets. To carry out the geo-referencing, ground control points (GCPs) have been identified on the maps and raw satellite data. The coefficients for two co-ordinate transformation equations have been computed based on polynomial regression between GCPs on map and satellite data. Alternate GCPs was generated





till the Root Mean Square (RMS) error become less than 0.5 pixels. Methodology Flow Chart is given in **Figure 3.12**.

3.4.7.3 Visual Interpretation and Land Use Mapping

Fundamental characteristics seen on the images have aided in the visual interpretation of satellite imagery. These are tone/color, size, shape, texture, pattern, location, association, resolution and season. Visual interpretation is subjective and differs from person to person and also upon the season, scale, spectral bands, spatial resolution, overall image contrast & quality of the data. Several parameters like terrain, climatic conditions, socio-economic trends, and environmental influences etc. play a vital role in the existence of various land use categories.

3.4.7.4 Land Use / Land Cover Classification

Digital image processing was carried out to delineate various land use / land cover categories in the lease area viz. built-up area, agriculture land, forests, scrub land and water bodies etc. by assigning necessary training sets, which were identified based on tone, texture, size, shape pattern and location information. Necessary care was taken to identify proper land use class, where there is conflict between the signatures of various classes. The interpreted map was verified on ground at limited points and final land use / land cover map was prepared.



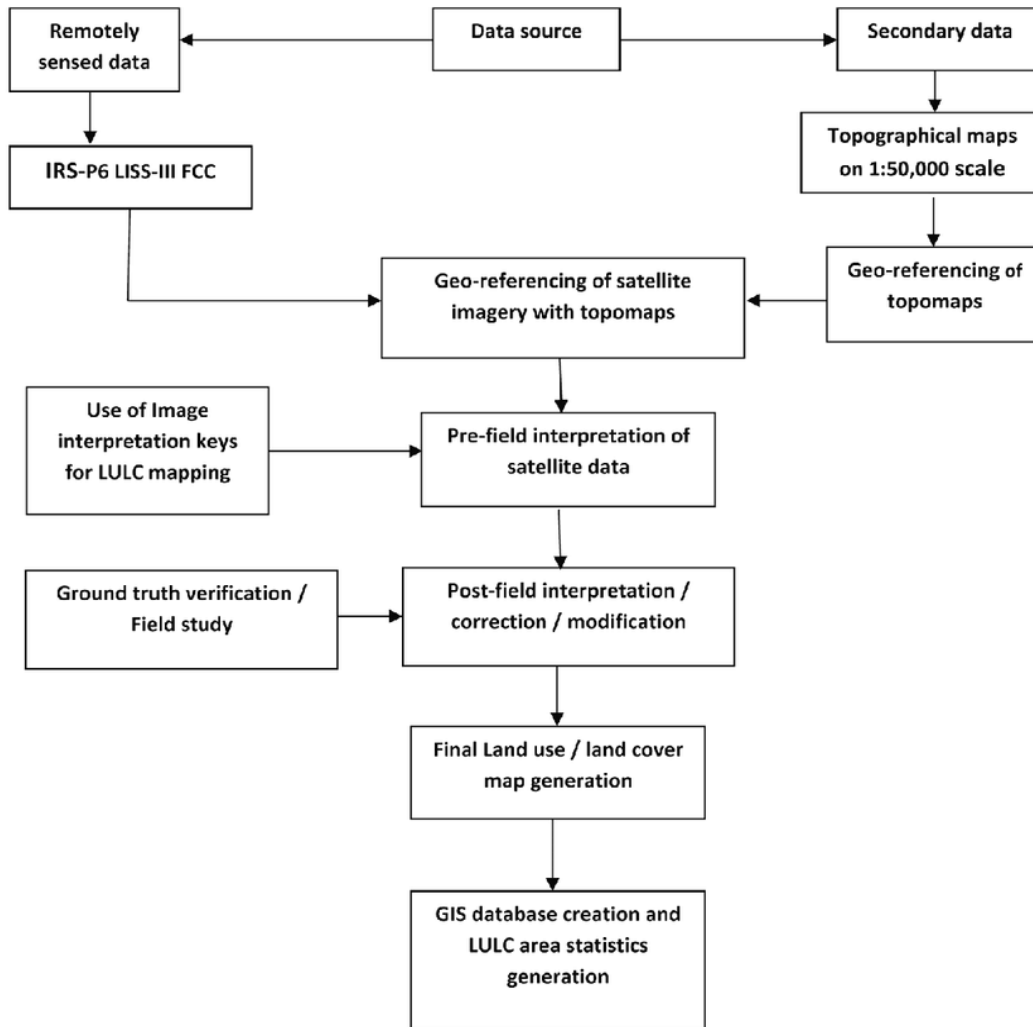


Figure 3.12: Methodology Flow Chart

3.4.7.5 Various Land Use Classes

The buffer zone can be broadly classified into forest areas, built-up areas, agriculture areas and other land with or without scrubs.

3.4.7.5.1 Forest

All the areas declared as reserve forest / protected forest areas are shown in this class.

3.4.7.5.2 Agricultural land

The areas where farmers practice cultivation in one season/ two seasons in a year.





3.4.7.5.3 Waste land

Land without any usage and without scrubs and sometimes they are rock exposed areas.

3.4.7.5.4 Area with or without Scrubs

Generally waste lands-non agriculture and non-forest areas covered with or without scrubs.

3.4.7.5.5 Water Bodies

The oceans, rivers, streams, lakes, tanks, reservoirs, canals, are etc. will be identified in this class.

3.4.7.5.6 Built-up

The villages/ colonies/ towns area is shown in this class.

3.4.7.5.7 Mining Area

The areas, where the mining activity is performing/ performed are shown in this class.

3.4.7.5.8 Industrial Area

The industrial Establishments are shown in this class.

3.4.7.5.9 Air strip

The Airport/Airstrip Establishments are shown in this class.

3.4.7.6 Land Use / Land Cover

The land use/land cover pattern of the study area have been framed from the Satellite Imagery (**Figure 3.13**) and Topo-sheet and authenticated by field visit. The land use/land cover pattern has been divided into 10 classes as follows: ((i) Agriculture Land (ii) Forest (iii) Waste Land (iv) Air Strip (v) Plantation (vi) Open Scrub (vii) Built-up (viii) Water body (ix) Mining Activity (x) Industrial Area. The given categories of land use and land cover pattern covers an area of about 51705 Ha. Various classes and their respective areas with percentage of coverage are given in **Figure 3.14, & Table 3.24.**

Table 3.24: Land Use of the Study Area

Land Use Classification	Area in Hectare	Area in %
Agriculture Land	21550	41.68
Air Strip	53	0.10





Land Use Classification	Area in Hectare	Area in %
Built up	10542	20.39
Forest	14209	27.48
Industrial Area	537	1.04
Mining Area	1563	3.02
Open Scrub	1483	2.87
Plantation	1412	2.73
Waste land	65	0.13
Waterbody	291	0.56
Total	51705	100.00

Source: (i) LISS III Satellite Imagery of Study Area, 2021; (ii) SOI Toposheet Map Sheet No. 58 E/13, 58 E/14, 58 I/1 & 58 I/2; (iii) Google Earth Inc.

3.4.7.6.1 Forest Area

Forest covers major portion of the study area. The forest land consists mostly of Reserved Forest. Some open jungles are situated in the northern part of the study area. The total forest area cover under various density categories is about 14209 Ha which is 27.48% of the total land area.

3.4.7.6.2 Agricultural Land

The Agricultural land covers the major land area of the total study area which is about 21550 Ha, 41.68% of the total land area. Major part of the agriculture land is double cropped agriculture land while some of the land part has been kept as fallow land where grasses are grown. These agricultural lands are used for seasonal agricultural purposes.

3.4.7.6.3 Waste Land

Wastelands are lands which are unproductive, unfit for cultivation and other economic uses due to rough terrain and eroded soils. The soil of this type of land area with very little vegetation is unsuitable for agricultural purposes. This type of land-use and land cover pattern covers about 65 Ha of land which is 0.13% of the total study area.

3.4.7.6.4 Open scrub

The soil of this type of land area with very little vegetation is unsuitable for agricultural purposes and is classified in the wasteland category. Only small thorny bushes are sustained in the soil. Generally, this type of land cover may be observed





to be spread within the agricultural land areas. Land area with the scrubs covers 1483 Ha of land area which is about 2.87% of total study area.

3.4.7.6.5 Built-up Land

Built-up in the project area refers to the village settlements with all infrastructural facilities like school, market, playground and various other facilities. In the study area the settlements are mostly rural settlements scattered in the north-west, southern and western part of the area in patches. Major Settlement of Salem is situated in the South Eastern part of the study area. Total area comes under built-up is 10542 Ha, which is 20.39% of the total study area.

3.4.7.6.6 Mining Area

The area is mainly, where the mining activity is performing/ performing. Such type of area is very few covering only 1563 Ha of land area which is 3.02% of total study area. The buffer zone is covered by reserved forests.

3.4.7.6.7 Water body

Water bodies refer to the small collection of water in any natural or manmade storage like ponds, lakes, tanks, reservoirs etc. In the study area these water bodies are present in very small patches near village settlements. Such types of water bodies are very few covering only 291 Ha of land area which is 0.56% of total study area.

3.4.7.6.8 Industrial Area

This kind of land use refers to the area where industrial Establishments are present in the study area. This type of area covers about 537 Ha of land area which is 1.04% of total study area.

3.4.7.6.9 Air Strip

This kind of land use refers to the area where airport has been developed by the govt. for air transportation purpose. This type of area covers about 53 Ha of land area which is 0.10% of total study area.

3.4.7.6.10 Plantation Area

This kind of land use refers to the area where plantation has been developed by the locals as a part of their occupation. This type of area covers about 1412 Ha of land area which is 2.73% of total study area.



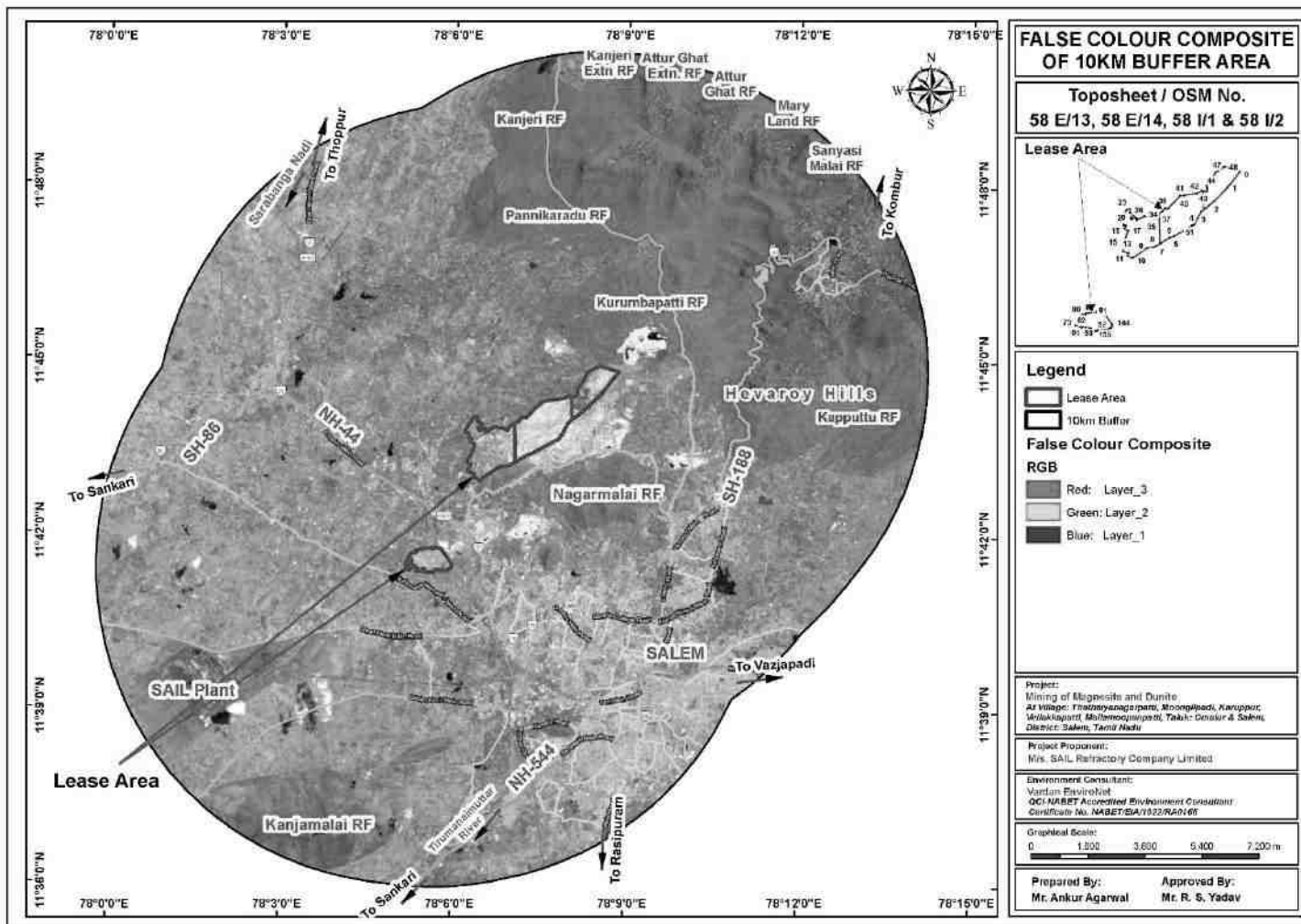


Figure 3.13: Satellite Imagery of 10 Km Study Area





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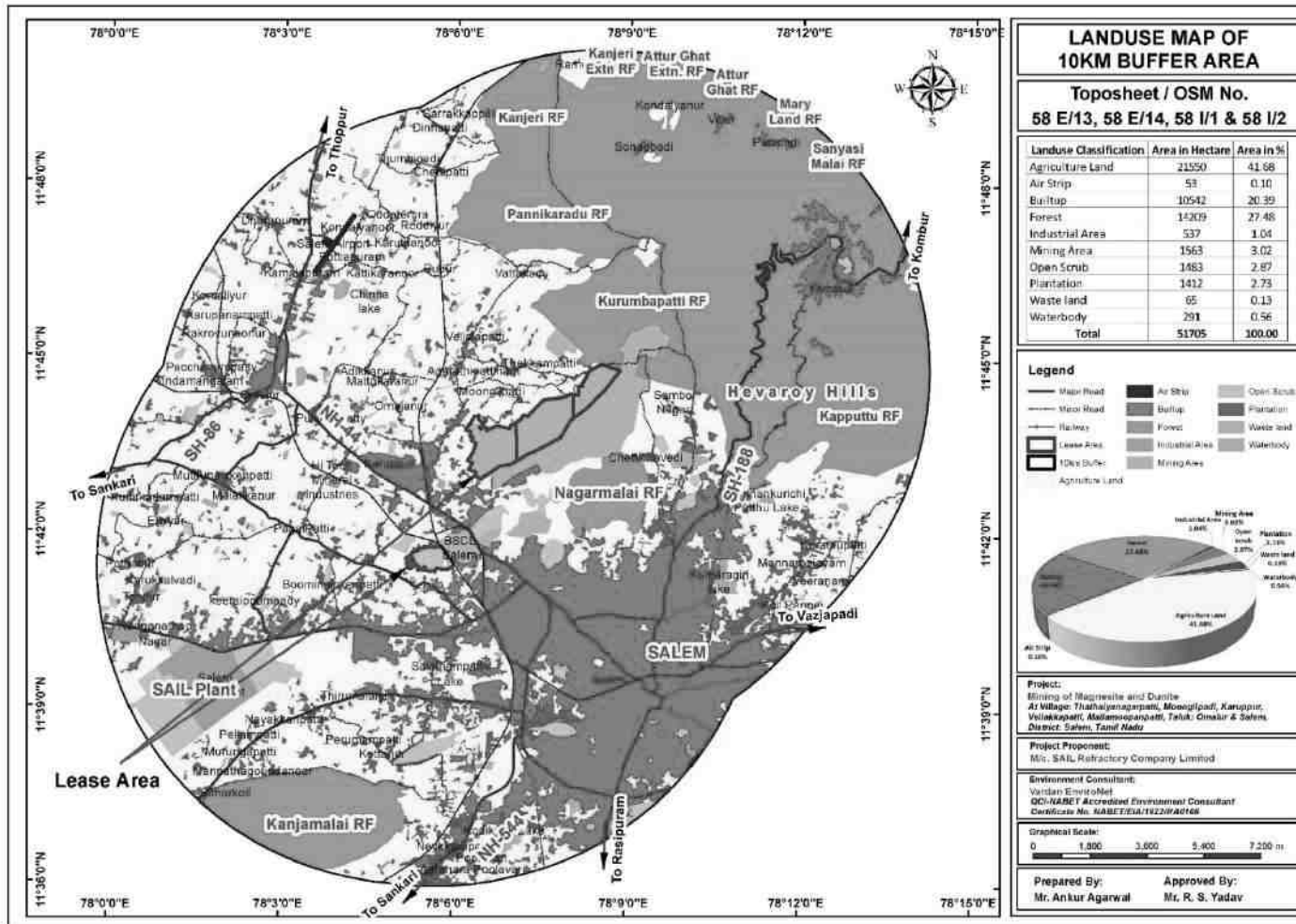


Figure 3.14: LULC Map of 10 km Study Area



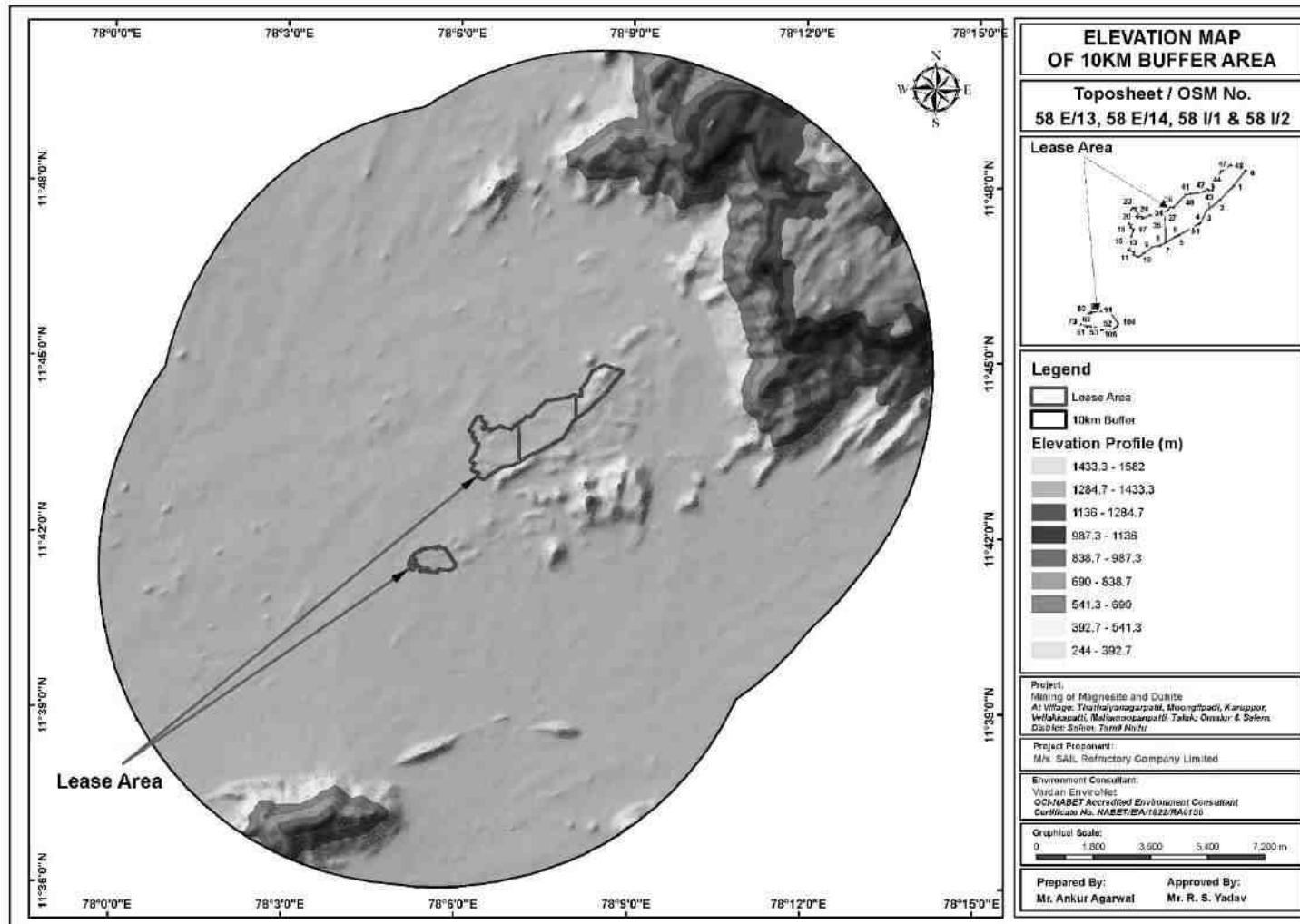


Figure 3.15: Elevation Map of 10 Km Study area



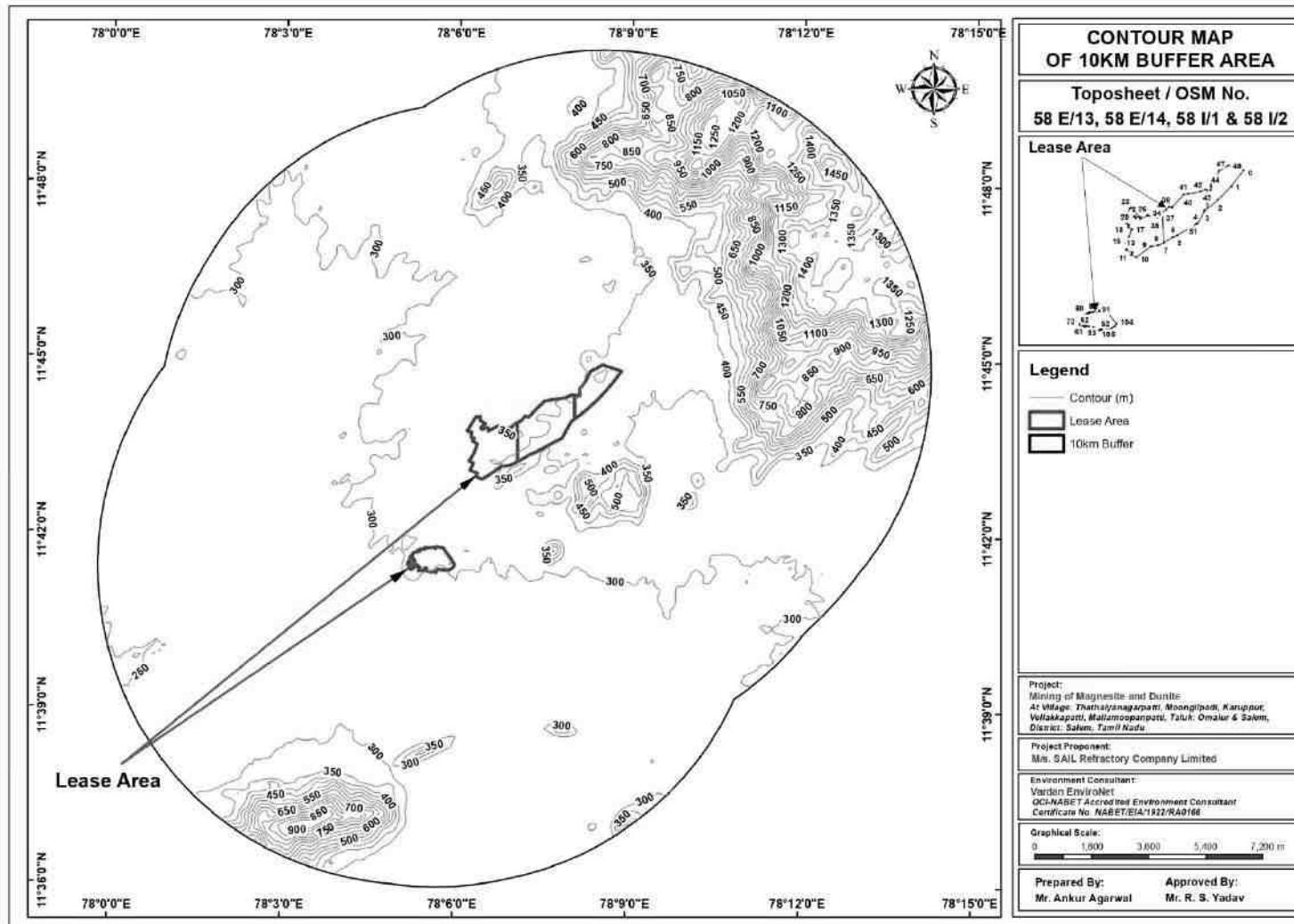


Figure 3.16: Contour Map of Study Area





3.4.8 Geomorphology and Soil Type

Salem district forms part of the upland plateau region of Tamil Nadu with many hill ranges, hillocks and undulating terrain with a gentle slope towards east. The prominent geomorphic units are Plateau, Structural hills, Bazada zone, Valley fill Pediments, Shallow Pediments and Buried Pediments. A number of hill ranges are located in the northern and north-eastern parts of the district, whereas the southern, western and eastern parts of the district are gently undulating and dotted with a few isolated hillocks. The important hill ranges in the district are Yercaud hills, Kanjamalai hills, Godumalai hills and Pachamalai hills. Topographically. The study area is a subdued topography with elevation ranges from 420m -340m above MSL.

3.4.8.1 Drainage

Salem district is drained by tributaries of Cauvery and Vellar rivers. Cauvery river, which is perennial in nature, flows along the western and southern boundaries of the district. Sarabanga and Tirumanimuttar are important tributaries of Cauvery River and originate in the Shevroy hills. The Swetha and Vasishta rivers are tributaries of Vellar river. The Swetha river originates in the Kollimalai and flows eastwards and joins the Vellar river. The Vasishta river originates in the chitteri hills and flows southwards and joins the Vellar river. In general, the district is characterized by dendritic drainage.

There is no water body like river or pond or lakes are found around 500m from the lease hold area.

3.4.8.2 Soil Type

The soils can be broadly classified into 6 major soils types' viz., Red in situ, Red Colluvial Soil, Black Soil, Brown Soil, Alluvial and Mixed Soil. Major part of the district is covered by Red in situ and Red Colluvial soils. Block soils are mostly seen in Salem, Attur, Omallur and Sankari taluks. Brown Soil occupies major portion of Yercaud and parts of Salem and Omallur taluks and the Alluvial Soil is seen along the river courses in Omallur and Sankari taluks. Mixed soil is occurring only in Attur taluk.

3.4.8.3 Regional Geology

As per the Department of Geology and Mining, a major part of the mineral wealth of Tamil Nadu is confined to Salem District, where a variety of important minerals like Magnesite, Dunite, Bauxite, Limestone, Iron ore, Quartz, Feldspar and Soapstone, Granites etc, are found and also has one of the largest magnesite deposits in India.





The general geological sequences of the district are given below:

Table 3.25: Regional Stratigraphic Sequence

Age	Nature and Characteristics
Recent	Thin reddish soil
Archean	Dunite, Olivine Gabbro, Pyroxenite Ultramafic Rocks Peninsular Gneiss, Hornblende-Gneiss, Biotite-gneiss & Charnockites

Salem district is having different variety of rock formations like peninsular gneisses, Charnockites Younger granites, Pegmatites and ultramafic rocks like Dunites, Peridotites and mafic rocks like pyroxenites.

The area forms part of Archean complex of peninsular India. The Geological formations consist of biotite-gneiss, Hornblende-gneisses, granite-gneisses intruded by younger granite, pegmatite and quartz vein. The granite-gneiss and biotite-gneisses represent ancient calcareous sediments which have suffered repeated metamorphic intrusions by younger granites. The Dolerite dyke rocks, commercially called as Black granite occur in Paithur, Seeliampatty Manjini, Umayalpuram of Attur Taluk and in Yellikaradu, Sampalli, Kaveripuram and Kannamoochi of Mettur Taluk. The Colour granites mainly of Granite and leptinite occur in Edappadi and Sankari Taluks which is extensively quarried for building and ornamental purposes. The pegmatite's vein occurs is an intrusive body into granite-gneiss which is the country rock. The granite-gneisses forms of oldest formation in the stratigraphic sequence. The country rock is moderately weathered whereas the pegmatite body resists weathered. Granites and pegmatites have intruded into the older gneisses and they are also of Archaean age, being more resistant than the gneiss to erosion. The granites and pegmatites stand out as residual ridges. The ultramafic rocks generally show evidence of greater weathering in comparison to the adjacent gneissic country rocks. With respect to the study area the depth of weathering in Dunite extends up to 40 m. The degree of weathering in these rocks is controlled by irregular fracture patterns. The regional ground water table is confined to the sum of weathering. In Tamil Nadu the most prominent deposit of magnesite is located in Chalk hills of Salem spreads 17 sq. km. Other Minor occurrences are reported from Vannankuttai, Pakkanadu, Chettipatti, Jalakandapuram, Vanavasi, Soragai, Kuppampettai and Kanniyampettai in Salem District.





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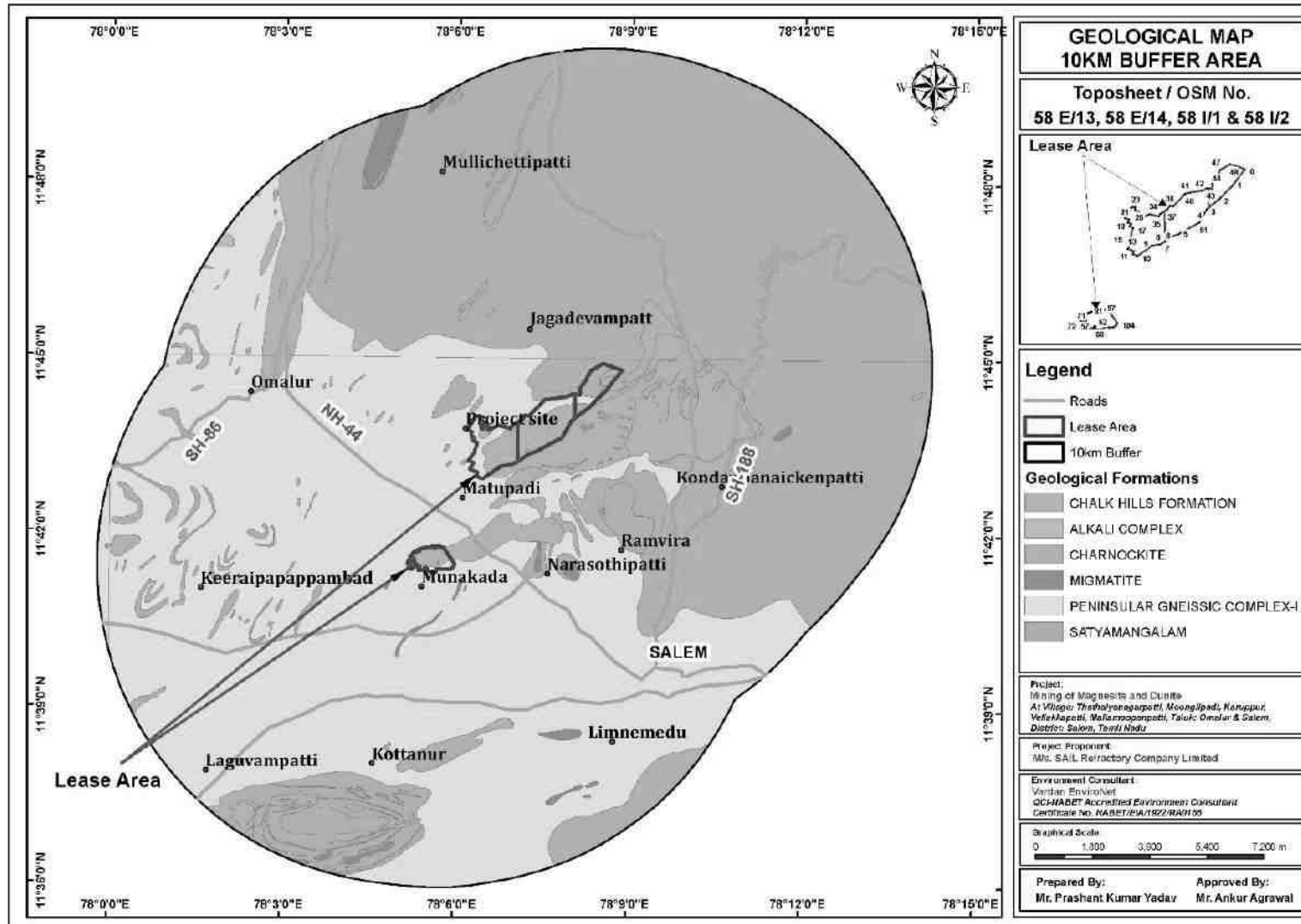


Figure 3.17: Geomorphology Map



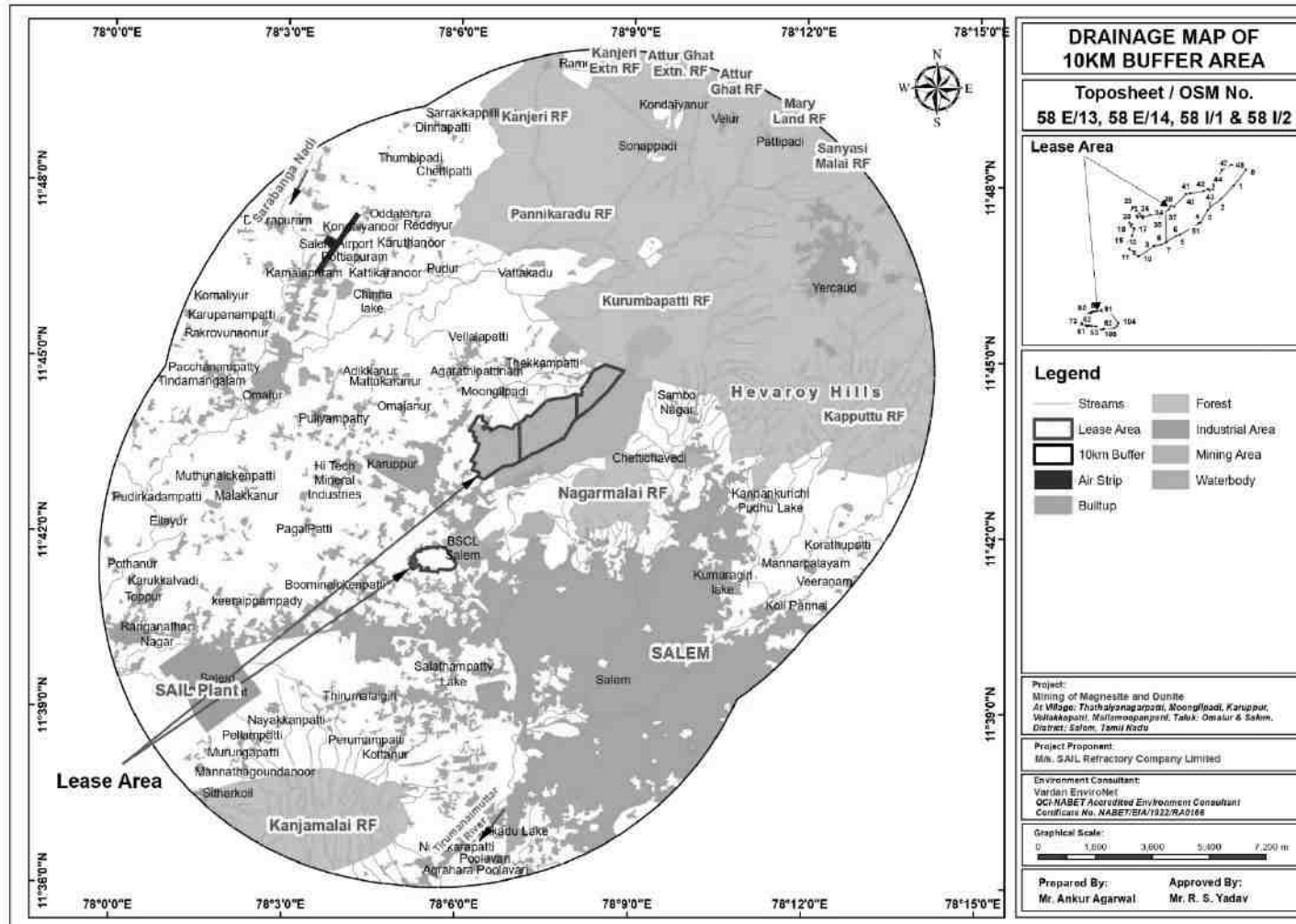


Figure 3.18: Drainage Map of the study area





3.4.9 Hydrogeology of the Area

Ground water occurrence, movement and recharge to aquifers are controlled by the degree of weathering, fracture pattern, geomorphological setup, and ground water potential further depends upon the nature of geological formations, geographical setup, incidence of rainfall, recharge and other hydrogeological characters of the aquifer.

Salem district is underlain entirely by Archaean Crystalline formations with recent alluvial and Colluvial deposits of limited areal extents along the courses of major rivers and foothills respectively. Weathered and fractured crystalline rocks and the Recent Colluvial deposits constitute the important aquifer systems in the district. These deposits comprise boulders, cobbles, gravels, sands and silts and are seen in the foothills of all the major hill ranges. The thickness of these aquifers ranges from a few meters to as much as 25 m. Ground water occurs under phreatic conditions and is developed by means of dug wells. They are important from ground water development point of view in the hilly terrain. Granite Gneiss, Charnockites, Granites and other associates represent the hard consolidated crystalline rocks.

Ground water occurs under phreatic conditions in the weathered mantle and under semi-confined conditions in the fractured zones. These rocks are devoid of primary porosity but are rendered porous and permeable with the development of secondary openings by fracturing and their interconnection. The thickness of weathered zone in the district ranges from depth of the dug wells tapping weathered residuum ranged from 10 to 38 m bgl. The yields of the open wells are low in the hill areas about 500 lpm for a drawdown of 2 m for four hours pumping, whereas the open wells in the plains varies from 200 to 1000 lpm. The yields of dug wells are improved at favorable locations by construction of extension bores, which are 50 to 75 m. deep. In recent years, the declining water levels and reduction in yields of wells are being observed due to increased extraction of ground water by a large number of bore wells for irrigation purposes. The Specific capacity of large diameter wells tested in crystalline rocks from 59 to 270 lpm / m. of drawdown, the yield of bore wells drilled down to a depth of 40 to 75 m by various state agencies mainly for domestic purposes ranged from 20 to 500 lpm. The yield of successful bore wells drilled down to a depth of 300 m bgl during the ground water exploration programme of Central Ground Water Board ranged from <1 to 14.00 lps.

3.4.9.1 Ground water level

Well inventory has been done in the study area and result of the same has been summarized below.





Pre-Monsoon: On the basis of depth of water level of the study area, the pre monsoonal depth to water level varies from less than 25.78 to 61.12 m bgl in the study area.

Post-Monsoon: On the basis of depth of water level of the study area, the post monsoonal depth to water level varies from less than 20.00 to 59.14 m bgl in the study area.

Whereas ground water level in the lease area varies from 52 to 55 m bgl.

Ground water level depth in and around the project site present in deep level and as we go away from lease area it went to shallow depth which is showing in the above-mentioned maps.

3.4.9.1.1 Ground Water Fluctuation

On the basis of pre and post monsoon data water level fluctuation data can be collected. It is observed that the water level fluctuation in study area is in between <1.00 to >3.00 meters below ground level.



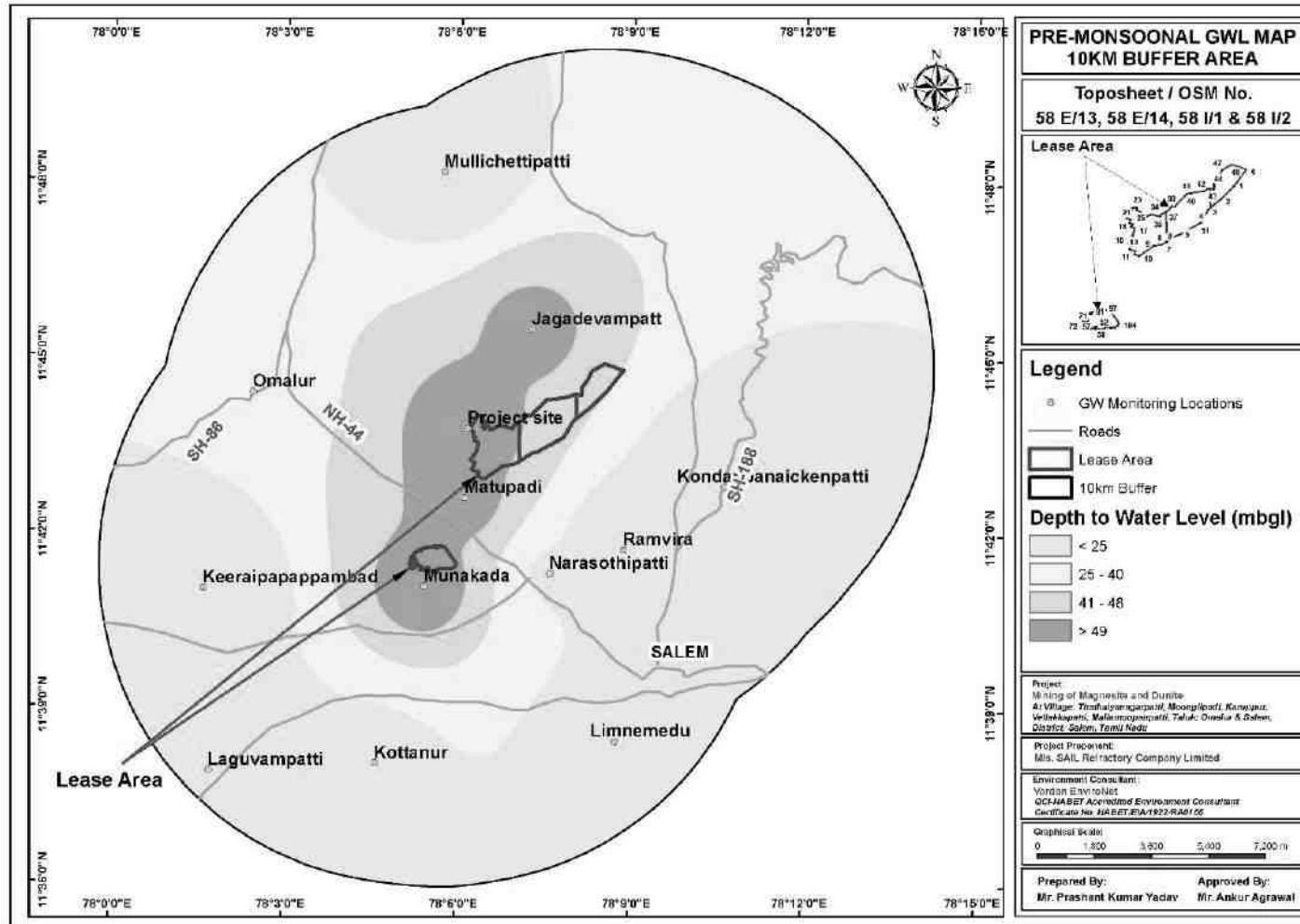


Figure 3.19: Pre-monsoon groundwater map of the study area





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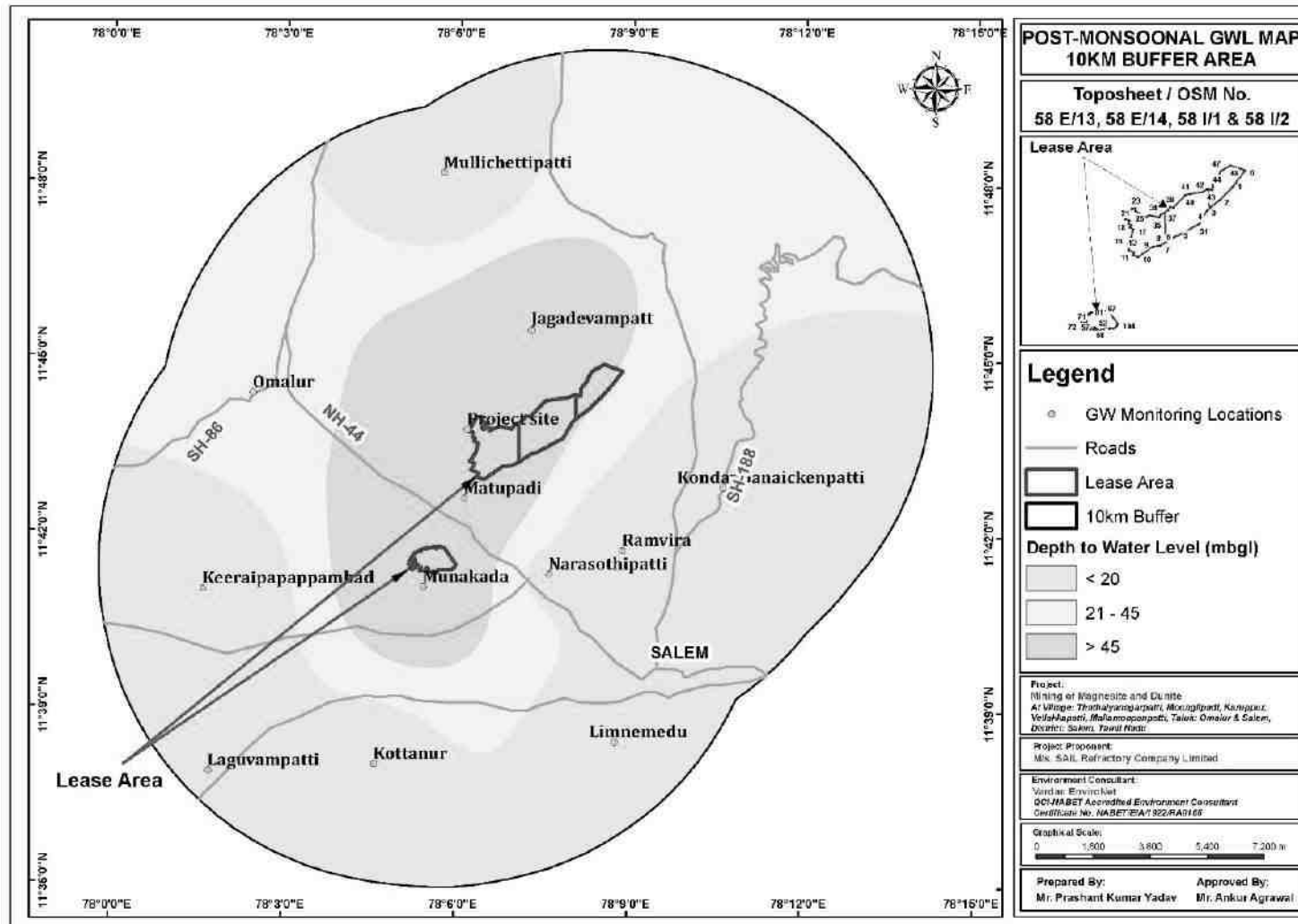


Figure 3.20: Post-monsoon groundwater map of the study area





3.4.10 Ecology and Biodiversity

3.4.10.1 Description of Flora and Fauna

A change in the composition of biotic communities is reflected by a change in the distribution pattern of natural species of flora and fauna existing in the ecosystem. The sensitivity of animal and plant species to the changes occurring in their existing ecosystem can, therefore, be used for monitoring of Impact Assessment studies of any project.

Biological communities are the indicator environmental condition and resource of its distribution and survival. Biotic component comprises of both plants (Flora) and animal (Fauna) communities, which interact not only within and between them but also with the Abiotic components, viz. physical and chemical components of the environment. The changes in biotic community are studied in the pattern of distribution, abundance and diversity.

The biological study was conducted as a part of EIA study report to understand the present status of ecosystem prevailing in the study area, to compare it with past condition with the help of available data, to predict changes in the biological environment as a result of present activities and to suggest measures for maintaining it.

A survey was conducted to study the flora and fauna within the 10 km radius of the proposed mining site. Besides primary surveys in the project sites, published literature and various floras were consulted to prepare an inventory of plant species growing at project sites. Some of the information was gathered from the local habitants.

3.4.10.2 Terrestrial Flora

3.4.10.2.1 Methodology

The study area taken for the study is 10 km radius with the plant site as center. The different methods adopted were as follows:

- A preliminary survey of the study area has been performed to get a general picture of the landscapes in vegetation. Traverses have been taken within different zone of the study area to note major vegetation patterns and plant communities including their growth form and dominant species. A forest inventory is “an attempt to describe the quantity and quality of forest trees and many of the characteristics of the land area upon which the trees are grown.”
- The objective this floral inventory of the study area, is to provide complete checklist of floristic structure within the core zone and buffer zone (10 km radial distance) from project site for formulating effective management and conservation measures.





- The study area lies in the Tropical Wet and Dry Climatic Zone (Koppen Classification) and under eastern plateau & Hill regions Agro Climatic Zone (Planning Commission). The area is hilly interspersed with plain and plateau region. Part of the study area is urban and industrial and the rest is rural and is covered with forests and villages

3.4.10.2.2 Floristic Composition of Core and Buffer Zone

The terrestrial flora of the study area i.e. buffer zone (10 km radial distance) from the project site could be categorized as agriculture vegetation, social forestry plantation, Agro-forestry plantation, plantation for green belt development and natural/forest vegetation.

3.4.10.2.3 Agricultural and Horticultural Crop

The agriculture in the area is predominantly rainfed with sing predominant Kharif crop as paddy. The agricultural yield is poor due to lack of irrigation. The season wise major crops are given in **Table 3.26**:

Table 3.26: Cropping Pattern of the Study area

Crop Variety	Family	Botanical Name	Trade Name
Agricultural Crop			
Cereals	Poaceae	<i>Oryza sativa</i>	Rice
	Poaceae	<i>Zea mays</i>	Maize
	Poaceae	<i>Sorghum vulgare</i>	Bajra
Pulses	Fabaceae	<i>Vigna radiate</i>	Moong
	Fabaceae	<i>Vigna mungo</i>	Urd
	Fabaceae	<i>Cajanus cajan</i>	Pigeon Pea
	Fabaceae	<i>Cicer arietinum</i>	Gram
	Fabaceae	<i>Pisum sativum Subsp. arvense</i>	Field Pea
Spices	Amaryllidaceae	<i>Allium sativum</i>	Garlic
	Zingiberaceae	<i>Zingiber officinale</i>	Adrak

3.4.10.2.4 Social and Agro forestry

In India, natural forests are being conserved primarily for the environmental benefits. Serious efforts are also being done to plant large number of trees outside forest under social forestry programs to increase the tree cover and fulfill demand of various forest produce required by the people and forest-based industries. Agricultural fields are one of the potential areas, where large scale planting of trees can be taken up along with the agricultural crops.





Table 3.27: Agro Forestry Species in the Study area

Family	Botanical Name	Trade Name
Caesalpiniaceae	<i>Delonix regia</i>	Gulmohar
Meliaceae	<i>Azadirachta indica</i>	Neem
Anacardiaceae	<i>Mangifera indica</i>	Aam
Euphorbiaceae	<i>Pongamia glabra</i>	Karanj
Musaceae	<i>Musa paradisiacal</i>	Banana
Moraceae	<i>Ficus benghalensis</i>	Bad
Moraceae	<i>Ficus religiosa</i>	Pipal
Sapotaceae	<i>Madhuca indica</i>	Mahua
Fabaceae	<i>Dalbergia latifolia</i>	Sissoo
Verbenaceae	<i>Tectona grandis</i>	Sagwan
Poaceae	<i>Dendrocalamus strictus</i>	Lathi bans
Fabaceae	<i>Saraca asoca</i>	Asok
Santalaceae	<i>Santalum album</i>	Anukkam
Combretaceae	<i>Terminalia tomentosa</i>	Asan
Anacardiaceae	<i>Semecarpus anacardium</i>	Bhalia
Malvaceae	<i>Bombax ceiba</i>	Semal
Fabaceae	<i>Albizia procera</i>	Siris
Fabaceae	<i>Albizia lebbeck</i>	Kala siris
Verbenaceae	<i>Gmelina arborea</i>	Gambhari
Rubiaceae	<i>Anthocephalus cadamba</i>	Kadam
Ebenaceae	<i>Diospyros melanoxylon</i>	Tendu
Fabaceae	<i>Cassia fistula</i>	Amaltas
Apocynaceae	<i>Holarrhena antidysenterica</i>	Korai
Combretaceae	<i>Anogeissus acuminata</i>	Phasi
Lythraceae	<i>Lagerstroemia parviflora</i>	Sidha

3.4.10.2.5 Grass Land

No prominent grass land ecosystem has been found in core and buffer zone of the project. However, the grass lands were mixed with natural vegetation in low lands and cultivable waste lands are now being utilized as grazing grounds to the livestock species. The grass species and sedges of core and buffer zone are listed below with the natural vegetation of buffer zone.





3.4.10.2.6 Endemic and Endanger Flora

No endemic and endangered floral species were recorded in the study area.

3.4.10.2.7 Location of National Park /Sanctuary

There is no Bio-sphere Reserve, National Parks, Wildlife Sanctuary, Tiger Reserve and Elephant Reserve within 10 km radius of the project site.

3.4.10.2.8 Natural /Forest Vegetation

The total study area is covered mostly with agriculture land. The flora of buffer zone comprises of plants growing in scattered vegetation, the edges of agricultural land, village woodlots and trees planted along the roads. Many tree species are planted in the area because of their usefulness, economic and aesthetic values.

Table 3.28: Floristic composition core and Buffer zone

S. No.	Scientific Name	Local Name	Family
TREES			
1.	<i>Acacia chundra</i>	Karangali	Mimosaceae
2.	<i>Acacia leucophloea</i>	Reunjha	Fabaceae
3.	<i>Acacia nilotica</i>	Babul	Fabaceae
4.	<i>Aegle marmelos</i>	Bel	Rutaceae
5.	<i>Annona squamosa</i>	Sitapalam	Annonaceae
6.	<i>Alangium salvifolium</i>	Ankol	Cornaceae
7.	<i>Albizia lebbeck</i>	Kala Siris	Fabaceae
8.	<i>Albizia procera</i>	Safed Siris	Fabaceae
9.	<i>Anogeissus latifolia</i>	Dhawda	Combretaceae
10.	<i>Artocarpus heterophyllus</i>	Kathal	Moraceae
11.	<i>Azadirachta indica</i>	Neem	Rutaceae
12.	<i>Bauhinia malabarica</i>	Aasta	Caesalpiniaceae
13.	<i>Bauhinia purpurea</i>	Kachnar	Caesalpiniaceae
14.	<i>Bauhinia racemosa</i>	Kathmahula	Caesalpiniaceae
15.	<i>Bombax ceiba</i>	Semal	Malvaceae
16.	<i>Bridelia retusa</i>	Kasai	Euphorbiaceae
17.	<i>Butea monosperma</i>	Palash	Fabaceae
18.	<i>Canthium dicoccum</i>	Nanjul	Rubiaceae
19.	<i>Cassia fistula</i>	Amaltas	Caesalpiniaceae
20.	<i>Chloroxylon swietenia</i>	Bhirra	Rutaceae





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S. No.	Scientific Name	Local Name	Family
21.	<i>Cleistanthus collinus</i>	Nilaippalai	Phyllanthaceae
22.	<i>Cordia dichotoma</i>	Lasora	Boraginaceae
23.	<i>Corymbia citriodora</i>	Safeda	Myrtaceae
24.	<i>Dalbergia latifolia</i>	Shisham	Fabaceae
25.	<i>Diospyros melanoxylon</i>	Tendu	Ebenaceae
26.	<i>Diospyros montana</i>	Patvan	Ebenaceae
27.	<i>Dodonaea angustifolia</i>	Khareta	Sapindaceae
28.	<i>Emblica officinalis</i>	Amla	Phyllanthaceae
29.	<i>Ehretia laevis</i>	Charmor	Boraginaceae
30.	<i>Erythrina suberosa</i>	Haduwa	Fabaceae
31.	<i>Ficus benghalensis</i>	Bargad	Moraceae
32.	<i>Ficus hispida</i>	Kathmur	Maoraceae
33.	<i>Ficus racemosa</i>	Gular	Moraceae
34.	<i>Ficus religiosa</i>	Papal	Moraceae
35.	<i>Gmelina arborea</i>	Khamer	Verbenaceae
36.	<i>Grewia tiliifolia</i>	Dhankat	Tiliaceae
37.	<i>Haldina cordifolia</i>	Haldu	Rubiaceae
38.	<i>Holoptelea integrifolia</i>	Chilbil	Ulmaceae
39.	<i>Hardwickia binata</i>	Acha	Caesalpineaceae
40.	<i>Kydia calycina</i>	Barunga	Malvaceae
41.	<i>Lagerstroemia parviflora</i>	Sendha	Lythraceae
42.	<i>Mallotus philippensis</i>	Sindoor	Euphorbiaceae
43.	<i>Mangifera indica</i>	Aam	Anacardiaceae
44.	<i>Melia azedarach</i>	Bakain	Meliaceae
45.	<i>Mitragyna parvifolia</i>	Kaima	Rubiaceae
46.	<i>Moringa oleifera</i>	Sainjna	Moringaceae
47.	<i>Phoenix sylvestris</i>	Khajur	Arecaceae
48.	<i>Polyalthia longifolia</i>	Ashok	Annonaceae
49.	<i>Pongamia pinnata</i>	Karanj	Fabaceae
50.	<i>Pterocarpus marsupium</i>	Bijasal	Fabaceae
51.	<i>Santalum album</i>	Chandan	Santalaceae
52.	<i>Sterculia urens</i>	Kullu	Sterculiaceae





S. No.	Scientific Name	Local Name	Family
53.	<i>Sterculia villosa</i>	Udaal	Sterculiaceae
54.	<i>Strychnos nux-vomica</i>	Kochila	Loganiaceae
55.	<i>Symplocos racemosa</i>	Lodra	Symplocaceae
56.	<i>Syzygium cumini</i>	Jamun	Myrtaceae
57.	<i>Tamarindus indica</i>	Imli	Caesalpiniaceae
58.	<i>Tectona grandis</i>	Sagaun	Verbenaceae
59.	<i>Terminalia arjuna</i>	Arjun	Combretaceae
60.	<i>Terminalia bellirica</i>	Bahera	Combretaceae
61.	<i>Terminalia chebula</i>	Harra	Combretaceae
62.	<i>Terminalia paniculata</i>	Pumarutu	Combretaceae
63.	<i>Terminalia tomentosa</i>	Asan	Combretaceae
64.	<i>Ziziphus mauritiana</i>	Ber	Rhamnaceae
SHRUBS			
1.	<i>Abelmoschus manihot</i>	Jangali Bhindi	Malvaceae
2.	<i>Abutilon indicum</i>	Kanghi	Malvaceae
3.	<i>Adhatoda zeylanica</i>	Adusa	Acanthaceae
4.	<i>Alangium salvifolium</i>	Ankola	Cornaceae
5.	<i>Annona squamosa</i>	Sitaphal	Annonaceae
6.	<i>Barleria prionitis</i>	Katsaraiya	Acanthaceae
7.	<i>Boehmeria macrophylla</i>	Sohkhara	Urticaceae
8.	<i>Calotropis gigantea</i>	Safed Aak	Asclepiadaceae
9.	<i>Calotropis procera</i>	Gulabi Aak	Asclepiadaceae
10.	<i>Carica papaya</i>	Papita	Caricaceae
11.	<i>Carissa opaca</i>	Karaunda	Apocynaceae
12.	<i>Carissa spinarum</i>	Jangali Karaunda	Apocynaceae
13.	<i>Cassia occidentalis</i>	Kasaundhi	Caesalpiniaceae
14.	<i>Catunaregam nilotica</i>	Kharhar	Rubiaceae
15.	<i>Citrus limon</i>	Neebu	Rutaceae
16.	<i>Clerodendrum multiflorum</i>	Bharangi	Verbenaceae
17.	<i>Colebrookea oppositifolia</i>	Ameda	Lamiaceae
18.	<i>Combretum nanum</i>	Bilaura, Medila	Combretaceae
19.	<i>Euphorbia neriifolia</i>	Sehud	Euphorbiaceae





S. No.	Scientific Name	Local Name	Family
20.	<i>Euphorbia nivulia</i>	katthuar	Euphorbiaceae
21.	<i>Flemingia chappar</i>	Galphula	Fabaceae
22.	<i>Flemingia nana</i>	Gursankari	Tiliaceae
23.	<i>Flemingia paniculata</i>	Ramdant	Fabaceae
24.	<i>Grewia helicterifolia</i>	Vansuli	Tiliaceae
25.	<i>Grewia hirsuta</i>	Gursankari	Tiliaceae
26.	<i>Helicteres isora</i>	Marodfali	Sterculiaceae
27.	<i>Hibiscus rosa-sinensis</i>	Gudhal	Malvaceae
28.	<i>Holarrhena pubescens</i>	Kutki, Kurriya	Apocynaceae
29.	<i>Indigofera tinctoria</i>	Neel	Fabaceae
30.	<i>Ixora pavetta</i>	Khujja	Rubiaceae
31.	<i>Jasminum humile</i>	Pili Chameli	Oleaceae
32.	<i>Jatropha curcas</i>	Ratanjyot	Euphorbiaceae
33.	<i>Lantana camara</i>	Unnichi	verbinaceae
34.	<i>Lawsonia inermis</i>	Mehndi	Lythraceae
35.	<i>Leea macrophylla</i>	Hatfun	Leeaceae
36.	<i>Murraya paniculata</i>	Aathil	Rutaceae
37.	<i>Nyctanthes arbor-tristis</i>	Harsingar	Oleaceae
38.	<i>Ochna obtusata</i>	Kanak Champa	Ochnaceae
39.	<i>Phoenix humilis</i>	Inji Malai Icham	Arecaceae
40.	<i>Phyllanthus reticulates</i>	Panjoli	Euphorbiaceae
41.	<i>Plumbago zeylanica</i>	Chitrak	Plumbaginaceae
42.	<i>Premna barbata</i>	Aradi	Verbenaceae
43.	<i>Ricinus communis</i>	Rendi	Euphorbiaceae
44.	<i>Tamarix ericoides</i>	Jhau	Tamaricaceae
45.	<i>Thespesia lampas</i>	Chaumukhia,	Malvaceae
46.	<i>Vitex negundo</i>	Nirgundi	Verbenaceae
47.	<i>Woodfordia fruticosa</i>	Dhavai	Lythraceae
48.	<i>Ziziphus mauritiana</i>	Ber	Rhamnaceae
49.	<i>Ziziphus oenoplia</i>	Barari	Rhamnaceae
HERBS			
1.	<i>Acalypha ciliata</i>	Chipki	Asteraceae





S. No.	Scientific Name	Local Name	Family
2.	<i>Achyranthes aspera</i>	Apamarg	Amaranthaceae
3.	<i>Acorus calamus</i>	Buch	Araceae
4.	<i>Aerva lanata</i>	Gorakhganja	Amaranthaceae
5.	<i>Aerva sanguinolenta</i>	Gorakh Ganja	Amaranthaceae
6.	<i>Ageratum conyzoides</i>	Agreatum	Asteraceae
7.	<i>Allium leptophyllum</i>	Van Lehsun	Liliaceae
8.	<i>Alternanthera sessilis</i>	Gudari sag	Amaranthaceae
9.	<i>Alysicarpus monilifer</i>	Alisicarpus	Fabaceae
10.	<i>Ammannia baccifera</i>	Dadmari	Lythraceae
11.	<i>Andrographis paniculata</i>	Kalmegh	Acanthaceae
12.	<i>Anisomeles indica</i>	Jangali Tulsi	Lamiaceae
13.	<i>Aponogeton crispum</i>	Aponogeton	Aponogetonaceae
14.	<i>Argemone mexicana</i>	Swarnchhiri	Papaveraceae
15.	<i>Asphodelus tenuifolius</i>	Bokat	Linaceae
16.	<i>Atylosia scarabaeoides</i>	Lotar	Fabaceae
17.	<i>Bacopa monnieri</i>	Brahmi	Scrophulariaceae
18.	<i>Bacopa procumbens.</i>	Jal-Neem	Scrophulariaceae
19.	<i>Barleria cristata</i>	Katsaraiya	Acanthaceae
20.	<i>Boerhavia diffusa</i>	Raktpunarwa	Nyctaginaceae
21.	<i>Bulbostylis barbata</i>		Cyperaceae
22.	<i>Cassia tora</i>	Chakramard	Caesalpinaceae
23.	<i>Catharanthus roseus</i>	Sadabahr	Apocynaceae
24.	<i>Centella asiatica</i>	Mandukparni	Apiaceae
25.	<i>Chlorophytum tuberosum</i>	Safed Musli	Liliaceae
26.	<i>Cleome gynandra</i>	Hurhur	Capparaceae
27.	<i>Cleome viscosa</i>	Hurhur	Capparaceae
28.	<i>Commelina benghalensis</i>	Kanchara	Commelinaceae
29.	<i>Commelina diffusa</i>	Kanshura	Commelinaceae
30.	<i>Convolvulus prostratus</i>	Shankhpushpi	Convolvulaceae
31.	<i>Crotalaria prostrata</i>	Kartik Jhumka	Fabaceae
32.	<i>Curcuma angustifolia</i>	Tikhur	Zingiberaceae
33.	<i>Curculigo orchoides</i>	Kali Musli	Hypoxidaceae





S. No.	Scientific Name	Local Name	Family
34.	<i>Curcuma aromatica</i>	Van Haldi	Zingiberaceae
35.	<i>Cyperus rotundus</i>	Motha	Cyperaceae
36.	<i>Dentella repens</i>	Parpat	Rubiaceae
37.	<i>Desmodium heterocarpon</i>	Salparni	Fabaceae
38.	<i>Desmodium triflorum</i>	Desmodium	Fabaceae
39.	<i>Dipteracanthus suffruticosus</i>	Chowlai	Acanthaceae
40.	<i>Echinops echinatus</i>	Utkatara	Asteraceae
41.	<i>Eclipta prostrata</i>	Bhringraj	Asteraceae
42.	<i>Elytraria acaulis</i>	Sahasramuniya	Acanthaceae
43.	<i>Euphorbia hirta</i>	Doodhi	Euphorbiaceae
44.	<i>Evolvulus alsinoides</i>	Sakhpushpi	Convolvulaceae
45.	<i>Fimbristylis dipsacea</i>	NA	Cyperaceae
46.	<i>Fimbristylis falcata</i>	Hathi Paw	Cyperaceae
47.	<i>Fumaria indica</i>	Pitpapa	Papaveraceae
48.	<i>Heliotropium indicum</i>	Hastimundi	Boraginaceae
49.	<i>Hygrophila salicifolia</i>	Talamkhana	Acanthaceae
50.	<i>Ipomoea eriocarpa</i>	Besharam	Convolvulaceae
51.	<i>Justicia quinqueangularis</i>	Justicia	Acanthaceae
52.	<i>Leucas aspera</i>	Bhondaki	Lamiaceae
53.	<i>Melilotus indica</i>	Van Maithi	Fabaceae
54.	<i>Ocimum basilicum</i>	Ban Tulsi	Lamiaceae
55.	<i>Oxalis corniculata</i>	Teenpati	Oxalidaceae
56.	<i>Oxalis corniculata</i>	Teen Patti	Oxalidaceae
57.	<i>Oxalis richardiana</i>	Teenpatti	Oxalidaceae
58.	<i>Phyllanthus amarus</i>	Bhuin Anwla	Euphorbiaceae
59.	<i>Physalis minima</i>	Chirponta	Solanaceae
60.	<i>Polygonum barbatum</i>	Polygonum	Polygonaceae
61.	<i>Polygonum glabrum</i>	Polygonum	Polygonaceae
62.	<i>Rauvolfia serpentina</i>	Sarpandha	Apocynaceae
63.	<i>Rungia pectinata</i>	Rungia	Acanthaceae
64.	<i>Scleria levis Retz.</i>	Scleria	Cyperaceae





S. No.	Scientific Name	Local Name	Family
65.	<i>Sesbania bispinosa</i>	Sirmili	Fabaceae
66.	<i>Sida acuta</i>	Mahabala	Malvaceae
67.	<i>Sida cordifolia</i>	Kharenti	Malvaceae
68.	<i>Sida rhombifolia</i>	Atibala	Malvaceae
69.	<i>Solanum nigrum</i>	makoya	Solanaceae
70.	<i>Solanum virginianum</i>	Bhatkataiya	Solanaceae
71.	<i>Tridax procumbens</i>	Khal Muriya	Asteraceae
72.	<i>Triumfetta pentandra</i>	Chipki	Tiliaceae
73.	<i>Triumfetta rhomboidea</i>	Chipki	Tiliaceae
74.	<i>Xanthium strumarium</i>	Gokharu	Asteraceae
GRASSES			
1.	<i>Apluda mutica</i>	Apluda	Poaceae
2.	<i>Apocopis vaginata</i>	Apocopis	Poaceae
3.	<i>Aristida adscensionis</i>	Aristida	Poaceae
4.	<i>Bambusa bambos</i>	Bamboo	Poaceae
5.	<i>Bothriochloa glabra</i>	Bothriochloa	Poaceae
6.	<i>Bothriochloa intermedia</i>	Bothriochloa	Poaceae
7.	<i>Bothriochloa pertusa</i>	Bothricloa	Poaceae
8.	<i>Brachiaria eruciformis</i>	Brachiaria	Poaceae
9.	<i>Brachiaria ramosa</i>	Brachiaria	Poaceae
10.	<i>Brachiaria reptans</i>	Brachiaria	Poaceae
11.	<i>Cenchrus ciliaris</i>	Cenchurus	Poaceae
12.	<i>Chloris dolichostachya</i>	Chloris	Poaceae
13.	<i>Chloris virgata</i>	Chloris	Poaceae
14.	<i>Chrysopogon fulvus</i>	Chrysopogon	Poaceae
15.	<i>Chrysopogon serrulatus</i>	Chrysopogon	Poaceae
16.	<i>Cymbopogon martinii</i>	Musail	Poaceae
17.	<i>Cynodon dactylon</i>	Doob	Poaceae
18.	<i>Dendrocalamus strictus</i>	Bans	Poaceae
19.	<i>Dichanthium annulatum</i>	Dichanthium	Poaceae
20.	<i>Digitaria stricta</i>	Digitaria	Poaceae
21.	<i>Eragrostis amabilis</i>	Erogrostis	Poaceae





S. No.	Scientific Name	Local Name	Family
22.	<i>Eragrostis atrovirens</i>	Erogrostis	Poaceae
23.	<i>Eragrostis cilianensis</i>	Erogrostis	Poaceae
24.	<i>Eragrostis ciliaris</i>	Erogrostis	Poaceae
25.	<i>Heteropogon contortus</i>	hetropogan	Poaceae
26.	<i>Imperata cylindrica</i>	Imperata	Poaceae
27.	<i>Oplismenus compositus</i>	Oplismenus	Poaceae
28.	<i>Oropetium thomaeum</i>	Oplismenus	Poaceae
29.	<i>Oryza minuta</i>	Jangali Dhan	Poaceae
30.	<i>Panicum psilopodium</i>	Panicum	Poaceae
31.	<i>Panicum sumatrense</i>	Panicum	Poaceae
32.	<i>Paspalidium flavidum</i>	Paspalum	Poaceae
33.	<i>Paspalidium punctatum</i>	Paspalum	Poaceae
34.	<i>Pennisetum pedicellatum</i>	Pennisetum	Poaceae
35.	<i>Pennisetum polystachyon</i>	Pennisetum	Poaceae
36.	<i>Perotis indica</i>	Perotis	Poaceae
37.	<i>Saccharum spontaneum</i>	Kans	Poaceae
38.	<i>Dendrocalamus strictus</i>	Bans	Poaceae
CLIMBERS			
1.	<i>Abrus precatorius</i>	Kali Ghughchi	Fabaceae
2.	<i>Asparagus racemosus</i>	Shatawar	Liliaceae
3.	<i>Butea superba</i>	Palas Bel	Fabaceae
4.	<i>Cissus quadrangularis</i>	Hadjood	Vitaceae
5.	<i>Coccinia grandis</i>	Kundururu	Cucurbitaceae
6.	<i>Combretum roxburghii</i>	Bilora, Medila	Combretaceae
7.	<i>Cryptolepis buchanani</i>	Nagbel	Asclepiadaceae
8.	<i>Gymnema sylvestre</i>	Gudmar	Asclepiadaceae
9.	<i>Tinospora cordifolia</i>	Giloya	Menispermaceae
EPIPHYTES			
1.	<i>Cuscuta reflexa</i>	Amarbel	Convolvulaceae
2.	<i>Vanda tessellata</i>	Vanda	Orchidaceae

Source: Field Survey





3.4.10.2.9 Wetland Diversity and Marshland

Wetlands are very useful to us. By producing resources, enabling recreational activities and controlling flood and pollution, they contribute to the national and local economies and environmental consequences. Wetlands provide important and incredible services to society, these services can neither be sold nor do they have the market value and tried to give wetlands an economic value

Table 3.29: Wetland/Marshland Diversity of Study area

Family	Botanical Name	Local Name
Salviniaceae	<i>Azolla pinnata</i>	Mosquito Fern
Asteraceae	<i>Caesulia axillaris</i>	Maka
Ceratophyllaceae	<i>Ceratophyllum demersum</i>	Hornwort
Poaceae	<i>Chrysopogon zizanioides</i>	Vetiver
Poaceae	<i>Coix lacryma-jobi</i>	Adlay Millet
Araceae	<i>Colocasia esculenta</i>	Taro
Commelinaceae	<i>Commelina benghalensis</i>	Kana
Cyperaceae	<i>Cyperus alternifolius</i>	Umbrella Sedge
Dryopteridaceae	<i>Dryopteris filix-mas</i>	Fern
Dryopteridaceae	<i>Dryopteris sieboldii</i>	Fern
Poaceae	<i>Echinochloa colona</i>	Shama
Pontederiaceae	<i>Eichhornia crassipes</i>	Jal Kumbhi
Asteraceae	<i>Grangea maderaspatana</i>	Madras Carpet, Mustaru
Acanthaceae	<i>Hygrophila salicifolia</i>	---
Convolvulaceae	<i>Ipomea aquatic</i>	Kalmi Shak
Lemnaceae	<i>Lemna minor</i>	Duck Weed
Onagraceae	<i>Ludwigia adscendens</i>	Water Primrose
Marsileaceae	<i>Marsilea quadrifolia</i>	Four Leaf Clover
Sterculiaceae	<i>Melochia corchorifolia</i>	Bilpat
Nelumbonaceae	<i>Nelumbo nucifera</i>	Lotus, Kamal
Nymphaeaceae	<i>Nymphaea pubescens</i>	White Lotus
Oxalidaceae	<i>Oxalis corniculata</i>	Amrul
Pandanaceae	<i>Pandanus odoratissimus</i>	Keora
Urticaceae	<i>Pilea microphylla</i>	Gun Powder Plant
Polygonaceae	<i>Polygonum hydropiper</i>	Marsh Pepper Knot Weed





Family	Botanical Name	Local Name
Portulacaceae	<i>Portulaca oleracea</i>	Little Hog-Weed
Potamogetonaceae	<i>Potamogeton natans</i>	Floating Pond Weed
Lythraceae	<i>Trapa natans</i>	Water Chest Nut
Ranunculaceae	<i>Ranunculus sceleratus</i>	Aglaon
Polygonaceae	<i>Rumex dentatus</i>	Ambavati
Typhaceae	<i>Typha angustata</i>	Patera
Lentibulariaceae	<i>Utricularia gibba</i>	Floating Bladderwort
Plantaginaceae	<i>Veronica anagallis-aquatica</i>	Water Speedwell

3.4.10.3 Fauna

To prepare a detailed report on the status of wildlife biodiversity within 10 km radial area from the periphery of mine lease area to assess the impacts due to the project activity and evolve suitable mitigation measures to protect and conserve wildlife biodiversity following components were studied:

- Wildlife Survey (Diversity)
- Habitat Study (Feeding, Breeding and roosting areas)
- Distribution/Status of Birds
- Rare & Endangered species of Fauna
- Specific local characteristics of biodiversity in the study area

3.4.10.3.1 Methodology

A linear transect of 1.0 km each was chosen for sampling at each site. Each transect was trekked for 1.5 hr for the sampling of faunal diversity through following methods for different categories. For the sampling of butterflies, the standard 'Pollard Walk' method was employed and all the species recorded daily. Voucher specimens of the species that could not be identified in the field were collected using a butterfly net besides photographing them.

For bird's sampling, 'Point Sampling' along the fixed transect (Foot trails) was carried out. All the species of birds were observed through a binocular and identified with the help of field guide book and photographs.

For the sampling of mammals, direct count on open width (20m) transect was used. In addition, information on recent sightings/records of mammals by the villagers/locals was also collected. For carnivores, indirect sampling was carried out and the mammals were identified by foot marks, faeces and other marks/sign





created by them. In case of reptiles mainly lizards were sampled by direct count on open width transects.

The study of fauna takes substantial amount of time to understand the specific faunal characteristic of area. The assessment of fauna has been done by extensive field survey of the area. During survey, the presence of wildlife was also inhabitants depending on animal sightings and the frequency of their visits in the project area which was later confirmed from forest department, Wildlife Department etc. Faunal diversity of the study area is given in (Table 3.30).

Table 3.30: Faunal Diversity from Study Area (Core & Buffer Zone)

S. No.	English Name	Scientific Name	Status/Schedule
Mammals			
1.	Little Indian field mouse	<i>Mus booduga</i>	Schedule-V
2.	Monkey	<i>Maccaca mulata</i>	Schedule-II
3.	Bat	<i>Rousettus leschenaultia</i>	Schedule-V
4.	Common Langur	<i>Semnopithecus entellus</i>	Schedule-II
5.	Five Striped Palm Squirrel	<i>Funambulus pennanii</i>	Schedule-IV
6.	Chachundar	<i>Suncus murinus</i>	Schedule-IV
7.	Chital	<i>Axis axis</i>	Schedule-III
8.	Jackal	<i>Canis aureus</i>	Schedule-II
9.	Fruit Bat	<i>Cynopterus sphinx</i>	Schedule-V
10.	Jungle Cat	<i>Felis chaus</i>	Schedule-II
11.	Common Mongoose	<i>Herpestes edwardsii</i>	Schedule-II
12.	Hyaena	<i>Hyaena hyaena</i>	Schedule-III
13.	Indian Porcupine	<i>Hysrix indica</i>	Schedule-IV
14.	Indian Hare	<i>Lepus nigricollis</i>	Schedule-IV
15.	Barking Deer	<i>Muntiacus muntjak</i>	Schedule-III
16.	Flying Squirrel	<i>Petaurista philippinensis</i>	Schedule-II
17.	House Rat	<i>Rattus rattus</i>	Schedule-V
18.	Wild Boar	<i>Sus scrofa</i>	Schedule-III
19.	Indian Civet	<i>Viverricula indica</i>	Schedule-II





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S. No.	English Name	Scientific Name	Status/Schedule
20.	Indian Fox	<i>Vulpus bengalensis</i>	Schedule-II
Amphibians			
1.	Indian pond frog	<i>Rana hexadactyla</i>	Schedule-IV
2.	Common Indian Toad	<i>Duttaphrynus melanostictus</i>	Not Listed
3.	Indian Bull Frog	<i>Hoplobatrachus tigerinus</i>	Schedule-IV
4.	Indian Skipper Frog	<i>Euphlyctis cyanophlyctis</i>	Schedule-IV
5.	Marble Toad	<i>Bufo stomaticus</i>	Not Listed
Reptiles			
1.	House gecko	<i>Hemidactylus flaviviridis</i>	Common
2.	Common garden lizard	<i>Calotes versicolor</i>	Common
3.	Brahminy skink	<i>Mabuya carinata</i>	Common
4.	Indian Cobra	<i>Naja naja</i>	Schedule-II
5.	Rat Snake	<i>Ptyas mucosa</i>	Schedule-IV
6.	Indian Krait	<i>Bungarus caeruleus</i>	Schedule-IV
7.	Russel Viper	<i>Daboia siamensis</i>	Schedule-II
Butterflies			
1.	White orange tip	<i>Ixias marianne</i>	Common
2.	Lime butterfly	<i>Papilio demoleus</i>	Common
3.	Common crow	<i>Euploea core</i>	Common
4.	Common map	<i>Cyrestis thyodamas</i>	Common
5.	Common mormon	<i>Papilio polytes</i>	Common
6.	Common Grass Yellow	<i>Eurema hecabe</i>	Fairly Common
7.	Stripped Tiger	<i>Danaus genutia</i>	Common
8.	Danaid Egg Fly	<i>Hypolimanas misippus</i>	Common
9.	Common Bush Brown	<i>Mycalesis perseus</i>	Common
Aves			
1.	Shikra	<i>Accipiter badius</i>	Schedule IV





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S. No.	English Name	Scientific Name	Status/Schedule
2.	Bank Myna	<i>Acridotheres ginginianus</i>	Schedule IV
3.	Common Myna	<i>Acridotheres tristis</i>	Schedule IV
4.	Small Blue Kingfisher	<i>Alcedo atthis</i>	Schedule IV
5.	Indian Darter	<i>Anhinga melanogaster</i>	Schedule IV
6.	House Swift	<i>Apus affinis</i>	Schedule IV
7.	Common Swift	<i>Apus apus</i>	Schedule IV
8.	Pond Heron	<i>Ardeola grayii</i>	Schedule IV
9.	Owl	<i>Bubo bubo</i>	Schedule IV
10.	Cattle Egret	<i>Bubulcus ibis</i>	Schedule IV
11.	Golden Fronted Leaf-Bird	<i>Chloropsis aurifrons</i>	Schedule IV
12.	Pied Cuckoo	<i>Clamator jacobinus</i>	Schedule IV
13.	Rock Pigeon	<i>Columba livia</i>	Schedule IV
14.	Indian Roller	<i>Coracias benghalensis</i>	Schedule IV
15.	House Crow	<i>Corvus splendens</i>	Schedule IV
16.	Bater	<i>Coturnix coturnix</i>	Schedule IV
17.	Indian Cuckoo	<i>Cuculus micropterus</i>	Schedule IV
18.	Tree Pie	<i>Dendrocitta vagabunda</i>	Schedule IV
19.	Black Drongo	<i>Dicrurus macrocercus</i>	Schedule IV
20.	Racket Tailed Drongo	<i>Dicrurus paradiseus</i>	Schedule IV
21.	Little Egret	<i>Egretta garzetta</i>	Schedule IV
22.	Red Headed Bunting	<i>Emberiza bruniceps</i>	Schedule IV
23.	Asian Koel	<i>Eudynamys scolopacea</i>	Schedule IV
24.	Indian Moorhen	<i>Gallinula chloropus</i>	Schedule IV
25.	Red Jungle Fowl	<i>Gallus gallus</i>	Schedule IV
26.	White Breasted Kingfisher	<i>Halcyon smyrnensis</i>	Schedule IV
27.	Brahminy Kite	<i>Haliastur indus</i>	Schedule IV





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S. No.	English Name	Scientific Name	Status/Schedule
28.	Common Hawk Cuckoo	<i>Hierococcyx varius</i>	Schedule IV
29.	Common Little Bittern	<i>Ixobrychus minutes</i>	Schedule IV
30.	Brown Headed Barbet	<i>Megalaima zeylanica</i>	Schedule IV
31.	Green Bee Eater	<i>Meropus orientalis</i>	Schedule IV
32.	Blue Cheeked Bee Eater	<i>Meropus persicus</i>	Schedule IV
33.	Blue Tailed Bee Eater	<i>Merops philippinus</i>	Schedule IV
34.	Little Cormorant	<i>Microcarbo niger</i>	Schedule IV
35.	Black Kite	<i>Milvus migrans</i>	Schedule IV
36.	Purple Sun Bird	<i>Nectarinia asiatica</i>	Schedule IV
37.	Small Sun Bird	<i>Nectarinia minima</i>	Schedule IV
38.	Indian Grey Hornbill	<i>Ocyrceros birostris</i>	Schedule-I
39.	Tailor Bird	<i>Orthotomus sutorius</i>	Schedule IV
40.	Grey Tit	<i>Parus major</i>	Schedule IV
41.	House Sparrow	<i>Passer domesticus</i>	Schedule IV
42.	Indian Peafowl	<i>Pavo cristatus</i>	Schedule-I
43.	Great Cormorant	<i>Phalacrocorax carbo</i>	Schedule IV
44.	Baya	<i>Ploceus philippinus</i>	Schedule IV
45.	Indian Black Ibis	<i>Pseudibis papillosa</i>	Schedule IV
46.	Green Parakeet	<i>Psittacara holochlora</i>	Schedule IV
47.	Rose Ringed Parakeet	<i>Psittacula krameri</i>	Schedule IV
48.	Red Vented Bulbul	<i>Pycnonotus cafer</i>	Schedule IV
49.	Pied Bush Chat	<i>Saxicola caprata</i>	Schedule IV
50.	Indian Robin	<i>Saxicoloides fulicata</i>	Schedule IV
51.	Spotted Dove	<i>Streptopelia chinensis</i>	Schedule IV
52.	Ring Dove	<i>Streptopelia decaocta</i>	Schedule IV
53.	Common Hoopoe	<i>Upupa epops</i>	Schedule IV





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S. No.	English Name	Scientific Name	Status/Schedule
54.	Brahminy Duck	<i>Tadorna ferruginea</i>	Schedule IV
55.	Common Babbler	<i>Turdoides caudatus</i>	Schedule IV
56.	Jungle Babbler	<i>Turdoides striatus</i>	Schedule IV
57.	Red Wattled Lapwing	<i>Vanellus indicus</i>	Schedule IV
Pisces			
1.	Rohu	<i>Labeo rohita</i>	Least Concern
2.	Katla	<i>Catla catla</i>	Least Concern
3.	Calbasu	<i>Labeo calbasu</i>	Least Concern
4.	Cat fish	<i>Mystus cavasius</i>	Least Concern
5.	Black Fish	<i>Barbus chilinadea</i>	Least Concern
6.	Singi	<i>Clarias batrachus</i>	Least Concern
7.	Bronze Feather Back	<i>Notopterus notopterus</i>	Least Concern
8.	Ganges River Gizzard Shad	<i>Gonialosa manmina</i>	Least Concern
9.	Hilsa	<i>Tenualosa ilisha</i>	Not Listed
10.	Chelluah	<i>Aspidoparia morar</i>	Least Concern
11.	Barna Baril	<i>Barilius barna</i>	Least Concern
12.	Chaguni	<i>Chagunius chagunio</i>	Least Concern
13.	Common Carp	<i>Cyprinus carpio</i>	Least Concern
14.	Reba Carp	<i>Cirrhinus reba</i>	Least Concern
15.	Sind Danio	<i>Danio devario</i>	Least Concern
16.	Kharsa, Butter	<i>Labeo angra</i>	Least Concern
17.	Bata	<i>Labeo bata</i>	Least Concern
18.	Boga Bata	<i>Labeo boga</i>	Least Concern
19.	Kali, Boalla	<i>Labeo dyocheilus</i>	Least Concern
20.	Kuri, Khursa	<i>Labeo goniuis</i>	Least Concern
21.	Swamp Barb	<i>Puntius chola</i>	Least Concern





S. No.	English Name	Scientific Name	Status/Schedule
22.	Great Snakehead	<i>Channa marulius</i>	Least Concern

Source: Field Survey

3.4.10.3 Endangered Species

121 species of vertebrates could be seen in the vicinity of the proposed project. Only one Schedule I i.e. *Oryx capensis*, under Wildlife Protection Act, 1972, have been reported from the study area. Although these are very common species and found in every locality, even in villages, certain steps should be taken to conserve the critical wild life:

- Programs for the conservation of wildlife will be formulated and implemented outside the protected areas by educating the local communities with help of local public agencies, and other stakeholders including the environment division officers of our company, in order to reduce the scope of man-animal conflict.
- It will be ensured that human activities on the fringe of the protected areas do not degrade the habitat.

Over all, the status of wildlife in a region is an accurate index of the state of ecological resources, and thus, of the natural resources base of human well-being. This indicates the interdependent nature of ecological entities (the web of life), in which wild life is a vital link and a base of eco-tourism. Thus, the importance of conserving and protecting wildlife will be spread among the local people.

3.4.10.4 Aquatic Diversity

The samples for qualitative and quantitative analysis of planktons were collected from the sub surface layer at knee depth. Water samples were filtered through plankton net of 20µ mesh size (APHA, 1971). The filtered samples were concentrated by using the centrifuge. By using Lackey's drops method and light microscope (Lackey, 1938), the qualitative analysis was carried out for phytoplankton and zooplankton (**Table 3.31**). The standard flora and other literature were followed for the qualitative evaluation of Plankton

Table 3.31: List of Phytoplankton and Zooplankton from Study area

S. No	Phytoplankton Species	Zooplankton Species
1	Navicula sp. (Diatom)	Daphnia sp.
2	Cyclotella sp. (Diatom)	Moina sp.
3	Synedra sp. (Diatom)	Paramecium sp.
4	Pinnularia sp. (Diatom)	Euglena sp.
5	Oscillatoria sp.	Ranatra sp.





S. No	Phytoplankton Species	Zooplankton Species
6	Nostoc sp.	Larvae of culex sp.
7	Anabaena sp. (Diatom)	Larvae of Dytiscus sp.
8	Spirogyra sp.	Cyclops sp.
9	Pediastrum.sp.	Diaptomus sp.
10	Microspora sp.	Nauplius sp.

Source: Field Survey

3.4.11 Socio-Economic Environment

Any developmental activity exerts a direct impact on the socio-economic environment of the region. Usually, the beneficial impacts such as better job opportunities, improved education, communication, energy, housing, health, transportation facilities etc. outweighs the adverse impacts, if any.

The study of socio-economic component of environment is incorporating various facets, viz. demographic structure, availability of basic amenities such as housing, education, health and medical services, occupation, water supply, sanitation, communication and power supply, prevailing diseases in the region as well as features such as places of tourist attraction and monuments of archaeological importance. The study of these parameters helps in identifying predicting and evaluating the likely impacts due to project activity in the surrounding region.

Baseline data such as demographic pattern, occupational status, educational, health and other amenities as existing in the study area have been studied.

3.4.11.1 Baseline Status

The latest available data has been compiled to generate the existing socio-economic scenario of the study area. Information on socio-economic profile was collected from the Primary Census Abstract CD 2011 including the population details of the region.

The Socio-Economic Status of the study areas is mentioned below.

- Total number of households are about 268502
- Total population of villages under the study area is 1032789 out of which having males are 52339(50.57%) and females are 510450 (49.42%)
- The average family size is about 3.8 persons per family
- Sex ratio (No. of females per 1000 males) is 977 which indicates that females are less in number than their male counterpart in the study area
- Out of the total population, the population of children within the age of 0-6 age-group is about 99622 (9.64%)
- Child Sex ratio is 943 i.e. no of female child per 1000 male child





- Scheduled caste population is 154330 (14.94%) and Scheduled tribes' population is 1915 (0.18%) of the total population
- Out of the total population in the region 763240 i.e. 73.90% are literates out of Male literates are about 410737(53.81) % and F emale literates are 352503 (46.18%).

It can be inferred from the data that the study area is on an average and the density of population is very high. There is a huge difference on the male-female population and also the female child ratio is low as compared to the adult female ratio. It is observed that the scheduled caste population is higher than the scheduled tribe population in the study area. The female literacy rate is poor may be due to lack of awareness among the villagers to promote education

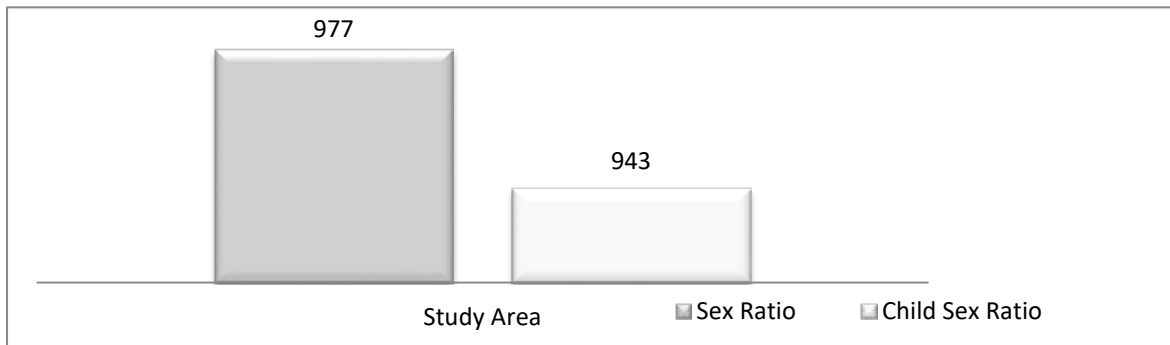


Figure 3.21: Sex Ratio of Population in the Study Area

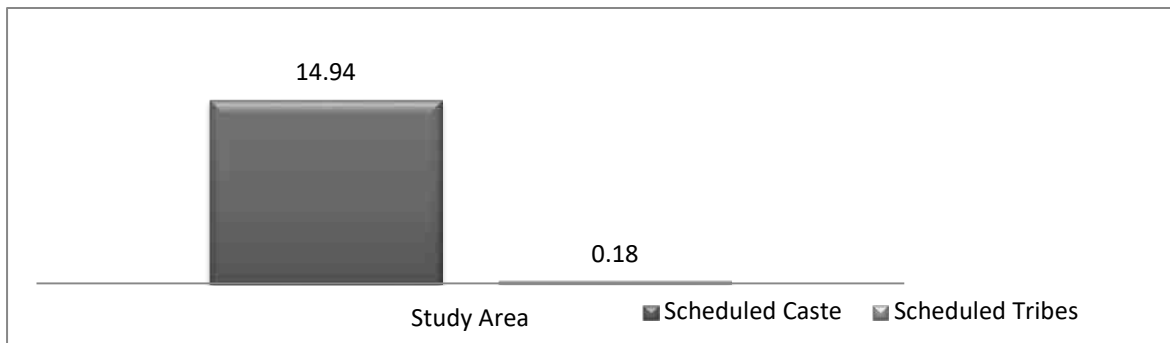


Figure 3.22: % Schedule cast and Schedule tribe Population in Study area

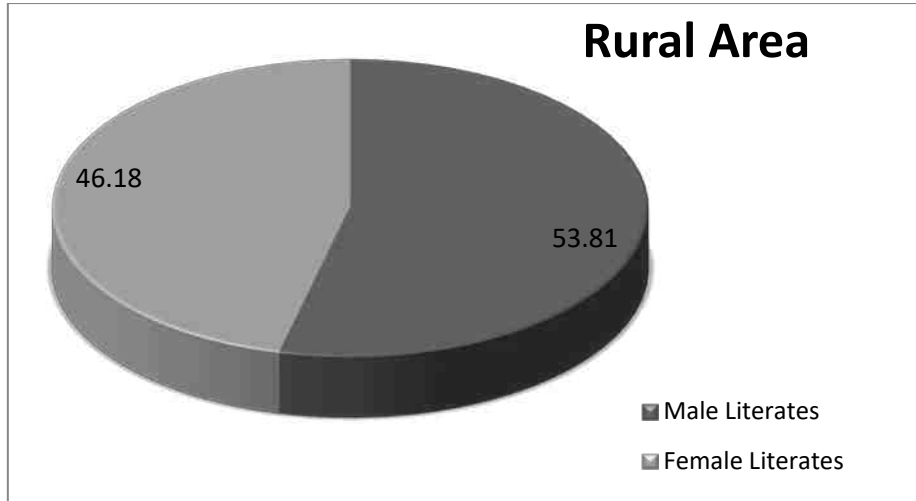


Figure 3.23: % Literacy Rate in Study area

3.4.11.2 Occupational Pattern/ Economic Resource Base

'Work' has been defined as participation in any economically productive activity. Such participation may be physical or mental. Persons on leave and under training are also treated as workers. However, rent receivers and pensioners are not treated as workers.

3.4.11.2.1 Total Workers

Occupational pattern of the villages and urban area within 10 km is given below table. Occupational pattern of any region mainly depends upon its economically active group i.e. the working populations involved in different economically productive activities. The total workers further categorized as main worker, marginal and the non-working population (**Table 3.32**).





Table 3.32: Socio-Economic Structure of the Study Area (Rural)

S. No.	Villages	Total Main Workers	Main Workers				Marginal Workers	Non-Workers
			Cultivators	Agricultural Laborers	Household Laborers	Other Workers		
Tamil Nadu State								
Salem District, Omalur Tehsil								
1.	Reddipatti	613	101	149	129	234	18	587
2.	Pachanampatti	3160	325	864	152	1819	345	4706
3.	Omalur	3335	637	617	176	1905	270	4151
4.	Kullamanickenpatti	1108	156	350	9	593	166	2000
5.	Sekkarapatti	857	20	630	6	201	7	570
6.	Ettikuttapatti	1021	33	824	19	145	209	1050
7.	Collappatti	1106	70	505	18	513	23	995
8.	Thekkampatti	2353	87	531	45	1690	998	4328
9.	Mungilpadi	1217	95	212	39	871	755	1974
10.	Sangitapatti	1278	194	568	32	484	55	1256
11.	Puliyampatti	1292	137	245	19	891	44	1907
12.	M.Chettipatti	1644	225	340	52	1027	13	2693
13.	Chellapillaikuttai	3070	670	862	111	1427	409	4055





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S. No.	Villages	Total Main Workers	Main Workers				Marginal Workers	Non-Workers
			Cultivators	Agricultural Laborers	Household Laborers	Other Workers		
14.	Pagalpatti	3271	326	962	239	1744	371	4192
15.	Manguppai	551	34	5	27	485	179	826
16.	Saminayakkanpatti	1747	151	406	27	1163	187	2208
17.	Tumbipadi	4972	746	1969	158	2099	895	6648
18.	Pottipuram	2814	258	1512	149	895	234	3022
19.	Sikkanampatti	1438	209	217	190	822	208	1992
20.	Thathayampatti	1318	133	548	8	629	4	1255
21.	Kamalapuram	5042	548	3163	141	1190	395	5927
22.	Gobinathapuram	492	210	141	13	128	164	451
23.	Sakkarachettipatti	1761	468	885	27	381	160	1380
24.	Thathayangarpatti	1588	310	792	14	472	98	1727
25.	Kaminaickanpatti.	348	66	121	2	159	9	280
26.	Jagadevampatti	595	196	189	14	196	0	784
27.	Vellalapatti	3286	229	1225	119	1713	131	3416
28.	Mailapalaiyam	254	75	138	23	18	2	652
29.	Naranampalayam	515	102	277	5	131	0	378





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S. No.	Villages	Total Main Workers	Main Workers				Marginal Workers	Non-Workers
			Cultivators	Agricultural Laborers	Household Laborers	Other Workers		
30.	Kottamettupatti	1951	188	335	45	1383	34	3057
31.	Balbakki	1374	287	183	31	873	51	1280
32.	Omalur (TP)	5394	53	61	301	4979	476	10409
33.	Karuppur (TP)	6441	236	1797	225	4183	327	7199
Total		67206	7575	21623	2565	35443	7237	87355
Salem District, Salem Tehsil								
34.	Salem (M Corp.)	316128	1599	3040	32597	278892	16019	497120
35.	Kannankurichi (TP)	7535	371	687	184	6293	231	11999
36.	Kondappanaickenpatti (CT)	2699	91	332	47	2229	170	4023
37.	Mallamooppampatti (CT)	4126	60	218	249	3599	114	5959
38.	Chettichavadi	2241	317	513	38	1373	39	2588
Total		332729	2438	4790	33115	292386	16573	521689
Grand Total		399935	10013	26413	35680	327829	23810	609044

Source: Primary Census Abstract, 2011 and Primary Survey





3.4.11.2.2 Main Workers

Main workers are those who have worked for a major part of the year (i.e. at least six months or 183 days). Main activity of a person who was engaged in more than one activity was reckoned in terms of time disposition. 395809 i.e. 38.70 % of the total population comes under the main workers category. Main workers are further classified into 4 categories viz., cultivators, agricultural laborers and household workers and other main workers

A. Cultivators

For purposes of the Census a person is classified as cultivator if he or she is engaged in cultivation on land owned or held from government or held from private persons or for payment in money, kind or share. The person who is engaged either as employer, single worker or family worker in cultivation of land is recognized as a cultivator. Cultivation involves ploughing, sowing, harvesting and production of cereals and millet crops such as wheat, paddy, jowar, bajra, ragi, etc., and other crops such as sugarcane, tobacco, ground-nuts, tapioca, etc., and pulses, raw jute and kindred fiber crop, cotton, cinchona and other medicinal plants, fruit growing, vegetable growing or keeping orchards or groves, etc. Cultivation does not include the following plantation crops—tea, coffee, rubber, coconut and betel-nuts (areca).

Maximum populations in the study area are engaged as Cultivators' i.e depended on agriculture. The cultivator population within the study area is 10013 (2.50%)

B. Agricultural Laborers

Persons working on land owned by others for wages or share in the yield have been treated as agricultural laborers. Out of the total main worker category agricultural laborers population is about 26413 i.e. 6.6%.

C. Laborers in Household Industry

The laborers engaged in household activity are quite low in all the study area. Among the total main workers 35680(8.92%) workers are engaged in Household activity.

D. Other Workers

All main workers i.e. those who have been engaged in some economic activity during the last one year and who are neither cultivators nor agricultural laborers or household industry workers are classified as other main workers. The type of workers that come under this category includes factory workers, plantation workers, those in trade, commerce, business, transport, construction, political or social works,





all government servants, municipal employees, teachers, priests, entertainers, artists etc. The other worker category includes 327829 workers i.e. 81.97%.

Different types of workers in total worker population may be classified and described below while presented in **Figure 3.24**.

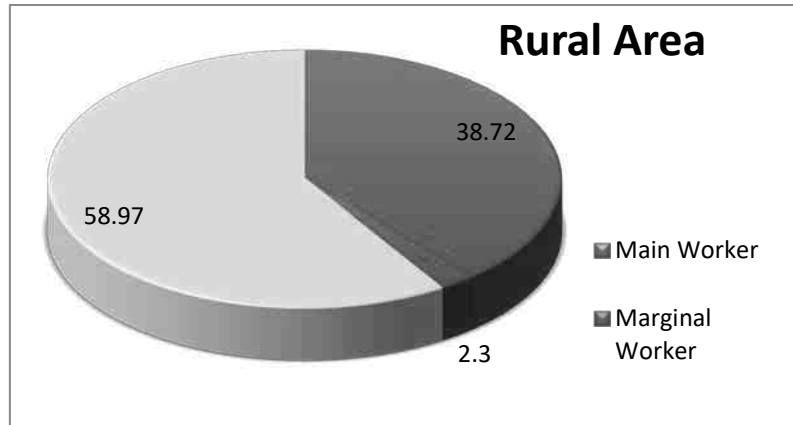


Figure 3.24: Occupational Structure in the Study Area

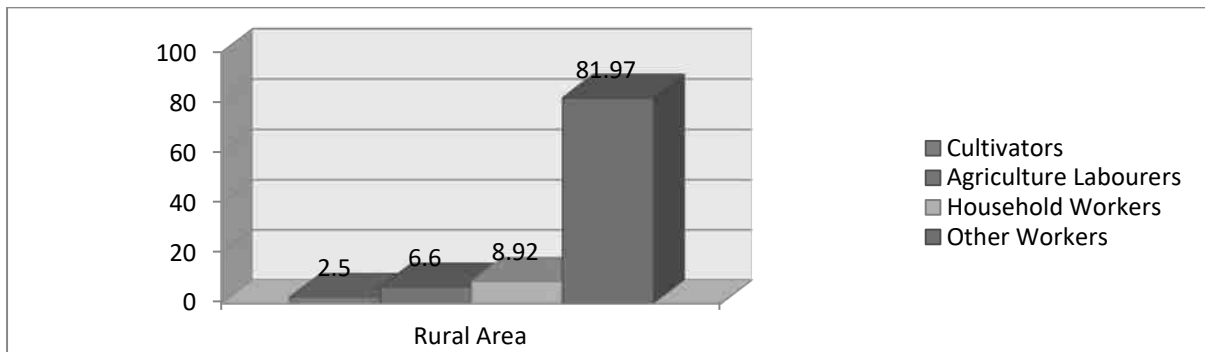


Figure 3.25: Categorization of Main worker in the Study Area

3.4.11.2.3 Marginal Workers

Marginal workers are those who have worked any time in the year for less than six months or 183 days but have not worked for a major part of the year. The population of marginal workers within the 10 km from the mine site comprises of about 23810 i.e 2.3% of the total population.

3.4.11.2.4 Non-Workers

Non-Workers are those who have not worked any time at all in the year. Non-workers constitute householders, students, dependents, retired persons etc.

The economy of the study area is primarily based on agriculture. The agriculture sector has thus absorbed a major portion of the working force.





The categories of main workers, marginal workers & non workers are complementary to each other. Therefore, in areas where the proportion of main workers & marginal workers are high, the proportion of non-workers would be naturally low. At present main workers category outweighs the marginal and non-workers in the study area.

The proportion of female main worker population is high as compared to their male worker counterpart because in general rural areas offer more opportunities for men & women to work in agriculture & animal husbandry etc. In view of the labor-intensive nature of agricultural economy, a large number of women are required to participate in work especially during the peak seasons of agricultural operations like sowing & harvesting which are to be carried out in a short span of time covering large areas in each village. The non-worker population includes 609044 (58.97%) population of the total population of the study area

3.4.11.3 Infrastructure Resource Base in the study area

The details of infrastructure resources base of the study area with reference to education, medical facility, water supply, post and telegraph, transportation, communication facility, power supply, existence of nearest town etc. are presented in Table below. The significant features of these important parameters for each study area are discussed as below in **Table 3.33**:

Table 3.33: Infrastructure Resource Base in the Study Area

S. No.	Amenities	Availability in Number
1.	Education Facility	P(47) Pvt P(3),M(32), S(6), Pvt S(7), Ssc (4),Pvt Ssc(1)
2.	Medical Facility	CHC(1), PHC(8), PHS(28), D(11),MCW(9),FCW(8)
3.	Drinking Water Facility	T (32), UnT(29), HP(18), CW(23),UCW(30),TW(33)
4.	Drainage Facility	OD(38), CD(31)
5.	Communication Facility	M(34),PO(1)
6.	Transportation Facility	BS(25),Pvt.BS(21)
7.	Approach Road	PR(29), KR(32)
8.	Power Supply	ED(32),EAG(32)





Educational Institutions		Medical Facilities		Drinking Water Supply		Communication	
P	: Primary School	CHC	: Community Health Centre	T	: Tap Water	PO	: Post Office
M	: Middle School	PHC	: Primary health Centre	CW	: Covered Well Water	PH	: Phone connections
S	: Secondary School	PHS	: Primary health sub center	UCW	: Uncovered Well Water		
		D	: Dispensary	HP	: Hand pump		
		MCW	: Maternal and Child Welfare				
Power Supply		Approach Road		Transportation		Drainage Facility	
E D	: Electricity for domestic purpose	PR	: Pucca Road	BS	: Bus	OD	: Open Drainage
		KR	: Kuccha road	RS	: Railway Station		

Source: Primary Census Abstract, 2011 and Primary Survey

3.4.11.3.1 Educational Facility

The numbers of educational institution in the study area are government primary schools in 47 villages and private school in 3 villages, middle school (32), Secondary schools (6), private secondary school (7) and 4 senior secondary school and private senior school in Pagalpatti village of study area. For further studies people have to avail the facility from the nearest town i.e Salem and Kottagoundampatty town.

3.4.11.3.2 Drinking Water Facility

The numbers of major sources of drinking water in the study area is available in Hand Pumps in 18 villages, uncovered wells in 30 villages, covered wells in 23 villages, treated tap water (32 villages) untreated tap water (29 villages) and tube wells in 33 villages.

3.4.11.3.3 Medical Facility

Medical institutions in rural parts of the region are inadequate, as per the data recorded in the village amenities CD in the 10 km radius of the project site there is only 1 Community Health Centre, Primary health Centre in 8 villages. There are 28





Primary health sub-center in the villages of the study area. Dispensary is in 11 villages, Maternal Child Welfare Centre in 9 villages and Family & Child Welfare center in 8 villages. People generally prefer private hospital for treatment because of the inadequate and poor facilities at government hospitals.

It is attributed from the data that different health problems are reported which could be attributed to improper sanitation, lack of health awareness among the people and lack of health-related infrastructure facilities.

3.4.11.3.4 Communication Facility

Communication facility is available in the form of Post office and telephone and mobile connection in the study area.

3.4.11.3.5 Transportation Facility

The main mode of transportation is by public bus available in 25 villages and private bus service in 21 villages of the study area and Railway station is in Karuppur, Magnesite junction and Omalur junction in the study area.

3.4.11.3.6 Approach Road

Pucca roads are available in 29 villages while Kuccha roads is available in 32 villages. This shows that the approach roads are available in all the villages which makes easier to travel to long distances.

3.4.11.3.7 Power Supply

Electricity is available in 32 villages for domestic and agriculture purpose in the study area and is available for 20-22 hours a day

3.4.11.3.8 Economic Resource Base

The economy of Salem, Tamil Nadu is mostly influenced by Information Technology, Steel, Textile industry, Agriculture and more. Salem is most popularly known as Steel city and Mangoes city of India. Salem has one Special Economic zone over 40 in Tamil Nadu, ELCOT has established an I T Special Economic Zone at Jagirammalayam village.

Salem district also have local planning authority called Salem Local Planning Authority for development of Salem City Corporation area and Salem Metropolitan Area and also for suburbs in Salem district.

The handloom industry is one of the most ancient cottage industries in Salem district of Tamil Nadu, India. The handloom industry is one of the most ancient cottage industries in Salem district of Tamil Nadu. Next to agriculture hand-loom weaving is





considered the most important industry in Tamil Nadu as well as India. In Salem district the chief industry was weaving, which was carried on in almost every large town or village. In Salem District the major Horticulture crops grown are Mango, Banana, Tapioca, Tomato, Brinjal, Bhendi, Onion, Turmeric, Pepper, Chilies, Coffee, Arecanut, Chrysanthemum, Arali, Jasmine etc., In total, about 67,800 ha of area covered by various Horticulture crops in this district

3.4.11.3.9 Cultural and Aesthetic Attributes

As such no culturally and aesthetically important places are located within the 10 km radius of the study area.

3.4.11.4 Socio-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.

3.4.11.4.1 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:

3.4.11.4.2 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 laborers, unemployed group etc. Judgmental and purposive sampling method includes the right cases from the total population that helps to fulfill the purpose of research needs.

3.4.11.4.3 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).

3.4.11.4.4 Data Collection Method

For the process of data collection through primary source certain methods are used among that are:

3.4.11.4.5 Field Survey and Observations

Field survey and observations is made at each sampling village and the socioeconomic status of that region is studied. Visits are made at hospitals, primary health centers and sub-centers to know the health status of the region. Various





governmental organizations such as statistical department, department of census operations are visited to collect the population details of that region.

3.4.11.5 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. 8 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.

- More than 81% villagers are primarily based on other activity. Majority of main workforce are engaged either as cultivators in the sampling villages.
- Majority of workers are practicing farming activities through irrigation source of Tube wells and Wells
- Most of the villages have Primary School (PS), Middle School (MS) and Secondary school while very few have senior secondary schools. Further education villagers go to the town places at Salem.
- The main source of drinking water supply is through treated Tap water treated, untreated tap water, covered well, uncovered well and Hand Pump, Tube wells.
- There is Primary Health Centre is in Mungilpadi, Pagalpatti, Tumbipadi, Kamalapuram villages among the surveyed villages. ANM (Auxiliary Nurse Midwife) frequently visits all the villages and regular vaccination and health checkup camps are organized by the health center
- Power supply is available in mostly all the sampling villages. Street lights are also available in all villages Power supply is available for 20-22 hours a day for domestic purpose





The list of villages for primary survey is given in **Table 3.34**:

Table 3.34: List of Villages for Primary Survey

S. No.	Amenities
1.	Thathaiyangerpatti
2.	Moongilpadi
3.	Karuppur
4.	Vellakkalpatti
5.	Mallamoopanpatti
6.	Pagalpatti
7.	Tumbipadi
8.	Kamalapuram

3.4.11.6 Manpower Requirement

Mine shall provide an opportunity of continuing direct employment for 434 persons.





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Table 3.35: Demographic Structure of the Study Area (Rural)

Sr No.	Villages	Households	Total Population	Population 0-6 Years	Scheduled Caste	Scheduled Tribes	Literates
Tamil Nadu State							
Salem District, Omalur Tehsil							
1.	Reddipatti	303	1218	144	16	0	648
2.	Pachanampatti	1943	8211	885	2537	7	4981
3.	Omalur	1939	7756	831	1022	1	4552
4.	Kullamanickenpatti	835	3274	341	234	1	1951
5.	Sekkarapatti	384	1434	125	759	0	921
6.	Ettikuttapatti	630	2280	229	471	0	1409
7.	Collappatti	542	2124	209	43	0	1343
8.	Thekkampatti	1986	7679	794	2737	1	4518
9.	Mungilpadi	1025	3946	432	347	0	2163
10.	Sangitapatti	678	2589	234	942	0	1666
11.	Puliyampatti	824	3243	351	1011	0	2051
12.	M.Chettipatti	1109	4350	427	884	0	2691
13.	Chellapillaikuttai	1932	7534	737	2139	0	4516





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Sr No.	Villages	Households	Total Population	Population 0-6 Years	Scheduled Caste	Scheduled Tribes	Literates
14.	Pagalpatti	2059	7834	736	1510	1	4865
15.	Manguppai	407	1556	154	926	0	1035
16.	Saminayakkanpatti	1083	4142	424	2632	0	2723
17.	Tumbipadi	3254	12515	1265	3873	16	7321
18.	Pottipuram	1603	6070	607	1725	0	3365
19.	Sikkanampatti	956	3638	398	1453	0	2136
20.	Thathayampatti	634	2577	278	1416	4	1604
21.	Kamalapuram	2905	11364	1117	1323	0	6810
22.	Gobinathapuram	331	1107	115	48	5	673
23.	Sakkarachettipatti	882	3301	317	1219	0	2061
24.	Thathayangarpatti	974	3413	319	389	198	2036
25.	Kaminaickanpatti.	177	637	52	63	0	335
26.	Jagadevampatti	401	1379	114	17	0	957
27	Vellalapatti	1754	6833	670	2198	15	4215
28	Mailapalaiyam	251	908	80	170	0	541





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Sr No.	Villages	Households	Total Population	Population 0-6 Years	Scheduled Caste	Scheduled Tribes	Literates
29	Naranampalayam	243	893	94	37	0	602
30	Kottamettupatti	1303	5042	507	1585	8	3458
31	Balbakki	715	2705	243	831	0	1815
32	Omalur (TP)	4229	16279	1596	2105	86	12454
33	Karuppur (TP)	3707	13967	1281	4912	10	9288
Total		41998	161798	16106	41574	353	101704
Salem District, Salem Tehsil							
34	Salem (M Corp.)	215747	829267	79067	106320	1270	633314
35	Kannankurichi (TP)	5022	19765	2015	2607	57	14090
36	Kondappanaickenpatti (CT)	1795	6892	711	1270	208	4727
37	Mallamooppampatti (CT)	2650	10199	1180	2111	13	6412
38	Chettichavadi	1290	4868	543	448	14	2993
Total		226504	870991	83516	112756	1562	661536
Grand Total		268502	1032789	99622	154330	1915	763240

Source: Primary Census Abstract, 2011 and Primary Survey





4. ANTICIPATED ENVIRONMENTAL IMPACT AND MITIGATION MEASURES

4.1 INTRODUCTION

Environmental impact in the study area is mainly about any alteration of environmental conditions or creation of new set of environmental conditions, adverse or beneficial, caused or induced by the impact of project. Prediction involving identification and assessment of potential impacts of the project on surrounding environment is a significant component of EIA studies. As per the interpretations of **Chapter 2** and **Chapter 3**, the project is for Mining of Magnesite and Dunite (Mine Lease Area 622.69 Ha, Production Capacity 26, 43,936 MTPA ROM) at Villages Thathaiyangerpatti, Moongilpadi, Karuppur, Vellakkalpatti, Mallamoopanpatti, Taluk Omalur & Salem, District Salem, Tamil Nadu. The installation and operation of these facilities may change air, water, Noise and soil quality of the area and may alter the environment of the area in various ways, such as removal of the mass, change in landscape, impact on flora and fauna of the area, change in surface drainage etc. Therefore, it is essential to assess the impacts of mining on different environmental parameters before starting the mining operations, so that abatement measures could be planned in advance for eco-friendly mining.

All components of the environment were considered and wherever possible impacts were evaluated in quantitative/qualitative terms. Several scientific methods are available to qualify and predict the impact of project on environmental attributes such as water, air, noise, land ecological socio-economic. Such predictions are superimposed, over baseline environmental status to derive post project scenario of the environmental conditions.

The resultant (post-project) quality of environmental parameters is reviewed with respect to the permissible limits. Based on the impacts thus predicted, preventive and mitigation measures were formulated and incorporated in the environmental management plan to minimize adverse impacts on environmental quality during and after the project execution.

The projected impact has been broadly divided into two phases.

- During construction: These activities may be regarded as temporary or short term and ceases with implementation of the project.
- During operation: These impacts are continuous warranting built in permanent measures for mitigation and monitoring.





Construction and operation phase of the project comprises of various activities, each of which will have an impact on some or other environmental parameters. Activities during construction and operational phase have been studied to estimate the impacts on environment. The impacts have been predicted for the proposed project assuming that the pollution due to the existing activities has already been covered under baseline environmental data.

4.2 IDENTIFICATION & CHARACTERIZATION OF IMPACTS

The wastes and pollutants generated due to various activities of the project may cause impacts on different environmental attributes. The major project activities and the anticipated environmental impacts due to the project are discussed below, under the following categories:

- Impacts due to project location
- Impacts due to project design
- Impacts during construction
- Impacts during operation.

4.2.1 Impacts due to Project Location

Mining is the site-specific project. The proposed operation shall be carried out within the existing mining lease area of 622.29 Hectares. No additional land shall be required for the project. Considering the land required for the proposed operation is already in possession, no person shall be displaced, hence no significant impact is envisaged due to the project.

4.2.2 Impacts due to Project Design

The proposed project envisaged state of art technology, presently available in the country in their project design. Hence, the proposed project will help in reducing impact on the environment.

4.2.3 Impact during Construction

There is no any construction activity involved in proposed project.

4.2.4 Impact during Operation Phase

The major activities at mine in the operational phase involves drilling, blasting, excavation, waste disposal, transportation etc. These activities may affect the environment in varying degrees through natural resources depletion viz. water consumption, release of pollutants (particulates and gaseous emissions), run-off from waste dump areas etc. Air, water and noise may be affected due to these activities. Associated activities, e.g. transportation of materials, operations of HEMM etc., may also affect air, water and noise environment. Greenbelt development will have a positive impact not only on flora and fauna but also on the air quality, noise





and soil. Positive impacts on socio-economic environment are expected due to employment, infrastructure development and also due to developmental activities will be taken up by the project management. The major project activities and the affected environmental parameters are given below:

4.2.4.1 Project Activities

1. Drilling, blasting, excavation.
2. Disposal of run off mine ton the spoil bank
3. Segregation of magnesite & Dunite
4. Transportation of materials and personnel.
5. Water Usage
6. Waste dump management.
7. Maintenance of HEMM

4.2.4.2 Pollution Sources

1. Air pollution due to drilling, blasting, excavation, loading, unloading
2. Noise & Vibration during drilling and blasting
3. Haul road emissions (fugitive dust) during transportation within Mine
4. Gaseous emissions during transportation of mineral
5. Water pollution from Waste dump

4.2.4.3 Affected Environmental Parameters

1. Air quality
2. Water quality and resource
3. Noise quality and Vibration
4. Soil quality
5. Biological environment
6. Socio-economic conditions

4.3 IMPACT MATRIX

Environmental impacts could be positive or negative, direct or indirect, local or regional and also reversible or irreversible. 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. 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**. Further the characteristics of these impacts have been evaluated and they are presented as matrix in **Table- 4.2**.





Table 4.1: Impact Identification Matrix

Aspects Impacted Attributes	Mining, Storage and handling and allied activity (Operation phase)						Post Operation		
	Site Clearance	Operation Open Cast-	Transportation Mineral	Storage/stackin g Mining Mineral	Generation of waste water	Development Greenbelt	Development of Green belt	(Buffer) Urbanization	Industrialization
Ambient Air	•	•	•	*	-	*	*	*	*
Water Resource	-	•	-	-	•	-	*	-	-
Water Quality	-	•	-	*	-	-	-	-	-
Ambient Noise	-	•	•	-	-	*	*	-	-
Flora and Fauna	•	•	-	-	-	*	*	-	-
Soil and Land-use	•	•	-	*	-	*	*	-	-
Infrastructure	•	•	-	-	-	-	-	-	-
Traffic	-	-	*	-	-	-	-	-	•
Health & Safety	-	•	-	*	-	*	*	-	*
Socio-economic	*	*	-	-	-	*	*	*	*

• Adverse Impact * Beneficial Impacts.





Table 4.2: Environmental Impacts During Operation

Activity	Environmental Aspects	Impact	Impact characteristics	
			Significance	Mitigative measures
Mining				
Drilling	Generation of dust	Air pollution	Significant	Wet drilling will be done to reduce dust generation during drilling. New Drilling M/c shall be provided with dust extraction system
	Generation of Gaseous emissions	Air pollution (SO ₂ /NO _x /CO)	Insignificant	Regular maintenance of Drilling M/c to reduce gaseous emissions.
	Generation of Noise	Noise Pollution	Insignificant	Operator Cabin will be enclosed. Ear muff shall be also be provided to the operator.
Blasting	Dust generation	Air pollution	Significant	Controlled blasting with proper burden, spacing, safe charge and adequate stemming shall be done.
	Gaseous emission	Air pollution NO _x / CO	Insignificant	Cartridge type explosive will be used
	Vibration & Air blast	Damage to nearby structures & buildings	Significant	Safe explosive charge will be decided based on Vibration study
	Fly rock generation	Potential for accidents (damage to equipment etc.)	Significant	Blasting Shelters will be provided Warning Signal will be placed Danger Zone shall be marked with Red Flag
Dozing of ore and waste	Dust generation	Air pollution	Insignificant	Operators will be in closed cabins of Dozer. Dust mask shall be provided
	Gaseous emission	Air pollution SO ₂ /NO _x /CO/HC	Insignificant	Proper maintenance of Dozer shall be done to keep emissions low.
	Noise generation	Noise pollution	Insignificant	Insignificant. No action needed. PPE shall be provided
Transportation of Minerals	Dust generation	Air pollution	Significant	Water sprinkling will be done on haul road





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Activity	Environmental Aspects	Impact	Impact characteristics	
			Significance	Mitigative measures
	Gaseous emission	Air pollution SO ₂ /NO _x /CO/HC	Insignificant	Regular maintenance of Dumper / Tippers to keep emissions under control
Transportation of RoM to Spoil Bank	Dust generation	Air pollution	Significant	Water sprinkling will be done on haul road
	Gaseous emission	Air pollution SO ₂ /NO _x /HC	Insignificant	Regular maintenance of Dumper / Tippers to keep emissions under control
Grading of Haul Road	Dust generation	Air pollution SPM/RPM	Insignificant	Operators will be in closed cabins of Grader. Dust mask shall be provided
	Gaseous emission	Air pollution SO ₂ /NO _x /CO	Insignificant	Proper maintenance of Grader shall be done to keep emissions low.
	Noise generation	Noise pollution	Insignificant	Insignificant. No action needed. PPE shall be provided
Domestic Use				
Operation of domestic utilities	Generation of sewage	Water Pollution Sewage waste	Significant	Septic tank with Soak pit will be used for sewage waste.
DG Set				
Operation of DG Set	Air / Gaseous Pollution	Air / Gaseous Pollution	Insignificant	Green DG set will be installed
	Noise Pollution	Noise Pollution	Significant	DG set will be installed in separate room





4.4 IMPACTS DURING OPERATIONAL PHASE

The proposed mine is opencast, which will involve drilling, blasting, excavation of mineral and waste and transportation within mine lease and transportation of mineral outside the lease, the activities related to the operational phase will have varying impacts on the environment and are considered for impact assessment.

4.4.1 Impact on Land Use

The proposed opencast mine will result in change of the land use pattern of the ML area. The land degradation is expected during mining activities like excavation of mineral overburden dumps, etc.

4.4.1.1 Land-use Alteration

As indicated earlier in **Chapter 3**, the mine lease area is 622.69 ha, no additional land will be acquired for mining or any other project related activity hence no Rehabilitation and Resettlement is involved under the present proposal. Activity wise land utilization under various land categories is given in below **Table 4.3**:

Table 4.3: Existing and Proposed land Use of the Mining Block

Particulars	Existing Land-use	Land use at the end of Plan Period (FY 2024-25)	Conceptual Land use
Excavated Area	175.08.00	176.35.00	176.93.45
Waste dump	168.82.00	170.55.5	172.08
Mineral Storage	-	-	-
Top Soil Storage Area	-	-	-
Infrastructure	5.89	5.89	5.89
Roads	24.00	24.00	24.00
Green Belt & Afforestation	54.31.9	54.31.9	54.31.9
Total	428.109	431.11.4	
Statutory barrier	19.15	19.15	19.15
Others (Unutilized)	175.43.10	172.42.6	170.3165
Grand Total	622.69	622.69	622.69

Source: Approved Review of Mining Plan

It can be seen from the above table that out of 622.69 ha, at present 175.08 ha land has been utilized. At the end of the present planned period, land utilization shall increase to 176.35 ha and at the end of mining, total 176.9345 ha shall come under





active utilization. At the end of mining activity, the land use of the area will be changed. The quarry area will be fenced to prevent any inadvertent movement of persons into the area. Part of the area covered under waste dumps will be afforested by plantation. Plantation will be carried out 7.5 m statutory barrier. Further exploration will be carried out based on which life of mine may get extended.

4.4.2 Slope Study of the Area

A slope study will be carried out by the SRCL through reputed Institute and report will be submitted to MOEF&CC after getting the EC and other permission from regulatory authority.

4.4.3 Impact on Air Quality

The opencast mining operation will increase Particulate Matters (PM), SO₂, NO_x, and CO due to blasting (using explosives), operation of diesel operated mining equipment etc. Impacts on air quality due to the proposed project depend on the quantum of mineral extraction, and transportation. The chances of affecting air quality with gaseous pollutants/ hazardous chemical constituents is ruled out, as the mining do not involve any chemical processes. The excavation from the mine may increase the work-zone dust levels, in absence of any dust control measures.

4.4.3.1 Emission from Point Sources (Stack emission)

Emissions of pollutant will be from use of DG set.

4.4.3.2 Emission from Area Sources (Fugitive Emissions)

Fugitive emissions are expected from following sources:

- Fugitive emissions are expected from drilling, blasting, excavation, loading & unloading operations
- Haul road emission during transportation of ROM

4.4.3.3 Air Pollution Impact Prediction through Dispersion Modelling

The emissions will be mainly Particulate Matter (PM)

Details of Mathematical Modelling

The Gaussian Dispersion Modelling (GDM) is used for prediction of dispersion of air emission and the computation of Ground Level Concentration (GLC) up to a specified distance from source. The fundamental model is given below:

$$c(x, y, z) = \frac{Q}{2\pi\sigma_y\sigma_z u} \exp\left(\frac{-y^2}{2\sigma_y^2}\right) \left(\exp\left(\frac{-(z-h)^2}{2\sigma_z^2}\right) + \exp\left(\frac{-(z+h)^2}{2\sigma_z^2}\right) \right)$$





Where c is a concentration at a given position, Q is the source term, x is the downwind, y is the crosswind and z is the vertical direction and u is the wind speed at the h height of the release. The σ_y , σ_z deviations describe the crosswind and vertical mixing of the pollutant. The above equation describes a mixing process that results in a Gaussian concentration distribution both in crosswind and in vertical direction, centered at the line downwind from the source. Gravitational settling and chemical or radioactive decays are neglected.

The model computes the pollutant concentration dispersed in microgram per cubic meter for any point source with the location coordinated x , y and z .

Approach & Methodology

The “Gaussian Dispersion Model” version formed the basic frame work of the computer model used for the computations of concentration of pollutants at ground level.

The model assumptions

- Steady State Condition - Ideal gas, continuous uniform emission rate, homogenous horizontal wind field, representative wind velocity, no directional wind shear in the vertical, infinite plume, no plume history and normal distribution of eddy turbulences.
- Pollutants Characteristics - The pollutant emitted are stable gases or aerosol which remains suspended in the air and particulates in the turbulent movement of the atmosphere and none of the material is removed as the plume advances and diffuses down wind and there is complete reflection at the ground.
- Gaussian distribution - The pollutant material within the plume takes on a Gaussian distribution in both the horizontal cross wind and vertical directions described by empirical dispersion parameters σ_y , and σ_z .
- It has been assumed that the pollutant does not undergo any physicochemical transformations.
- Gravitational settling of pollutants has not been considered.
- Reflection factor from any surface has not been considered.
- Control measures applied during calculation.
- PM_{2.5} has been assumed 65% of PM₁₀.

Model Setup

Emission of PM₁₀ from Mining area

The emission rates for the different sources in the mining area were calculated primarily based on emission factor equation given in latest USEPA’s AP-42 guidelines. Further the emission estimation equations given in “TSP Emission Factors for different mining activities for Air Quality Impact Prediction as collated from different Sources” by S P Banerjee (CMRI) were also considered since these





are based on the study conducted in India for the estimation of emission rate of respirable suspended particulate matter from various open cast mining activities. In addition, as the proposed mine development will be undertaken in environmentally friendly manner as per the stipulated guidelines, activity specific control factors are considered in calculation the emission rates.

Drilling

Emissions from drilling are a relatively minor component of the overall emission from an open-cast mine. The USEPA default uncontrolled emission factor of 0.31 kg/hole is used for PM₁₀ emission estimation. Drilling will be carried out using 110 mm dia. Drill with burden 2.5 & 3.0 m spacing.

Blasting

The emission rate has been calculated based on the equation given below:

$$E = 0.00022 \times A^{1.5} \quad \text{---- AP42 (Oct 1998)}$$

Where,

E = Blasting Emission Factor, kg/blast

A= Area blasted in m²

Loading of Material

The blasted mineral will be loaded on dumpers using excavators, The PM₁₀ emission rate due to loading activity is calculated using below equation.

$$E = k \times 0.0016 \times \left(\frac{\left(\frac{U}{2.2} \right)^{1.3}}{\left(\frac{M}{2} \right)^{1.4}} \right) \quad \text{--- AP42 (Nov 2006)}$$

Where,

E = Emission Factor, kg/ton

k = Particle size multiplier, 0.35 for PM₁₀

M = Moisture Content, %

u = Mean wind speed, m/s

Emission of PM₁₀ due to Transportation

The hauling of mineral from the mining pit via haul road (unpaved road) will cause emission of particulate matters. This emission will be limited to the extent of haul road in the mining area. The particulate matters generated due to transportation on haul road get settled in proximity of the haul road only. As per the mining plan one working shift of 8 h ours per day will be us ed for transportation. The following empirical expressions is used to estimate the quantity in pounds (lb) of size-specific





particulate emissions from an unpaved road in industrial sites, per vehicle mile travelled (VMT)

$$E = k \left(\frac{s}{12}\right)^a \left(\frac{W}{3}\right)^b + C \quad \text{--- AP42 (Nov 2006)}$$

Where,

k, a, b are empirical constants i.e. different for different particle size.

E = size-specific emission factor (lb/VMT)

s = surface material silt content (%)

W = mean vehicle weight (tons)

C = emission factor for 1980's vehicle fleet exhaust, brake wear and tire wear, 0.0047 lb/VMT for PM₁₀. The source characteristics s, W are referred to as correction parameters for adjusting the emission estimates to local conditions. The effective emission factor after considering reduction in emission potential of haul roads due to water sprinkling was calculated for use in AERMOD model.

Summary of calculated Emission Rates

Activities	Unit	PM ₁₀	PM _{2.5}
Drilling	g/s	0.24496	0.097984
Blasting	g/s/m ²	0.09546	0.038184
Loading/Unloading	g/s	0.226462	0.090585
Transportation	g/s/m ²	0.0049	0.00196

Model Output

The AERMOD model has been setup and run for study period (3 months) to find out the cumulative maximum ground level concentration of PM₁₀ and PM_{2.5} generated from the different activities in the mining areas.

GLC of PM₁₀

The maximum predicted GLC of PM₁₀ due to the proposed project is 8.46 ug/m³ at A1 location however the Cumulative GLC of PM₁₀ is 90.33 ug/m³ at A4 location, which is within NAAQ standard for PM10 concentration (100 ug/m³).

GLC of PM_{2.5}

The maximum predicted GLC of PM_{2.5} due to the proposed project 5.64 ug/m³ at A1 location however Cumulative GLC of PM_{2.5} is 51.55 ug/m³ at A4 location, which is within NAAQ standard for PM_{2.5} concentration (60ug/m³).





GLC of SO_x

The maximum predicted GLC for SO_x due to the proposed project is 0.0058 ug/m³ at A3 location however Cumulative GLC of SO_x is 16.80 ug/m³ at A4 location, which is within NAAQ standard for SO_x concentration (80µg/m³).

GLC of NO₂

The maximum predicted GLC for NO_x due to the proposed project is 0.00064 µg/m³ at A3 location however Cumulative GLC of NO_x is 27.70 µg/m³ at A4 location, which is within NAAQ standard for NO_x concentration (80µg/m³).

Summary of GLC incremental at Baseline locations are given in **Table 4.4** below. Isopleths of the modelling are given in **Figure 4.1 and Figure 4.5**.





Table 4.4: Predicted 24 Hourly GLC & Resultant Cumulative GLC

Location Code	AAQM Location Name	Baseline					Predicted GLC					Cumulative GLC for both				
		Max Baseline Conc. PM ₁₀ (µg/m ³)	Max Baseline Conc. PM _{2.5} (µg/m ³)	Max Baseline Conc. SO ₂ (µg/m ³)	Max Baseline Conc. NO ₂ (µg/m ³)	Max Baseline Conc. CO (mg/m ³)	Predicted GLC (µg/m ³) –PM ₁₀	redicted GLC (µg/m ³) –P PM _{2.5}	Predicted GLC (µg/m ³) –SO ₂	Predicted GLC (µg/m ³) –NO ₂	Predicted GLC (mg/m ³) –CO	Cumulative GLC PM ₁₀ (µg/m ³)	Cumulative GLC PM _{2.5} (µg/m ³)	Cumulative GLC SO ₂ (µg/m ³)	Cumulative GLC NO ₂ (µg/m ³)	Cumulative GLC (mg/m ³) –CO
A1	Project site	78.9	41.5	20.8	12.8	0.92	8.46609	5.64406	0.00301	0.00033	0.000012	87.36609	47.14406	12.80301	20.80301	0.920012
A2	Project site B	78.6	41.3	20.7	12.6	0.82	4.9871	3.3247	0.00303	0.0003	0.000001	83.5871	44.6247	12.60303	20.70303	0.820001
A3	Nr village Mettupatti	82.1	45.7	25.6	14.9	0.98	6.54611	4.36407	0.00584	0.00064	0.000002	88.64611	50.06407	14.90584	25.60584	0.980002
A4	Nr. Village Kullakvundunur	85.9	48.6	27.7	16.8	1.26	4.42662	2.95108	0.00147	0.00016	0.000006	90.32662	51.55108	16.80147	27.70147	1.260006
A5	VNr Village Kombaipatti	84.1	47.7	26.7	15.9	1.02	0.76602	0.51068	0.00056	0.00006	0.000002	84.86602	48.21068	15.90056	26.70056	1.020002
A6	Nr village Gundur	79.1	42.3	22.5	12.8	0.9	1.77661	1.18441	0.00017	0.00002	0.000001	80.87661	43.48441	12.80017	22.50017	0.900001





Draft EIA Report for Mining of Magnesite & Dunite over an area 622.69 Ha, located at Villages Thathaiyangerpatti, Moongilpadi, Karuppur, Vellakkalpatti, Mallamooanpatti, Taluk- Omalur & Salem, District-Salem (Tamil Nadu) By M/s SAIL Refractory Company Limited (SRCL).

Location Code	AAQM Location Name	Baseline					Predicted GLC					Cumulative GLC for both				
		Max Baseline Conc. PM ₁₀ (µg/m ³)	Max Baseline Conc. PM _{2.5} (µg/m ³)	Max Baseline Conc. SO ₂ (µg/m ³)	Max Baseline Conc. NO ₂ (µg/m ³)	Max Baseline Conc. CO (mg/m ³)	Predicted GLC (µg/m ³) –PM ₁₀	redicted GLC (µg/m ³) –P PM _{2.5}	Predicted GLC (µg/m ³) –SO ₂	Predicted GLC (µg/m ³) –NO ₂	Predicted GLC (mg/m ³) –CO	Cumulative GLC PM ₁₀ (µg/m ³)	Cumulative GLC PM _{2.5} (µg/m ³)	Cumulative GLC SO ₂ (µg/m ³)	Cumulative GLC NO ₂ (µg/m ³)	Cumulative GLC (mg/m ³) –CO
																1
A7	Nr. Village Pudur	80.8	44.5	23.8	13.8	1.1	2.31603	1.54402	0.00119	0.00013	0.000005	83.11603	46.04402	13.80119	23.80119	1.100005
A8	Nr. Village Keeraipampadi	76.5	39.5	18.8	10.5	1	3.25584	2.17056	0.00058	0.00006	0.000002	79.75584	41.67056	10.50058	18.80058	1.000002



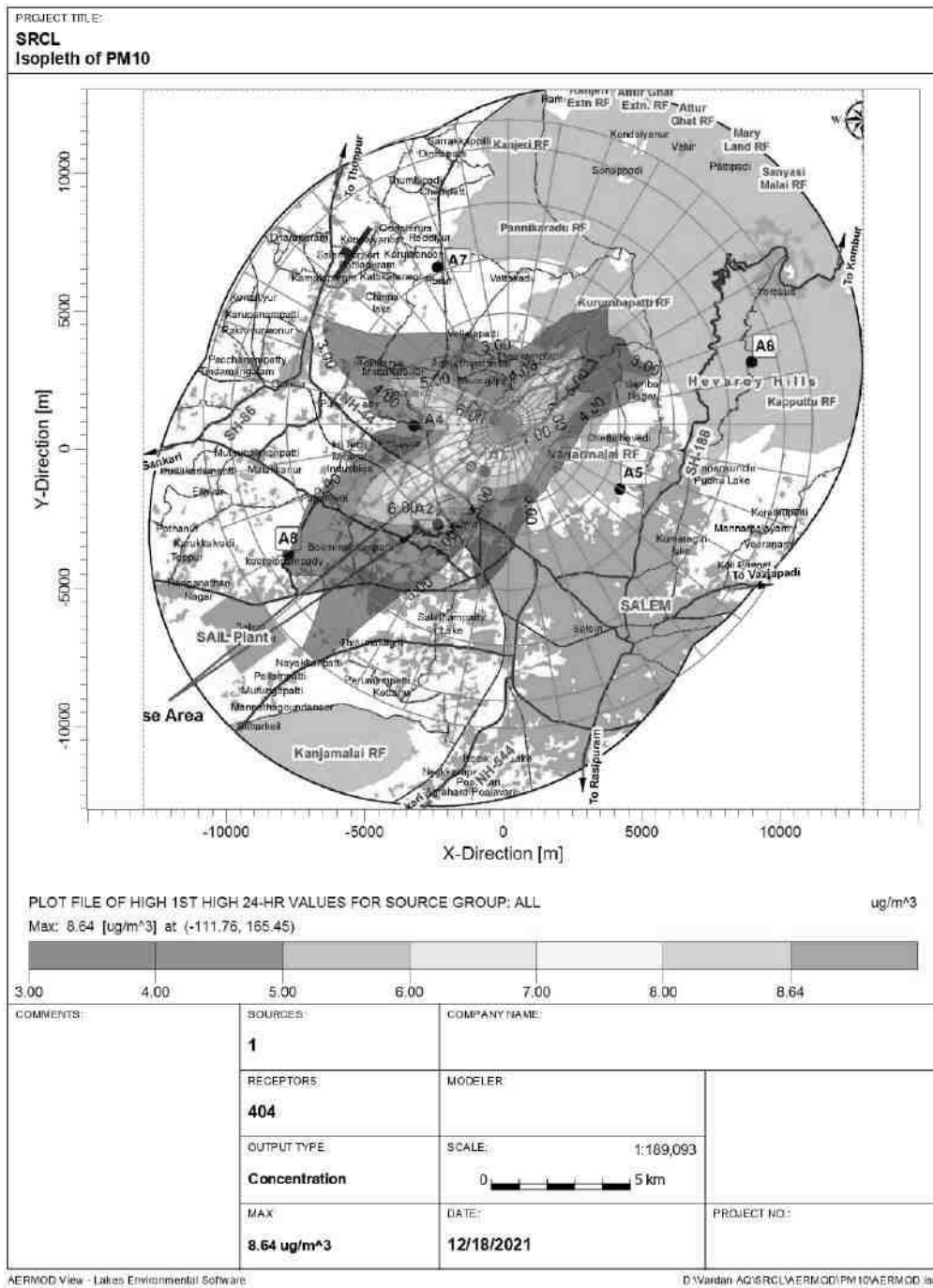


Figure 4.1: Isopleth for 24-hr incremental concentration of PM₁₀ (µg/m³)



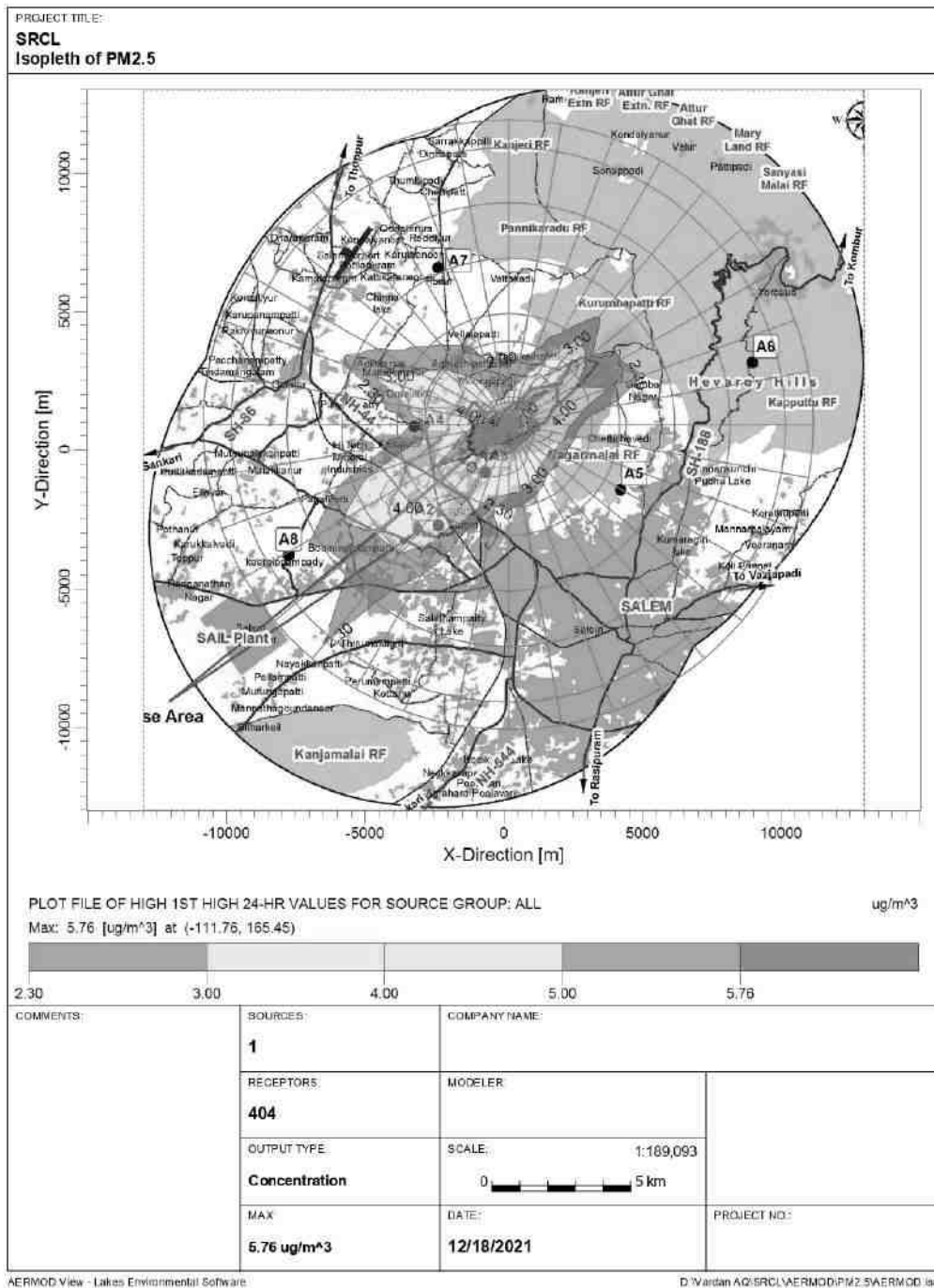


Figure 4.2: Isopleth for 24-hr incremental concentration of PM_{2.5} (ug/m³)



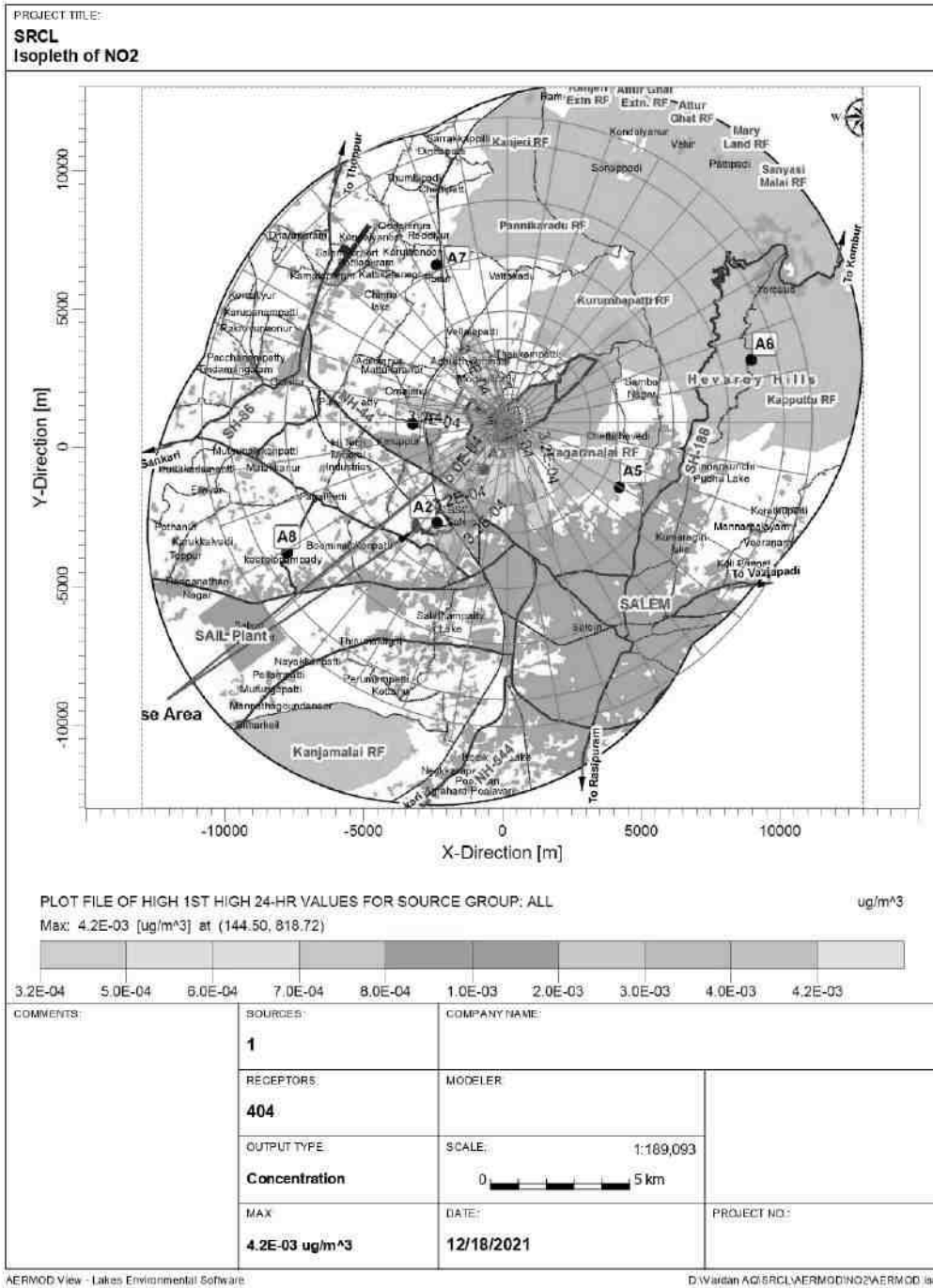


Figure 4.3: Isopleth for 24-hr incremental concentration of NO₂ (µg/m³)



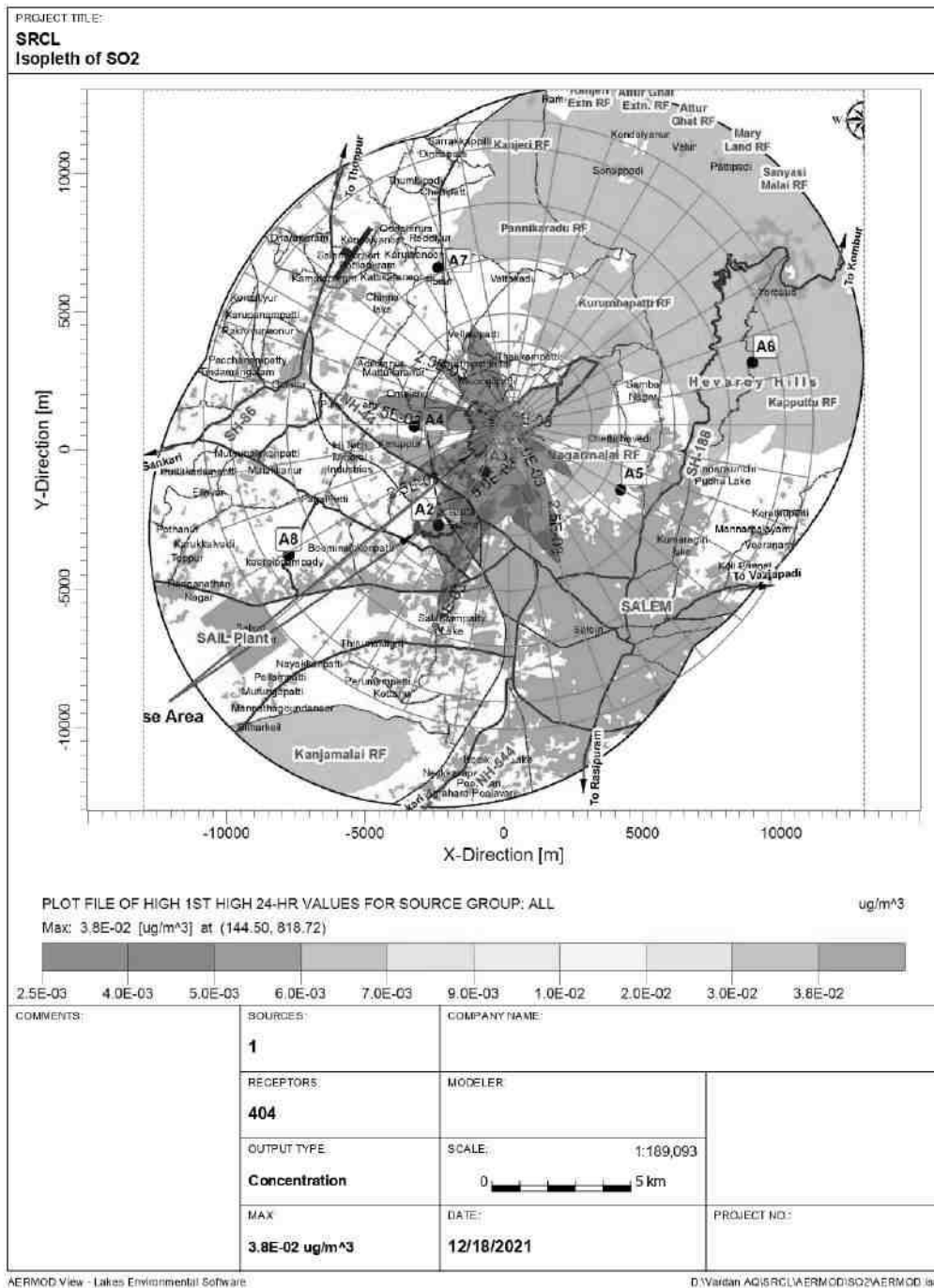


Figure 4.4: Isopleth for 24-hr incremental concentration of SO₂ (µg/m³)



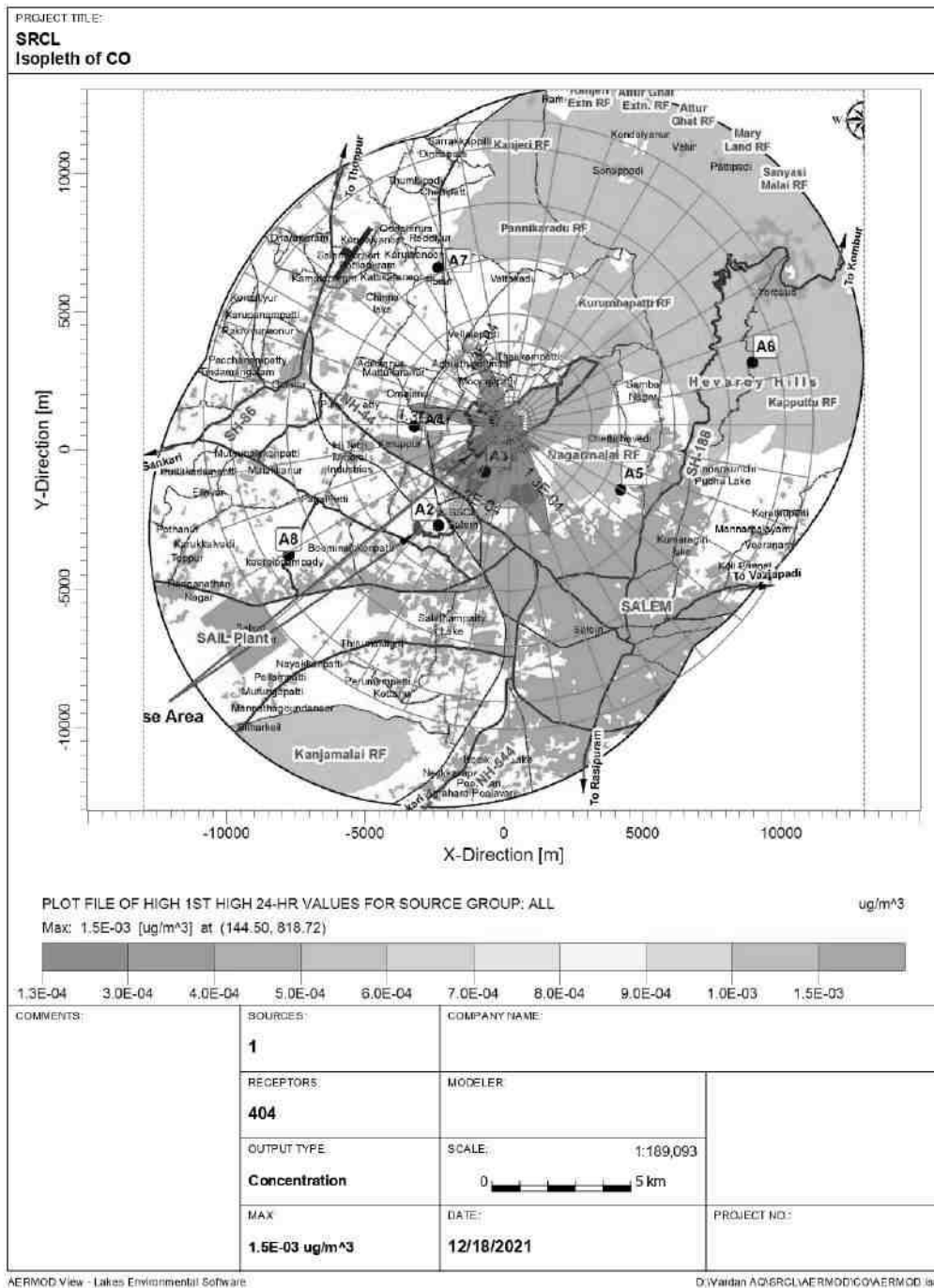


Figure 4.5: Isopleth for 24-hr incremental concentration of CO (mg/m³)





4.4.3.4 Air Pollution Mitigation Measures

Dust is the main air pollutant generated from the mining. The nature of mining operations is such that complete elimination of dust from mining process would not be possible. However, some preventive measures *i.e.* control at source like provision of dust collectors, dust suppression during the course of various mining operations, shall be resorted to minimize fugitive dust emission. The details of source wise pollution prevention measures planned to implement during the proposed expansion are as follows:

4.4.3.4.1 Drilling

Blast hole drilling generate considerable amount of dust in the open cast mining. All drill machines being engaged in the mine are equipped with Wet drilling facility to minimize the dust generation. Sharp drill bits are being used / will be used. All new drilling machines shall be provided with dust extractors.

The operating crew of the drills are also provided with dust masks to prevent their exposure to dust. Moreover, dust hoods will also be provided at the collar of the hole.

4.4.3.4.2 Blasting

Blasting is relatively minor contributor to total dust emissions. However, blasting dust in the form of concentrated cloud, that is highly visible and may have potential impact on neighbours at downwind of the blast. The blasting of near-surface weathered materials that contain a high proportion of fines, creates high dust emissions.

Blasting under unfavourable wind and atmospheric conditions *i.e.* during foggy weather or during nights and when low visible clouds, will be avoided to protect areas adjacent to the mine.

4.4.3.4.3 Haul Roads

Loading of ROM material into tippers / dumpers usually occurs within the pit. The tippers /dumpers, then transport the ROM to spoil bank through designated haul roads. Fugitive dust emissions are caused by the contact of the tyres with the unsealed road surface that affect the total distance travelled.

Vehicular emissions are being controlled through regular and proper preventive maintenance schedules. Emissions tests are also being done with diesel smoke meter to ensure emission values.

Haul road water sprinkling will be done continuously in production shift to ensure effective suppression of dust on haul roads. About 30 m³ of water will be used per day towards dust suppression on haul roads and wet drilling.





In addition to these, the following measures will be adopted to minimise the fugitive dust emissions from the haul roads:

- Sprinkling water at regular interval on the haul road for effective dust suppression.
- Compaction & gradation and drainage on both sides of haul roads
- Proper maintenance of transport vehicles
- Avoiding overloading and enforcing speed limit on dumpers

4.4.3.4.4 Gaseous Emission Control

The exhaust emissions from internal combustion engines of mining machinery shall be kept within the prescribed limits by strict adherence to the regime of regular maintenance and overhaul of mining fleet machineries and vehicles.

4.5 IMPACTS OF WATER POLLUTION AND ITS MITIGATION MEASURES

4.5.1 Impact of Mining on Water Usage

Water is most important resource. Maximum water requirement for the proposed project is 90 m³/day which will be sourced from bore well and mine water. SRCL has applied for permission for drawl of ground water.

4.5.2 Impact of Mining on Surface Water

The area has no perennial nalla, hence there will not be any impact of mining on surface water regime. Hence, there is no possibility of any siltation in natural streams and reduction of vertical percolation. It is therefore apparent that there is hardly any impact of mining on the surface water regime.

The rain water flow towards catchment area is not flowing through the lease area as garland drains are made around the lease area. Hence, solid wash off will not occur.

4.5.3 Impact of Mining on Ground Water

The mining activity proposed to be carried out in next five years will not interfere anywhere with the natural drainage pattern. Ground water table at lease varies from 50 m to 55 m.

The mining activity shall be reached up to 349 mRL year in block I and 330 m RL in block II at the end plan period as well as at conceptual phase. The water level in the area is 50 to 55 m below ground level (285 to 290 m RL). Hence, the ground water in the area is not likely to be affected at all during the plan period as well as during conceptual period.



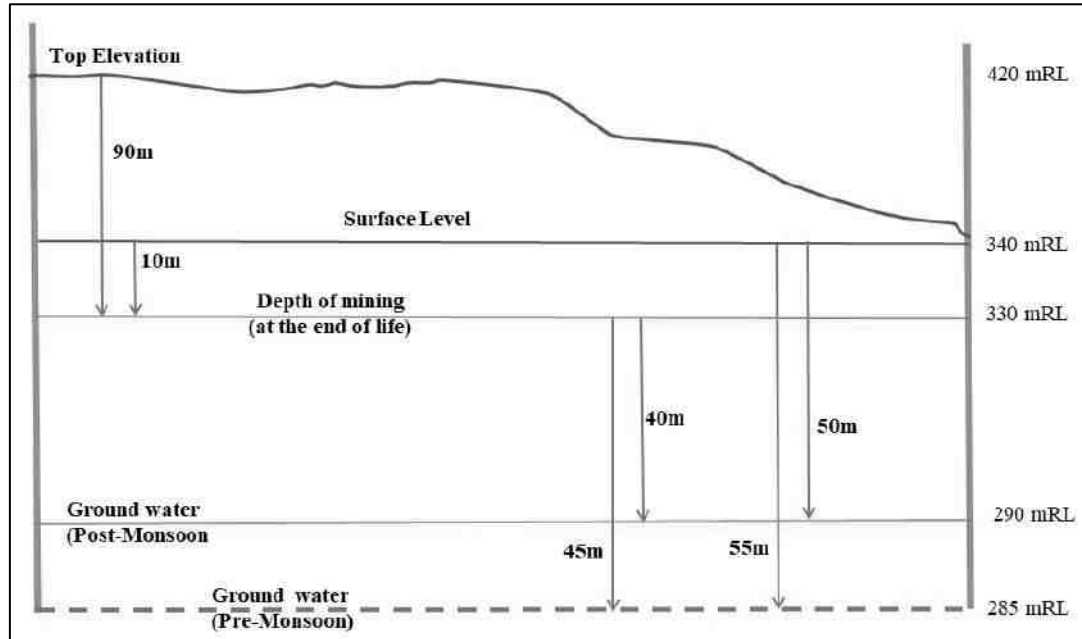


Figure 4.6: Site Specific Ground water Table

4.5.4 Impact due to Effluent Generation from the Mine

There is no effluent generation from the mine, the only waste water generation would be from domestic purpose which will be discharge in septic tank/soak pit system.

4.5.5 Rain Water Harvesting Potential of the Mine

In designing any rainwater harvesting structure, capturing rainfall and runoff for local use is the key concept. Hard surface such as roof pavements and roads that decrease groundwater percolation constitute catchments and generate the high runoff which has to be diverted in to the storage tank & recharged in to ground water regime. To improve water availability, rainwater harvesting is the most imminent & long-term solution.

In view of above, rainwater-harvesting structures at this point can serve the purpose of arresting roof top rainwater and runoff generated through roads in the area. The design is based on average annual rainfall, peak rainfall intensity and the intake capacity of the water by the aquifers.

For good design of rainwater harvesting, following points are to be kept under consideration.

- Ideal location with good ground slope.
- The location has adequate subsurface permeability of the aquifer to accommodate maximum recharge of rainwater through injection well.
- Rate of filtration should exceed average rainfall intensity.
- Clogging of filtration media should be cleaned periodically.
- Ground water pollution does not take place.





4.5.5.1.1 Rain Water Harvesting & Artificial Recharge within lease area:

Based on the site plan of the project area, the computation of rainfall runoff of entire lease area has been worked out and the details are tabulated below:

Table 4.5: Details of Rainwater Harvesting within the Lease Area

Sr. No	Details	Area (m ²)	Annual Rainfall (m)	Run-off Coeff	Total Runoff(m ³ /annum)
1	Rooftop Area	58,900	0.79	0.8	37,224.8
2	Road and Paved Area	2,40,000	0.79	0.7	1,32,720
3	Green Belt Area	5,43,100	0.79	0.2	85,809.8
4	Open Land Area	53,84,900	0.79	0.2	8,50,814.2
Total Runoff water quantity/Annual					11,06,568.8

Total annual runoff of lease area is 1106568.8 m³/annum which could be stored and recharge by adopting different feasible rain water harvesting techniques.

We will adopt following rain water harvesting measure to recharge the collated rain water,

- By making garland drains all the collated rain water will be directed to mine pit or other recharge structure.
- Settling tanks will be provided in the lease area.
- Mine pit also acts as natural recharge for the collected rain water.
- It is also proposed to adopt the rain water harvesting pits on feasible location for direct recharge of the water collected from roof top area.

4.6 IMPACTS OF NOISE/VIBRATIONS AND MITIGATION MEASURES

Ambient noise levels measured in and around the Mine during the study period indicated that the noise levels at all the locations were within the permissible limits at most of the times. The proposed project may increase the work-zone and ambient noise levels to some extent. As stated in **Chapter 2**, the proposed mine will be mechanized opencast mining with deep hole drilling & blasting for ROM extraction.

The mine will have following source of noise

- Drilling
- Blasting
- Operation of Machineries & Vehicular Movement





The impact of this airborne noise will be more on the operating personnel and on the persons working nearby and not so much on the surroundings. In the present case, the noise caused will be mainly restricted to the core zone. The noise levels recorded at various places in the study area are well within the desired limit. But, the future increment in noise levels due to the proposed activities may impose some problem if project management does not adopt appropriate control measures.

4.6.1 Noise Dispersion from the Mine

The noise generation from the mine will be from various sources, which will be originating from various locations within the site. Hemispherical sound propagation has been assumed. For the purpose of noise dispersion for worst case scenario, it is assumed that all the noise generating sources from the quarry are located within the mine site and will operate at the same time and can move within the mine boundary. Hence, the Centre point is taken as the starting point of noise. The dispersion of this noise is computed by using the noise dispersion model.

4.6.2 Mathematical Model for Sound Wave Propagation during Operation

For estimation of dispersion of noise in the ambient from the source point, a standard mathematical model for sound wave propagation is used. The sound pressure levels generated by noise sources decreases with increasing distance from the source due to wave divergence. An additional decrease in sound pressure level with distance from the source is expected due to atmospheric effect or its interaction with objects in the transmission path. For hemispherical sound wave propagation through homogenous loss free medium, one can estimate combined effect of noise levels at various locations, due to different sources using model based on the following equation:

$$L_p(\text{total}) = 10 \log (10^{L_{p1}/10} + 10^{L_{p2}/10} + \dots + 10^{L_{pn}/10}) + AE$$

Where L_{p1} , L_{p2} , L_{pn} are noise levels at a point due to different sources

The sound power level of various equipment proposed to be used in the mining operation is given in **Table 4.6**.

Table 4.6: Expected Noise Levels from Mine Operations

S. No.	Machines/Units	Expected Noise Levels
Mining		
1	Drilling	83
2	Excavator	79
3	Dumpers	80





S. No.	Machines/Units	Expected Noise Levels
4	Dozers	78
5	Jack hammer	82
6	Compressor	81

Note: As blasting noise is instantaneous and causes an overpressure, it is not put as input to day-night model.

The combined noise level when all the above-mentioned machineries are operated at together calculated as 89 dB(A). Noise propagation model was used to predict noise pressure levels from these activities to various distances from the project boundary. The Atmospheric Conditions and Ground effects were also considered as mentioned in ISO:9613. The boundary plantation around the mine area was also considered while modelling. The results are shown in **Table 4.7 & 4.8**. The Noise level contour map is shown in **Figure 4.7 & 4.8**.

Table 4.7: Incremental Noise Level at Different Locations (Without EMP)

Location Codes	Distance from the project site (km)	Baseline Leq Values in dB(A)		Incremental Sound Pressure level in dB(A)		Resultant Sound pressure Level in dB(A)		Remarks
		Day	Night	Day	Night	Day	Night	
N1	--	71.9	63.0	76.8	68.9	78.02	71.39	Major Impact
N2	--	70.6	64.6	75.2	67.7	76.49	70.93	Major Impact
N3	0.4	53.8	44.2	67.8	54.8	67.97	55.15	Moderate impact
N4	1.4	52.8	43.1	63.4	50.2	63.76	50.97	Moderate impact
N5	5.3	46.1	35.5	62.1	48.7	62.21	48.90	Minor Impact
N6	6.0	47.5	36.8	56.6	44.5	57.10	45.18	Minor Impact
N7	6.0	53.8	43.2	59.5	44.1	60.54	46.68	Minor Impact
N8	4.5	53.9	43.6	57.8	45.9	59.28	47.91	Minor Impact

The combined noise level when the machineries are operated in shift wise time duration along with implementation of EMP is calculated to be 78.6 dB(A).





Table 4.8: Incremental Noise Level at Different Locations (With EMP)

Location Codes	Distance from the project site (km)	Baseline Leq Values in dB(A)		Incremental Sound Pressure level in dB(A)		Resultant Sound pressure Level in dB(A)		Remarks
		Day	Night	Day	Night	Day	Night	
N1	--	71.9	63.0	64.5	51.4	72.63	64.80	Major Impact
N2	--	70.6	64.6	63.8	50.7	71.42	66.28	Major Impact
N3	0.4	53.8	44.2	46.3	33.2	54.51	44.54	Moderate Impact
N4	1.4	52.8	43.1	44.1	31.1	53.35	43.37	Minor Impact
N5	5.3	46.1	35.5	42.2	29.2	47.58	36.41	Minor Impact
N6	6.0	47.5	36.8	36.6	23.5	47.84	37.00	Minor Impact
N7	6.0	53.8	43.2	40.5	27.4	54.00	43.32	Minor Impact
N8	4.5	53.9	43.6	38.3	25.2	54.02	43.66	Minor Impact



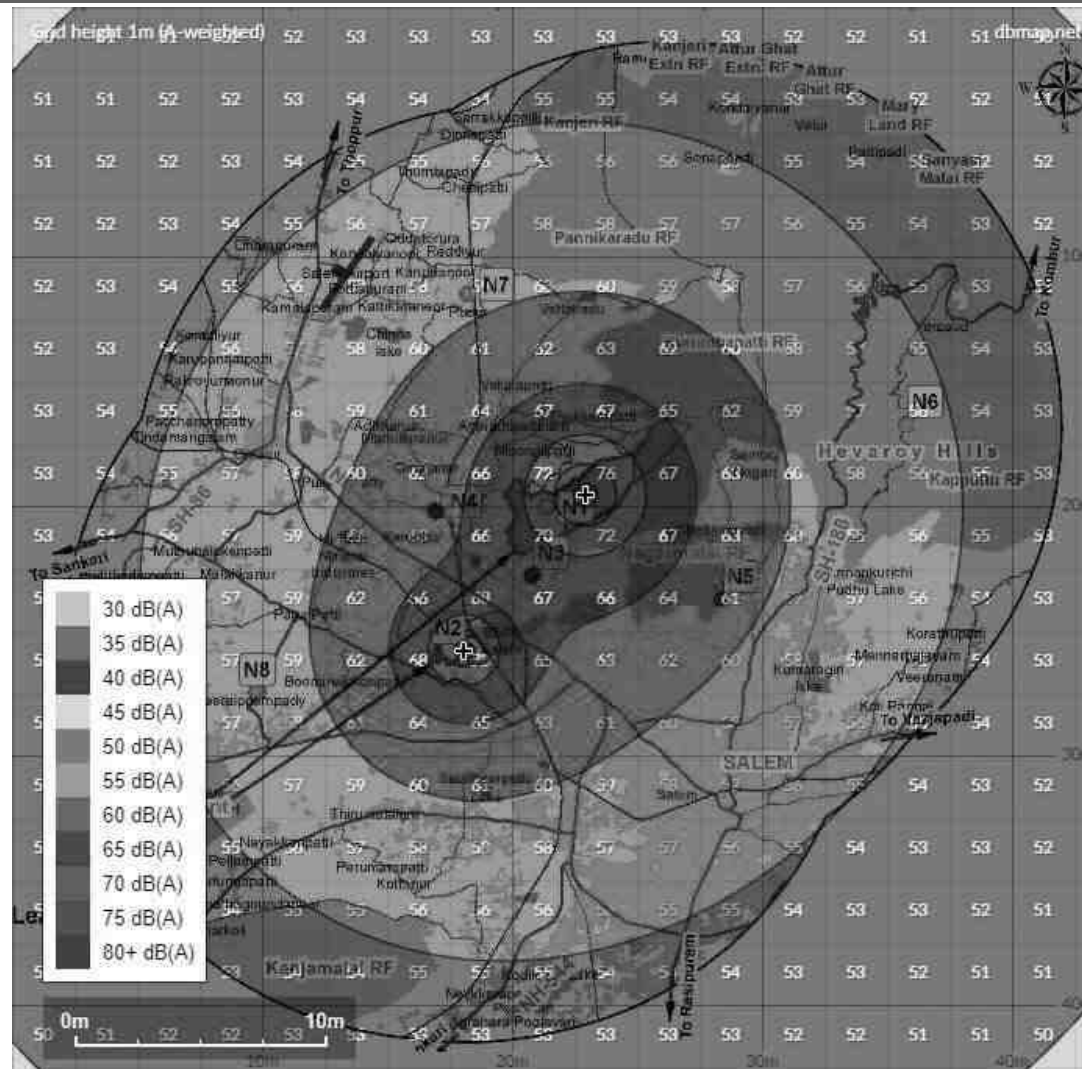


Figure 4.7: Noise Contours for 10 Km Radius Study Area (Without EMP)



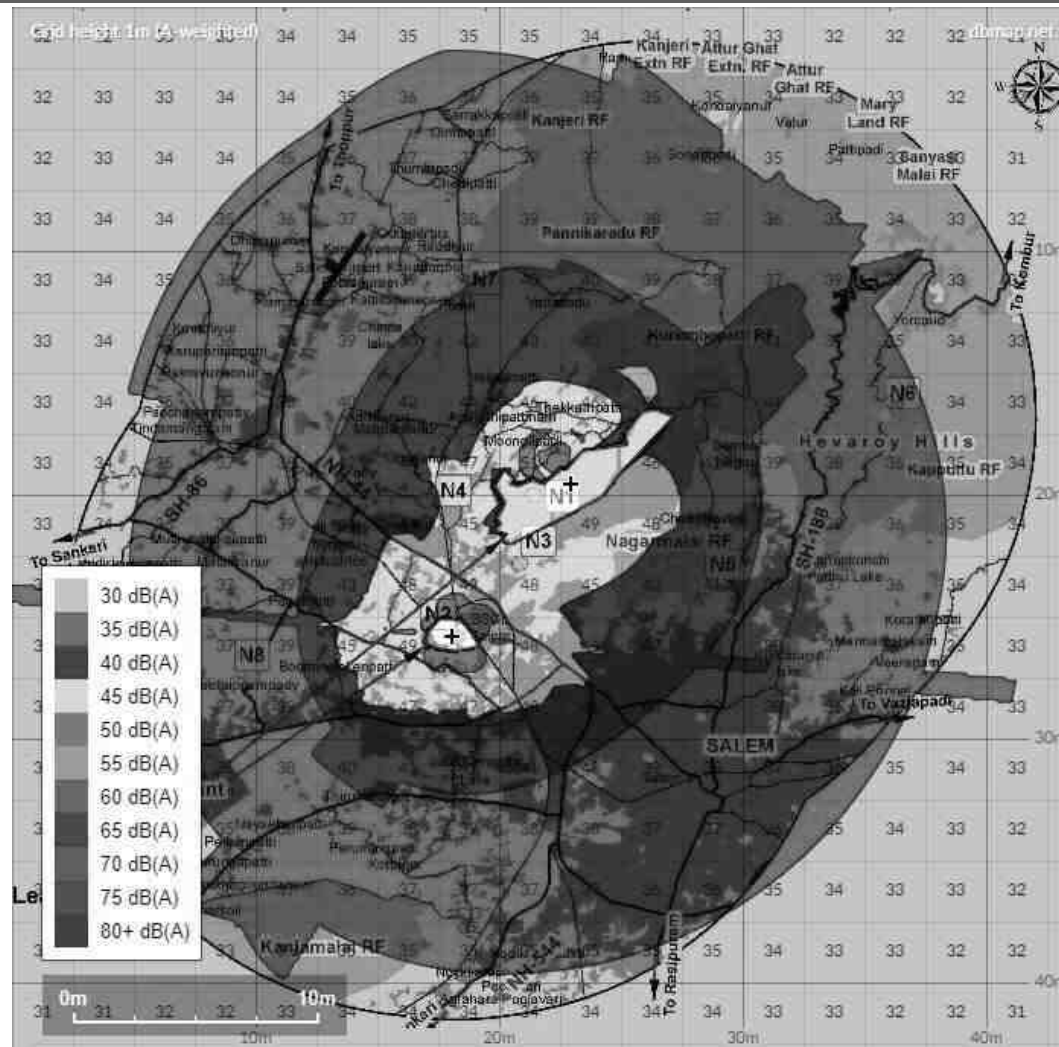


Figure 4.8: Noise Contours for 10 Km Radius Study Area (With EMP)





4.6.3 Observation

- Incremental noise level in nearest habitation Mettupatti at a distance of 400 m from site is 54.51 dB (A) during day time and 44.54 dB (A) at night time.
- The noise levels are further reduced when the implementation of EMP and shift wise operation of machineries is considered.
- Beyond 400 m from the project area, increase in noise level, due to proposed activities, will be negligible.
- Noise level does not exceed the CPCB limit at any location due to mining activity.

4.6.4 Mitigation Measures

Control of Mine Machinery and Units

When attempting to attenuate noise, it should be borne in mind that noise radiates from most machinery as both airborne and as structure-borne sound at the same time. Following mitigation measures will be adopted:

- Provision of sound-insulated chambers for workers deployed on machines producing higher levels of noise like bulldozers, drills, etc.
- Selection of new low-noise equipment from the manufactures failing which use of additional retrofits if available.
- Providing silencers or enclosures for noise generating machines such as DG sets, compressors, etc.

4.6.5 Blasting

In order to loosen the material blasting in hard formations is the required. The noise produced by blasting will be for extremely short duration though with a high intensity. Noise of blast is site specific and depends on type, quantity of explosives, dimensions of drill holes, degree of compaction of explosive in the hole and rock. The noise levels during blasting operations are likely to be in the range of 120-140 dB (A) at 50-100 m distance from the blast site. The noise levels decrease substantially with distance. Blasting will be carried out at noon time. Ground Vibration Study will be carried out by SRCL and submitted to MOEF&CC, once EC and other permission will be granted by regulator.

4.6.6 Mitigation Measures

Due attention will be given to the following factors:

- Quantity of explosive: The quantity of explosive blasted will be decided as per Vibration Study and trial blasting results
- Controlled blasting with proper spacing, burden and stemming will be maintained
- Stemming material: Stemming material to be used is the drill cuttings and chips of triangular shape.
- Delay system: Cord relay will be used.





- Blasting time: Blasting will be done in day time preferably during noon.
- Blasting Frequency: Blasting frequency will be limited to 5-6 days per week as per the development requirement.
- Warning: Before blasting is done, warning sound shall be given and placards/flags will be displayed so that people can move to safe places.
- Secondary blasting will be reduced;
- All provisions of Metalliferous Mines Regulations 1961 will be followed.

4.7 IMPACT DUE TO GROUND VIBRATIONS, AIR BLAST & FLY ROCK

4.7.1 Ground Vibration

Ground vibration, fly rock, air blast, noise, dust and fumes are the deleterious effects of blasting on environment. The explosive energy sets up a seismic wave in the ground, which can cause significant damage to structures and disturbance to human occupants. It causes major damages to the pit configuration too. When an explosive charge is fired inside the blast hole, it is instantly converted into hot gases, which exert intense pressure on the blast hole walls. High intensity shock waves propagate radially in all the directions and the shock waves which fails to reach a free face cause the rock particles to oscillate. This oscillation is felt as ground vibration.

Ground vibration is expressed by amplitude (Peak Particle Velocity) & frequency of blast. The parameters, which exhibit control on the amplitude and frequency of the ground vibration, are divided in two groups as follows:

- (a) Non-controllable Parameters
- (b) Controllable Parameters

The non-controllable parameters are those, over which the Blasting Engineer does not have any control. The local geology, rock characteristics and distances of the structures from blast site are the non-controllable parameters. However, the control on the ground vibrations can be established with the help of controllable parameters. The same have been produced below:

1. Maximum explosive charge per delay
2. Type of Explosive
3. Blast Design parameters i.e. Burden, spacing, stemming length, charge length and specific charge
4. Confinement
5. Initiation system and Delay timing
6. Direction of Initiation

The oscillation of rock particles is called Particle Velocity and its maximum value is called Peak Particle Velocity (PPV), which is measured in milli meter per second. The standards for safe limit of PPV are established by Director General of Mines





Safety for safe level criteria vide Circular No. 7 dated 29th August 1997. The safe level criteria PPV as mentioned in Circular No. 7 of DGMS is presented in **Table No. 4.9.**

Table 4.9: Permissible Peak Particle Velocity (mm/sec)

Sl.No.	Type of Structure	Dominant Excitation frequency, Hz		
		< 8	8 - 25	> 25
A	Buildings / Structures not belonging to the owner			
i.	Domestic houses / structures (kuccha brick and cement)	5	10	15
ii.	Industrial Buildings (RCC & Framed Structures)	10	20	25
iii.	Objects of historical importance & sensitive structures	2	5	10
B	Buildings belonging to the owner with limited span of life			
i.	Domestic houses / structures (kuccha brick and cement)	10	15	25
ii.	Industrial Buildings (RCC & Framed Structures)	15	25	50

Source: DGMS Circular No. 7 dated 29th August 1997

As the distance from blast site increases, the PPV value is likely to reduce. The ground vibrations generated by blasting during the mining operations will be kept within the standards prescribed by DGMS by adopting controlled blasting technique including suitable blast design. The impacts will also be minimized by choosing proper detonating system, optimizing total explosive charge and explosive charge / delay.

4.7.1.1 Vibration Control Measures

The following measures shall be taken at the mines for control of vibrations due to blasting:

- Using optimum maximum explosive charge per delay to keep the ppv below the threshold limit.
- Optimising blast design by exercising strict control over blast design parameters such as burden, spacing, proper stemming orientation of all blast drill holes and accurate drilling based on rock type, jointing pattern, proper face preparation etc.
- Ensure designed depth and inclination of blast holes, keeping the sub-grade drilling optimum.
- Ensure proper free face for first row of holes.
- Establish times of blasting to suit local conditions.





4.7.2 Air Over pressure (Blast Induced Noise)

The use of explosives creates airborne pressure fluctuations (air blast) over a wide frequency range. When in the higher frequency range, this energy is audible and is perceived as “noise”. At frequencies of less than 20 Hz, the sound energy is inaudible but it is capable of causing objects to vibrate such as rattling of loose windows and crockery.

4.7.2.1 Air Over Pressure Control Measures

The following measures will be adopted during blasting operations to control the air blast pressure.

- Adequate stemming shall be ensured to avoid eruption from collar region.
- Maximum charge per delay will be limited based on site specific predictor equation.
- During foggy weather and when low cloud is visible, as also during high winds in the direction of residential townships, blasting operations will be avoided.
- Optimum blast design will be implemented to suit various strata conditions prevailing in the mines.

4.7.3 Fly Rock

Fly rock fragments shall be controlled to ensure safety of personnel, as well as to protect the structures/machineries within the blasting zone from damage. Depending upon the diameter of the holes, bench height, spacing & burden and the charge weight per delay, the maximum distance to which rock fragments usually fly within a distance of 100 to 150 m. The following measures will be taken to control the fly rock during blasting operations at the proposed mining site:

- Proper burden and spacing will be maintained according to the bench height, nature of rocks and diameter of the holes.
- Length of the stemming column shall not be less than the burden.
- Angular holes will be made in conformity with the slope of the bench.
- As far as possible holes will be located beyond weak zones
- All loose pieces of rocks from the blasting site will be cleared before charging the hole.
- Drill hole depths will be checked before loading by the Blasting In-charge.
- Proper warning signals, flags are posted before blasting at various locations.
- Blasting Shelters will be provided with thick MS sheets with enclosures on all sides except one side, to take shelter for persons engaged in blasting.
- Besides the above, the blasting personnel ensures, physically that all personnel have been withdrawn from the danger zone. Guards are be posted on all access roads leading to the blasting site, who prevent unauthorized entry of mine personnel.





4.8 WASTE MANAGEMENT

The solid wastes generated from the mining operations is waste from ROM.

4.8.1 Waste Generation and Its Management

4.8.1.1 Waste Generation Block I

The anticipated waste during the present plan period is about 9,09,839 tonnes. The generated waste during the present plan period is proposed to be dumped over the existing spoil dump situated in the centre portion of the lease area is given in **Table 4.10**.

Table 4.10: Year-Wise Waste Generation and Dump dimension for plan period Block I

Year	Waste Generation, MT	Proposed Mineral Spoil Dump Dimension	Remarks
2020-21	114520	140 m X 120 m X 3.4 m (h)	Dumped over the existing Mineral spoil Dump-5
2021-22	114465	140 m X 120 m X 6.8 m (h)	
2022-23	114510	140 m X 120 m X 10.2 m (h)	
2023-24	171292	140 m X 120 m X 15.3 m (h)	
2024-25	395052	140 m X 120 m X 27.0 m (h)	
Total	909839		

Source: Approved Review of Mining Plan

Table 4.11: Waste Generation till life of mine Block I

Details	Waste Generation, MT
Existing Dump	13267985
Proposed Dump (Including Existing Plan Period)	5011200
Total	18279185

Source: Approved Review of Mining Plan

Table 4.12: Proposed Dump Dimension till life of mine Block I

Details	Quantity Waste, MT	Proposed Mineral Spoil Dump Dimension
Dump 1 (Dumped over the existing Mineral spoil Dump-5)	1747200	140 m X 120 m X 52 m (h)





Details	Quantity Waste, MT	Proposed Mineral Spoil Dump Dimension
Dump 1 (Dumped over the existing Mineral spoil Dump-2)	3264000	200 m X 160 m X 51 m (h)
Total	5011200	

Source: Approved Review of Mining Plan

4.8.1.2 Waste Generation Block II

Mined waste forms nearly 94-96% from ROM in the Block-II. The anticipated waste during the present plan period is about 93, 61,345 tonnes. The generated waste during the present plan period is proposed to be dumped on the north-western portion of the lease area.

Table 4.13: Year-Wise Waste Generation and Dump dimension for plan period Block II

Year	Waste Generation, MT	Proposed Mineral Spoil Dump Dimension	Remarks
2020-21	1889610	315 m X 184 m X 8.15 m (h)	Dumped over North west portion of lease area
2021-22	1754872	315 m X 184 m X 8.15 m (h) 260 m X 155 m X 10.88 m (h)	
2022-23	2348556	315 m X 184 m X 8.15 m (h) 260 m X 155 m X 10.88 m (h) 208 m X 150 m X 18.81 m (h)	
2023-24	1554964	315 m X 184 m X 8.15 m (h) 260 m X 155 m X 10.88 m (h) 208 m X 150 m X 18.81 m (h) 208 m X 150 m X 12.45 m (h)	
2024-25	1813344	315 m X 184 m X 8.15 m (h) 260 m X 155 m X 10.88 m (h) 208 m X 150 m X 18.81 m (h) 208 m X 150 m X 12.45 m	





Year	Waste Generation, MT	Proposed Mineral Spoil Dump Dimension	Remarks
		(h) 208 m X 150 m X 14.53 m (h)	
Total	9361345		

Source: Approved Review of Mining Plan

Table 4.14: Waste Generation till life of mine Block II

Details	Waste Generation , MT
Existing Dump	9965123
Proposed Dump	9361345
Total	19326468

Source: Approved Review of Mining Plan

Table 4.15: Proposed Dump Dimension till life of mine Block II

S.NO	Quantity Waste, MT	Proposed Mineral Spoil Dump Dimension
1	1889610	315 m X 184 m X 8.15m (h)
2	1754872	260 m X 155 m X 10.88 m (h)
3	2348556	208 m X 150 m X 18.81 m (h)
4	1554964	208 m X 150 m X 12.45 m (h)
5	1813344	208 m X 150 m X 14.53 m (h)
Total	9361345	

Source: Approved Review of Mining Plan

4.8.1.3 Waste Generation Block III

There is no proposal for excavation of ROM in Block-III of the lease area during the present plan period in the year (2020-21 to 2024-25). Hence the quantity of generation of waste during the present plan period in this Block does not arise.

Table 4.16: Waste Generation till life of mine Block III

Details	Waste Generation , MT	No of Dumps and Dump Dimension
Existing Dump	12799513	There are 25 existing dump of various size in Block III
Proposed Dump	2300000	Proposed dump of 250 m X 200 m X 23 m (h)





Details	Waste Generation , MT	No of Dumps and Dump Dimension
Total	15099513	

Source: Approved Review of Mining Plan

4.8.1.4 Waste Generation Block IV

There is no proposal for excavation of ROM in Block-IV of the lease area during the present plan period in the year (2020-21 to 2024-25). Hence the quantity of generation of waste during the present plan period in this Block does not arise.

Table 4.17: Waste Generation till life of mine Block IV

Details	Waste Generation, MT	No of Dumps and Dump Dimension
Existing Dump	3616092	There are 13 existing dumps of various size in Block IV
Proposed Dump	252108	Proposed dump of 800 m X 350 m X 0.45 m (h)
Total	3868200	

Source: Approved Review of Mining Plan

The slope of the dump is always maintained below 30° Proper haul roads and slopes are maintained in the dump for the.

4.9 IMPACTS ON ECOLOGY & BIODIVERSITY AND ITS MITIGATION MEASURES

No National Park, Wild Life Sanctuary, Bio-sphere Reserve, Elephant Reserve, Tiger Reserve or Elephant Corridor etc. is present within 10 km of mining lease area. There is one Schedule-I faunal species have been reported during the site visit. Details of the species present in the Study Area are given in the **Chapter-3** of the report. However, the Mine is dedicated and committed to conserve the species. The Conservation measures for protection of flora and fauna in Core and Buffer Zone of the Mine will be prepared in consultation with local Forest and Wild Life Department. The same will be implemented in the area on the funding from the Mine for the conservation of the flora and fauna, present in the Study Area.

Green belt / cover, is an important sink for air pollutants, it also absorbs noise. Enhancing green cover not only mitigates pollutants but also improves the ecological conditions / aesthetics and reduces the adversities of extreme weather conditions. Trees also have major long-term impacts on soil quality and the ground water table. By using suitable plant species, green belts can be developed in strategic zones to provide protection from emitted pollutants and noise.





The green belt / cover will serve the following purposes:

- Compensate the damage to vegetation due to setting up and operation of the mine.
- Prevent the spread of fugitive dust generated due to mining and allied activities
- Attenuate noise generated by the mine.
- Reduce soil erosion.
- Help stabilize the slope of external over-burden dumps.
- Increases green cover and improve aesthetics.
- Attract animals to re-colonise the area when the mine is abandoned.

The species for plantation have been selected on the basis of soil quality, place of plantation, chances of survival, commercial value (timber value, ornamental value, etc.), etc. It is to be noted that only indigenous species will be planted. Exotic species like Eucalyptus and Australian Acacia will not be planted. The species for green belt /vegetation cover development will be selected in consultation with State Forest Department and State Soil Conservation Department. Mixed plantations will be done keeping optimum spacing between the saplings. However, the species suitable for planting in the area as recommended by Central Pollution Control Board in their publication "Guidelines for Developing Greenbelts" (PROBES/75/1999-2000).

The project area will be reclaimed by greenbelt development and gap plantation, total 4,10,975 trees on 33 % of lease area @ 2000 trees per ha, will be planted inside the mining lease area on waste dump, in backfilled area, and along approach road. Out of this 205 ha (33% area of Mine lease area) of green belt development area 58.26 ha area has been developed as green belt area with planting 34,950 trees and 16.63 ha area will be covered under greenbelt development with 41,581 trees in next 10 years.

The row of plants facing mine should be smaller species and those facing outside should be taller species.

There may be some impact on the biological environment due to the air pollution during transportation of ore to the end use plant. The dust deposition on the plants along the approach road may reduce the photosynthesis. This will be taken care by transportation of ore in, covered truck with tarpaulin and regular water sprinkling on the approach road. Plantation along the approach road will further reduce the impact. There is no water discharge from the mine, hence impact due to effluent discharge in surrounding area is ruled out.

Noise and vibrations due to the blasting operations cannot be avoided. However, the blasting operations will be limited to day hours only during 12.00 to 13.00, so as to minimize disturbance to wildlife. All necessary precautions & norms will be adhered





as prescribed by DGMS to avoid flying off objects outside ML due to blasting operation. All safety precaution and norms for prescribe by DGMS will be followed during blasting operation.

4.10 SOCIO ECONOMIC IMPACT OF THE PROJECT AND SAFETY MEASURES

Critically analyzing the existing environmental status of the socio-economic profile and visualizing the scenario with the project, the impacts of the project would be varied and may generate both positive and negative impacts of the proposed project in the region that are stated below:

4.10.1 Positive Impacts

4.10.1.1 Rehabilitation and Resettlement

The project does not envisage any leasing or acquisition of private land. Hence R&R plan is not applicable under the present proposal.

4.10.1.2 Increase in Job Opportunities

As per the survey it has been observed that the population in general do not have opportunities of earning from employment and the non-worker population is higher in the region so the mining operations in general will help to provide direct and indirect job opportunities for auxiliary and ancillary works. Hence jobs and business opportunities in logistical activities will come up. The mining operation will provide employment to mostly the local people

As the influx of population such as truck drivers, attendants, contractors and labourers will increase in the area. Many auxiliary jobs will also increase such as Dhabbas/ hotels, Tea stalls, vehicle repairing shops etc ultimately increasing the economic status of the area.

4.10.1.3 Minimal Burden in the Existing Infrastructure Facilities

Local work force will be given first preference in the mining activity due to which influx of the outsiders will be very minimal. If sufficient number of local workers will not be available, then workers from outside will be engaged.

4.10.1.4 Improvement in Infrastructure

The activity will benefit the local people due to provision of more infrastructural facilities such as developments of approach routes within the village area, street light, health facilities etc.





4.10.2 Adverse Impacts:

- Productivity of crops will be deteriorated affecting the agriculture-based livelihood due to the pollution arising out of the mines, if proper mitigation measures are not implemented.
- Mining generates extra vehicle traffic, which negatively impairs the environment and also the local environment may be impacted. But to mitigate the impact trees will be planted in the area of mine site
- Risks of accidents are expected during loading of minerals into truck/tractors-trolley and during transportation. This can be avoided by adopting good safety measures and practices.

4.10.3 Mitigation Measures of Socio-economic Environment

- Adequate measures have been envisaged in the project design to control dust & noise. Proposed adequate & effective control measures will be provided which include dust suppression
- Well maintained tarpaulin covered trucks etc shall be used. Therefore, the likely adverse impacts on people, health, social and economic factors will be minimized
- Female population in the study area must be given education about the awareness of sex education and health education and safety through awareness camps in collaboration with the local NGOs
- Periodic health check-up camps shall be organized by project authority for villagers near the project villages
- Apart from the normal health check-up, emphasis shall also be given to prevent specific diseases originating due to emission of different pollutants such as respiratory ailments, skin problems, water borne diseases, hearing abilities etc.
- Job oriented training courses must be organized through industrial / technical training institutions for educated youth like electrical, tailoring, plumbing, type writing, shorthand and machine repairing, welding fabrication, and other skill developing trades
- Whenever necessary, collaboration between project authority and local bodies will be done on regular basis with an objective to build and maintain a good relationship which is necessary for smooth functioning of the project as well as progress and welfare of the people in the study area
- Awareness programs will be taken to make people aware about the environmental protection, need of water conservation etc.

4.11 GREEN BELT DEVELOPMENT PLAN

In order to minimize the environmental impacts arising due to the proposed project, especially from air pollution, noise pollution, soil erosion etc., the Greenbelt development around the project sites can provide the mitigation option. The green canopy not only absorbs some of these pollutants but also improves the aesthetic environment. Therefore, a "Green Belt Development Plan" has been proposed.

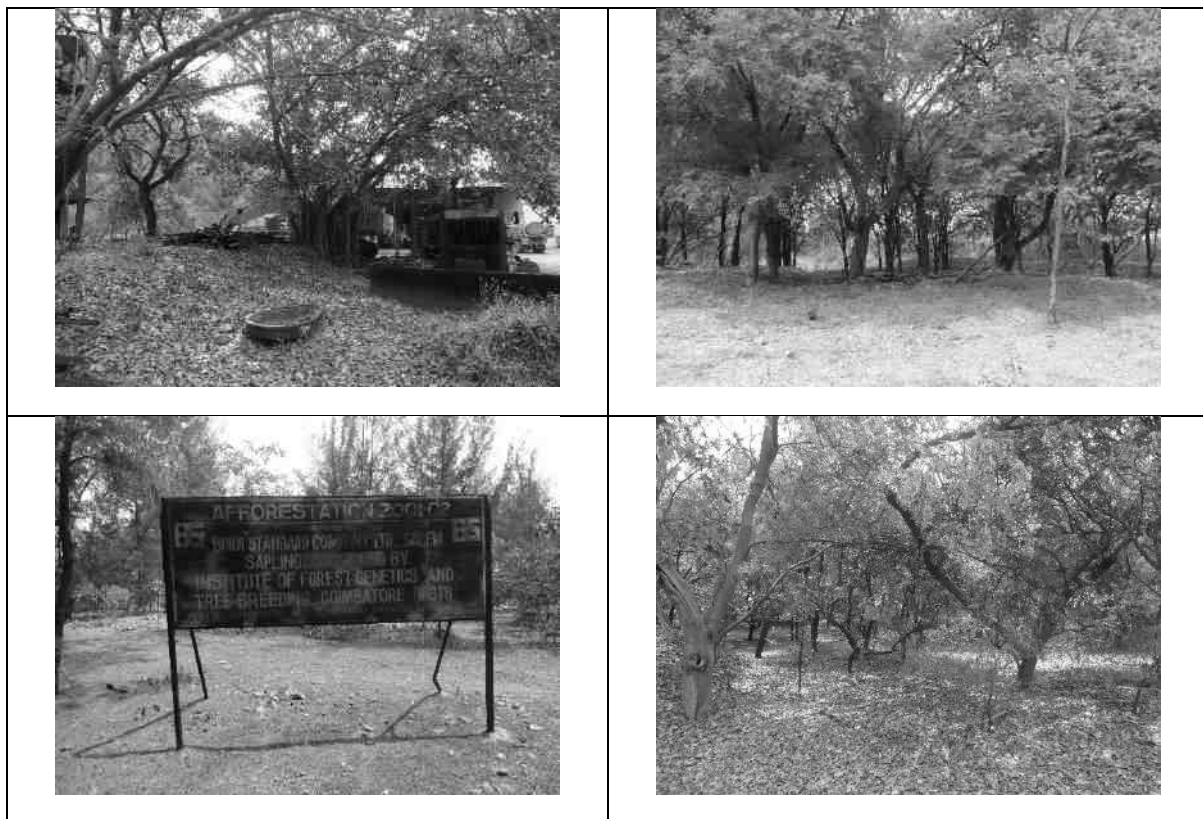




Under the afforestation plan, plantation will be done on both side of the approach roads, Safety zone, Waste dump and in mined out area as well as in nearest village. The species selected are dust tolerant and fast growing. Plantation along the roads side is necessary as these areas will contain fine particulates resulting from mineral transportation activity. Plantation will also be carried out as social forestry programme in villages, school and the areas allocated by the Panchayat/State authorities. A suitable combination of trees that can grow fast and also have good leaf cover shall be adopted to develop the greenbelt.

The project area will be reclaimed by greenbelt development and gap plantation, total 4,10,975 trees on 33 % of lease area @ 2000 trees per ha, will be planted inside the mining lease area on waste dump, in backfilled area, and along approach road. Out of this 205 ha (33% area of Mine lease area) of green belt development area 58.26 ha area has been developed as green belt area with planting 34,950 trees and 16.63 ha area will be covered under greenbelt development with 41,581 trees in next 10 years.

The greenbelt development program is given in **Table 4.19**.





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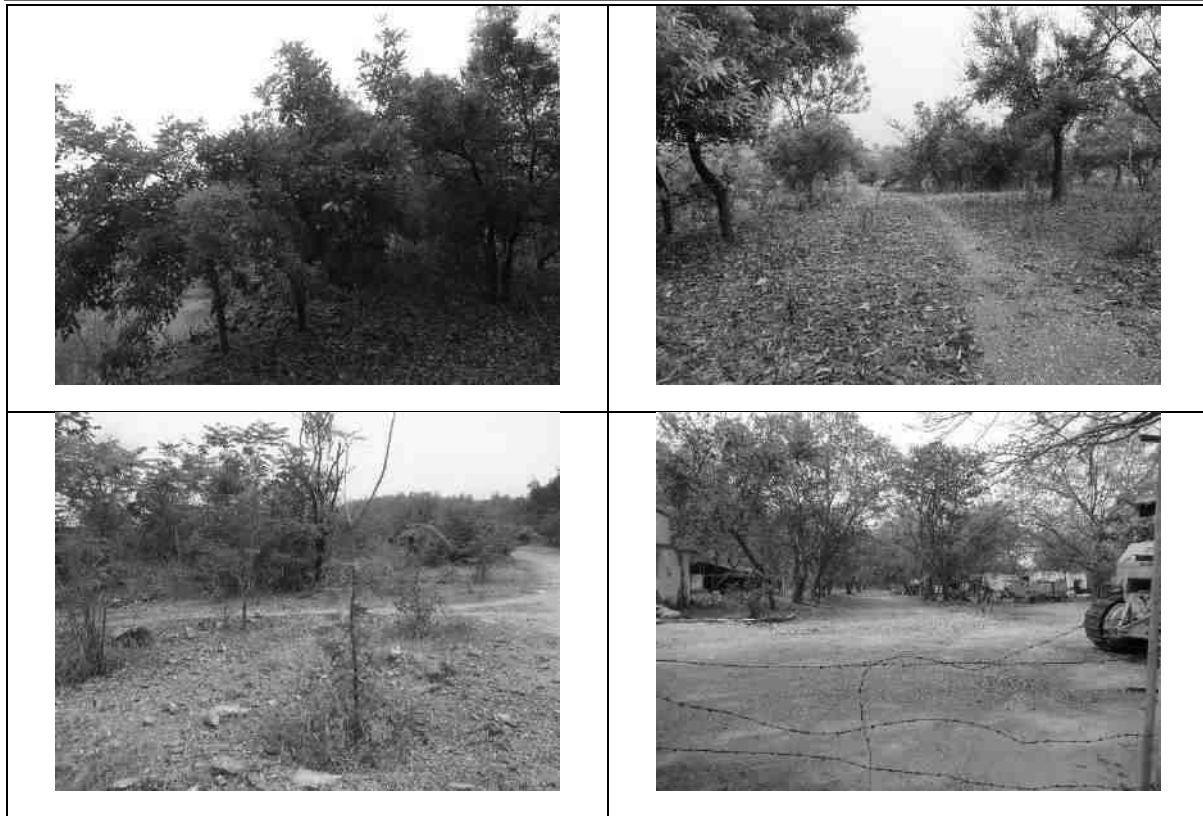


Figure 4.9: Photographs of the Mine (Existing Plantation)

The existing afforestation and greenbelt details is given in **Table 4.18**.

Table 4.18: Area of Plantation under Existing Greenbelt

Block Name	Afforestation area in ha	Greenbelt in ha	Total Area in ha	No of trees
Block I	30.06.05	2.20.30	32.26.80	19350
Block II	0.68.40	1.73.40	2.41.80	1450
Block III	19.53.00	-	19.53.00	11700
Block IV	4.04.00	-	4.04.00	2450
Total			58.25.60	34950

Table 4.19: Plan for the Proposed Afforestation & Greenbelt till 10 years

Block Name	Afforestation area in ha	Greenbelt in ha	Total Area in ha	No of trees
Block I	-	1.33.47	1.33.47	3337
Block II	1.50.53	1.76.42	3.26.95	8174
Block III	1.51.17	4.89.25	6.40.42	16010
Block IV		5.62.38	5.62.38	14060
Total			16.63.22	41581





Table 4.20: Budget for Greenbelt Development till 10 years

S. No.	Total Plantation	Capital Budget (Rs. in Lakhs)	Recurring Budget (Rs. in Lakhs)
1.	41581	103.95	4.0

4.11.1 Guidelines for Plantation

The plant species identified shall be planted using pitting technique. The pit size will be either 45 cm x 45 cm x 45 cm or 60 cm x 60 cm x 60 cm. bigger pit size will be considered at marginal and poor-quality soil. Soil used for filling the pit should be mixed with well decomposed farm yard manure or sewage sludge at the rate of 2.5 kg (on dry weight basis) and 3.6 kg (on dry weight basis) for 45cm x 45 cm x 45 cm and 60 cm x 60 cm x 60 cm size pits respectively. The filling of soil should be completed at least 5-10 days before actual plantation. Healthy sapling of identified species should be planted in each pit with the commencement of monsoon. Provision for regular and liberal watering during the summer period during the commissioning stage of the plant will be arranged from the local available resources. The authorities responsible for plantation will also make adequate measures for the protection of the saplings. While making choices of plant species for cultivation in green belt, weightage has been given to the natural native species, bio climatic condition, plants which can be grown as per normal horticultural practices. Plant species identified for greenbelt development, considering the bio-climatic and soil condition.

4.11.2 Selection of Plants for Greenbelts

The main limitation for plants to function as scavenger of pollutants are, plant's interaction to air pollutants, sensitivity to pollutants, climatic conditions and soil characteristics. While making choice of plants species for cultivation in green belts, due consideration has to be given to the natural factor of bio-climate. Xerophytes plants are not necessarily good for greenbelts; they with their sunken stomata can withstand pollution by avoidance but are poor absorber of pollutants. Character of plants mainly considered for affecting absorption of pollutant gases and removal of dust particle are as follows.

4.11.2.1 For Absorption of Gases

- Tolerance towards pollutants in question, at concentration, that are not too high to be instantaneously lethal.
- Longer duration of foliage.
- Freely exposed foliage.
- Adequate height of crown.
- Openness of foliage in canopy.





- Big leaves (long and broad laminar surface)
- Large number of stomatal apertures.

4.11.2.2 For removal of suspended particular matter

- Height and spread of crown.
- Leaves supported on firm petiole.
- Abundance of surface on bark and foliage.
- Roughness of bark.
- Abundance of auxiliary hairs.
- Hairs or scales on laminar surface.
- Protected Stomata.

4.11.3 Objective of Green Belt Development Plan

The main purpose of this plan is to develop greenbelt and landscape at project site so that following specific purpose is met with after completion of the project:

- a. General pollution abatement.
- b. Air pollution attenuation.
- c. Dust absorption.

To attain the target as envisaged under the State Forest Policy and National Forest Policy, the provision of green belts/avenue plantations is made under developmental projects.

Table 4.21: List of Species for Plantation

Botanical Name	Trade Name
Tall Species	
<i>Albizzia lebbek</i>	Siris
<i>Azadirachta indica</i>	Neem
<i>Polyalthia longifoila</i>	Druping Ashok
<i>Mangifera indica</i>	Aam
<i>Ficus religiosa</i>	Peepal
<i>Butea spp</i>	Palash
<i>Cassia siamea</i>	Cassia
<i>Pongamia pinnata</i>	Karanj
<i>Cassia fistula</i>	Amaltas
Small Species	
<i>Thevieta peruviana</i>	Yellow Kaneer





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Botanical Name	Trade Name
<i>Nerium sp.</i>	Pink Kaner
<i>Bougainvillea spp.</i>	Bougainvillea
<i>Zizyphus sp.</i>	Ber
<i>Delonix regia</i>	Gulmohar
<i>Duranta sp.</i>	Duranta
<i>Murriya exocitica</i>	Kamayani
<i>Acacia arabica</i>	Babool
<i>Annona squamosa</i>	Sharifa
<i>Cassia auriculata</i>	Cassia

Plants selected for plantation on the backfilled area shall be draught hardy in nature, with fast growth rate and with glabrous/ pendulous leaves, and with large crown volume to surface area of fluttering leaves. The species selected will be from among the following.

Table 4.22: List of Species for Plantation on backfilled area

Botanical Name	Trade Name
<i>Albizia lebbeck</i>	Siris
<i>Leucaena leucocephala</i>	Subabool
<i>Ficus religiosa</i>	Peepal
<i>Polyalthia longifoila</i>	Druping Ashok
<i>Azadirachta indica</i>	Neem
<i>Pongamia pinnata</i>	Karanj
<i>Acacia arabica</i>	Babool
<i>Zizyphus sp.</i>	Ber
<i>Acacia leucophloea</i>	<i>Acacia</i>
<i>Annona squamosa</i>	<i>Sitaphal</i>

Post Plantation Care

Immediately after planting the seedlings, watering will be done. Further watering will depend on the rainfall. In the dry seasons watering will be regularly done especially during March to June. Watering in one year planted saplings will be more frequent (thrice a week). Manuring will be done using organic manure (animal dung, agricultural waste, kitchen waste, etc.). Younger saplings will be surrounded with tree guards. Diseased and dead plants will be uprooted and destroyed and replaced





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by fresh saplings. Growth / health and survival rate of saplings will be regularly monitored and remedial actions will be undertaken as required.



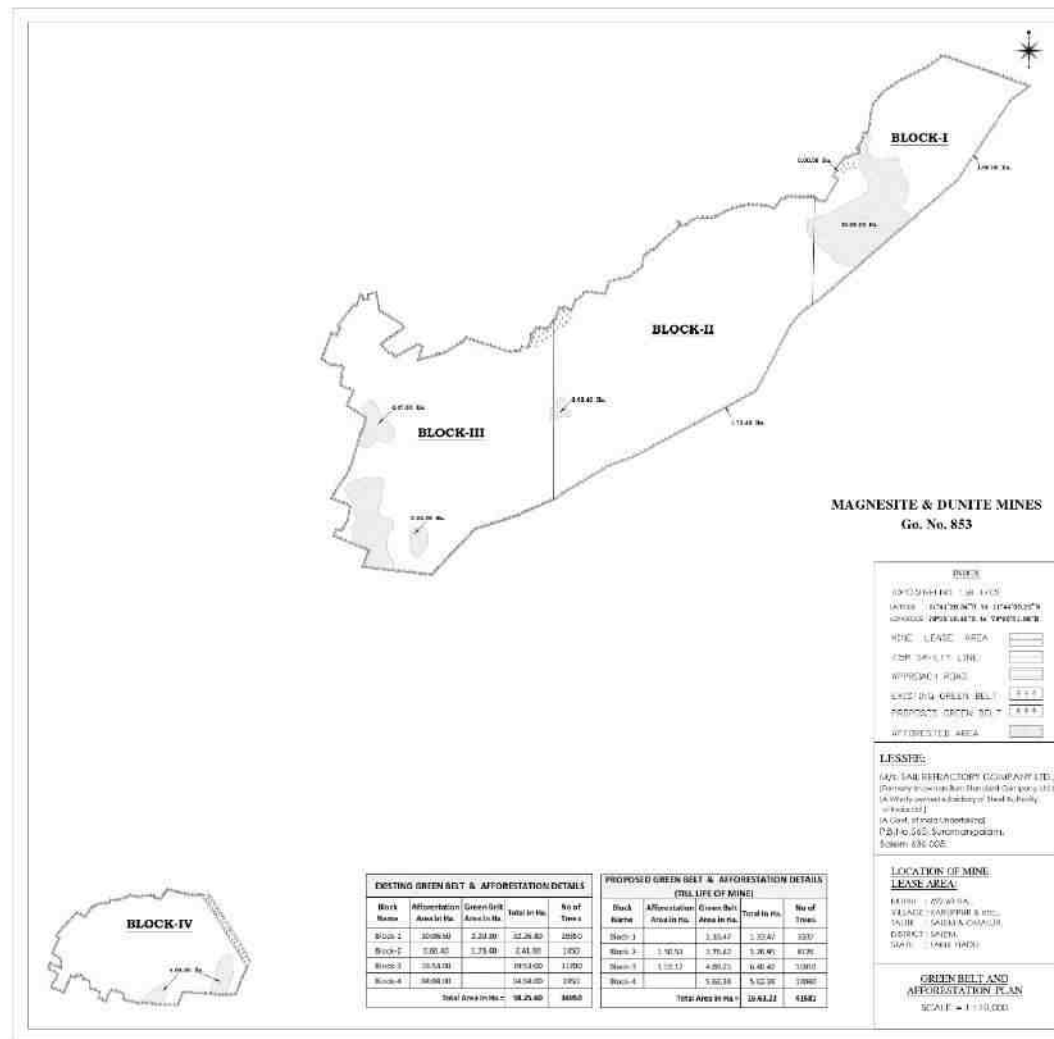


Figure 4.10: Plantation Map





4.12 MINE CLOSURE PLAN

The mine closure plan is one of the most important requirements in the environmental management of mining projects. The closure operation is a continuous series of activities right from the commencement to decommissioning of the project. Therefore, the progressive mine closure plan is specifically included in the mining plan, which is to be reviewed every five years in the scheme of mining. The primary aim is to ensure that the following broad objectives along with the abandonment of the mine can be successfully achieved:

- Creation of a productive and sustainable after-use for the site, acceptable to mine owners, regulatory agencies, and most importantly to the community.
- Protection of public health and safety of the surrounding habitation.
- Minimization of environmental damage.
- Conservation of valuable attributes and aesthetics.
- Counter balancing the adverse socioeconomic impacts.

4.12.1 Post Mining Land Use

At present 175.08 ha land is under various mining activities. At the end of the present planned period, land utilization shall increase to 176.35 ha and at the end of mining, total 176.9345 ha shall come under active utilization. At the end of mining activity, the land use of the area will be changed. The quarry area will be fenced to prevent any inadvertent movement of persons into the area. Part of the area covered under waste dumps will be afforested by plantation. Plantation will be carried out 7.5 m statutory barrier. Further exploration will be carried out based on which life of mine may get extended.

The information on protective measures for reclamation and rehabilitation works year wise may be provided as per the following **Table 4.23**:





Table 4.23: Reclamation and Rehabilitation as per mining plan

Items	Details	Proposal				
		FY 2020-21	FY 2021-22	FY 2022-23	FY 2023-24	FY 2024-25
Dump management	Area afforested (ha)	Dump Area	Dump Area	Dump Area	Dump Area	Dump Area
	No of saplings planted	2,000	2,000	2,000	2,000	2,000
	Cumulative no of plants	4,000	4,000	6,000	8,000	10,000
	Cost including watch and care during the year.	0.30 Lakh	0.30 Lakh	0.30 Lakh	0.30 Lakh	0.30 Lakh
	Garland drain construction around the dumps	No Proposal	No Proposal	No Proposal	No Proposal	No Proposal
Management of worked out benches	Area available for rehabilitation (ha)	NIL	NIL	NIL	NIL	NIL
	Afforestation done(ha)	NIL	NIL	NIL	NIL	NIL
	No of saplings planted in the year	NIL	NIL	NIL	NIL	NIL
	Cumulative no of plants	NIL	NIL	NIL	NIL	NIL
	Any other method of rehabilitation (specify)	NIL	NIL	NIL	NIL	NIL
	Cost including watch and care during the year	NIL	NIL	NIL	NIL	NIL
Reclamation and Rehabilitation by backfilling	Void available for Backfilling (L x B x D) pit wise /stope wise	NIL	NIL	NIL	NIL	NIL
	Void filled by waste /tailings	NIL	NIL	NIL	NIL	NIL
	Afforestation on the backfilled	NIL	NIL	NIL	NIL	NIL





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Items	Details	Proposal				
		FY 2020-21	FY 2021-22	FY 2022-23	FY 2023-24	FY 2024-25
	area					
	Rehabilitation by making water reservoir	NIL	NIL	NIL	NIL	NIL
	Any other means (specify)	NIL	NIL	NIL	NIL	NIL
Rehabilitation of waste land within lease	Area available (ha)	NIL	NIL	NIL	NIL	NIL
	Area rehabilitated	NIL	NIL	NIL	NIL	NIL
	Method of Rehabilitation	NIL	NIL	NIL	NIL	NIL
Others (specify)	Total cost including ambient air, water, noise, soil and ground vibration quality monitoring.	Rs. 9.08 Lakh	Rs. 9.08 Lakh	Rs. 9.08 Lakh	Rs. 9.08 Lakh	Rs. 9.08 Lakh





5. ANALYSIS OF ALTERNATIVES (TECHNOLOGY & SITE)

The proposed project is for Mining of Magnesite and Dunite (Mine Lease Area 622.69 Ha, Production Capacity 26, 43,936 MTPA ROM) at Village Thathaiyangerpatti, Moongilpadi, Karuppur, Vellakkalpatti, Mallamoopanpatti Taluk Omalur & Salem, District Salem, Tamil Nadu. A comparison of alternatives helps to determine the best method of achieving the project objectives with minimum environmental impacts or indicates more environmentally friendly and cost-effective options.

5.1 ANALYSIS OF ALTERNATIVE SITE

Since the mining activity is site specific and it depends on occurrence of minerals and ores and also as per allocation by State department, therefore, alternate sites are not examined with respect to this project. However, the site has following benefits:

- **Site Connectivity:** Mining site is well connected with National Highway NH- 7 at a distance of 800 m in NE from block IV and nearest Railway Station magnesite railway station is only at a distance of 300 m in NW from Block IV. Salem is the nearest town located at a distance of 6 km in SE from Block IV. Good connectivity for transportation of material.
- **Manpower:** The mining activity has not been carried out since 10.01.2017, however prior to that the mine was operational, hence both high skilled, skilled, semi-skilled and unskilled labour are easily available at the site.
- Proximity to the electricity grid.
- Sub soil water is available at reasonable depth.

5.2 ENVIRONMENT SENSITIVITY OF THE LOCATION

1. There is no Wildlife Sanctuary / National Park / Bio-sphere Reserve / Habitat of Migratory birds within 10 km radius from the project site.
2. There is no Tiger Reserve / Elephant Reserve / Turtle Nesting Ground within 10 km radius from the project site.
3. There is no Archaeological Monument / Defence installation within 10 km radius from the project site.

5.3 ALTERNATIVE FOR TECHNOLOGY

The technology envisaged for the project is proven. The technology is not new, easily available and working successfully in the vicinity of the project and elsewhere. A brief of the technology including Method of Work and Design parameters is given in **Chapter-2**.





The proposed project envisaged state of art technology, presently available in the country in their project design. Hence, the proposed project will help in reducing impact on the environment. The anticipated adverse impacts shall be less due to the following:

- All statutory requirements, guidelines and recommendations of CECB/CPCB/MoEF&CC shall be complied.
- No waste water shall be discharged outside.
- Waste to be generated shall be disposed-off in environment friendly manner through internal OB Dumps.
- Air emission shall be controlled by providing adequate pollution control equipment.
- Continuous efforts shall be made for improvement of the socio-economic status of the surrounding area.





6. ENVIRONMENTAL MONITORING PROGRAM

6.1 INTRODUCTION

Environmental Monitoring is an essential tool for sustainable development and ensuring effective implementation of Environmental Management Plan and mitigation measures. The monitoring and evaluation of the management measures envisaged are critical in implementation of the Project. Monitoring involves periodic checking to ascertain whether activities are going according to the plans. The purpose of the environmental monitoring plan is to ensure that the envisaged purpose of the project is achieved and results in desired benefits.

To ensure the effective implementation of the proposed mitigation measures, the broad objectives of monitoring plan are:

- To implement the mitigative measures defined in EMP.
- To evaluate the performance of mitigation measures proposed in the EMP.
- To evaluate the adequacy of Environmental Management Plan.
- To suggest improvements in management plan, if required
- To improve environmental quality.

A detailed monitoring of emissions and effluent from different sources for different environmental parameters will be carried out as per the permitted norms and any further notification / direction from Tamil Nadu Pollution Control Board, Central Pollution Control Board (CPCB) and MoEF&CC. Monitoring methodologies will follow standard methods prescribed by Central Pollution Control Board (CPCB), Bureau of Indian Standards (BIS), USEPA, AWWA etc.

6.2 PARAMETERS TO BE MONITORED

- Ambient Air Quality,
- Work zone Air quality,
- Water Quality and Ground Water Level
- Noise Level
- Vibration study
- Performance of pollution control equipment

6.2.1 Ambient Air Quality

Ambient air quality monitoring in core zone and buffer one will be done as per direction by TNPCB. The selected parameters shall be monitored as per National Ambient air quality Standard, 2009.





Table 6.1: Proposed Ambient Air Quality Monitoring (Frequency and Parameters)

Description	Number of Monitoring Stations	Frequency
Ambient Air Quality	6	Monthly
Parameters – PM ₁₀ , PM _{2.5} , SO ₂ , NO ₂ , CO, PAH (both side of the road)		

6.2.2 Stack Monitoring

DG set Stack analysis will be carried out as per CTO of TNPCB.

6.2.3 Fugitive Emissions Monitoring

Fugitive emissions shall be monitored as per GSR 809 (E) in predominant down wind direction for **Particulate Matters** at a distance of 25 ± 2 meters from the source of pollution, at following locations:

Table 6.2: Fugitive Emissions Monitoring Location

Area	Monitoring Location
Mine Face	Drilling, excavation and loading
Haul Road / Service Road	Haul road to spoil bank and Waste Dumps, spoil bank to mine exit
Ore Storage and loading	Spoil bank/ waste
Waste Dumps	Active Waste Dumps

6.2.4 Effluent Quality - Not Applicable

There will be no effluent generation from the mine. Domestic waste water is being treated in Septic tank, followed by Soak pit.

6.2.5 Ground and Surface Water Quality

Ground water quality of the Borewells / Hand pumps shall be measured, twice in a year, to check for the quality of ground water for any contamination due to dumping. Results of the ground water will be compared with IS: 10500:2012, drinking water standard.

Surface Water Samples will be collected from two locations in nearby villages and will be compared with IS: 2296 surface water standard.





6.2.6 Noise Monitoring

Work-Zone Noise

Noise monitoring shall be carried out at near to the high noise generating areas like Drilling, Blasting, DG Set, Compressor etc., once in a month.

Ambient Noise

Ambient noise levels will be monitored once in every quarter during day time (6 AM to 10 PM) and night time (10 PM to 6 AM) as per The Noise Pollution (Regulation and Control) Rules, 2000, Schedule III at Industrial, Commercial, Residential and Silence Zone.

Table 6.3: Noise Monitoring Station at Core Zone and Buffer Zone

Station Code	Monitoring Station
Core Zone	
N1	Project Site (block I to III)
N2	Project Site (block IV)
Buffer Zone	
N3	Mettupatti
N4	Kullakavundunur
N5	Keeraipappampadi

6.2.7 Soil Characteristics

Soil quality shall be monitored once in a year at two locations, as per the prevailing practice, to check the impact of mining on soil, particularly on nearby agriculture land

Table 6.4: Existing & Proposed Soil Measurement Locations

Sample code	Monitoring Station	Latitude	Longitude
S1	Mettupatti	11°42'37.9"N	78°6'28.2"E
S2	Kullakavundunur	11°43'22.1"N	78°5'18.5"E

6.2.8 Inspection / Monitoring of quarry slope and dump slope failure

Regular examination will be carried out to look after the slope failure on mine faces etc. Slope Stability is a critical safety and production issue for open-cast mines around the world to understand the probability of mine wall failures. Dump slope failure occurs mainly due to accumulation of water in dumping areas, formation of





gullies in the dump slopes, improper terracing/dumping etc. with precision level inspection on regular interval.

6.2.9 Study of Blasting effect

Main reason of fly rock due to blasting is Improper blast design i.e., less stemming, inadequate burden & spacing, high charge concentration, improper delay, presence of geological discontinuities such as joints, faults, muds etc. Regular study shall be conducted for proper designing of blast (i.e., charge weight per blast, number of holes, spacing, stemming etc.). Ground vibration and sound overpressure will be compiled.

6.2.10 Plantation

Plant growth, its maintenance and survival rate will be monitored.

6.2.11 Occupational Health & Safety Monitoring

Surveillance of workers health: A systematic program for medical check-up at regular intervals will be followed at the Mine for all workers (including contractor workers) to ascertain any changes in the health condition of workers due to the working conditions. Employee's health is being checked at the time of joining and at regular interval, thereafter.

Inspection and Testing of Safety Appliances: All safety appliances shall be regularly inspected and tested as hazard control measures for mine operation. The inspection shall verify that issued personal protective equipment (PPE) continues to provide adequate protection and is being worn as required.

6.2.12 Training

Training activities for employees and visitors shall be adequately monitored and documented (curriculum, duration, and participants). Emergency exercises, including fire drills shall be documented adequately.

6.2.13 Periodic Inspection of Effectiveness of Pollution Control Facilities

A detailed inspection schedule shall be drawn for checking the effectiveness all pollution control systems. The maintenance shall be done strictly as per schedule and guidelines furnished by equipment manufacturer.

6.2.14 Socio-Economic Development – Monitoring of the commitments made to address the concern of stakeholders during PH

The communities, benefited by the mine, are the key stakeholders of the mining. It is suggested that SRCL should have structured interactions with the community to





disseminate the measures taken by the mine and also to elicit suggestions for overall improvement for the development of the area.

6.2.15 Accidents and Diseases Monitoring

SRCL shall establish procedures and systems for reporting and recording of Occupational accidents and diseases and dangerous occurrences and incidents.

These systems shall enable workers to report immediately to their immediate supervisor any situation they believe presents a serious danger to life or health. The systems and the employer shall further enable and encourage workers to report to management all:

- Occupational injuries and near misses;
- Suspected cases of occupational disease; and
- Dangerous occurrences and incidents.

All reported occupational accidents, occupational diseases, dangerous occurrences and incidents together with near misses shall be investigated with the assistance of a person knowledgeable/competent in occupational safety. The investigation shall:

- Establish what happened;
- Determine the cause of what happened; and
- Identify measures necessary to prevent a recurrence

6.3 BUDGET ALLOCATION FOR MONITORING

In order to maintain the environmental quality within the stipulated standards, regular monitoring of various environmental components is necessary. For this the project proponent has constituted an Environmental Management Cell. The Cell will make appropriate budget for the purpose. Regular record review for any change in financial requirement of environment management will be done and appropriate budgetary provisions will be made. Along with other budgets, Budget for environmental monitoring will be prepared and revised regularly as per requirement.

Table 6.5: Cost of Environmental Monitoring Program

S. No.	Item	Cost in Rs. Per year
1.	Cost of monitoring of environmental parameters for Air, Water, Noise and Soil	9,08,000
2.	Monitoring of Slope Stabilization & Blasting Effect	1,50,000
3.	Efficiency monitoring of Pollution Control Equipment	50,000
4.	Plantation	400,000
5.	Socio-economic development	100,000



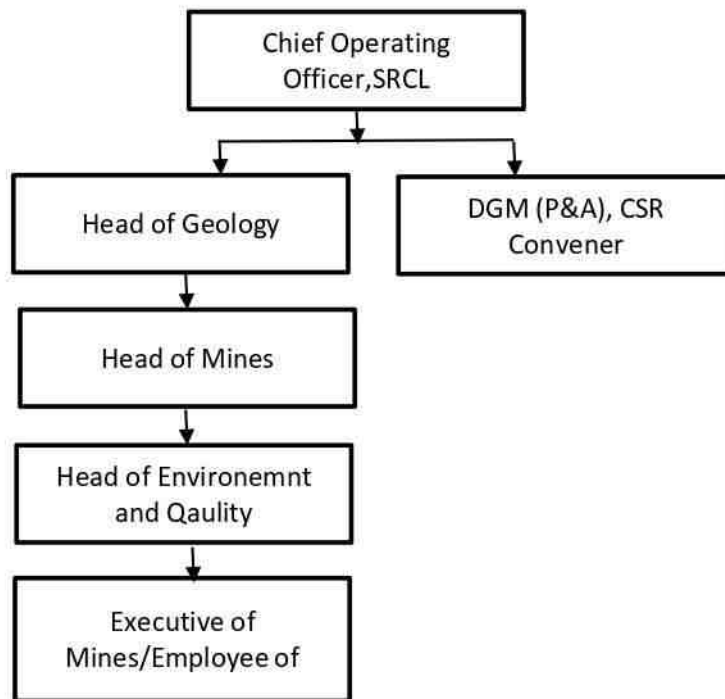


Total	1608000
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6.4 ENVIRONMENTAL MANAGEMENT CELL

SRCL is committed for implementation of all the mitigation and management measures suggested in Environmental Monitoring Program. A separate department "Environmental Management Cell" (EMC) will be established to look after all environmental related matters of the mine. The EMC will supervise the reported activity from time to time for smooth implementation of Environmental Monitoring Program and Mitigation and Management measures and will take necessary actions if required. The cell will act to ensure the suitability, adequacy and effectiveness of the Environment Management Program. It will also ensure to meet all the Statutory Requirements.

Organizational set-up of EMC is as follows:



Considering the statutory requirement and requirement of various operational departments the estimated manpower for the EMC is:

Table 6.6: Manpower at EMC

Description	Man power
Chief Operating Officer, SRCL	1
DGM (P&A) CSR Convener	1
Head of Geology	1





Draft EIA Report for Mining of Magnesite & Dunite over an area 622.69 Ha, located at Villages Thathaiyangerpatti, Moongilpadi, Karuppur, Vellakkalpatti, Mallamoopanpatti, Taluk - Omalur & Salem, District-Salem (Tamil Nadu) By M/s SAIL Refractory Company Limited (SRCL).

Description	Man power
Head of Mines	1
Head Environment and Quality	1
Executive of mines/Employee of Mines	2
Total	7

EMC will serve the following purpose:

- Identification of any environmental problem, which may occur in the mine or surrounding area
- Initiating or providing solutions to those problems through designated channels and verification of the implementation status
- Control of activities inside the mine, until the environmental problem has been corrected
- Suitably respond to emergency situations. Provide details of the emergency and the actions taken to the top management
- Suitably make modifications or alterations in the mine to meet regulatory standards as amended from time to time.

6.4.1 Monitoring & responsibility

The cell will responsible for monitoring of the mine environment related requirements which include:

6.4.2 Interaction with the State Pollution Control Board

EMC shall be in regular touch with TNPCB and shall send them environmental monitoring reports regularly in the prescribed format, as per the prevailing practice. Any new regulations considered by State/Central Pollution Control Board for the mine shall be taken care of by EMC.

6.4.3 Providing Training

EMC would be responsible for the implementation of the EMP, needs to be trained on the effective implementation of the environmental issues. To ensure the success of the implementation set up proposed, there is a high requirement of training and skill up-gradation. For the proposed project, additional training facilities will be developed for environmental control. For proper implementation of the EMP, the officials responsible for EMP implementation will be trained accordingly.

To achieve the overall objective of pollution control it is essential not only to provide latest pollution control and monitoring systems but also to provide trained man power resources to operate and maintain the same. So far, the practice with many mines is to utilize the mine operations and maintenance crew for operation of systems. This





has shown adverse results due to lack of specialized knowledge in addition to priority selection. Therefore, apart from the EMC, specific training will be provided to personnel handling the operation and maintenance of different pollution control equipment.

In-mine training facilities will be developed for environmental control. Specialized courses at various Research / Educational institutes will be organized. The training will be given to employees to cover the following fields:

- Awareness of pollution control and environmental protection to all.
- Operation and maintenance of specialized pollution control equipment.
- Organize field monitoring, maintenance and calibration of pollution monitoring instruments.
- Laboratory testing of pollutants.
- Repair of pollution monitoring instruments.
- Occupational health/safety.
- Disaster management.
- Environmental management.
- Afforestation / plantation and post care of mine.
- Knowledge of norms, regulations and procedures.
- Risk assessment and Disaster Management.

The cell will also be responsible for monitoring of the mine safety and safety related systems which include

- Checking of safety related operating conditions.
- Visual inspection of safety equipment
- Preparation of a maintenance plan and documentation of maintenance work specifying different maintenance intervals and the type of work to be performed

Other responsibilities of the cell will include

- A CPCB/TNPCB registered agency will be retained to generate the environment quality data in respect of air, water, noise, soil and meteorology and prepare the Environmental report.
- Submitting environmental monitoring report to TNPCB. The cell will also take mitigative or corrective measures as required or suggested by the Board.
- Timely renewal of Consents & Authorization will be taken care of.
- Conduct and submit annual Environmental Statement to the State Pollution Control Board in Form V under Rule 14 of the Environment (Protection) Second Amendment Rules 1992 of the Environment (Protection) Act, 1986.
- Prepare and submit six monthly report on the compliance with the conditions of the environmental clearance and submit to the Regional Office of MoEF&CC
- Comply with the conditions prescribed under the Consents and Authorization
- File timely return under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016, E-Waste (Management) Rules, 2016 and Batteries (Management and Handling) Rules, 2001.





- Keeping the management updated on regular basis about the findings / results of monitoring activities and proposes measures to improve environmental performance.
- Conducting regular safety drills and training programs to educate employees on safety practices. A qualified and experienced safety officer will be responsible for the identification of the hazardous conditions and unsafe acts of workers and advise on corrective actions, organize training programs and provide professional expert advice on various issues related to occupational safety and health.
- Conducting safety and health audits to ensure that recommended safety and health measures are followed.

Responsibilities for Environmental Management Cell (EMC) under Integrated Management System of the Mine

The responsibilities of the EMC include the following:

- Green belt development and inventory of flora
- Ensuring minimal use of water.
- Proper implementation of pollution control measures.
- Access the risk area.
- Implementation of QMS.
- Conducting Internal Audits.
- Closing of NCs and conduction of Management Review Meetings.
- Implementation of the control and protective measures.
- Coordination related to environment related activities within the project area as well as related outside agencies.
- Collection of health statistics of workers.
- Monitoring the progress of implementation of environmental management programme.
- Management of drainage system, dumps, reclamation and restoration etc.
- To make continuous efforts to improve environment.





Table 6.7: Responsibility Matrix for Implementation of Environmental Management Cell (EMC)

Attributes	Environmental Management					Reporting and Receiving Feedback from Statutory Authority	
	Primary Responsibility and Report Generation	Short Term and Time Series Analysis and Generation of Status Report	Approval of Status Report and Decision on Actions	Implementation of Follow up Action	Verification of Follow up Action and Reporting Back to Approval Authority	Who will do?	Whom to report?
Environment Monitoring (Air, Water & Noise)	EMC [Employee/Executive of Mine Department]	Head (Environment and Quality)	Head of Mines (EMC)	EMC [Employee/Executive of Mine Department]	COO (EMC)	EMC	Regional MoEF&CC/SP CB
Plantation & Greenbelt development	EMC [Employee/Executive of Mine Department]			EMC [Employee/Executive of Mine Department]			
Reclamation progress [Biological reclamation]	EMC [Employee/Executive of Mine Department]			EMC [Employee/Executive of Mine Department]			
Social Welfare	CSR cell			CSR cell			





Attributes	Environmental Management					Reporting and Receiving Feedback from Statutory Authority	
	Primary Responsibility and Report Generation	Short Term and Time Series Analysis and Generation of Status Report	Approval of Status Report and Decision on Actions	Implementation of Follow up Action	Verification of Follow up Action and Reporting Back to Approval Authority	Who will do?	Whom to report?
Reclamation progress [Technical reclamation]	Mining & Excavation			Mining & Excavation		Mining & Excavation	DGMS
Drainage cleaning	Civil			Civil		NA	
Water and Energy Utilization	Mechanical, Electrical and Civil Maintenance			Mechanical, Electrical and Civil Maintenance			
Occupational Health Monitoring	Health unit			Mining & Excavation			
Dump slope, Quarry slope inspection	Mine Safety	Mine Safety	Mining & Excavation	Mining & Excavation	Mine safety	DGMS	
Blast Monitoring	Mine Safety	Mining & Excavation					
Environmental and safety related training	Vocational training centre	Vocational training centre	Vocational training centre				





6.5 SUMMARY

The environment monitoring plan enables environmental management system with early sign of need for additional action and modification of ongoing actions for environment management, improvement and conservation. The environmental monitoring points will be decided considering the environmental impacts likely to occur due to the operation of proposed project as the main scope of monitoring program is to track, timely and regularly, the change in environmental conditions and to take timely action for protection of environment. Monitoring of environmental samples will be done as per the guidelines provided by MoEF&CC/CPCB/SPCB. Separate records for water, solid wastes, air emission, soil and manure/ compost will be prepared and preserved regularly. Along with other budgets, Budget for environmental management will be prepared and revised regularly as per requirement.





7. ADDITIONAL STUDIES

7.1 PREAMBLE

In this chapter followings have been discussed:

- Public consultation / Public Hearing
- Hazard Identification and Risk Management

7.2 PUBLIC HEARING

Details will be incorporated after completion of public hearing by SPCB

7.3 HAZARD IDENTIFICATION & RISK ASSESSMENT

Risk assessment is the systematic study of uncertainties and risks encountered in various areas during any operation. Risk Assessment normally involve identification of hazards, assessment of risk associated with it, evaluation of its impacts and to suggest mitigation measures. As part of managing the health and safety of business, we must control the risks in our workplace and chalk out actions to reduce the significant consequences. Hence, it is necessary to understand what is 'Risk' due to mining operations and purpose of Risk Assessment.

This will not only ensure smooth operation and but also result in savings by reducing the lost manhours due to accidents. The same thing is true for explosives, where the slightest negligence may cause premature initiation causing injury to persons or damage to equipment and due to sudden release of chemical energy can create havoc.

7.3.1 Hazard

'Hazard' has been defined as a source of potential harm to people, property or the environment. Alternatively, hazard is an agent (either chemical, biological, or physical) or it is a set of conditions that presents a source of risk. In any given situation hazards are fixed, they can vary in two ways-their intrinsic nature (e.g. high pressure/low pressure) and their scale (more or a less).

Apart from electrical energy forms of physical hazards in open cast mining, the other form of physical hazards are noise and vibration from heavy earth moving machineries, damage to structure/machinery or injury to the persons due to uncontrolled blasting.

Blasting and Other Mining Operation

Most of the accidents from blasting occur due to the projectiles, as they may sometimes go even beyond the danger zone, mainly due to overcharging of the shot-holes as a result of certain special features of the local ground. Flying rocks are





encountered during initial and final blasting operations. Vibrations also lead to displacement of adjoining areas. Dust and noise are also problems commonly encountered during blasting operations. Accidents may occur due to improper, unsafe drilling practices, improper design and lack of maintenance.

Overburden

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

Heavy Machineries

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

Explosives (Sudden Release of Chemical Energy)

The same thing is true for explosive, where the slightest negligence may cause premature initiation causing injury to persons or damage to equipment; the only difference being that here the sudden release of chemical energy can cause the havoc.

7.3.2 Storage of Explosive

At present, two explosive magazines are present on the site, which are built in line with Indian Explosives act 1984 and Explosives rules 1983. The explosive is used under the supervision of certified personals of mine. Also the magazine is under control of Magazine-in-charge/Asst Manager and maintained in accordance with relevant rules and MMR 1961. SRCL will bring explosive in a certified van with a valid license from Magazine to blasting site.

To avoid the incidents in such areas, following measures to be followed if the storage of explosive onsite:

- Proper and safe storage of explosives in approved and Licensed Magazine;
- Proper, safe and careful handling and use of explosives by competent Blasters having Blaster's Certificate of Competency issued by DGMS;
- Proper security system to prevent theft/ pilferage, unauthorized entry into Magazine area and checking authorized persons to prevent carrying of match box, lights, mobile phones, cigarette or Bidi etc;
- Conventional explosives shall be used in their original cartridge packing and such cartridge shall not be cut to remove explosive for making cartridge of different size;
- Explosives shall be conveyed in special containers;
- The holes which will be charged with explosives will not be left unattended till blasting is completed;





Before starting charging, clear audible warning signals by Sirens will be given so that people nearby can take shelter.

7.3.3 Movement of Dumpers, Jeeps, Trucks, Explosive Van etc. on Haulage Road

Most of the accidents during transport of dumpers, trucks and dozers and other heavy vehicles are often attributable to mechanical failures and human errors. Identifying the hazards that come along with the presence of vehicles at the workplace (e.g. reversing operations, loading) can cause harm if not properly handled. Among some of the factors that may make vehicle accidents more likely are:

- Rough access roads
- Time pressure
- Inadequate brakes (Possibly from lack of maintenance)
- Untrained drivers
- Overturning vehicles

To avoid such accidents following measures should be taken care of:

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

7.3.4 Fire in Fuel / Oil Storage

Diesel will be stored and used in the Mine site for use in Mining Machineries, JCB/Dumper, DG sets etc. These oil barrels may leak, damage or spill and potential to catch fire. Following measures to be followed to avoid such incidents:

- Barrels of Oils to be stored inside separate room with lock at gate
- Bund wall to be constructed all along the storage area with oil collection pit at one end
- Only authorized person should be allowed to enter





- Storage area should be provided with fire proof lights
- Adequate Firefighting system to be provided

7.3.5 Water Logging

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

- Position of water body should be correctly known; and
- Draining of mine water by suitable capacity pumps.

Some of the Hazards from Open Cast Mining and their likely consequences are given in the Table, below:

Table 7.1: Hazards in Open Cast Mines

Site planning and layout	Travel in moving vehicle in uneven terrain causing accidents frequently	<ul style="list-style-type: none"> • Poor visibility • Incompetent driver • Poorly maintained vehicles 	Medium Risk
Handling of explosives	Unintended explosions (exposure to overpressure)	<ul style="list-style-type: none"> • Defective explosives • Outdated explosives • Improper handling of explosives • lightning strike • Fire (can be caused by unsafe practices or as ignition) • Sabotage 	High Risk
Charging of explosives	Unintended explosion or exposure (exposure to overpressure)	<ul style="list-style-type: none"> • Defective explosives • Outdated explosives • Improper handling of explosives • lightning strike • Fire (can be caused by unsafe practices or as ignition) • Sabotage 	High Risk
Blasting	Hit by fly rock (bodily injuries)	<ul style="list-style-type: none"> • Poor access control of blast area • Poor blasting practices (leading to excessive fly rock) 	High Risk
Bench Formation	Rock falls or slide due to lack of bench face stability (bodily injuries)	<ul style="list-style-type: none"> • Improper design of bench • Force Majeure (such as heavy floods or rainfall) • Incompetent personnel 	Low Risk
Mineral Handling and sorting (Sizing manually)	Injuries during sorting	<ul style="list-style-type: none"> • Non usage of required PPE • Incompetent • Personnel 	Low Risk





7.3.6 Risk and Risk Assessment

'Risk' is the chance, high or low that somebody will be harmed by the hazards. The frequencies and probabilities of events leading to an incident are assessed to determine risk. All the related incidents need to be studied thoroughly so that a suitable remedial action could be taken. For a want of quantitative view of hazard / incident / consequences combination, knowledge of two things is essential; how serious (are the consequences) and how often (will it happen). Here 'how serious' can be measured in many ways like number of employee fatalities, cost of damage and number of serious ill health cases in the local population. There is other 'how serious' factors, which may not be very easy to quantify but which are still highly relevant to the continuation of operations – the response of enforcing authorities and local communities.

'How often' is simply frequency (number of times a year, for examples). So, we can measure risk in terms of the combination of the two. For example, number of employee fatalities per year and financial loss per year.

The hazard, incident, consequences and risk can be put in a simple form as below;

Hazard + Incident = Consequence

Consequences x Frequency = Risk

Because there are so many combinations of hazards, incidents and consequences, it is impossible to assess them all. Complicated quantitative approach will be avoided when a simple qualitative approach is available.

7.3.6.1 Risk Assessment

The risk assessment of a mine involves identifying hazards and the risk associated with it. Risk assessment will be done in the following steps

- Step 1 : Identification of hazards
- Step 2 : Identification and Ranking of incidents and consequences.
- Step 3 : Act to reduce significant consequences
- Step 4 : Estimate frequencies of residual significant consequences.
- Step 5 : Estimate risks and prioritize action.

Step 1: Identification of Hazards

Before identification of hazard under Step 1, the damage potential of an incident, either high or medium or low, will be considered. Similarly, in terms of quantity, the hazardous incident will be consolidated either high or medium or low. After identification of hazards, the other important features like quantity, physical state and location will be identified.





It is quite obvious that the combinations like high damage potential – high quantity, high damage potential – medium quantity and medium potential – high quantity, will fall under 'High Hazard' area and it is this area, where more emphasis will be given. Similarly, the combination of high damage potential – low quantity, medium damage potential – medium quantity and low damage potential - high quantity, fall under 'Medium Hazard' area. Also, the medium damage potential – low quantity, low damage potential – medium quantity and low damage potential – low quantity, fall under 'Low hazard' area.

Step 2: Identification & Ranking of Incidents and Consequences

After identification of the hazard scale of High, Medium and Low under Step 1, scale of the incident will be found. For this purpose, the scale of incident will be judged by its severity. For example, there is small leakage on a pipe range, it will be a minor incident. But if there is leakage from a 100 mm transfer pipe, it will become an intermediate incident. But if there is failure of storage tank, this becomes major.

After ranking the hazards as High, Medium, and Low in Step 1 and the scale to incident as Minor, Intermediate and Major, the hazard / incident combinations will be identified and ranked. Combinations like High hazard – Major incident, High Hazard – Intermediate incidents, and medium hazard – Major Incidents will be ranked as those with major consequences. Similarly, High hazard = Minor incident, Medium Hazard = Intermediate incidents, and Low hazard = Major incidents will be ranked as those with intermediate consequence. And ultimately, combination like medium hazard – Minor incident, Low hazard – Intermediate incident and Low hazard – Minor incident will be ranked as those with Minor consequence.

After knowing the hazard and their location, for each potential consequence, how and where it can occur will be found and resulting primary and secondary consequences will be identified. For example, the primary consequences of a conductor falling on ground could cause disruption in power supply in the mine. The secondary consequence could be the persons or animals in forest coming in contact with live conductor inadvertently.

After identifying the significant consequences, action will be taken to eliminate or reduce them wherever this is cost effective (Step 3). Where this cannot be achieved cost effectively, more quantitative assessment to assess the frequency of the consequences will be done. (Step 4).

Step 3: Act to Reduce Significant Consequence

This will be achieved either by eliminating / reducing hazards and incidents or by exploring ways of mitigating consequences. It always involves expenses, e.g. providing automatic fire extinguishing system of HEM equipment. It is always





desirable because it avoid losses due to accident. The hazard, incident and consequences will be tackled in that order.

7.3.6.1.1 Eliminating / Reducing Hazards

For eliminating / reducing hazards, the points which will be considered are; how to eliminate the hazard, can it be substituted with something less hazardous, can it be done more efficiently. With above reference, following will be considered for eliminating / reducing hazard by substituting with less hazardous things subjected to they are cost effective.

Eliminating / Reducing Incidents

For eliminating / reducing incidents, an 'event tree' of the incident will be constructed, where the events that contribute to the incident will be listed. This gives an opportunity to explore ways of eliminating or reducing the likelihood of the events occurring. Some of the options that may be considered are as follows;

Sometimes Job Safety Analysis is a powerful method for identifying opportunities for simplifying operations of a hazardous event. This leads into frequently over-looked area of human error, which is a significant contributor to the incident. The issues involved are complexity of the operation, frequency of the operation, training of the operator, motivation of the operator to follow the correct procedures and the understanding of the operator regarding the consequences of getting it wrong.

Measures for Risk Minimization at the Proposed Mine

House Keeping: The provision and maintenance of a safe and healthy workplace is the most basic principle of health and safety. Dirty and untidy workplaces or walkways may contribute to a very large proportion of trip and fall accidents. In the context of surface mining proposal at the proposed blocks, there will be provision of well-defined roadways and walkways, free from any obstructions. Regular cleaning up of spillages will greatly reduce the potential for this type of accident.

Work: Application of risk assessment depends upon a full understanding of all aspects of job being undertaken. In carrying out a risk assessment in relation to a particular task, the evaluation must include a review of the knowledge, experience and training of those persons carrying out the work. Only trained and skilled personnel for a particular job will be deputed in the mines.

Personal Competence: It follows that the knowledge, experience and training of personnel involved in work is critical to the result of any risk assessment. A knowledgeable, experienced, well trained and competently supervised workforce will be at a lower risk of accidents occurring than a poorly trained and badly supervised workforce. All workmen will be properly trained in their respective jobs before engaging them for service.





Co-ordination: It is essential to have a coordinator to ensure that everyone engaged in the work is capable and understand the role of others and their responsibility for each other. This is particularly important when contract workers undertake part or all of the work to be carried out. A competent person in the rank of Assistant Mine Manager will be given the responsibility for overseeing and coordinating work.

Plants and Equipment: There is an assumption in the risk assessment that plant and equipment are suitable for the work being undertaken and have been designed, manufactured and deployed to fulfil at least the minimum health and safety standards. Failure to meet the standard will result in people being at higher risk and remedial steps should be put in hand to make good the shortfall. Other interim arrangements should be implemented to protect any person exposed to latent danger. Maintenance of plant and equipment to agreed specification, whether original or upgraded to the latest health and safety standards, is essential and shall be carried out assiduously.

Dangerous parts of Machinery: The revolving parts and entrapment between reciprocating parts will be well protected so as to prevent any risk to workmen.

Workplaces: Access to workplaces will be by well-constructed and maintained permanent fixed means. The sides of all workplaces from which persons may fall, shall always be kept securely protected.

Health Hazards: For the purposes of risk assessment, health hazards should be interpreted as being harmful dust, vibration and noise, which are emitted during mining operations, as well as during handling and transportation of ore. Control of dust at the source and effective control of other health hazards are recommended to have minimum effect on health of workmen in the mines.

Personal Protective Equipment: Personal Protective Equipment (PPE) shall be provided of good quality, suitable for the hazard e.g. a dust respirator fitted with the correct filter to capture the particular hazardous dust. These PPEs will be maintained to the recommended standards. As PPEs can only provide limited protection, it shall only use as last resort or as an interim arrangement, until other steps are taken to reduce the risk of personal injury.

Traffic Movement: Traffic Movement should take place within the designated areas with suitable roadways. One-way traffic movement systems are preferred over two directional traffic systems. The risk of accidents due to traffic movement is much less with a one way than a two-way traffic movement system. Efforts will be made to design one-way traffic, to the extent possible, in the mines, especially at the working pit areas to minimize risk of accidents.





Mitigate the Consequences

After taking all measures to eliminate or reduce hazards and incidents, the next stage is to explore ways of mitigating the consequences. Few steps which will be taken to mitigate the consequences in open cast mines are discussed below.

Step 4: Estimate frequencies of residual Significant Consequences

Having done everything to reduce the consequences of hazard / incident interaction, there may be chances of having of unacceptable consequences. The next step is to understand the risks posed by these residual consequences and their frequency of occurrences. Applying risk analysis techniques which are more detailed application of the basic 'event tree' or 'fault tree' analysis approach using frequency, probability and reliability data to calculate the frequency of events, incidents and consequences.

One example of such residual significant consequences in open cast mine is fly rock from primary /secondary blasting operation which may cause damage to property or even injury to persons. The brake failure of tyre mounted vehicles like Dumpers, Grader, Wheel Loaders / Dozers, Trucks and Jeeps while moving down gradient are other examples, which may result in accident to the operators or damage to the equipment.

Step 5: Establish Risks and Prioritize Action

Risk analysis quantifies the risk associated with significant consequences, helping to prioritize action. The outcome of risk analysis could produce a ranking of risks. The range of consequences can be described in terms of injuries / damages property damage or environmental damage. The next step is to bring the 'high risk band' situation to 'medium risk band' situation. For this cost benefit analysis will be applied to make balanced judgments for improvement based on cost and as sociated reduction in risk.

Controls and Action Plans

To ensure that causes leading to the possible consequences are prevented from occurring, control and action plans are developed and suggested as described in **Table 7.2**. It is required that these control and action plans be implemented and reviewed at least annually and also when there are changes to the work plan.





Table 7.2: Control and Action Plans

S. No.	Hazard	Causes	Control	Relevant	Procedure	Responsible Person (Designation)
1	Unintended explosions exposure	Defective explosives	Explosive used should be purchased only from approved and licensed authority	Metallic ferrous Mines Regulation 1961, Explosive act, 1884	If any defective explosive is found, it is returned back to the magazine	Authorized supplier of explosives having explosive License holder
2	Overpressure during storage of explosives In magazines	Outdated explosives	If deteriorated or unserviceable explosive is found, seek advice of licensing authority	Explosive act, 1884	supplier for disposal at their end as per Rule 16 of The Explosive Rules 1983	Mines Manager/ Authorized supplier of explosives having explosive License holder
			Records and accounts of explosive stock and issue is to be maintained Stock should be drawn upon strict rotation. Well planning for requirement of explosives shall be exercised. Disposal of outdated explosives as the chief controller or Controller of explosive may issue	Explosive act, 1884, MMR-1961.	Maintaining registers for Explosives receipt, issue and stock as per Reg. 154, 156 of MMR 1961.	
		Improper storage Of explosives	Detonator are to be stored separately Explosives shall be stored in dry and well-ventilated area Protect explosives from extreme temperatures	Explosive act, 1884,	Explosives and Detonators are Stored separately as per approved design and	Authorized supplier of explosives having





S. No.	Hazard	Causes	Control	Relevant	Procedure	Responsible Person (Designation)
					licensed capacity of magazine under Explosive act, 1884	explosive License holder
		Force majeure Conditions such as lightning strike	Lightning conductor are to be installed on the top of magazine Lightning conductor should not have resistance more than 10 ohms	The Explosive Rules 1983	Lightning arrestors are provided and maintained as per the requirement under Rule 116 the Explosive Rules 1983	Authorized supplier of explosives having explosive License holder
		Fire (can be caused by unsafe practices or as arson)	Empty packages shall be removed immediately and destroyed. No smoking or any source of light or fire shall be allowed near explosives storage	The Explosive Rules 1983 MMR - 1961	Follow the instructions Specified in Rule 154, 156 and 170 of MMR – 1961 for storage, and handling of Explosives. Rule 97 and 101 of the ER 1983	Mines Manager, Mines Foreman (Blasting), Authorized supplier of explosives having explosive License holder
		Sabotage	Security shall be provided at the Magazine Shortage and theft of explosive shall be reported to the Nearest police station and the licensing authority	The Explosive Rules, 1983,	Round the clock security guards provided and Immediate reporting to nearest Police Station and Licensing Authority	Authorized supplier of explosives having explosive





S. No.	Hazard	Causes	Control	Relevant	Procedure	Responsible Person (Designation)
					one in case of thefts or sabotage as per Rule – 123 of ER 1983	License holder
3	Rock falls or slide due to lack of bench face stability (bodily injuries)	Improper design of bench	Proper catch bench design and proper blasting pattern reduces over break Maintain the width to height ratio as per DGMS	MMR-1961	Procedure for opencast working as per Reg.106	Mines Manager
		Force Majeure (such as heavy floods or rainfall)	Dewatering or culverting the storm water may reduce slides of bench	MMR-1961.	Following procedures as per Reg. 127 and 130 of MMR –1961 for Dewatering or and culverting the water	Mines Manager
		Improper blasting practices	Good design of blasting network is important to reduce rock fall and slides of bench face	MMR-1961.	Procedure for opencast working as per Reg.106	Mines Manager
		Incompetent blasting personnel	shot firer's permit granted under explosive rules	MMR - 1961	Appointment of Shot firer as provided in Reg. 160 of MMR 1961	Mines Manager
4	Vehicle accident (bodily injuries)	Head on collision between vehicle and another vehicle (due to poor visibility or incompetent drivers)	Haul road should be sprinkled Regularly Driving at night shall be avoided Driver should be RTO licensed holder for driving vehicle	MMR – 1961 Motor Vehicle Act	Sprinkling of water in haul road as per Reg. 124 MMR 1961 and appointment of RTO licensed drivers	Mines Manager





S. No.	Hazard	Causes	Control	Relevant	Procedure	Responsible Person (Designation)
		Poor vehicle maintenance	Periodic servicing of vehicle Brakes and steering apparatus should be in good condition Headlight and tail light of the vehicle should be in good condition	MMR 1961	Procedure for Maintenance of Vehicles under Reg. 176 of MMR-1961	Mines Manager
5	Unintended explosion or exposure to overpressure, charging blast holes	Poor access control of blast area	Well planning is required before and after charging of blast holes.	MMR 1961	Procedure for drilling charging stemming and firing of holes as per Reg.162	Mines Manager, Assistant Manager (Blasting),
			Blast sites should be secured and warning signs posted before loading boreholes.			Assistant Manager (Blasting), Blaster
		Incompetent blasting personnel	shot firer's permit granted under explosive rules	MMR 1961	Appointment of Shot firer as per Reg. 160 as per MMR1961	Mines Manager
		Poor blasting practices	Tamping rod of wood must be used, iron or steel rods should not be used. No smoking or any source of light or fire shall be allowed near explosives storage. Before loading the blast, hole blaster should check the driller log Blast sites should be secured and warning signs posted before loading boreholes.	MMR – 1961 -The Explosive Rules, 1983,	Procedure for drilling charging stemming and Firing of holes as per Reg. 161,Rule 14 of ER ISO procedure QSP-760-06	Certified Blaster
		Defective explosives	Explosive used should be purchased only from approved and licensed authority only	The Explosiv	Explosive are Purchased from Approved	Mines Manager





S. No.	Hazard	Causes	Control	Relevant	Procedure	Responsible Person (Designation)
			If deteriorated or unserviceable explosive is found, seek advice of licensing authority	e Rules, 1983	manufactured or authorized license holder from CCE.	
		Outdated explosives	Stock should be drawn upon strict rotation	The Explosive Rules, 1983	Issue of explosives ISO procedure QSP-760- 06	Mines Manager
6	Hit by fly rock (bodily injuries) During blasting	Poor access control of blast area	Adequate blast area security must be provided. Blast sites should be secured and warning signs posted before loading boreholes. Post guards at the access points to prevent unauthorized entry	MMR – 1961	Procedure for	Mines Manager
		Poor blasting practices (leading to excessive fly rock)	Burden, spacing, hole diameter, stemming, sub drilling, initiation system, and type of explosive used matched the characteristics of the rock formation. Adequate blasting Shelter must be used for the persons whose presence is required in blasting. Nobody should be present within 300 m radius of blasting site as per DGMS circular except blasting personnel. Practice for controlled blasting Technique with milli-second delay detonators/electric shock tubes/cord delays. Training of persons and their helpers engaged in such blasting operation.	DGMS/ (Tech) Cir.No.2 of 2003	Procedure for drilling and blasting, tacking shelter etc. as per Reg. 164 MMR1961, DGMS (SOMA)/ (Tech) Cir.No.2 of 2003	Certified Blaster (MMR)





S. No.	Hazard	Causes	Control	Relevant	Procedure	Responsible Person (Designation)
7	Hit by Machineryes Electrical equipment (bodily injurie)	Poor machinery Maintenance	Periodic servicing of electrical instruments. Periodic Inspection / Audit of Electrical equipment cables and accessories Non-compliance to SOP	MMR 1961	Procedure laid under Section 174 C hapter XVI – Machinery and Plant of MMR 1961	Mines Manager
		Poor Cabling/Earthling to Rotating Equipment	Periodic servicing of electrical instruments. Periodic Inspection/Audit of Electrical equipment cables and accessories Non-compliance to SOP	Indian Electricity Rules 2003	Section VII – Works of Licensees of Indian Electricity Rules 2003	Electrical In charge under Mines Rules 1955





7.3.7 General Safety Measures in Mines

The complete mining will be carried out under the management control and direction of a qualified and competent person. The DGMS have been regularly issuing standing orders, model standing orders and circulars to be followed by the mine management in case of disaster, if any. Moreover, mining staff will be sent to refresher courses from time to time to keep them alert. However, following natural/industrial hazards may occur during normal operation:

- Accident due to explosives;
- Accident due to heavy mining equipment; and
- Sabotage in case of magazine

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

- All safety precautions and provisions of the Mine Act, 1955 and the Mines Rules, 1955 will be strictly followed during all mining operations;
- Entry of unauthorized persons will be strictly prohibited;
- Firefighting and first-aid provisions in the mine's office and mining area;
- Provisions of all the safety appliances such as safety boot, helmets, goggles etc. will be made available to the employees and regular check for their use;
- Training and refresher courses for all the employees working in hazardous premises; Under mines rules all employees of mines shall have to undergo the training at a regular interval;
- Working of mine, as per approved plans and regularly updating the mine plans;
- Cleaning of mine faces will be regularly done;
- Handling of explosives, charging and blasting will be carried out by competent persons only;
- Provision of magazine at a safe place with fencing and necessary security arrangement;
- Regular maintenance and testing of all mining equipment as per manufacturer's guidelines;
- Suppression of dust on the haulage roads;
- Adequate safety equipment will be provided at explosive magazine by authorized explosive supplier; and
- Increasing the awareness of safety and disaster through competitions, posters and other similar drives.
- In HSD and explosives storage area, ignitions sources should be avoided. Use of mobile phones strictly prohibited.
- Adequate dust suppression measures should be provided to suppress the dust during mining operation and transportation.
- Firefighting measures should be provided to avoid any fire and ensure that there is no explosive in HSD handling area.





7.4 OCCUPATIONAL HEALTH HAZARD

Open cast method involves dust generation by excavation, loading and transportation of mineral. At site, during excavation and loading activity, dust is main pollutant which affects the health of workers whereas environmental and climatic conditions also generate the health problems. Addressing the occupational health hazard means gaining an understanding of the source (its location and magnitude or concentration), identifying an exposure pathway (e.g. a means to get it in contact with someone), and determination of likely a receptor (someone receiving the stuff that is migrating).

Occupational hazard due to open cast mining mainly comes under the physical hazards. Temporary office and stores will be provided in the mining area. Specified first-aid box with all necessary facilities will be maintained at the project site office and the rest shelter as per Mines Act 1952. Medical facilities, primary health center are there in the area, imparting services for advanced medical facility. Communication server like post office and telephones are available in the nearby villages.

Possible physical hazards are as below mention:

7.4.1 Physical Hazards Due to Mining Operations

Following health related hazards were identified in open cast mining operations to the workers:-

Light: - The workers may be exposed to the risk of poor illumination or excessive brightness. The effects are eye strain, headache, eye pain and lachrymation, congestion around the cornea and eye fatigue. In present case, the mining activity is done during day time only.

Heat and Humidity: - The most common physical hazard is heat. The direct effects of heat exposure are burns, heat 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 48⁰C or above.

Eye Irritation: - During the high windy days in summer the dust could be the problems for eyes like itching and watering of eyes.

Respiratory Problems: - Large amounts of dust in air can be a health hazard, exacerbating respiratory disorders such as asthma and irritating the lungs and bronchial passages.

Noise Induced Hearing Loss: - Machinery is the main source of noise pollution at the mine site.





Particulars	Control Measures
Heat & Light	<p>The mine site will have adequate drinking water supply so that workers do not get dehydration.</p> <p>Lightweight and loose fitting clothes having light colors will be preferred to wear.</p> <p>Rigorous exercise and more physical activities will be avoided in hot weather.</p>
Noise	<p>Noise exposure measurements will be taken to determine the need for noise control strategies.</p> <p>The personal protective equipment will be provided for each mine workers.</p> <p>Supervisor will be instructed for reporting any problems with hearing protectors or noise control equipment.</p> <p>At noisy working activity, exposure time will be minimized.</p> <p>Machineries will be labeled with noise levels.</p>
Respiratory	<p>PPE's like face mask etc. will be provided during mining activity.</p> <p>Periodic medical examinations will be provided for all workers.</p> <p>Awareness program will be organized for workers.</p>

7.4.2 General Control Measures

- Regular maintenance and testing all the tools & equipment's as per manufacturer's guidelines.
- Provision of personal protective equipment to the workers working in the mine.
- Periodical Medical Examination of all workers by medical specialists will be conducted.
- Awareness program will be organized for workers.

7.4.3 Training and Human Resources Development

- Appointment and delegating qualified and experienced personnel in various disciplines.
- Adequate training/refresher training will be provided to the supervisors, workers keeping in view provisions of Mines Vocational Training Rules, 1966; Mine Rules, 1955, Mines Rescue Rules, 1985.
- Personnel who have to operate and maintain machineries, Trucks etc are to be trained under the guidance of the manufacturers and as per provisions of DGMS Circular Technical 1/1989 regarding accidents in opencast mines. Recommendation of Seventh Conference on Safety in Mines on "Safety in Open Cast Mining", "Traffic Rules and Procedures", "Mobile equipment and Highway Delivery Vehicles", "Operations and Operator Training" and other related circulars.
- The training of mine personnel shall be provided regularly with respect to environmental protection.





- (e) Special courses for employees will be arranged for afforestation, revegetation, reclamation, health hazards (identification), malaria eradication, HIV prevention etc. in the training center of the company.

7.4.4 Medical Examination Schedule

Table 7.3: Medical Examination Schedule

S. No	Activities	1st Year	2nd Year	3rd Year	4th Year	5th Year
1.	Initial Medical Examination (Mine Workers)					
A	Physical Check -up		-	-	-	-
B	Psychological Test		-	-	-	-
C	Audiometric Test		-	-	-	-
D	Respiratory Test					
2.	Periodical Medical Examination (Mine Workers)					
A	Physical Check -up	-				
B	Audiometric Test	-				
C	Eye Check -up	-				
D	Respiratory Test	-				
3.	Medical Camp	-				
	(Mine Workers & Nearby Villagers)					

Medical Follow Ups: Work force will be divided into three targeted groups age wise as follows:

Age Group	PME as per Mine Rule 1955	Special Examination
Less than 25 years	Once in a Three Years	In case of emergencies
Between 25 to 40 Years	Once in a Three Years	In case of emergencies
Above 40 years	Once in a Three Years	In case of emergencies

Medical help on top priority immediately after diagnosis/ accident is the essence of preventive aspects.

7.5 DISASTER MANAGEMENT PLAN

The objectives of DMP are to describe the company's emergency preparedness, organization, the resource availability and response actions applicable to deal with various types of situations that can occur at mines in shortest possible time.





Thus, the overall objectives of the emergency plan are summarized as:

- Rapid control and containment of Hazardous situation.
- Minimizing the risk and impact of event/ accident.
- Effective prevention of damage to property.

The Disaster Management Plan (DMP) is a guide, giving general considerations, directions, and procedures for handling emergencies likely to arise from planned operations. The following DMP has been prepared for the SRCL's mine on the basis of the Risk Assessment and related findings covered in the report.

7.5.1 Disaster Management Plan: Structure

The Disaster Management Plan (DMP) is supposed to be a dynamic, changing document focusing on continual advantage of doing this is to have a system that is in synchronicity with commonly used SHE systems such as ISO 14001 and OHSAS 18001.

7.5.2 Policy

The Environmental policy is existing and accessible to all at site and to other stakeholders. The policy has been framed considering legislative compliance, stakeholder involvement, continual improvement, and management by objectives.

7.5.3 Planning

7.5.3.1 Identification and Prevention of Possible Emergency Situations

Possible emergency situations can broadly be classified into unintended explosions, vehicle collision etc. as discussed above. Additional emergency situations can be developed on the basis of audit or other procedures prior to commencement of operations.

7.5.3.2 Emergency Prevention

Some of the ways of preventing emergencies are as follows:

- Preparation of a Preventive Maintenance Schedule Program and also covering maintenance schedules for all critical equipment and instruments as per recommendations of the manufacturer's user manuals,
- Importantly, it is of great importance to collect and analyze information pertaining to minor incidents and accidents at the site, as well as for recording near-misses or emergencies that were averted. This information gives an indication of how likely or unlikely it is for the site to face actual emergency and what shall be further action to prevent them from occurring.
- Establishment of an ongoing training and evaluation program, incorporating the development of capabilities amongst employees about potential emergencies and ways and means of identifying and averting the same. Most emergencies do not





occur without some incident or an abnormal situation. So there is always sometime of few seconds to few minutes to arrest an incident of abnormal situation from turning in to an emergency. This is the role of the shift in-charge who is the incident controller (IC) along with his shift team.

7.5.3.3 Emergency Plan Objectives

Specific objectives of the Emergency Response Plan are to be clearly listed with regards to the responses desired for successful management of the possible emergency situations. Suggested Objectives could include:

- To define and assess emergencies, including risk and environmental impact assessment.
- To control and contain incidents.
- To safeguard employees.
- To minimize damage to property or / and the environment.
- To inform employees, the general public and the authority on the hazards / risks assessed.
- Safeguard provided residual risk if any and the role to be played by them in the event of emergency.
- To inform authorities like Safety and Fire Dept and Mutual Aid Centers to come up for help.
- For effective rescue and treatment of casualties and to count the injured.
- To identify and list fatal accidents if any.
- To secure the safe rehabilitation of affected areas and to restore normally.
- To provide authoritative information to the news media.
- To preserve records, equipment etc. and to organize investigation into the cause of the emergency and preventive measures to stop its recurrence.
- To ensure safety of staff and patients and resume work.
- To work out a plan with all provisions to handle emergencies and to provide for emergency.
- Preparedness and the periodical rehearsal of the plan.

The objectives are suggested in emergency preparedness plan.

Responsibilities, resources and timeframes require to be allocated for implementing the objectives.

7.5.4 Implementation

7.5.4.1 Allocation of resources

Key Personnel are identified for carrying out specific and assigned duties in case of any kind of Emergency. All such key personnel shall be available on call on holidays and off duty also.

- Commander (Manager Quarries)





- Deputy commander (Personnel Officer)
- Site Incident Controller (Shift in charge)
- Deputy Incident Controller (Senior Mining Mate)
- Other key personnel
- Essential workers

7.5.4.2 Responsibilities of Commander / Deputy Commander

- To take charge at the place of incident.
- To activate the Emergency Preparedness Plan according to severity of situation.
- Inform all the employees and relatives of the affected employees.
- Call all key personnel and inform Doctor to be ready for treatment.
- Commander shall deploy staff carry out following functions.
 - To coordinate and reinforce Emergency Combat at Site along with Site Incident Controller.
 - To liaise with other Departments and guide their personnel.
 - To supervise Assembly and Evacuation at all points.
 - To look after Patients who are bed ridden and any Casualties and give psychological support.
- Activate Assembly and Evacuation Plan if required as per situation by ordering Site Incident Controller.
- Inform and liaise with Agent (Mines), Police department and District Emergency Authority.
- Arrange for chronological records of emergency to be maintained.
- Issue authorized statements to News Media.
- Ensure that proper consideration is given for preservation of evidence and arrange for video shooting /photographs.
- Deputy Commander shall carry out the responsibilities of Commander in his absence and assist him in his duties when present.
- Assign Medicare and Emergency Management tasks to all persons of management cadre.

7.5.4.3 Responsibilities of Mines Foreman

- To take immediate charge at the site of incident.
- Ensure that immediate steps as per Emergency Preparedness Plan are taken and direct the worker staff.
- Inform Commander, Deputy Commander and other key personnel's.
- Shall blow the Siren / Hooter as per situation to declare Emergency.
- Supervise assembly and evacuation as per plan, if required.
- Appoint more than one Deputy Incident Controller to take charge if emergency occurs at more than one place.
- Ensure that Commander has been alerted.
- Take decisions for controlling the emergency till arrival by Commander.
- Ensure that casualties are receiving adequate attention and medical care.
- Ensure accounting for personnel and rescue of missing persons.





- Control traffic movement in Quarry premises.
- When emergency is prolonged arrange for relief of rescue workers and catering facilities.
- Deputy Incident Controller shall take charge at site of emergency in the absence of Site Incident Controller.
- In the presence of same, he shall assist Site Incident Controller or take charge at another location, if emergency exists in more than one place.

7.5.4.4 Responsibilities of Essential Workers

- A task force of essential trained staff is made available to get work done by Incident Controllers. Such work shall include-
- Fire fighting and spill control till fire brigade takes the charge.
- To help the fire brigade, if it is so required.
- Emergency engineering work e.g. isolating equipment, materials, urgent repairing or replacement, electrical work etc.
- Provision of emergency power, water, lighting, material, etc.
- Movement of equipment, special vehicle and transport to or from the scene of the incident.
- Search, evacuation, rescue and welfare. First - Aid and medical help.
- Manning of assembly points to record the arrival of evacuated personnel. Manning of outside shelters and welfare of evacuated persons there.
- Assistance at casualty's reception areas to record details of casualties.
- Assistance at communication center to handle outgoing and incoming calls and to act as messengers if necessary.
- Control of traffic at Quarry premises.

7.5.5 Setting up of Emergency Infrastructure

To enable the key persons to implement the DMP, the following infrastructure will require to be set up:

7.5.5.1 Assembly Points

In case of emergency the site needs to be evacuated immediately. On evacuation people will go to pre- assigned assembly points. The charge will be taken by shift in charge and in his absence person deployed by Commander will be in charge of respective assembly points and will supervise Assembly and Head Count. A Board indicating the Assembly Point having relevant information is placed at point for guidance.

7.5.5.2 Liaison with State Authorities

Government authorities, local hospital, police, fire services, tehsildar, district collector will be kept informed about the occurrence and development of any incident by Commander and procure necessary help and guidance from these authorities.





7.5.5.3 Task Force of Essential Staff

A task force of essential trained staff is made available to get work done by the Commander. Task Force personnel shall be trained to perform tasks as mentioned above.

7.5.5.4 Emergency Control Centre

Manager-Quarry Office will act as Emergency Control Center and provided with required communication facilities. The Control Center is situated in an area of minimum risk and close to the road to allow for ready access by a vehicle if other systems fail or extra communication facilities are needed to be set up. The Emergency control center should consist of following items:

- External telephones
- Internal telephones
- E-Mail facilities
- Emergency plan
- Stationeries
- Torches and emergency lights.

Following is the list of Emergency Contact Number (Off Site)

- District Collector: 04272450301
- Commissioner of Police: 04272224000
- Superintendent of Police: 04272274747
- Public Relations Officer (I&PR): 04272421077
- JD Health Services (I/c): 04272413775
- Regional Transport Officer, Salem (W): 04272225588
- Regional Transport Officer, Salem (E): 04272243144
- Regional Transport Officer, Salem (S): 04272272588
- District Fire Officer: 04272440938
- Medical Officer (Salem): 0427- 2403889/9443457309

Helpline Numbers

- Police Control Room: 100
- Women Helpline: 1091
- Fire and Rescue: 101
- Ambulance Help Line: 102
- Child Help line: 1098
- State Control Room: 1070
- Collectorate Control Room: 1077
- Collectratem Board : 0427 – 2450301,2450302,2450303
- Accident Help Line: 108
- Disaster Help Line: 1077





7.5.6 Fire Fighting

Person noticing the fire shall immediately raise alarm and ask the nearest person to inform Matron and Manager-Quarry. Portable Fire Extinguisher shall be used in an attempt to extinguish the fire, by the person at site. Matron shall assess the severity of fire and if likely to be severe shall take following steps.

- Call fire tenders and mobile trailer pump from nearby fire department.
- Call for assembly of all persons at assembly points
- Arrange for turning "OFF" main switch of electricity supply.
- Manager-Mines shall review the steps taken by Matron in his capacity as COMMANDER and establish a "Control Room" in his office.

7.5.6.1 Immediate Step in Case of Explosion:

At first the concerned security guard should inform about it to the shift-in-charge and Mgr. Mines. They will take the precaution described in the Work Instruction.

7.5.6.2 Further Steps in Case of Fire Spreading

Commander shall continuously assess the situation and if it is not being controlled then ensure:

- Assembly of all persons at the assembly points.
- Arrival of fire tenders and / or Mobile Trailer Pump.
- Ensure evacuation in orderly fashion.
- Ensure that any vehicle parked near the Fire Site is taken away to safe area.
- Carry out responsibilities as detailed as above.

7.5.7 Emergency Preparedness for Electrical Shock / Accident

- Source of power should be put off immediately in case of any electrical shock.
- Injured person should be shifted to safe place.
- Persons engaged in rescuing operation should use all PPEs and take appropriate precaution while removing the injured persons.
- Trained persons are engaged to give first-aid treatment to injured persons.
- In case of major injury the injured is shifted to the Dispensary/Hospital.
- In case of electrical fire, only CO2 type Fire Extinguisher issued.
- Accident report in prescribed form is sent to appropriate authority in case of reportable injury.
- All the persons engaged to carry out this operation should be equipped with appropriate PPEs (Personal Protective Equipment's) like safety shoes, helmets, dust masks etc.

7.5.7.1 Medical Aid

The Mines has a First Aid Centre.





7.5.7.1.1 Treatment of affected persons

- Injured / Affected persons shall be provided suitable first-aid treatment and sent to Co.'s Doctor for further treatment depending on injury.
- Patients requiring further treatment shall be sent in Ambulances to Hospitals in nearby.
- Patients suffering from minor problems shall be discharged and sent home after preliminary treatment.

7.5.7.1.2 Post Emergency Activities

Medical checkup: Medical checkup of affected persons if any and suitable medical aid shall be provided. **Collection of Records:** Exact information shall be collected regarding cause of **Emergency and remedial measures suggested preventing recurrence.**

As it's an existing mine (Currently not in operation) PP has done Periodical Medical Examination of existing employees as per statute.

Inquiry: Detailed inquiry shall be carried out to find out cause which will be in the form of fact finding and recommendations made to suitable authority.

Insurance Claims (if any): Insurance claims for damage due to consequences of emergency shall be filed.

7.5.8 Mock Drill

Full scale mock drill shall be conducted at least once a year in coordination with Safety Department. Manager-Mines shall declare the emergency for mock drill and all persons concerned shall perform duties as per Responsibilities given in this Plan.

7.5.9 Training

Regular training of all concerned personnel will be conducted to enable the Staff to face any type of Emergency be it Natural Disasters, Fire in Equipment, Building or any explosion in quarry.

7.5.9.1 Training and Human Resources Development

- (a) Appointment and delegating qualified and experienced personnel in various disciplines.
- (b) Adequate training/refresher training will be provided to the supervisors, workers keeping in view provisions of Mines Vocational Training Rules, 1966; Mine Rules, 1955, Mines Rescue Rules, 1985.
- (c) Personnel who have to operate and maintain machineries, Trucks etc are to be trained under the guidance of the manufacturers and as per provisions of DGMS Circular Technical 1/1989 regarding accidents in opencast mines. Recommendation of Seventh Conference on Safety in Mines on "Safety in Open





Cast Mining”, “Traffic Rules and Procedures”, “Mobile equipment and Highway Delivery Vehicles”, “Operations and Operator Training” and other related circulars.

- (d) The training of mine personnel shall be provided regularly with respect to environmental protection.
- (e) Special courses for employees will be arranged for afforestation, revegetation, reclamation, health hazards (identification), malaria eradication and HIV prevention etc in the training centre of the company.

7.5.10 DMP Audit, Non-Conformance and Corrective Action and Preventive Action

Since this DMP has been designed as a dynamic document, it is required that its performance be audited at regular intervals. Ideally, persons auditing the DMP should be external auditors (i.e. not employed at the site being audited). The audit should result in a set of findings that are put before the site management for review.

Audits will be periodic, at intervals that are decided by the Head Office. Audit reports shall state the exact non-compliance with the particular clause of this DMP, and should include steps to be taken to attain compliance, through corrective and preventive actions.

7.5.11 Evacuation Plan

To establish method of systematic, safe and orderly evacuation of all the occupants in case of fire or any emergency, in the least possible time, to a safe assembly point through nearest safe means of escape. Facility staff will be notified of evacuation by one or more of the following method(s):

- Verbal, Intercom, Portable Radio, Alarm, Other
- Notification to emergency services to ECC
- Staff will follow predetermined evacuation routes and assemble at designated areas.
- Evacuation maps must be displayed throughout the facility.
- Individual responsible for coordinating evacuations must confirm the process

Table 7.4: OHS Budget

S. No.	OHS Requirement	OHS Budget (In Lakh Rupees)
1	Fires extinguisher and water tanker to tackle fire	5.0
3	Maintain register of Fire Extinguisher system with proper numbering, location and next refilling due date	-
4	Environment Audit (Once in a Year)	1.0
5	Third Party EHS Audit (Once in 2 years)	1.0
6	PPE Purchase (Standards to be maintained)	10.0





S. No.	OHS Requirement	OHS Budget (In Lakh Rupees)
7	Training and Safety Awareness Program/Safety week celebration Conduction and Safety Slogans	5.0
8	Misc.	2.0
	Total	24

7.6 NATURAL AND MANMADE CALAMITIES WHICH CAN LEAD TO EMERGENCY

7.6.1 Earthquake

The Salem District area falls under the seismic zone-III, which is the Moderate damage risk zone earthquake up to magnitude 5.0 and may trigger into a technological disaster, includes collapse of structures, buildings leading to fire and explosion. Earthquake cannot usually be forecasted and therefore precautions immediately prior to such event are not usually possible.

Emergency recovery plan has been considered by the emergency management team as per the situation and site conditions as follows in **Table no 7.5**.

Table 7.5: Emergency Recovery Plan

Step	Activity	Action By
Preparedness	<ul style="list-style-type: none"> Constitute Emergency Response Team Identify ECC, if the identified ones are damaged Control centers to be equipped with <ul style="list-style-type: none"> Alarming Communication facilities Emergency vehicles/ equipment List of emergency contacts & suppliers Medical facilities 	Agent (Mines)
Action during effective period	<ul style="list-style-type: none"> Do not panic. Raise alarm Avoid standing near to windows, external walls Stand near the columns or duck under sturdy furniture. Assemble at emergency assembly point as there may be aftershocks 	Individual(s)
Action after effective Period (Establish Emergency Control Center. Site Main Controller to direct	<ul style="list-style-type: none"> Assess situation and initiate shut down of plants (if required) Initiate search & rescue (if required) Evacuation of people. Recovery/ Rehabilitation Work Medical care for the injured. 	Main Controller, Incident Controller, Site Incident Controller, Coordinators – Fire &





Step	Activity	Action By
all activities)	<ul style="list-style-type: none">• Supply of food and drinking water.• Temporary shelters like tents, metal sheds etc.• Repairing lines of communication and information.• Restoring transport routes• Take head count• Activate emergency plan as situation demands• Assess damage	Security, Safety, Material and Medical

7.6.2 Mine Inundation

No river or pond or any other water bodies are located nearby except a seasonal odai track. Inundation of mines is not possible. However, lower benches may be flooded during rainy season due to heavy rainfall. During rainy seasons mine workings will be restricted in the top benches, the seepage water and rain water will be drained by 5HP portable pumps.

7.7 REHABILITATION& RESETTLEMENT (R&R) PLAN

No habitats and private land is present within the lease therefore R & R Plan is not applicable.

7.8 CONCLUSION

As discussed in above sections, adequate risk Control measures for process have been considered for the proposed project. Project Activity is not likely to cause major significant risk to onsite, offsite & environment. Suitable Mitigation Measures will be taken by M/s SRCL to ensure complete workplace safety. In the event of disaster onsite, offsite and all the emergency planning procedures will be followed so as to minimize the impact on working personnel, plant surrounding and environment.





8. PROJECT BENEFITS

8.1 INTRODUCTION

Magnesite Mineral is an essential raw material for manufacturing refractory materials used by Iron & Steel Industry. Magnesite reserves are famous worldwide for its Cryptocrystalline structure, which is best suited for manufacturing refractory bricks. The above said project plays significant role in meeting the refractory requirements of Iron & Steel industry.

Dunite and Pyroxinite are preferred as flux to dolomite as a source of MgO in sintering and also in Iron & steel Industry. Dunite is also useful in construction industry, Dunite rocks are used for construction of aggregates, construction of roads etc. Dunite is having refractory properties and plays a significant role in Refractory Industry

The Magnesite and Dunite mining plays a key role in the economic growth of any country.

8.2 EMPLOYMENT POTENTIAL

Proposed mining shall provide an opportunity of direct employment about 434 persons.

8.2.1 Direct Employment

Employment scenario of the study area is largely dependent on the agriculture. The present project has employment generation potential by way of recruiting local people directly for different activities of the mining. The proposed project will improve the rural employment.

Estimated manpower requirement about 434. High skilled, skilled, semi skilled & unskilled workers will be employed by the company through contractors.

Local people will be given the opportunity in employment as per their qualification and expertise. Priority will be given to scheduled tribe families including women. This will enhance the present socio economic status of the local people.

8.2.2 Indirect Employment

Indirect employment and income effects of any mining activity usually remain widespread across a long region. Over the years the mine has caused generation of income and employment opportunities in the vicinity of the mine, specifically, transport and commercial establishments. Employment generation potential by way





of recruiting local people directly for different activities of the mine, specifically at the construction phase. It is expected that substantial portion of the investment in this project will trickle down to the local people in the form of employment and income.

As the expansion will take place, indirect employment is likely to grow further. The project is expected to generate substantial indirect employment in other sectors such as service units etc. employment and income effects indicates that the project has strong positive direct as well as indirect impact on employment and income generation of the area.

8.3 IMPROVEMENT IN INFRASTRUCTURE

The proposed project will enhance the following physical infrastructure facilities in the adjoining areas:

- a. **Road Transport:** The existing road will be maintained regularly for better road communication.
- b. **Market:** Generating useful economic resource for construction. Excavated minor mineral will provide a good market opportunity.
- c. **Infrastructure:** Maintenance of community assets (infrastructure) like village roads/ linked roads, dispensary and health center, market place etc., as a part of corporate environment responsibility..
- d. **Green Belt Development:** PP has proposed to plant 41, 581 trees till conceptual plan period in addition to this pp has already planted 34, 950 trees of native species.
- e. **Increasing other business opportunities for local people:** There will be scope of hiring vehicle like tractors & trolleys, JCB, excavators, loaders during operation phase.
- f. **Medical facilities:** First Aid Centre with ambulances, providing 24x7 assistance, have been provided at the mine site. Further, in case of major illness, accidents etc. employees have been facilitated by medical treatment on referral basis. Medical camps are being regularly conducted for local villagers free of cost.

8.4 EDUCATION

The local peoples' interest towards education will increase due to the expectation of getting jobs, especially from non-agricultural sources. The project is expected to increase such aspirations by bringing opportunities of some direct and indirect employment for the local people. The general awareness towards the importance of education is expected to increase as a result of the proposed expansion. The project will have positive impact on the level of education of the people.





8.5 BENEFITS TO THE STATE

The proposed project shall contribute towards developmental needs of the State. The project would support Government's endeavour in bringing up the assigned area in terms of growth indices such as infrastructural development and employment generation. Also, the revenue generated from Ore Mining may get reinvested by the State Govt. in further developmental works of the State. Moreover, the proposed project will also boost the economic development of a predominantly backward region of the state.

8.6 IMPROVEMENTS IN THE SOCIAL INFRASTRUCTURE

The mining activity in the region will have a positive impact on the social, economic condition of the area by way of providing employment to the local inhabitants; wages paid to them will increase the per capita income, housing, education, medical and transportation facilities, economic status, health and agriculture.

A detailed program for socio economic development of the area has been framed. The salient features of the program are as follows:

S. No.	Broad Objectives	Activities Proposed
1	Skill and Entrepreneurship Development	Skilled development programme
		Training programme for ladies (stiching, embroider, tailoring, etc)
2	Health	Providing infrastructure facilities such as beds, medical instruments etc. to the health centre near project site.
		Medical check-up in and around mine area to villagers
3	Infrastructure Development	Installation of water tank, contrction of bore well in Government primary school in nearby village. Contruction toilet in schools. Construction of water tank and toilet in villages. Construction of community hall in villages.
		Distribution of computers in Government School
		Lab equipment in Government School
		Rain shelter and benches in villages
		Development of infrastrucutr in Government school
		Infrastructure development in nearby village
4	Sanitation and hydGINE	Construction of nalla for proper drainage system
		Distribution of dust bin and arrangement of garbage disposal
5	Afforestation	Plantation of trees along road side





8.7 ECOLOGICAL BENEFITS

The proposed project will improve the ecology by planting the trees of native species. 34,950 no of tress has already been planted by PP and it is proposed to plant another 41, 581 tress till conceptual period. Some area covered under waste dumps will be afforested by plantation. Plantation will be also be carried out on 7.5 m statutory barrier.

8.8 OTHER TANGIBLE BENEFITS

The proposed project by nature serves as the nuclei for development of small-scale industries in the areas around them. These small-scale units usually have input-output linkages with the other industries.

The present project is likely to accelerate such industrialization through “Buble Effects” in the study area. It is important to note that the small-scale units are usually labour-intensive and high-priority industries from social point of view. This is expected to play a major role in the future economic and social development of this area. The proposed project is expected to serve as Centre of significant small-scale industrial economy around it complemented by the services sector. This is expected to play a major role in the future economic and social development of this area.





9. ENVIRONMENTAL COST BENEFIT ANALYSIS

As per EIA Notification dated 14th September, 2006 as amended from time to time; the chapter on “Environmental Cost Benefit Analysis” is applicable only, if the same is recommended at the Scoping Stage.

As per the ToR issued by MoEF&CC for the project vide F.No.23-166/2018-IA.III (V) dated 17th September 2021, the Environmental Cost Benefit Analysis for the project is not required.





10. ENVIRONMENT MANAGEMENT PLAN

10.1 INTRODUCTION

Any development project is associated with certain positive impacts as well as some negative impacts on the environment. However, the negative or adverse impacts cannot possibly rule out scientific development. At the same time adverse impacts cannot be neglected. The Environmental Management Plan describes the administrative aspects of ensuring that mitigation measures are implemented and their effectiveness monitored. EMP ensure that set of mitigation measures taken to eliminate the adverse environmental impacts or reduce them to acceptable levels. During the implementation and operation of the project have been effectively implemented. The plan helps in formulation, implementation and monitoring of the environmental parameters during and after commissioning of the project. The Environmental Management Plan describes in brief, the management plan for proper and adequate implementation of treatment and control system for air and water and noise pollution and for maintaining the environment. It also includes the development of green belts in and around the plant, proper safety of the workers, noise control, fire protection systems and measures.

10.2 PURPOSE OF ENVIRONMENTAL MANAGEMENT PLAN

The environment management plan is prepared with a view to facilitate effective environment management of the project, in general and implementation of the mitigation measures in particular. The EMP provides a delivery mechanism to address potential adverse impacts and to introduce standards of good practice to be adopted for all project works. For each stage of the program, the EMP lists all the requirements to ensure effective mitigation of every potential biophysical and socio-economic impact identified in the EIA. For each operation, which could otherwise give rise to impact, the following information is presented:

1. To treat and dispose-off all the pollutants viz. liquid, gaseous and solid waste if any generated so as to meet statutory requirements (Relevant Pollution Control Acts) with appropriate technology
2. Abatement treatment and disposal off all the pollutants viz. liquid, gaseous and solid waste so as to meet statutory requirements (Relevant Pollution Control Acts) with appropriate technology.
3. To support and implement work to achieve environmental standards and to improve the methods of environmental management.
4. To promote green-belt development.
5. To encourage good working conditions for employees.





6. To reduce fire and accident hazards.
7. Budgeting and allocation of funds for environment management system.
8. To adopt cleaner production technology and waste minimization program

10.3 ENVIRONMENT MANAGEMENT POLICY & ENVIRONMENT COMMITTEE

The Company is very much oblivious of its responsibility in protecting the Environment. Thus, various mitigation measures as given in the report shall be taken-up and effort will be made to reduce the impact of the Project on the Environment. Any action or effort remains incomplete, if it is not monitored properly at regular intervals and corrective measures taken, wherever necessary. Regular monitoring has thus, been provided.

The Company has well defined policy. The system of reporting of Non-conformances /violation of any Environmental Law/Policy will be as per the SOP defined under the Integrated Management System. As per the SOP, any non-conformances/violation of Environmental Law/Policy, either identified during Internal Audits or reported by any authority or received through any source, will be discussed during Management Review Meetings with Board of Directors/Partners. Under the system designated persons at all hierarchy level have been identified for ensuring adherence to the policy and compliance with the environmental laws and regulations. Also, system has been developed to take adequate measures.

SOP in case of any Violation is observed

1. The cases of violations/non-compliances of Environment or Forest Laws, if any, shall be reported to the Board of Directors through EHS Manager and shall identify designate responsible person for ensuring compliance with the Environmental Laws and Regulations.
2. Comply with all relevant environmental laws and regulations to minimize risks to health, safety and the environment.

Work with local government, regulatory authorities and communities



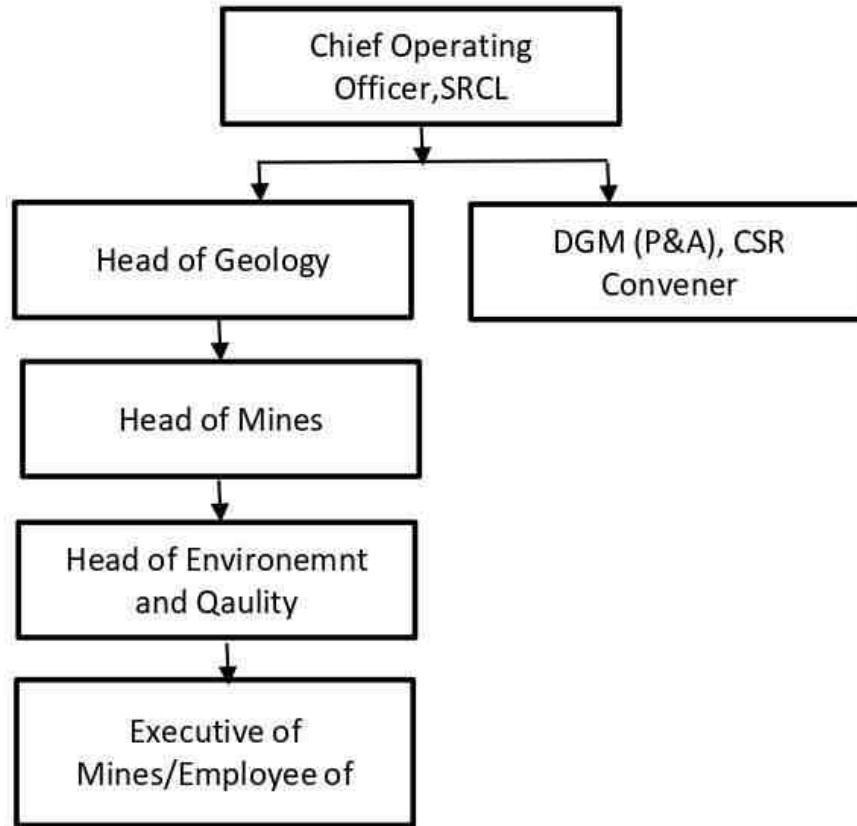


Figure 10.1: Organizational Set-up for Environmental Reporting

The main aims of the said Policy are to

1. Effectively manage, monitor, improve and communicate the environmental performance.
2. Take all reasonable steps to prevent pollution.
3. Set realistic and measurable objectives and targets for continual improvement of the environmental performance.
4. Ensure that all employees and contractors are trained to understand their environmental responsibilities and create an environment that adheres to the Company's Policies, procedures and applicable regulations.
5. Hold leadership accountable for good environment performance of our operations and projects. Inherent in that accountability will be the commitment of management to provide resources and successfully create an appropriate environment.
6. Comply fully with all relevant legal requirements, codes of practice and regulations.
7. Reduce, recycle and reuse natural resources.
8. Minimize waste generation and increase reuse within the framework of waste management procedures.
9. Identify and manage environmental risks and hazards.





10. The project proponent shall regularly review this policy and ensure the effectiveness of the policy in the present context.
11. that corrective and preventative actions are taken in order to ensure continual improvement.
12. To treat all the pollutants viz. air, gaseous and noise, which contribute to the degradation of the environment, with appropriate technologies.
13. To comply with all regulations stipulated by the Central / State Pollution Control Boards related to air emissions and liquid effluent discharge as per air and water pollution control laws.
14. To handle hazardous wastes as per the Hazardous Waste Hazardous & Other Wastes Rules, 2016 of the Environment (Protection) Act, 1986
15. To encourage support and conduct developmental work for the purpose of achieving environmental standards and to improve the methods of environmental management.
16. To make continuous efforts to improve environment.
17. The system of reporting of Non-conformances/ violation of any Environmental Law/Policy will be as per the management system.

Table 10.1: Manpower Details of the Environmental Management Cell (EMC)

Sl. No.	Name	Designation	Qualification	Experience (year)
1.	R. Velmurugan	AGM (Production)	MBA, Degree in Ceramic	24
2.	Madhu Chitteti/ S. Sankar	Sr. Mgr.(Mines)/ Master Mining Foreman	B-Tech (Mining)/ Second Class Manager's Certificate of Competency and Bachelor of Business Administration	12/ 24
3.	P. Arjunan	GM – Works & Mines	B.E Mechanical	35
4.	Vishal Shukla	Chief Operating Officer	B. Tech (Mining) & M. Tech, (Steel Technology)	30
5	A. B. Mandal	DGM (P&A) CSR Convener	BE (Metallurgy), PGDMM and MBA	29

For successful implementation of the environmental management plan other agencies of the State will also be involved by SRCL, if required (for regulatory requirement or technical support).

10.3.1 Interaction with State Pollution Control Board

EMC always remains in regular touch with SPCB/Regional Office, MoEF&CC and sends them periodic compliance report on EMP compliance in the prescribed format.





Any new regulations/ guidelines considered by SPCB / CPCB shall be taken care of by EMC.

10.3.2 Training

Training facilities has already been developed for environmental control. For proper implementation of the EMP, the environmental officers, mining engineers, geologists, horticulturists, field executives etc. responsible for EMP implementation are trained as per the need.

The training will be given to concern employees covering the following areas:

1. Awareness of pollution control and environmental protection
2. Awareness Training on Environment Management System.
3. Environmental management.
4. Afforestation / plantation and post care of plants.
5. Knowledge of norms, regulations and procedures.
6. Risk assessment and Disaster Management.
7. Management System

10.3.3 Standard Operating Procedures on Environment, implemented under IMS

SRCL will implement the following Standard Operating Procedures (SOP) in the Mine, related to Environment, under Integrated Management System:

- Procedure for work zone and ambient air quality monitoring and control measures.
- Procedure for work zone and ambient noise level measurement and control measures
- Procedure for vibration measurement and control measures.
- Procedure for measurement and control of blast induced noise, vibration and fly rock.
- Procedure for greenbelt development.
- Procedure for developing social amenities.
- Procedure for environmental reporting system.
- Procedure for environment auditing.
- Procedure for environment related communication with stakeholders.
- Procedure for evaluating continual improvement in environment quality.
- Procedure for access to updated norms and standards.
- Procedure for operation of excavators, dumpers, drills, dozers, graders, rock breakers etc.
- Procedure for transportation of explosives, issue of explosives, blasting, control blasting etc.





Draft EIA Report for Mining of Magnesite & Dunite over an area 622.69 Ha, located at Villages Thathaiyangerpatti, Moongilpadi, Karuppur, Vellakkalpatti, Mallamoopanpatti, Taluk - Omalur & Salem, District-Salem (Tamil Nadu) By M/s SAIL Refractory Company Limited (SRCL).



**SAIL REFRACTORY COMPANY LIMITED,
SALEM-636 005.**



ENVIRONMENTAL POLICY

SAIL Refractory Company Limited, one of the leading refractory producers of India, in its endeavour to strengthen environment management and maintain clean and sustainable environment in and around its plant, mines & township is committed to:

1. Protect the environment by integrating sound environmental practices for control and prevention of pollution from all its activities.
2. Comply with legal and other requirements pertaining to the environment, forests and wildlife and to go beyond.
3. Systematic approach of environment management by accreditation with Environment Management System.
4. Contribute towards mitigation of climate change through adoption of measures to reduce emission of greenhouse gases, enhancing green coverage, adopting energy efficient technologies, enhancing use of green energy.
5. Promoting innovative environment-friendly processes and products.
6. Ecological restoration of degraded mined out landscapes.
7. Integrate principle of "reduce, recover, recycle and reuse" in its operations for conservation of natural resources, including water, to ensure sustainable future.
8. Continual improvement of environmental performance by setting challenging targets, transparent reporting system and robust review mechanism.
9. Continuously monitor emissions, discharges and ambient air quality and submitting to Concerned Authorities for self-regulation of environmental deviations, if any.
10. Encourage employees to participate in maintaining a safe and healthy working condition.
11. Providing safe, healthy and socially accountable work environment for all its employees and other persons working in the plant, mines and Township through prevention of accidents, injury and ill health and respecting human rights.

Date: 31.03.2022

Anirban Das Gupta
Chairman, SRCL

Figure 10.2: Environment Policy





10.4 IMPLEMENTATION OF ENVIRONMENT MANAGEMENT PLAN

A separate department "Environmental Management Cell" (EMC) exists to look after all environmental related matters of the plant. The EMC will supervise the reported activity from time to time for smooth implementation of Environmental Mitigation and Management measures and will take necessary actions if required. The cell will act to ensure the suitability, adequacy and effectiveness of the Environment Management Program. It will also ensure to meet all the Statutory Requirements. Roles & responsibilities of Environment Monitoring Cell (EMC) has been discussed in details in Chapter-6.

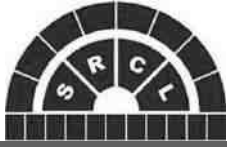
10.4.1 Budgetary provisions for implementation of environment management plan

Following provisions are proposed to be taken for improving, control and monitoring of environment protection measures.

Table 10.2: Annual Budget for Environmental Management Plan for Operation

Sl. No.	Environmental Protection Measures	Capital Cost	Recurring Cost
		(Rs. In lakhs)	(Rs. In lakhs/year)
1	Air Pollution Control Measures ➤ Dust Suppression Systems at haul road	60.0	3.0
2	Water Pollution Control Measures	-	10.0
	➤ Construction of Garland drain	30.0	
	➤ Dewatering of mine water in rainy season	2.0	
3	Noise Pollution Control Measures ➤ Maintenance of Machineries	-	3.0
4	Greenbelt Development	103.95	4.0
5	Rain Water Harvesting	5.0	1.0
6	Fire Fighting and Safety measures	3.0	24.0
Total		203.95	45
Total EMP Budget		248.95	





11. SUMMARY & CONCLUSION

11.1 INTRODUCTION

The chapter discusses about the summary of whole EIA/EMP report along with recommendation and conclusion. Mining lease area of SRCL Magnesite and Dunite mining is 622.69 Ha.

The present proposal is for mining of 26, 43,936 MTPA ROM for Magnesite and Dunite mineral at Village Thathaiyangerpatti, Moongilpadi, Karuppur, Vellakkapatti, Mallamoopanpatti Taluk Omalur & Salem, District Salem, Tamil Nadu.

The proposed project is listed under activity 1(a) Mining of Minerals of Schedule of EIA Notification, 2006 as amended till date, falls under category 'A' and requires prior environmental clearance from Ministry of Environment, Forest & Climate Change.

This is violation case as per S.O. 804 (E) dated 14.03.2017 under EIA notification 2006. Mine has violate the EIA notification 1994 as the mining was carried out without obtaining EC since the inception of mining lease and during renewal of lease in year 2000.

11.2 PROJECT DESCRIPTION

The total mining lease area is 622.69 Ha. Earlier, the mining lease was granted to M/s Burn Standard Company Ltd. (BSCL, A Govt. of India Undertaking) Salem-636005, Tamil Nadu for a period of 20 years vide G.O. No. 853 dated 05.06.1979. Ministry of Heavy Industries & Public Enterprises, Gol, vide memo dated 17.11.2011 transferred the Refractory unit of M/s BSCL at Salem with all assets, and liabilities to M/s Steel Authority of the India Limited (SAIL). Industries, Investment Promotion and Commerce (MMA.1) Department, Secretariat, Chennai - 600 009, Tamil Nadu vide their letter No 10839/MMA.1/2019-2 Dated: 02.11.2022 issued Letter of Intent to SAIL Refractory Company Limited in respect of the mining lease granted in G.o.(Ms).No.853, dated 05.06. 1979. As per the Review of Mining Plan along with Progressive Mine Closure Plan total mineral reserve and resources are 23.95 million tonnes of Magnesite and 16.423 million Tonnes of Dunite and Mineable reserve 0.745 million tonnes of Magnesite and 0.654 million tonnes of Dunite. Mining will be done by the other than Fully Mechanised opencast method using drilling and blasting. Detail of the project is summarized in below attached table:





Table 11.1: Detail of the Project

S. No.	Description	Particulars					
1.	Mine lease area	622.69 Ha					
2.	Forest Area	Not Applicable					
3.	Lease Validity	Up to 20.04.2029					
4.	Approval of Mining Plan	Approved by Office of Regional Controller of mines, Indian Bureau of Mines vide letter number TN/SLM/MG&DU/ROMP/-1589 MDS dated 30/07/2020 for period 2020-21 to 2024-25					
5.	Type of mine	Opencast Mine					
6.	Method of mining	Other than Fully Mechanized Opencast Mining method, excavators will be deployed for the excavation, development of benches, loading and for the formation of roads. Mining operation is carried out by engaging both jack hammers and wagon drills. Heavy blasting will be done as and when required, besides regular blasting will be carried out with jackhammer drilling. Loading and transport of the ROM will be done by Hydraulic excavator and tippers. But the collection, segregation, dressing and stacking of ore size as Lumps (> 75mm), Smalls (25-75mm) and Jelly (10-25mm) are done by manual means					
7.	Existing Status of Mine	Mining activity has been stopped since 10.01.2017					
8.	Proposed Capacity	ROM: 2643936 TPA Magnesite: 115071 TPA Dunite: 67104 TPA					
9.	Expected life of mine	About 10 years (Based on details exploration life of mine can change)					
10.	Production MT (for the planned period, first five years)	Year	Tentative excavation, MT	Magnesite, MT	Dunite, MT	Waste, MT	Ore to Waste Ration
		Block I					
		20-21	178938	10736	6710 2	114520	1:1.47
		21-22	178852	10731	6707 0	114465	1:1.47
		22-23	178922	10735	6709 6	114510	1:1.47
23-24	237944	13089	6695 4	171292	1:2.14		





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S. No.	Description	Particulars					
		24-25	471068	22416	6700 1	395052	1:4.41
Block II							
		20-21	1993884	104274	-	1889610	1:18.12
		21-22	1851532	96660	-	1754872	1:18.15
		22-23	2452530	103974	-	2348556	1:22.59
		23-24	1653124	98160	-	1554964	1:15.84
		24-25	1903200	89856	-	1813344	1:20.18
11.	Ore to Waste ratio (t/t)	1:2.26 (Block I), 1:18.99 (Block II)					
12.	Total Mineral Reserve and resources	Magnesite: 23.95 million tonnes Dunite:16.423 million tonnes					
13.	Mineable reserves	Magnesite: 0.745 million tonnes Dunite:0.654 million tonnes					
14.	Working Regime	300 days / one Shift per day / 8 hours per Shift					
15.	Bench height / bench width	6 m/6 m					
16.	Overburden to be generated	Nil					
17.	Topsoil to be generated	Nil					
18.	Ultimate pit slope	45 ⁰					
19.	Ultimate working depth at the end of plan period	Block II: 48m					
20.	No. of waste dumps at the end of plan period	Block I: 12 Nos. of Waste dump (11 is existing & 1 proposed) Block II: 28 Nos. of Waste dump (23 is existing & 5 proposed) Block III: 25 Nos. of Waste dump (25 is existing) Block IV: 13 Nos. of Waste dump (13 is existing)					
21.	Employment Potential	Total: 434 persons					
22.	Power requirement	Transformer: 200 KVA from TNEB (Tamil Nadu Electricity Board) 45 KVA DG Set					





S. No.	Description	Particulars
23.	Water requirement	Source: Through Bore wells & Mine Water Domestic Water Requirement: 10 m ³ /day Dust Suppression water requirement: 30 m ³ /day Water requirement for Plantation: 50 m ³ /day Total Requirement: 90 m³/day
24.	Fuel consumption	HSD: 2, 50, 000 Liter /year Lube OIL: 7000 Lit/Year
25.	Explosive Requirement	1057 kg/Day
26.	Transportation	Within Lease After drilling & blasting, excavated material will shifted to spoil bank through trippers 15 tonnes capacity. Outside Lease The magnesite and dunite minerals from spoil bank will be transported to SRCL factory hired trucks of 10 tonnes capacity.
27.	Project Cost	Rs. 3.0 crore

11.3 DESCRIPTION OF THE ENVIRONMENT

Environmental data have been collected in relation to proposed mining for Air, Noise, Water, Soil, Ecology and Biodiversity. The generation of primary data, as well as collection of secondary data and information from the site and surroundings was carried out during pre monsoon Season, i.e. March to May 2021. The EIA study is being done for the Mine Lease (core zone) and area within 10 Km distance from the mine lease boundary (buffer zone), both of which together comprise the study area.

Table 11.2: Baseline Environment Status

Parameters	Baseline Status
Ambient Air Quality	PM ₁₀ – 80.74 to 74.10 µg/m ³ PM _{2.5} – 43.97 to 36.76 µg/m ³ SO ₂ – 6.00 to 16.8 µg/m ³ NO _x – 14.00 to 27.78 µg/m ³
Noise Level	Noise Level During Day Time – 72.6 and 49.7 dB (A) Noise Level During Night Time – 64.65 to 41.96 dB(A)
Water Quality	Ground Water: All the Parameters Like pH varies from 7.42 to 7.77, Total Hardness varies from 308.45 to 378.46 mg/L, Total Dissolved Solids varies from 562 to 697 mg/L, Chlorides – 82.53 to 115.23 mg/l etc. are found within the permissible limits. Surface Water: All the Parameters Like pH varies from 7.47 to 7.8, Total Hardness varies from 641 to 740.82 mg/L, Total Dissolved Solids varies from 818 to 1048 mg/L, Dissolved Oxygen – 5.1 mg/l to 6.5 mg/l etc. are found within the permissible limits.





Parameters	Baseline Status
Soil Quality	pH- 7.58 to 7.76 Organic matter 0.31% to 0.7 %
Ecology And Biodiversity	There is no wildlife sanctuary/biosphere reserve/national parks present within 10 Km radius of the study area.
Socio Economic	The proposed project will provide positive impact to the nearby area. The project will provide direct and indirect employment to nearby villagers.
Traffic	The proposed project will not cause major impacts due to increase in the PCU/Day which is 366 PCU/day. The LOS study shows that the existing traffic scenario is “good” and the free flow of vehicles is observed during the study period. Due to the mine project the traffic density will increase and the value of LOS will not change.

11.4 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

The proposed mining operations are not anticipated to raise the concentration of the pollutants beyond prescribed limits. However, the measures are suggested to mitigate any harmful impacts of pollutants, like the plantation of trees along haul roads especially near settlements, to help to reduce the impact of dust on the nearby villages; planning, transportation routes of mined material so as to reach the nearest paved roads by shortest route; regular water sprinkling on unpaved roads to avoid dust generation during transportation etc. The mining activities is likely to increase the per capita income of local people by which the socioeconomic status of the people will be improved. The local people have been provided with either direct employments or indirect employment such as transport & other business, contract works and development work like roads, etc. and other welfare amenities such as medical facilities, drinking water supply etc. Except dust generation, there is no source which can show a probability for health related diseases. Regular water sprinkling will be done with water sprinklers and dust masks will be provided to the workers. All workers will be subjected to a medical examination as per Mines Rule 1955 both at the time of appointment and at least once in a year. Medical camps will be organized for this activity. Insurance for all employees as per the rules will also be carried out.

Considering the aspects, namely meeting a bulk of the internal and external demand, need for earning revenue to state exchequer, indirect employment generation and economic development of a area, continuation of mining operation, is essential. However, best management practices like afforestation programme, network of garland drains and settling pits etc. have been integrated into project planning and EMP with an aim to minimize the environmental consequences and maximize the project benefits.





Table 11.3: Anticipated Environmental impacts and mitigation

Environmental Component	Project Activities	Impacts	Adverse / Beneficial	Mitigative Measures
Air Quality	Drilling and Blasting	PM ₁₀ , PM _{2.5} , SO ₂ and NO ₂	Adverse	Use of dust aprons by drillers and adopting wet drilling methods. A. The production of blast fumes containing noxious gases will be reduced by the following methods: <ul style="list-style-type: none"> • Use of adequate booster/primer; and • Proper stemming of the blast hole. • Scientific design of blast. B. Wet drilling method. C. Development of greenbelt.
	Extraction of mineral Loading / unloading of mineral and waste, stock piling of ore, dumping of waste at dump sites within ML area	Increase in SPM levels in ambient air due to dust generation and NO ₂ , HC, SO ₂ and CO concentration levels in ambient air due to vehicular emissions.	Adverse	<ul style="list-style-type: none"> • Sprinkling of water on haul roads at regular intervals. • Installing permanent water sprinklers at strategic areas/locations/stretch. • Regular maintenance of vehicles and machinery will be carried out. • Cabins for shovel and dumpers and dust respirators to workmen will be provided. • Dust suppression will be done on exposed area using water sprinkler. • Greenbelt development will be taken up on dump, haul roads and statutory barrier. • A good housekeeping and proper maintenance will be practiced which will help in controlling pollution.
	Transportation of mineral and waste	-do-	Adverse	<ul style="list-style-type: none"> • Use of tarpaulin covered trucks for transportation of mineral outside the ML area. • Regular water sprinkling on haul, access roads and all transfer points. • Haul roads to be maintained by surface grading to minimize excessive road surface wearing. • Roads no longer required will be re-vegetated as soon as possible.





Environmental Component	Project Activities	Impacts	Adverse / Beneficial	Mitigative Measures
	General equipment operations	Increase in SPM, NO ₂ and CO concentrations in ambient air.	Adverse	<ul style="list-style-type: none"> Regular maintenance of all equipment to minimize particulate matter and gaseous emissions from diesel driven vehicles & equipment.
	All activities	Excessive exposures to airborne particulate matter.	Adverse	Personal protective equipment (PPE) will be provided to all workers working in dusty environment.
Noise Levels and Ground Vibrations	Drilling and Blasting	High impulsive noise levels, overpressure and ground vibrations impacts and noise related community annoyance	Adverse	<p>➤ Noise Control Measures</p> <ul style="list-style-type: none"> Controlled blasting with proper spacing, burden and stemming will be maintained; The blasting will be carried out during favorable atmospheric condition and less human activity timings; Provision of sound insulated chambers for the workers deployed on machines Green belt (7.5 m wide) has been developed all along the lease boundaries to attenuate noise. A thick tree belt will be provided in phased manner around the periphery of the mine to attenuate noise; Trees will be planted on both sides of haul roads. Personal Protective Equipment (PPE) like ear muffs/ear plugs will be provided to the essential workers working in high noise area Reducing the exposure time of workers to the higher noise levels. Regular monitoring of Noise level will be carried out. <p>➤ Measures to Control Ground Vibration</p>
	Machine and transportation of overburden and Iron ore within the ML area.	Increase in noise levels occupational hazard due to noise exposures and increase in ambient noise levels.	Adverse	





Environmental Component	Project Activities	Impacts	Adverse / Beneficial	Mitigative Measures
				<ul style="list-style-type: none"> • Proper quantity of explosive, suitable stemming materials and appropriate delay system are to be adopted for safe blasting. • A safe blasting zone is kept around the periphery of the quarry. • Overcharging will be avoided; • The charge per delay will be minimized and preferably more number of delays will be used per blasts;
Water Resources and Quality	Water required for mine, (dust suppression systems, domestic facilities and greenbelt development)	Depletion of resources	Adverse	<p>Main source of industrial water will be through borewells and mine water.</p> <p>➤ Mine Drainage:</p> <ul style="list-style-type: none"> • The garland drains will be developed in advance for each mine stage such that water is collected in these garland drains and discharged properly into settling tanks to settle out suspended solids in the storm water. The clarified water is reused for green belt development. • The overall drainage planning will be done in such a manner that the existing drainage conditions should be maintained to the extent possible, so that run off distribution is not affected. • The settling tank and drains are cleaned periodically, especially during monsoons. <p>➤ Surface Water Pollution Control Measures</p> <ul style="list-style-type: none"> • Retaining walls of adequate dimensions will be provided at the toe of dumps to prevent wash off from dumps. This will help in preventing silting of water drains/channels; • The worked out slopes will be stabilized by planting appropriate shrub/grass species on the slopes. This will help in preventing wash-off from these slopes;
	Waste water generated from domestic usage at mine.	Depletion of ground water land soil quality when domestic waste water discharge improperly .	Adverse	





Environmental Component	Project Activities	Impacts	Adverse / Beneficial	Mitigative Measures
				<ul style="list-style-type: none"> The mine water will be regularly tested for presence of any undesirable elements and appropriate measures will be taken in case any element is found exceeding the limits prescribed by CPCB; <p>➤ Ground Water Pollution Control Measures</p> <ul style="list-style-type: none"> The domestic sewage will be routed to septic tanks followed by soak pits. Regular monitoring of water levels and quality in the existing open wells and bore well in the vicinity will be carried out.
Drainage pattern and Hydrogeology	Quarries, Ore stack yards and waste dump	Catchment area inside the mine will be affected.	Adverse	No surface streams have been proposed to be diverted for the project. The pre-mining surface drainage pattern shall be maintained as far as possible.
Landuse and Soil Characteristics	Mining & allied activities	Existing landuse of the core zone will alter. Land degradation due to disposal of waste materials.	Adverse	<p>Following measures will be taken:</p> <ul style="list-style-type: none"> Construction/ Installation of diversion drains and settlin ponds Dust suppression on exposed areas using water tankers and automatic sprinkling systems. Properly terracing of dump to minimize erosion. Plantation along road in and around the safety zone using native plant sapling. Compliance with mine decommissioning plan.
Flora and Fauna	Mine development	Displacement of existing	Adverse	<ul style="list-style-type: none"> Progressive afforestation and green belt development in the ML area has been carried out and shall continue till the life of the mine.





Environmental Component	Project Activities	Impacts	Adverse / Beneficial	Mitigative Measures
	and operations Mineral Transportation	fauna. Loss of vegetation		
Occupational Health & Safety	Overall Mining & allied activities	Occupational health problems due to dust & noise. Accident probability due to slope failure, movement of machineries, handling of explosives.	Adverse	<ul style="list-style-type: none"> Adoption of dust suppression measures like spraying water, wet drilling etc. Plantation Avoid blasting during unfavorable wind & atmospheric conditions Use of personal protective equipment. Periodical training of workers Compliance with DGMS circulars <p>Emergency response plan that includes installation of emergency response equipment to combat events such as fire. All personnel required to handle hazardous materials will be provided with personal protective equipment suitable for the hazardous material being handled. On-site first aid facilities will be provided to employees and are being extended to the local community in emergencies.</p>
Socio-economic Aspects	Land acquisition for mine site	No displacement of people & loss of properties.	-	The project does not envisage any leasing or acquisition of private land. Hence, there won't be any land owners who have to be resettled or rehabilitated.
	Mining operations	Increase in economic status of local people & in	Beneficial	The project will provide ample opportunity to the local people for direct and in-direct employment. The proposed project may create opportunities for indirect employment in the field of transportation business, vehicle hiring, labours, trading of construction materials, carpenters etc. necessary





Draft EIA Report for Mining of Magnesite & Dunite over an area 622.69 Ha, located at Villages Thathaiyangerpatti, Moongilpadi, Karuppur, Vellakkalpatti, Mallamoopanpatti, Taluk - Omalur & Salem, District-Salem (Tamil Nadu) By M/s SAIL Refractory Company Limited (SRCL).

Environmental Component	Project Activities	Impacts	Adverse / Beneficial	Mitigative Measures
		the region due to Increase in employment opportunities both direct and indirect.		budgetary allocations for social development will be for the upliftment of villages as per the requirement of regulations.

11.5 ANALYSIS OF ALTERNATIVES

We have analyzed all the option for technology alternatives of the proposed project. since it is a mineral specific project therefor analysis of alternative site is not applicable.





11.6 ENVIRONMENTAL MONITORING PROGRAM

In order to maintain the environmental quality within the stipulated standards, regular monitoring of various environmental components is necessary which will comply as per conditions. For this the lessee M/s. SRCL has taken the decision to formulate an Environment Policy of the mine and constitute an Environmental Management Cell and committed to operate the proposed mine with the objectives mentioned in approved Environment Policy. EMP may also require measurement of ambient environmental quality in the vicinity of a site using ecological/biological, physical and chemical indicators. Monitoring may include socioeconomic interaction, through local liaison activities or even assessment of complaints. Regular Monitoring of all the environmental parameters viz., air, water, noise, SE,EB and soil, as per the formulated program based on CPCB and MoEF&CC guidelines will be carried out every year. The location of the monitoring stations was selected on the basis of prevailing micro meteorological conditions of the area like; wind direction and wind speed, relative humidity, temperature. A budget for monitoring of Air, water, Noise and Soil will be Rs. 9.08 Lakhs per annum which is to be incurred by the project proponent for undertaking pollution prevention measures during the mining activity. A budget of Rs. 203.95 Lakhs as a capital cost and Rs 45 lakhs for recurring cost for plan period has been kept for EMP.

11.7 ADDITIONAL STUDIES

Risk assessments will help mine operators to identify high, medium and low risk levels. This is a requirement of the Occupational Health and Safety Act 2000. Risk assessments will help to prioritize the risks and provide information on the need to safely control the risks. In this way, mine owners and operators will be able to implement safety improvements. Mining and allied activities are associated with several potential hazards to both the employees and the public at large. A worker in a mine will be able to work under conditions, which are adequately safe and healthy. At the same time the environmental conditions also will not impair his working efficiency. This is possible only when there is adequate safety in mines. Hence mine safety is one of the most essential aspects of any working mine.

11.8 PROJECT BENEFIT

In addition to the existing workers management will recruit the semi-skilled and unskilled workers from the nearby villages. The project activity and the management will definitely support the local Panchayat and provide another form of assistance for the development of public amenities in this region. The company management will contribute to the Educational Development, Infrastructure Development, health facilities, sanitation and hygiene, employment opportunity, afforestation etc. for the welfare of the villagers.





11.9 ENVIRONMENTAL MANAGEMENT PLAN

As per Above discussion there is no major impact on the environment due to mining except fugitive emission in the form of dust generated during mining. The adequate preventive measures will be adopted to contain the various pollutants within permissible limits. In addition to the existing plantation development will be carried out which will be an effective pollution mitigate technique, and help avoid soil erosion during monsoon season. Employment opportunities will be provided to the locals only occupational from the mine site is the only prevailing source of income for their livelihood. A budget of Rs. 203.95 Lakhs as a capital cost and Rs 45 lakhs for recurring cost for plan period has been kept for EMP.

11.10 CONCLUSION

From the baseline study and various above discussions on the 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.





12. DISCLOSURE OF CONSULTANT

12.1 INTRODUCTION

Vardan Environet is a pioneer consulting organisation of India specializing in Environmental Protection, Industrial Pollution Control, Environmental & Mechanical testing and engineering field. Vardan assists clients in comprehensive environmental and engineering services ranging from conceptual planning and preliminary investigation to detailed engineering designs. Local knowledge coupled with national and international experience of proven technical know-how and a strong commitment from our team of experts enables Vardan to assist in solving the clients environmental and engineering problems successfully with competence by first analysing then visualizing and finally utilizing technically strong and dedicated skill.

Vardan has successfully completed a wide range of multi-disciplinary assignments/reports. The company's project formulation requires preliminary and detailed project investigation. The objective of the investigation is to assess the technical viability and cost effectiveness of the proposals vis-à-vis the objective and benefit. Vardan was founded in 2012 and brought together a number of consultancy services with a track record of performance in the environmental Science and Engineering field.

Headquartered in Gurugram, Vardan has prominent presence in Delhi-NCR, Rajasthan, Maharashtra, Madhya Pradesh, West Bengal and Jharkhand. With a man-power of over more than 200 professionals, the organization comprises of senior retired government officers from various departments like Pollution Control Board, Mines & Geology, Civil Services, SAIL, GAIL, NEERI who have decades of experience in the field of environmental management. The team also Comprises of young, dynamic and progress driven Environment, Civil, Mechanical & Chemical engineers, Geologists, GIS experts, Ecologists and Auditors.

Vardan EnviroLab, a sister concern provides reliable and precise testing services for a wide range of Environmental, Chemical, Food testing, Microbiology and Building Materials with in-house Equipment/Instruments of advance technology along with experienced technical staff.

12.2 SERVICES OF VARDAN ENVIRONET

- Environmental Impact Assessment (EIA), Environmental Management Plan (EMP), Environmental Compliance, Mining Plan, Social Impact Assessment,
- Testing of water, Waste water, Ambient & work zone air, stack emissions, noise, soil, limestone, dolomite, iron ore, coal, cement, bricks, concrete, blocks, steel bars & wires, Indoor Air Quality monitoring, Sludge.





- Hydrological surveys for ground water clearance.
- Approvals/NOC/Clearances from various Government Authorities.
- Detailed Project report/Feasibility report/Plans/Designs.
- Environmental Quality Monitoring and analysis.
- Geotechnical investigations, Topographical Survey, Planning and Designs.
- EHS, Energy and water Audit, risk/hazard studies and disaster management plan (both onsite and off-site)

12.3 RECOGNITIONS

- Approved by NABET in 21 sectors for preparation of EIA/EMP reports.
- Vardan EnviroLab is recognized by Ministry of Environment, Forest & Climate Change, Govt. of India under Environmental Protection Act 1986.
- Vardan EnviroLab is accredited by NABL in the field of Testing.
- Vardan EnviroLab is certified by OHSAS 18001:2007.
- Vardan EnviroLab is certified by ISO 14001:2015.
- Vardan EnviroLab is certified by ISO 9001:2015.
- Vardan EnviroLab is approved by HSPCB & RSPCB.

12.4 LIST OF SOFTWARE MODELS FOR ENVIRONMENTAL STUDIES

- Multisource Dispersion Model based on Gaussian Model (ISCST3, AERMOD)
- Noise Propagation Model (Dhawani Pro)
- Risk and Hazard studies through Aloha model
- GIS mapping through Arc GIS, watershed & area drainage mapping, cadastral mapping, DGPS survey, 3D modelling, Urban/Rural area planning & management and Digital Elevation Model.
- Transect and line intercepts for Ecology and Biodiversity studies
- Extrapolative method & Intuitive technique (Delphi technique) in socio-economic assessment.

12.5 KEY MANAGEMENT PERSONNEL OF VARDAN

Table 12.1: Key Management Personnel of Vardan

S. No.	Name	Designation	Experience (Years)
1.	R.S. Yadav	Managing Director	32
2.	Roopika Sharma	CEO	12
3.	Aman Sharma	Partner	14
4.	Anshul Yadav	Partner	8
5.	Dr. Niteesh Kumar	General Manager	13
6.	Anshul Yadav	EIA Coordinator	8





12.6 EMINENT CLIENTELE OF VARDAN

Vardan has executed around 1500 projects across all over India in a short span of time covering both public and private sectors. Following are some of our reputed clients.

Indian Oil, HPCL, NTPC, NHPC, BPCL, Delhi Metro, GAIL, GPIL, SAIL, NHAI, APCPL, RITES, MPPGCL, Indian Railways, JK Lakshmi Cement Ltd., L&T, Tata, Adani, Hero, Honda, HCL, Panasonic, Jaypee group, DLF, Godrej, Haldiram's, Unitech, JBM, Trident hotels, Lanco, Aditya Birla, Mangalam cement, JW Marriot, Eros group and many others.





12.7 CERTIFICATIONS OF VARDAN



QUALITY COUNCIL OF INDIA
Creating an Ecosystem for Quality



**National Accreditation Board
for Education and Training**



Certificate of Accreditation

Vardan Environet
Plot No. 82-A, Sector 5, IMT Manesar, Gurgaon-122051, Haryana

The organization is accredited as **Category-A** 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/ underground mining	1	1 (a) (i)	A
2	Offshore & Onshore Oil and gas exploration, development & production	2	1 (b)	A
3	River Valley projects	3	1 (c)	A
4	Thermal power plants	4	1 (d)	B
5	Coal washeries	6	2 (a)	A
6	Mineral beneficiation	7	2 (b)	A
7	Metallurgical industries (ferrous & nonferrous)- both primary & secondary	8	3 (a)	A
8	Cement Plants	9	3(b)	A
9	Coke oven plants	11	4 (b)	A
10	Synthetic organic chemicals industry	21	5 (f)	A
11	Distilleries	22	5 (g)	A
12	Sugar industry	25	5 (j)	B
13	Oil & gas transportation, passing through national parks/ sanctuaries/coral reefs /ecologically sensitive Areas including LNG terminal	27	6 (a)	A
14	Isolated storage & handling of hazardous chemicals	28	-	B
15	Airports	29	7 (a)	A
16	Bio-medical waste treatment facilities	32A	7 (d a)	B
17	Highways	34	7 (f)	A
18	Common effluent treatment plants (CETPs)	36	7 (h)	B
19	Common municipal solid waste management facility (CMSWMF)	37	7 (i)	B
20	Building and construction projects	38	8 (a)	B
21	Townships and Area development projects	39	8 (b)	B

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in SAAC minutes dated Mar. 16, 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/22/2311 dated Apr.13, 2022. The accreditation needs to be renewed before the expiry date by Vardan Environet, Gurgaon following due process of assessment.



Sr. Director, NABET
Dated: Apr. 13, 2022

Certificate No.
NABET/EIA/2023/SA 0158

Valid up to
May. 05, 2023

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





12.8 ENVIRONMENTAL MONITORING AND ANALYSIS LABORATORY

Environmental Baseline data generation has been carried out by NABL Accredited laboratory Vardan EnviroLab, Sector-5, IMT Manesar, Gurgaon, Haryana. The laboratory has also been accorded recognition as Environment Laboratory by MoEF&CC. NABL Accreditation Certificate of Vardan EnviroLab is given below.

रविस्ट्री सं. सी.एन.-33004/99

REGD. No. D. L.-33004/99



सी.जी.-डी.एल.-अ.-02062021-227331
CG-DL-E-02062021-227331

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EXTRAORDINARY
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पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय

अधिसूचना

नई दिल्ली, 1 जून, 2021

का.आ. 2131(अ).—केंद्रीय सरकार, पर्यावरण (संरक्षण) नियम, 1986, के नियम 10 के साथ पठित पर्यावरण (संरक्षण) अधिनियम, 1986 (1986 का 29) की धारा 12 की उप-धारा (1) के खंड (ख) और धारा 13, द्वारा प्रदत्त शक्तियों का प्रयोग करते हुए तत्कालीन पर्यावरण और वन मंत्रालय का.आ 1174 (अ), तारीख 18, जुलाई, 2007, द्वारा भारत सरकार की अधिसूचना में निम्नलिखित और संशोधन करती है अर्थात् :-

उक्त अधिसूचना की सारणी में -

(i) क्रम संख्या 23, 36, 40, 44, 46, 48, 50, 51, 57, 67, 68, 70, 74, 99, 101, 106, 112, 119, 127 और 138 और उससे संबंधित प्रविष्टियों के स्थान पर, क्रमशः निम्नलिखित क्रम संख्या और प्रविष्टियां रखी जाएंगी, अर्थात्:-

सारणी

क्र.सं.	प्रयोगशाला का नाम	सरकारी विद्वेषक के नाम	निम्नलिखित तारीख तक वैध मान्यता
(1)	(2)	(3)	(4)
23	मैसर्स विट्रो लैब्स, # 2-2-647/ ए/3, 3	(i) श्री चौ. नरसिम्हा राव	01 जून, 2021

2952 GI/2021.

(1)





127	मैसर्स वर्धन एनरोलैब प्लॉट नंबर 82 / ए, सेक्टर -5, एचएसआईआईडीसी, आईएमटी, मानेसर, गुडगांव -122051, हरियाणा	(i) श्री एस. शर्मा (ii) श्री गौर प्रताप सिंह (iii) डॉ. शिव प्रकाश सिंह	01 जून, 2021 से 6 जनवरी, 2023
138	मैसर्स फूड हाइजीन एंड हेल्थ प्रयोगशाला, को सर्वे नंबर 126/10, प्लॉट नं. -1, हडपसर इंडस्ट्रियल एस्टेट, हडपसर, ताल - हवेली, जिला - पुणे -1013, महाराष्ट्र	(i) श्री रोहन देशपांडे (ii) सुश्री सीमा सतीश बाकडे (iii) सुश्री सुपमा महेश	01 जून, 2021 से 29 मार्च, 2024

(iii) क्रम संख्या 201 और उससे संबंधित प्रविष्टियों के पश्चात, निम्नलिखित क्रम संख्या और प्रविष्टियां रखी जाएंगी, अर्थात:-

क्र.सं.	प्रयोगशाला का नाम	सरकारी विश्लेषक के नाम	निम्नलिखित तारीख तक वैध मान्यता
(1)	(2)	(3)	(4)
"202	209 मैसर्स अजीस लैब्स प्लॉट नं -एम-43 सेक्टर -3, पीठमपुर जिला धार -454774, मध्य प्रदेश	(i) श्री रविशंकर सहाय (ii) श्री मनोज ब्रामनीया (iii) सुश्री निकिता भंड	01 जून, 2021 से 28 फरवरी 2023
203	मैसर्स क्रिएटिव एनवायरो सर्विसेज, 42, दूर संचार नगर, सेवॉय कॉम्प्लेक्स अरेरा कॉलोनी के निकट भोपाल -462039, मध्य प्रदेश	(i) डॉ. जी.के. जैस (ii) श्री संतोष खंटल (iii) सुश्री अमृता मिश्रा	01 जून, 2021 से 11 अक्टूबर, 2021
204	मैसर्स एशिया एनवायरो लैब, एच1-837, प्रदूषण बोर्ड के पास, चरण- II, रिको औद्योगिक क्षेत्र, भिवाड़ी, जिला- अलवर- 301019, राजस्थान	(i) श्री विक्रम सिंह (ii) श्री रोहताश	01 जून, 2021 से 23 दिसंबर, 2023
205	मैसर्स क्वालिटी रिसर्च और एनालिटिकल लैब्स. 341, ग्राउंड फ्लोर, कार्यात्मक औद्योगिक क्षेत्र, पटपडगंज, नई दिल्ली -110092	(i) डॉ. गौरव माहेश्वरी (ii) मिस अनीता सिंह	01 जून, 2021 से 21 अक्टूबर, 2023
206	मैसर्स दिल्ली एनालिटिकल रिसर्च प्रयोगशाला, प्लॉट नंबर 2, टिम्बर ब्लॉक, झिलमिल औद्योगिक क्षेत्र, दिल्ली-110095	(i) डा. प्रियंका मिश्रा (ii) श्री विनय गुमा (iii) श्री नाओ ज्योति कुमार गुप्त	01 जून, 2021 से 12 नवंबर, 2021
207	मैसर्स वर्धन एनरोलैब, प्लॉट नंबर - 24 और 25, नारायण विहार, बीब्लॉक, मानसरोवर, जयपुर- 302035, राजस्थान	(i) श्री राजिंदर सिंह यादव (ii) श्री राज कुमार यादव (iii) श्री नेमी चंद चौधरी	01 जून, 2021 से 6 जनवरी, 2023
208	मैसर्स पर्यावरण परीक्षण लैब, दुकान नंबर 1, देना बैंक के पास, वास रोड, रामनगर, ददरुहेरा, रेवाड़ी -123106, हरियाणा	(i) श्री करतार सिंह (ii) श्री हेमराज	01 जून, 2021 से 23 मार्च, 2024
209	मैसर्स अल्टीमेट एनवायरोलाइटिकल समाधान, एचडीडी 272, चरण-3, जेपी	(i) श्री अनुराग के. श्रीवास्तव	01 जून, 2021 से





CERTIFICATE OF REGISTRATION



This is to certify that the management system of
M/S VARDAN ENVIROLAB

has been formally assessed by
INTERNATIONAL CERTIFICATION & INSPECTION UK LTD.
and found to comply with the requirements of

ISO 9001:2015
(Quality Management Systems)

Scope of Registration:

PROVISION OF TESTING DISCIPLINE FOR ENVIRONMENTAL, CHEMICAL,
FOOD MICROBIOLOGICAL AND MECHANICAL SAMPLES.

Registered Site (s):

PLOT NO.82-A, SECTOR-5, IMT MANESAR, GURUGRAM - 122051, HARYANA, INDIA.

:: Certificate No :: ICIINDI/3807/XX

Date of initial registration: **07 January 2020**

First Surveillance Audit on or before: **10 December 2020**

Second Surveillance Audit on or before: **10 December 2021**

Re-certification Due: **06 January 2023**

**This Certificate is property of ICI UK Ltd. and remains valid
subject to satisfactory surveillance audits.**

Peter Collins

Executive Director

International Certification & Inspection UK Limited.

71-75 Shelton Street Covent Garden London, WC2H 9JQ United Kingdom



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Draft EIA Report for Mining of Magnesite & Dunite over an area 622.69 Ha, located at Villages Thathaiyangerpatti, Moongilpadi, Karuppur, Vellakkalpatti, Mallamoopanpatti, Taluk - Omalur & Salem, District-Salem (Tamil Nadu) By M/s SAIL Refractory Company Limited (SRCL)

CERTIFICATE OF REGISTRATION



This is to certify that the management system of

VARDAN ENVIROLAB

has been formally assessed by
INTERNATIONAL CERTIFICATION & INSPECTION UK LTD.
and found to comply with the requirements of

ISO 14001:2015

Environmental Management Systems

Scope of Registration:

Testing of Environmental Parameters, Food Products, Pharmaceuticals, Building Materials, Disinfection Services, Auditing and Other Technical Services.

Registered Site (s):

Plot No. 82-A, Sector - 5, IMT Manesar, Gurugram - 122051, (Haryana), India.

:: Certificate No :: ICIINDI/4534/XX

Date of initial registration: 20 June 2020

First Surveillance Audit on or before: 10 May 2021

Second Surveillance Audit on or before: 10 May 2022

Re-certification Due: 19 June 2023

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M/s Vardan EnviroNet

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CERTIFICATE OF REGISTRATION



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INTERNATIONAL CERTIFICATION & INSPECTION UK LTD.
 and found to comply with the requirements of
ISO 45001:2018
Occupational Health and Safety

Scope of Registration:

PROVISION OF TESTING SERVICES FOR ENVIRONMENTAL SAMPLE (WATER, WASTE WATER, AMBIENT AIR, NOISE, STACK EMISSION), BUILDING MATERIALS SAMPLE (CEMENT, CONCRETS, BRICKS, PAVOUR BLOCK, STEEL), DRUGS AND PHARMACEUTICAL SAMPLE & FOOD AND AGRICULTURAL PRODUCTS.

Registered Site (s):

PLOT NO. 82 - A, SECTOR -5, IMT MANESAR - 122051, HARYANA, INDIA.

:: Certificate No :: ICIINDI/3806/XX

Date of initial registration: 07 January 2020
First Surveillance Audit on or before: 10 December 2020
Second Surveillance Audit on or before: 10 December 2021
Re-certification Due: 06 January 2023

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Executive Director
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13. Assessment of Ecological Damage Remediation Plan Community Resource Augmentation Plan

13.1 INTRODUCTION

The proposed project is listed under activities 1(a) Mining of Minerals under the Schedule of EIA Notification, 2006 as amended till date and categorized as Category-A (Under Violation). As per the notification, the projects necessitate prior environmental clearance from Ministry of Environment Forest & Climate Change, the proposed project has violated the EIA notification as the mining has been operating without Environmental Clearance since the inception of mining lease and during renewal of lease in year 2000, which is violation of EIA notification 1994. The mine was operated based on Consent to Operate (CTO) from Tamil Nadu Pollution Control Board since 1991.

Since the project is considered to be in violation of EIA notification based on above discussions, provisions mentioned in the EIA notification amendment 14th March 2017 become applicable to the project. This chapter addresses the requirement of provisions mentioned in the EIA notification amendment 14th March 2017.

13.2 ECONOMIC BENEFIT DERIVED

Annual Production since 2000 is given in **Table 13.1**

Table 13-1: Annual Production from Mine

Year	Magnesite in (TPA)	Dunite (TPA)
2000-2001	39500	9000
2001-2002	35900	9000
2002-2003	32500	11000
2003-2004	61000	16000
2004-2005	75500	8000
2005-2006	69000	20000
2006-2007	68000	33000
2007-2008	89000	23000
2008-2009	135000	28000
2009-2010	64100	22000
2010-2011	85000	30000





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Year	Magnesite in (TPA)	Dunite (TPA)
2011-2012	68960	37870
2012-2013	80000	23000
2013-2014	75000	15000
2014-2015	65000	13600
2015-2016	58000	12800
2016-2017	42000	1500

The following table shows income generated, expense and economic benefit derived from the production.





Table 13-2: Economic Benefit Derived

Year	Magnesite in (TPA)	Mineral Rate from IBM for crude Magnesite in Rs/Tonne	Income incurred from production of crude magnesite	Production cost per tonne of crude Magnesite	Expense incurred for crude magnesite in INR	Net Profit incurred from crude magnesite in INR
A	B	C	D	E	F	G= D-F
2000-2001	39500	1295.35	5,11,66,325	945.61	3,73,51,595	1,38,14,730
2001-2002	35900	1337.20	4,80,05,480	976.16	3,50,44,144	1,29,61,336
2002-2003	32500	1390.78	4,52,00,350	1,075.27	3,29,96,275	1,22,04,075
2003-2004	61000	1416.61	8,64,13,210	1,034.13	6,30,81,930	2,33,31,280
2004-2005	75500	983.05	7,42,20,275	717.63	5,41,81,065	2,00,39,210
2005-2006	69000	1178.52	8,13,17,880	860.32	5,93,62,080	2,19,55,800
2006-2007	68000	1592.09	10,82,62,120	1,162.23	7,90,31,640	2,92,30,480
2007-2008	89000	1398.82	12,44,94,980	1,021.14	9,08,81,460	3,36,13,520
2008-2009	135000	1493.89	20,16,75,150	1,090.54	14,72,22,900	5,44,52,250
2009-2010	64100	1483.12	9,50,67,992	1,092.69	6,93,99,788	2,56,68,204
2010-2011	85000	1670.45	14,19,88,250	1,219.43	10,36,51,550	3,83,36,700
2011-2012	68960	1,609.29	11,09,75,949	1,174.77	8,10,12,139	2,99,63,810
2012-2013	80000	2,112.97	16,90,37,600	1,630.95	13,04,76,000	3,85,61,600
2013-2014	75000	2,505.60	18,79,20,000	1,801.75	13,51,31,250	5,27,88,750
2014-2015	65000	2,926.56	18,37,26,400	1,742.56	11,32,66,400	7,04,60,000
2015-2016	58000	2,662.45	15,44,22,100	2766.16	12,56,37,280	2,87,84,820





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Year	Magnesite in (TPA)	Mineral Rate from IBM for crude Magnesite in Rs/Tonne	Income incurred from production of crude magnesite	Production cost per tonne of crude Magnesite	Expense incurred for crude magnesite in INR	Net Profit incurred from crude magnesite in INR
2016-2017	42000	2,799.02	11,71,38,840	2,024.1,2	8,50,13,040	3,21,25,800
Total (A)	1143460					53,82,92,365

Year	Dunite (TPA)	Mineral Rate from IBM for Dunite in Rs/Tonne	Income incurred from production of Dunite	Production cost per tonne of Dunite	Expense incurred for Dunite in INR	Net Profit incurred from Dunite in INR
A	B	C	D	E	F	G= D-F
2000-2001	9000	125.38	11,28,420	169.27	15,23,340	-3,94,920
2001-2002	9000	138.60	12,47,400	187.11	16,83,990	-4,36,590
2002-2003	11000	187.50	20,62,500	253.13	27,84,430	-7,21,930
2003-2004	16000	101.29	16,20,640	136.74	21,87,840	-5,67,200
2004-2005	8000	225.88	18,07,040	304.94	24,39,520	-6,32,480
2005-2006	20000	272.46	54,49,200	367.82	73,56,400	-19,07,200
2006-2007	33000	182.25	60,14,250	246.04	81,19,320	-21,05,070
2007-2008	23000	440.58	1,01,33,340	594.78	1,36,79,940	-35,46,600
2008-2009	28000	870.06	2,43,61,680	1,174.58	3,28,88,240	-85,26,560
2009-2010	22000	304.73	67,04,060	411.39	90,50,580	-23,46,520
2010-2011	30000	299.79	89,93,700	404.72	1,21,41,600	-31,47,900
2011-2012	37870	709.99	2,68,87,321	958.49	3,62,98,016	-94,10,695





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Year	Dunite (TPA)	Mineral Rate from IBM for Dunite in Rs/Tonne	Income incurred from production of Dunite	Production cost per tonne of Dunite	Expense incurred for Dunite in INR	Net Profit incurred from Dunite in INR
2012-2013	23000	1152.71	2,65,12,330	1,355.43	3,11,74,890	-46,62,560
2013-2014	15000	1527.63	2,29,14,450	1,796.11	2,69,41,650	-40,27,200
2014-2015	13600	1465.09	1,99,25,224	1,703.94	2,31,73,584	-32,48,360
2015-2016	12800	1527.63	1,95,53,664	1,915.89	2,45,23,392	-49,69,728
2016-2017	1500	1527.63	22,91,445	2,959.90	44,39,850	-21,48,405
Total (B)	312770					-5,27,99,918

Year	Maintenance cost of red hill mines
A	B
2017-2018	-1,95,96,177
2018-2019	-2,47,13,051
2019-2020	-1,27,79,445
2020-2021	-1,27,89,839
2021-2022	-1,04,92,433
Total (C)	-8,03,70,945





SRCL has violated by producing 11,43,460 Tonnes Magnesite and 3,12,770 Tonnes Dunite 2000-2001 onwards. Final net profit incurred is **(Total A + Total B + Total C above)** of **INR ₹ 40,51,21,502** was accrued due to production during the violation period. 3% of the total net profit of INR ₹ **1,21,53,645/-** will be contributed towards remediation plan cost. The CA certificate of the same is attached.

Table 13-3: EMP Cost Saved

Sl. No.	Description	Item	Recurring cost per year for 17 years (Rs. in Lakhs)	Capital cost (Rs. in Lakhs)
1	Air Pollution / Occupational health & safety	Dust Suppression Systems on Haul roads	2.0	10.00
2	Water & Soil erosion	Dump reclamation through bench formation & Stabilization	--	5.00
		Dewatering of Mine water (Rainfall Season)	0.50	--
3	Noise pollution	Maintenance of Machinery	1.0	--
4	Biological & Socioeconomic aspect	Green belt maintenance	0.50	2.50
		EHS permits and compliance related studies.	--	6
		Safety Equipment	--	0.97
5	Environment data generation and EMP preparation, etc.	Provision of environmental monitoring equipment's like AAQ Monitoring system, Noise Meter, pH / EC Meter and Soil & Water Quality Analyser. (No Capital cost Since all EMP related works are outsourced)	2.00	--
TOTAL			6.0	24.47





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Total EMP Cost saved during the violation period of 17 years is INR 1,26,47,000/- . & 3% of this cost ₹ 3,79,410/-will be contributed to remediation plan cost





13.3 ASSESSMENT OF ECOLOGICAL DAMAGE

13.3.1 Impact on Land environment

No land outside the project area has been used for the purpose of production. The mined-out area was reclaimed as per the post-mining land use as mentioned in approved mining plan at that time. The excavated area till date is within the overall excavation area and the land use is as per the approved mining plan. As such degradation of land due to mining is within the envisaged extent of land use.

The calculation of monetary cost for damage caused due to change in land use / land cover within the mining lease area is given in **Table 13.4**.

Table 13-4: Monetary Cost for Damage due to change in Land use

S. No.	Damage Description	Qty X Damage Cost	Amount (Rs., Lakhs)	Comments
1	Mandatory requirement of 33% plantation. Area used till date for mining is 175.08 Ha and 33% of used area is 57.77 Ha in which plantation was carried out in 54.319 Ha, so balance area is covered under violation calculation	3.4574 Ha X 1500 X 500	25,93,050	Plantation rate-1500 No / Ha Cost of Plantation-Rs.500 per plantation
2	Mandatory requirement of plantation of width 7.5 Meters within the ML boundary. Out of 23402.93 m total running boundary 175.08 Ha which is under mining, hence 6580.13 m need plantation. Excluding existing plantation (5244 m), balance area is mentioned below as violation. Approx. 1336.13 Meters.	1.0021 Ha X 1500 X 500	7,51,575	Plantation rate-1500 No / Ha Cost of Plantation-Rs.500 per plantation
Total			33,44,625	





13.3.2 Impact on Air environment

Different air pollution parameters like Particulate Matters less than 10 μ (PM₁₀), Particulate Matter less than 2.5 μ (PM_{2.5}), Sulphur Dioxide (SO₂) and Nitrogen Oxides (NO_x) have been identified as critical parameters relating to project activities. Please refer Table summarized details of the mine corresponding quantified emission values of respective pollutants.

Table 13-5: Emissions from Various Activities

EMISSION FROM VARIOUS ACTIVITIES WITH CONTROL MEASURES (KG/DAY)					
Activity	YEAR	PM _{2.5}	PM ₁₀	SO _x	NO _x
ACTIVITY- Drilling CONTROL MEASURE - 70% Emissions Controlled Due to Water Sprinkling	2000-01	6.37761	2.55104	NA	NA
	2001-02	6.23174	2.4927		
	2002-03	6.1728	2.46912		
	2003-04	7.32627	2.93051		
	2004-05	7.50657	3.00263		
	2005-06	7.6516	3.06064		
	2006-07	7.94752	3.17901		
	2007-08	8.19787	3.27915		
	2008-09	9.1747	3.66988		
	2009-10	7.57594	3.03037		
	2010-11	8.26313	3.30525		
	2011-12	8.08246	3.23298		
	2012-13	7.99441	3.19777		
	2013-14	7.67729	3.07092		
	2014-15	7.37161	2.94864		
2015-16	7.14407	2.85763			
2016-17	6.1728	2.46912			
ACTIVITY- Blasting CONTROL MEASURE - 50% Emissions Controlled Due To Pit retention	2000-01	1.11718	0.44687	NA	NA
	2001-02	1.07492	0.42997		
	2002-03	1.05803	0.42321		
	2003-04	1.40766	0.56306		
	2004-05	1.46587	0.58635		
	2005-06	1.51338	0.60535		
	2006-07	1.61218	0.64487		
	2007-08	1.6977	0.67908		
	2008-09	2.04808	0.81923		
	2009-10	1.48852	0.59541		
	2010-11	1.72029	0.68812		
	2011-12	1.65806	0.66322		
	2012-13	1.62806	0.65123		





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EMISSION FROM VARIOUS ACTIVITIES WITH CONTROL MEASURES (KG/DAY)					
Activity	YEAR	PM_{2.5}	PM₁₀	SO_x	NO_x
	2013-14	1.52186	0.60874		
	2014-15	1.42221	0.56888		
	2015-16	1.3498	0.53992		
	2016-17	1.05803	0.42321		
ACTIVITY- Loading & Unloading of Ore CONTROL MEASURE - 50% Emissions Controlled Due To Pit / Stockyard surface retention	2000-01	0.35892	0.14357	NA	NA
	2001-02	0.33228	0.13291		
	2002-03	0.32192	0.12877		
	2003-04	0.56984	0.22793		
	2004-05	0.61794	0.24718		
	2005-06	0.65864	0.26346		
	2006-07	0.74745	0.29898		
	2007-08	0.82885	0.33154		
	2008-09	1.20628	0.48251		
	2009-10	0.63718	0.25487		
	2010-11	0.85105	0.34042		
	2011-12	0.79059	0.31624		
	2012-13	0.76225	0.3049		
	2013-14	0.66604	0.26642		
	2014-15	0.58168	0.23267		
ACTIVITY- Transport of Ore to stockyard CONTROL MEASURE - 60% Emissions Controlled Due To Water Sprinkling and covering the top of tipper with tarpaulin sheets	2000-01	0.00626	0.0025	0.25458	0.5432
	2001-02	0.00579	0.00232	0.25458	0.50288
	2002-03	0.00561	0.00224	0.25458	0.4872
	2003-04	0.00993	0.00397	0.33792	0.8624
	2004-05	0.01077	0.00431	0.35875	0.9352
	2005-06	0.01148	0.00459	0.37958	0.9968
	2006-07	0.01303	0.00521	0.41875	1.1312
	2007-08	0.01445	0.00578	0.46042	1.2544
	2008-09	0.02103	0.00841	0.60625	1.8256
	2009-10	0.01111	0.00444	0.37958	0.96432
	2010-11	0.01484	0.00593	0.46042	1.288
	2011-12	0.01378	0.00551	0.43958	1.1965
	2012-13	0.01329	0.00532	0.43958	1.1536
	2013-14	0.01161	0.00464	0.37958	1.008
	2014-15	0.01014	0.00406	0.33792	0.88032





EMISSION FROM VARIOUS ACTIVITIES WITH CONTROL MEASURES (KG/DAY)					
Activity	YEAR	PM_{2.5}	PM₁₀	SO_x	NO_x
	2015-16	0.00913	0.00365	0.31708	0.79296
	2016-17	0.00561	0.00224	0.25458	0.4872

The emission factors from above two references were multiplied with total emissions generated due to violation production to arrive upon the total emission load of pollutant during violation period to estimate the damage cost

Monetary Cost for Violation of Air Emissions Due to Excess Production

The cost of damage to air due to mining and other subsequent activities during the period of violation has been calculated based on the emissions factors, in correlation to the production during the particular year.

Table 13-6: Cost per kg of Emission

COST PER KG OF EMISSION (INR)			
PM_{2.5}	PM₁₀	SO_x	NO_x
524	340	165	96

Considering above emissions from various activities, and cost per kg of emission and 150 days for drilling and 52 days of blasting while 300 working days for other activities, the cost of damage to air due to mining and other subsequent activities during the period of violation has been calculated which is given below.

Table 13-7: Cost of Damage to air environment due to violation

Year	Damage Cost Per Annum (INR)*
2000-01	770276.6034
2001-02	747856.8457
2002-03	738903.3276
2003-04	929969.5362
2004-05	962635.5171
2005-06	989629.4519
2006-07	1046015.941
2007-08	1095744.866
2008-09	1304177.839
2009-10	976026.494
2010-11	1108421.699
2011-12	1072552.154
2012-13	1055861.17
2013-14	994277.2473





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Year	Damage Cost Per Annum (INR)*
2014-15	937859.1714
2015-16	897671.6131
2016-17	738903.3276
Total	1,63,66,782.81

*-The unit cost per Kg of emission of respective pollutants are arrived based on reference from "Cost of Air Pollution from European Union Industrial Facilities". Further the cost is scaled down <20%, considering the local scenario and currency inflation rate.

13.3.3 Impact on Noise environment

There is no significant damage due to noise and vibration resulted due to mining activities. Therefore, this impact has been considered as low. It was assumed that by analysing the supply frequency and efficiency of PPE to Workers would be more relevant method for damage assessment. Since, they are considered initial contact or primarily impacted due to noise and vibration caused while involved in mining activities.

Thus, the total Noise Damage Compensation Cost is estimated as Rs. 3.40 Lacs as per table given below

Table 13-8: Cost of Damage due to Noise and vibration in ML

S. No	Damage Description	Qty X Damage Cost	Amount Rs in INR	Comments
1	Partial Provision of PPE to Labourers of 340 Nos. during the years of production	340 X 1000	3,40,000	Total count of laborer's worked for 17 y ears near noise area is 340 which is taken for damage assessment @
Sub Total			3,40,000	Rs1000/head.

13.3.4 Impact on Water Environment

Impact on Ground Water

In the process of mining, water will be accumulated in the dip most places of the mine due to rain. The water so accumulated is collected via suitable capacity pumps and stored in reservoirs within ML area. In case of Open cast mining, the general practice is to use old excavated mines for storage rain water. In SRCL mine lease the ground water is 50 to 55 m below the ground level observed near lease and





working has not intersected the ground water till date and hence no seepage water discharge which could impact the ground water was envisaged.

The baseline data for ground water in the study area reveals that all the parameters fall within the permissible limit of the drinking water standard IS 10500. The concentration of iron (as Fe), is slightly above the acceptable limit of 0.3 mg/L at locations GW-8 (0.36 mg/L).

Impact on Surface Water

The sources of waters that are considered under surface water category are Ponds or Lakes, Catchment Tanks / reservoir's, Nallahs, Rivers or Streams. For all these categories of surface water the primary source of water is rainfall. The impact on the surface hydrology (quantity) and quality depends on the provisions that are in place like check dams, Rain water harvesting and recharge pits, etc. to handle the quantum of monsoon rains in the core area and buffer areas. There is no water body like river or pond or lakes are found around 500m from the lease hold area.

As soon as the internal dump was formed, the surface runoff above the ground level was diverted to garland drains provided. As such there is no obstruction for surface runoff water during these years.

Impact of not providing rain water harvesting system

The following volume is calculated for rain water harvesting potential with total mine lease area of 622.69 ha.

Table 13-9: Rain Water Harvesting Potential of the Site

Sr. No	Details	Area (m ²)	Annual Rainfall (m)	Run-off Coeff	Total Runoff(m ³ /annum)
1	Rooftop Area	58,900	0.79	0.8	37,224.8
2	Road and Paved Area	2,40,000	0.79	0.7	1,32,720
3	Green Belt Area	5,43,100	0.79	0.2	85,809.8
4	Open Land Area	53,84,900	0.79	0.2	8,50,814.2
Total Runoff water quantity/Annual					11,06,568.8

From above table it is evident that the mine lease area has potential to harvest 11,06,568.8 KL of rainwater annually. The total water requirement for Plantation and dust suppression at 80 KLD for 210 working days is 16,800 KL. The site has





sufficient harvesting capacity as per above table, hence a rain water harvesting pit of approx. volume 20,000 KL will be required and cost for non-provision is included in the damage cost.

Table 13-10: Cost of Damage to Water environment

S. No	Damage Description	Qty X Damage Cost	Amount in INR	Comment
1	Sourcing of water for domestic, plantation and dust suppression use without EC (domestic consumption @3 KLD for 300 working days per year and for dust suppression and plantation 30 K LD @ 150 days per year) for 17 years of violation)	91,800 M3 X 60	55,08,000	Cost taken from latest CPCB guideline
3	Construction of RWH Pit	1 X 5,00,000	5,00,000	Cost of construction of RWH pit and utilization for greenbelt and dust suppression.
Sub Total			60,08,000	

13.3.5 Impact on Ecology and Biodiversity

During survey it is observed that, there are no prominent vegetation patches and wildlife habitats in the core zone. However, the mining and its related activities have altered the topography of landscape and initiate degradation in quality of environment, Ecological degradation, Loss of biodiversity, Loss of Wildlife habitats due to overburden removed and dumped in ML area. Having said the above, the vigorous plantation initiative by SRCL has turned the inactive OB dump yards into dense plantation area.

Table 13-11: Cost of Damage to Ecology and Biodiversity

S. No	Damage Description	Qty X Damage Cost	Amount Rs in Lacs	Comments
1	Compensatory amount for trees which have been cut during the	1000 X 500	5,00,000	For every 1 tree/Shrubs cut 5 trees to be planted as damage and corresponding cost is





	mining activity.			taken. This damage is considered apart from your regular plantation for GB. Considering 200 small shrubs were cut during mining till date. Cost mentioned is for plantation and maintenance. Considering it as rural area INR 500 is taken for same.
Sub Total			5,00,000	

13.4 Proposed remediation Plan and Natural and Community Resource Augmentation Plan

Total damage cost due to violation on different environmental attribute is given in table below

Table 13-12: Monetary Cost for Damage to all Environment Attributes

S. No	Environmental attributes	Damage Cost Amount Rs in Lacs	Remarks
1	Air Environment	1,63,66,782.81	
2	Land Environment	33,44,625	
3	Noise Environment	3,40,000	
4	Water Environment	60,08,000	
5	Ecology and Biodiversity	5,00,000	
6	EMP cost saved during violation period	3,79,420	Total EMP Cost saved during the violation period of 17 years is INR 1,26,47,000/- and 3% of that is taken as Profit accrued during violation.
7	Profit accrued during violation period	1,21,53,645	Total Profit accrued during violation period is ₹ 40,51,23,169/- 3% of this cost ₹ 1,21,53,695/- will be contributed to Remediation Plan cost.
Sub Total		3,90,92,472.81	





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Table 13-13: Remediation Plan

Environment Component	Remediation measures for environmental damage	1 st Year	2 nd Year	3 rd Year	Total
Air Environment	Avenue Plantation in nearby villages (~ 2000 trees each year along with tree guard, cost of plan with tree guard 500)	₹ 10,00,000.00	₹ 10,00,000.00	₹ 10,00,000.00	₹ 30,00,000.00
	Total (A)	₹ 10,00,000.00	₹ 10,00,000.00	₹ 10,00,000.00	₹ 30,00,000.00
Water Environment	Construction of RWH pits in nearby villages	₹ 12,00,000.00	₹ 10,00,000.00	₹ 10,00,000.00	₹ 32,00,000.00
	Installation of Piezometer in nearby villages	₹ 1,50,000.00	₹ 1,50,000.00	₹ 1,50,000.00	₹ 4,50,000.00
	Total (B)	₹ 13,50,000.00	₹ 11,50,000.00	₹ 11,50,000.00	₹ 36,50,000.00
Ecological Environment & Soil Environment	Monitoring cost of soil quality in surrounding villages. (Soil Fertility Parameter - INR 3000 per sample, 10 samples from each village per year)	₹ 3,00,000.00	₹ 3,00,000.00	₹ 3,00,000.00	₹ 9,00,000.00
Waste Management	Distribution of 10 Nos Waste Collection bins of capacity 500 Liters to be kept in common areas in nearby 30 villages each at INR 9500 per unit	₹ 9,50,000.00	₹ 9,50,000.00	₹ 9,75,000.00	₹ 28,50,000.00





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	Providing 5 Nos colour coded bins in nearby 10 schools, 5 Primary Health Center at INR 5000 per unit	₹ 1,50,000.00	₹ 1,50,000.00	₹ 75,000.00	₹ 3,75,000.00
Socio Economic	Skill Development Training to local youth in nearby villages (50 Person every year for three years)	₹ 7,50,000.00	₹ 7,00,000.00	₹ 7,00,000.00	₹ 22,50,000.00
	Total (C)	₹ 21,50,000.00	₹ 21,00,000.00	₹ 20,50,000.00	₹ 63,00,000.00
Grand Total (A) + (B) + (C)		₹ 45,00,000.00	₹ 42,50,000.00	₹ 42,00,000.00	₹ 1,29,50,000.00

Table 13-14: Natural Resource Augmentation Plan

Environmental components	Natural Resource Augmentation	1 st Year	2 nd Year	3 rd Year	Total
Energy Conservation	Distribution of LED Bulb (5 Bulb in each household of 15 W and total in 500 household in surrounding villages) (cost of each bulb ₹ 350)	₹ 3,00,000.00	₹ 3,00,000.00	₹ 2,75,000.00	₹ 8,75,000.00
	Providing 1 KW Solar Street Lighting (including panels, inverters, wiring, structure, connectors, junction boxes, etc.) in nearby villages @ Rs.50,000 per unit (Total 150 unit)	₹ 30,00,000.00	₹ 30,00,000.00	₹ 15,00,000.00	₹ 75,00,000.00
Water Environment	Providing roof top rain water harvesting system for	₹ 20,00,000.00	₹ 10,00,000.00	₹ 10,00,000.00	₹ 40,00,000.00





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Environmental components	Natural Resource Augmentation	1 st Year	2 nd Year	3 rd Year	Total
	Panchayat Houses in nearby 20 Villages (One unit @ ₹ 200,000) (including raw material, labour, construction and maintenance for one year)				
Land Environment	Renovation of community wells along with animal water troughs in nearby villages.	₹ 1,00,000.00	₹ 1,00,000.00	₹ 1,00,000.00	₹ 3,00,000.00
TOTAL					₹ 1,26,75,000.00





Table 13-15: Community Development Plan

Sl. No.	Community Resource Development	1 st Year	2 nd Year	3 rd Year	Total
1	To build common toilets in 3 villages in discussions with the village panchayat. Cost of each Toilet at INR 50,000	₹ 1,50,000.00	₹ 1,50,000.00	₹ 1,50,000.00	₹ 4,50,000.00
2	Facilitation of computer facility (Compute + Printer + LCD Projector) center in 20 schools in villages in the study area	₹ 10,00,000.00	₹ 5,00,000.00	₹ 5,00,000.00	₹ 20,00,000.00
3	To Support village level sports activities / library	₹ 2,00,000.00	₹ 1,75,000.00	₹ 1,75,000.00	₹ 5,50,000.00
4	Employment generation for local populace through skill development in surrounding villages	₹ 5,00,000.00	₹ 5,00,000.00	₹ 5,00,000.00	₹ 15,00,000.00
5	Health facility development assistance at Taluk Place and Conducting periodic medical check-up camps for general health in surrounding villages	₹ 15,00,000.00	₹ 15,00,000.00	₹ 15,00,000.00	₹ 45,00,000.00
6	Attention in improvement of local infrastructure for agriculture purpose (Repair of irrigation canal, Bund around agriculture land, etc)	₹ 5,00,000.00	₹ 5,00,000.00	₹ 5,00,000.00	₹ 15,00,000.00





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Sl. No.	Community Resource Development	1 st Year	2 nd Year	3 rd Year	Total
7	Construction of Community Hall (Villages willing to allot plot)	₹ 10,00,000.00	₹ 10,00,000.00	₹ 10,00,000.00	₹ 30,00,000.00
Total					₹ 1,35,00,000.00





13.5 Budget for remediation plan, natural resource augmentation plan and community resource augmentation plan

The summary of amounts which will be spent for Remediation Plan, Natural Resource Augmentation Plan and Community Resource Augmentation Plan is given below

Table 13-16: Budget

Sl. No.	Description	Estimated cost
1	Remediation Plan	₹ 1,29,50,000.00
2	Natural Resources Augmentation Plan	₹ 1,26,75,000.00
3	Community Resources Augmentation Plan	₹ 1,35,00,000.00
Total		₹ 3,91,25,000.00

Remediation plan and natural resource and community resource augmentation plan cost is given ₹ 3,91,25,000.00 against the Damage cost of ₹ 3,90,92,472.81

Calculation of bank guarantee amount as per Notification No. S.O. 804(E), dated 14-03-2017 shall be ₹ 3,91,25,000.00 as per details given here-in-above. The Bank guarantee shall be given for a period of 3 years, however the plan expenditure for remediation plan, Natural Resource Augmentation Plan and Community Resource Augmentation Plan shall be undertaken in right earnestness and completed in 3 years.