

**DRAFT EIA / EMP FOR
PROPOSED ROUGH STONE & GRAVEL QUARRY
(CATEGORY – B1)**

(Submitted for Public Hearing as per the provisions of EIA Notification 2006 &
its amendments thereof)

APPROVED TOR Lr.No.SEIAA-TN/F.No.9684/SEAC/ToR-1424/2022 Dated: 18.04.2023

PROPOSED QUARRY LEASE DETAILS	
SURVEY NOS	507 & 508
VILLAGE	THERKUKARSERI
TALUK	SRIVAIKUNDAM
DISTRICT	THOOTHUKUDI
EXTENT	4.21.5 HA
PROPOSED PRODUCTION FOR FIVE YEARS	4,64,760 m ³ OF ROUGH STONE 84,222 m ³ OF GRAVEL
LAND	OWN PATTALAND

(Sector No. 1(a) (Sector no.1 as per NABET)

Category of the Project: B1 Cluster Mining, Total Cluster Area – 8.81 Ha

Baseline Monitoring Period – March to May 2023

APPLICANT

THIRU. K.SUBBAIAH

S/o.KARUNAKARAN,

**DOOR NO.8/11, NADU THERU, MAVADI PANNAI, THIRUCHENDUR TALUK
AND THOOTHUKUDI DISTRICT.**

PIN CODE– 628 623.

ORGANIZATION

M/s. GLOBAL MINING SOLUTIONS

(NABET ACCREDITED & ISO 9001 CERTIFIED CONSULTANT)

**PLOT NO. 6, SF NO. 13/2, A2, VS CITY, RC CHETTYPATTY,
KOTTAMETTUPATTY, OMALUR, SALEM, TAMIL NADU – 636 455**

NABET ACCREDITATION NO – NABET/EIA/2326/IA 0110

November -2023



Draft EIA EMP report of Proposed Rough stone and Gravel Quarry of Mr. K. Subbaiah at SF No 507 & 508 over a Extent of 4.21.5 Ha in Therkukarseri Village, Srivaikundam Taluk, Thoothukudi District, Tamil Nadu


AMENDMENT PAGE

SL	Page No.	Section / Clause / Para / Line (as Applicable)	Date of Amendment	Amendment Made	Reasons of amendment	Signature of Person Authorizing Amendment
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ACKNOWLEDGEMENT

M/s. Global Mining Solutions, Salem is very much thankful to Thiru. K.Subbaiah, Lessee for the confidence and trust placed on the organization for carrying out Environmental Impact Assessment (EIA) study for the proposed Rough Stone & Gravel Quarry over a cluster area of 8.81 Ha at Therkukarseri Village, Srivaukundam Taluk, Thoothukudi District, Tamil Nadu and formulating the Environmental Management Plan (EMP). We also gratefully acknowledge the cooperation and assistance provided by concerned government authorities for collection of secondary information for the preparation of EIA/EMP report. Our sincere thanks to the local people of Therkukarseri and the nearby villages for their whole hearted cooperation and constant involvement during the entire field study without which the study would not have been possible.

For: M/s. Global Mining Solutions



(M. Prabhu)

Managing Director

UNDERTAKING

In Line with MoEF OM no. J – 11013/41/2006-IA.II (I) dated 5th October 2011, we hereby give our undertaking for owning the content and information in the EIA/EMP report submitted for EC of the proposed Rough Stone & Gravel Quarry over a cluster area of 8.81 Ha at Therkukarseri Village, Srivaukundam Taluk, Thoothukudi District, Tamil Nadu.

For Global Mining Solutions


*Name: Manikandan Manickam
EIA Coordinator – Mining of Minerals
Global Mining Solutions*

UNDERTAKING


In Line with MOEF OM no. J-11013/41/2006-IA.II (1) dated 4th Aug 2009 and its Amendments, we hereby confirm that all Terms of Reference issued by Ministry of Environment, Forest and Climate Change vide Letter No: SEIAA-TN/F.No. 9684/SEAC/ToR-1424/2022 Dated: 18.04.2023 for preparation of EIA/EMP report for the proposed Stone & Gravel Quarry over a cluster area of 8.81 Ha at Therkukarseri Village, Srivaukundam Taluk, Thoothukudi District, Tamil Nadu, for the production of 4,64,760 Cu.m of Rough Stone and 84,222 Cu.m of Gravel from the proposed lease area and the details has been complied in the EIA/EMP report is factually correct.



The EIA/EMP report has been prepared by M/s. Global Mining Solutions (GMS), Salem. GMS is a NABET accredited consultant for preparation of EIA/EMP report of Mining of Minerals (Opencast only) vide certificate No. NABET/EIA/2326/IA 0110 valid till 04.01.2026.

For Global Mining Solutions


*Name: Manikandan Manickam
EIA Coordinator – Mining of Minerals
Global Mining Solutions*

Draft EIA EMP report of Proposed Rough stone and Gravel Quarry of Mr. K. Subbaiah at SF No 507 & 508 over a Extent of 4.21.5 Ha in Therkukarseri Village, Srivaikundam Taluk, Thoothukudi District, Tamil Nadu

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The Accreditation shall remain in force subject to continued compliance with the terms and conditions mentioned in QCI-NABET's letter of accreditation bearing no. QCI/NABET/ENV/ACC/23/2724 dated March 31, 2023. The accreditation needs to be renewed before the expiry date by Global Mining Solutions, Salem following the due process of assessment.




Sr. Director, NABET
Date: March 31, 2023

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ANNEXURE - VII

Declaration by Experts contributing to the proposed Rough Stone & Gravel Quarry over a cluster area of 8.81 Ha at Therkukarseri Village, Srivaukundam Taluk, Thoothukudi District, Tamil Nadu.

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

EIA Coordinator Name: M. Manikandan Manickam


Signature & Date

Period of involvement: March 2023 to May 2023.


Contact information:

M/s Global Mining Solutions

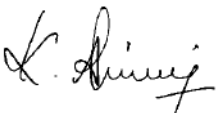




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Kottamettupatty, Omalur,

Salem, Tamil Nadu – 636 455

S. No.	Functional areas	Name of the expert/s	Involvement (period and task**)	Signature and Date
1	AP	Dhanalakshmi Ramanathan	Assessment of existing air quality, Impact of the project on ambient air and suggested mitigation measures for air pollution.	


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			<u>Period: March 2023 to May 2023.</u>	
2	WP	Abirami Kaliaperumal	Assessment of existing water quality, impact of the project on surface and ground water quality, suggested mitigation measures for minimizing the impact. <u>Period: March 2023 to May 2023.</u>	
3	SHW	Ramadoss N	Assessment of waste generated from the project, suggested waste management practices. <u>Period: March 2023 to May 2023.</u>	
4	SE	Sarasvathy K	Baseline SE study. Data compilation and assessment. Impact of the project on SE status of the area. Formulation of CER plan. <u>Period: March 2023 to May 2023.</u>	
5	EB	Saravanan S	Baseline data collection of related to ecology of the area. <u>Period: March 2023 to May 2023.</u>	
6	HG	Ravinthiran N	Hydrogeological feature of the area. Ground water depth and impact of project on ground water of the area. <u>Period: March 2023 to May 2023.</u>	

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7	AQ	Srilatha Thiruveedhula	Air quality modeling utilizing the area source model. Predication of the ground level concentration of the dust. Suggesting suitable mitigation measures. <u>Period: March 2023 to May 2023.</u>	T Srilatha
8	NV	Dhanalakshmi Ramanathan	Ambient noise study of the area. Incremental noise generation due to quarry operation and impact of the noise due to the project. <u>Period: March 2023 to May 2023.</u>	R. Dhams
9	LU	Srilatha Thiruveedhula	Preparation of land use map based on satellite imagery. Land use classification and analysis. Impact prediction of the project on the surrounding land environment. <u>Period: March 2023 to May 2023.</u>	T Srilatha
10	RH	S.V. Prashant	Identification of the Risk related to the mining activities. Preparation of emergency disaster management plan. Plan for supply of safety equipment for the worker. <u>Period: March 2023 to May 2023.</u>	Prashant
11	SC	Shisupal Sing	Soil monitoring, secondary data collection on soil type, soil	Shisupal Sing

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			<p><i>management practices, utilization of topsoil.</i></p> <p><u>Period: March 2023 to May 2023.</u></p>	
12	GEO	Valliappan Meyyappan	<p><i>Geological map, stability of quarry and dump, management plan for mine stability, after use of mining quarry and geological feature of the area.</i></p> <p><u>Period: March 2023 to May 2023.</u></p>	

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List of Annexures

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Annexure – 8	Monitoring Report for Air, Water, Noise & Soil

TERMS OF REFERENCE & ITS COMPLIANCE

Draft EIA EMP report of Proposed Rough stone and Gravel Quarry of Mr. K. Subbaiah at SF No 507 & 508 over a Extent of 4.21.5 Ha in Therkukarseri Village, Srivaikundam Taluk, Thoothukudi District, Tamil Nadu



**THIRU. DEEPAK S. BILGI, I.F.S.
MEMBER SECRETARY**

**STATE LEVEL ENVIRONMENT IMPACT
ASSESSMENT AUTHORITY-TAMILNADU**

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No.1, Jeenis Road, Saidapet,
Chennai - 600 015.
Phone No. 044-24359973
Fax No. 044-24359975

TERMS OF REFERENCE (ToR)

Lr.No.SEIAA-TN/F.No.9684/SEAC/ToR-1424/2022 Dated:18.04.2023

To

Thiru.K.Subbaih
S/O Karunakaran
No 8/11.Nadu Theru
Mavadi Pannai,
Then Thriupperai Post
Thoothukudi District.

Sir / Madam,

Sub: SEIAA, Tamil Nadu – Terms of Reference with Public Hearing (ToR) for the Proposed Rough Stone & Gravel quarry over an extent of 4.21.5 Ha in S.F.Nos.507 & 508 Therkukaraseri Village, Srivaukundam Taluk, Thoothukudi District, Tamil Nadu by Thiru.K Subbaih - under project category – “BI” and Schedule S.No.1(a) – ToR issued along with Public Hearing - preparation of EIA report – Regarding.

Ref: 1. Online proposal No. SIA/TN/MIN/412134/2022, dated 26.12.2022.
2. Your application submitted for Terms of Reference dated: 28.12.2022.
3. Minutes of the 365th SEAC meeting held on 24.03.2023.
4. Minutes of the 612nd SEIAA meeting held on 17.04.2023 & 18.04.2023.

Kindly refer to your proposal submitted to the State Level Impact Assessment Authority for Terms of Reference.

The proponent, Thiru.K.Subbaih has submitted application for Terms of Reference (ToR) on 28.12.2022, in Form-I, Pre-Feasibility report for the Proposed Rough Stone & Gravel quarry over an

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Draft EIA EMP report of Proposed Rough stone and Gravel Quarry of Mr. K. Subbaiah at SF No 507 & 508 over a Extent of 4.21.5 Ha in Therkukarseri Village, Srivaikundam Taluk, Thoothukudi District, Tamil Nadu

Lr No.SEIAA-TN/F.No.9684/SEAC/ToR-1424/2022 Dated:18.04.2023

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extent of 4.21.5 Ha in S.F.Nos.507 & 508 Therkukaraseri Village, Srivaikundam Taluk, Thoothukudi District, Tamil Nadu.

Discussion by SEAC and the Remarks:-

Proposed Rough Stone & Gravel quarry over an extent of 4.21.5Ha in S.F.Nos.507 & 508 Therkukaraseri Village, Srivaikundam Taluk, Thoothukudi District, Tamil Nadu by Thiru.K Subbaih - for Terms of Reference

(SIA/TN/MIN/412134/2022, dated 26.12.2022)

The proposal was placed in 365th SEAC meeting held on 24.03.2023. The details of the project furnished by the proponent are available in the website (parivesh.nic.in).

The SEAC noted the following

1. The Project Proponent, **Thiru.K.Subbaih** has applied for Terms of Reference for the proposed Rough Stone & Gravel quarry over an extent of 4.21.5 Ha in S.F.Nos. 507 & 508 Therkukaraseri Village, Srivaikundam Taluk, Thoothukudi District, Tamil Nadu.
2. The proposed quarry/activity is covered under Category "B1" of Item 1(a) "Mining Projects" of the Schedule to the EIA Notification, 2006.
3. As per the mining plan the lease period is 5 years. The mining plan is for the period of 5 years & production should not exceed 4,64,760 Cu.m of rough stone & 84,222 cu.m. of Gravel and the annual peak production 93620 cu.m. of Rough Stone(4th Year) & 21945 Cu.m of Gravel (1st year).
The ultimate depth - 33 m BGL.

Based on the presentation made by the proponent and considering safety point of view, SEAC recommended for grant of Terms of Reference (TOR) with Public Hearing for the production of 4,64,760 Cu.m of rough stone & 84,222 cu.m. of Gravel and the annual peak production 93620 cu.m. of Rough Stone(4th Year) & 21945 Cu.m of Gravel (1st year)and for the period of 5 years with ultimate depth upto 33m, subject to the following TORs, in addition to the standard terms of reference for EIA study for non-coal mining projects and details issued by the MOEF & CC to be included in EIA/EMP Report:

1. In the case of proposed lease in an existing (or old) quarry where the benches are not formed (or) partially formed as per the approved Mining Plan, the Project Proponent (PP) shall prepare and submit an 'Action Plan' for carrying out the realignment of the benches in the proposed quarry lease after it is approved by the concerned Asst. Director of Geology and Mining during the time of appraisal for obtaining the EC.


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2. PP shall produce EC compliance report from Competent Authority in the EIA Report for the mining activity already done in the same site.
3. The PP shall include the letter received from DFO concerned stating the proximity details of Reserve Forests, Protected Areas, Sanctuaries, Tiger reserve etc., upto a radius of 25 km from the proposed site.
4. Details of opdai(water course), viz nature of odai, origin, category etc.,
5. The Proponent shall submit a conceptual 'Slope Stability Plan' for the proposed quarry during the appraisal while obtaining the EC, as the depth of the working is extended beyond 30 m below ground level.
6. The PP shall furnish the affidavit stating that the blasting operation in the proposed quarry is carried out by the statutory competent person as per the MMR 1961 such as blaster, mining mate, mine foreman, II/I Class mines manager appointed by the proponent.
7. The EIA Coordinators shall obtain and furnish the details of quarry/quarries operated by the proponent in the past, either in the same location or elsewhere in the State with video and photographic evidences.
8. If the proponent has already carried out the mining activity in the proposed mining lease area after 15.01.2016, then the proponent shall furnish the following details from AD/DD, mines,
9. What was the period of the operation and stoppage of the earlier mines with last work permit issued by the AD/DD mines?
 - a. Quantity of minerals mined out.
 - b. Highest production achieved in any one year
 - c. Detail of approved depth of mining.
 - d. Actual depth of the mining achieved earlier.
 - e. Name of the person already mined in that leases area.
 - f. If EC and CTO already obtained, the copy of the same shall be submitted.
 - g. Whether the mining was carried out as per the approved mine plan (or EC if issued) with stipulated benches.
10. All corner coordinates of the mine lease area, superimposed on a High Resolution Imagery/Topo sheet, topographic sheet, geomorphology, lithology and geology of the mining lease area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).
11. The PP shall carry out Drone video survey covering the cluster, Green belt , fencing etc.,


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12. The proponent shall furnish photographs of adequate fencing, green belt along the periphery including replantation of existing trees & safety distance between the adjacent quarries & water bodies nearby provided as per the approved mining plan.
13. The Project Proponent shall provide the details of mineral reserves and mineable reserves, planned production capacity, proposed working methodology with justifications, the anticipated impacts of the mining operations on the surrounding environment and the remedial measures for the same.
14. The Project Proponent shall provide the Organization chart indicating the appointment of various statutory officials and other competent persons to be appointed as per the provisions of Mines Act, 1952 and the MMR, 1961 for carrying out the quarrying operations scientifically and systematically in order to ensure safety and to protect the environment.
15. The Project Proponent shall conduct the hydro-geological study considering the contour map of the water table detailing the number of ground water pumping & open wells, and surface water bodies such as rivers, tanks, canals, ponds etc. within 1 km (radius) along with the collected water level data for both monsoon and non-monsoon seasons from the PWD / TWAD so as to assess the impacts on the wells due to mining activity. 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.
16. The proponent shall furnish the baseline data for the environmental and ecological parameters with regard to surface water/ground water quality, air quality, soil quality & flora/fauna including traffic/vehicular movement study.
17. The Proponent shall carry out the Cumulative impact study due to mining operations carried out in the quarry specifically with reference to the specific environment in terms of air pollution, water pollution, & health impacts. Accordingly, the Environment Management plan should be prepared keeping the concerned quarry and the surrounding habitations in the mind.
18. Rain water harvesting management with recharging details along with water balance (both monsoon & non-monsoon) be submitted.
19. Issues relating to Mine Safety, including slope geometry in case of Granite quarrying, blasting parameters etc. should be detailed. The proposed safeguard measures in each case should also be provided.
20. Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other


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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.

21. Details of the land for storage of Overburden/Waste Dumps (or) Rejects outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be provided.
22. Since non-saleable waste /OB / intermediate waste etc. is huge in the granite quarry, the Proponent shall provide the details pertaining to management of the above material with year wise utilization and average moving inventory be submitted.
23. Proximity to Areas declared as 'Critically Polluted' (or) the Project areas which attracts the court restrictions for mining operations, should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the TNPCB (or) Dept. of Geology and Mining should be secured and furnished to the effect that the proposed mining activities could be considered.
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.
25. Impact on local transport infrastructure due to the Project should be indicated.
26. A tree survey study shall be carried out (nos., name of the species, age, diameter etc.,) both within the mining lease applied area & 300m buffer zone and its management during mining activity.
27. A detailed mine closure plan for the proposed project shall be included in EIA/EMP report which should be site-specific.
28. Public Hearing points raised and commitments of the Project Proponent on the same along with time bound Action Plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project and to be submitted to SEIAA/SEAC with regard to the Office Memorandum of MoEF& CC accordingly.
29. The Public hearing advertisement shall be published in one major National daily and one most circulated vernacular daily.
30. The PP shall produce/display the EIA report, Executive summary and other related information with respect to public hearing in Tamil Language also.


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31. As a part of the study of flora and fauna around the vicinity of the proposed site, the EIA coordinator shall strive to educate the local students on the importance of preserving local flora and fauna by involving them in the study, wherever possible.
32. The recommendation for the issue of "Terms of Reference" is subjected to the outcome of the Hon'ble NGT, Principal Bench, New Delhi in O.A No.186 of 2016 (M.A.No.350/2016) and O.A. No.200/2016 and O.A.No.580/2016 (M.A.No.1182/2016) and O.A.No.102/2017 and O.A.No.404/2016 (M.A.No.758/2016, M.A.No.920/2016, M.A.No.1122/2016, M.A.No.12/2017 & M.A. No. 843/2017) and O.A.No.405/2016 and O.A.No.520 of 2016 (M.A.No.981/2016, M.A.No.982/2016 & M.A.No.384/2017).
33. The purpose of Green belt around the project is to capture the fugitive emissions, carbon sequestration and to attenuate the noise generated, in addition to improving the aesthetics. A wide range of indigenous plant species should be planted as given in the **appendix-I** in consultation with the DFO, State Agriculture University and local school/college authorities. The plant species with dense/moderate canopy of native origin should be chosen. Species of small/medium/tall trees alternating with shrubs should be planted in a mixed manner.
34. Taller/one year old Saplings raised in appropriate size of bags, preferably eco-friendly bags should be planted as per the advice of local forest authorities/botanist/Horticulturist with regard to site specific choices. The proponent shall earmark the greenbelt area with GPS coordinates all along the boundary of the project site with at least 3 meters wide and in between blocks in an organized manner.
35. A Disaster management Plan shall be prepared and included in the EIA/EMP Report.
36. A Risk Assessment and management Plan shall be prepared and included in the EIA/EMP Report.
37. Occupational Health impacts of the Project should be anticipated and the proposed preventive


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measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.

38. 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.
39. The Socio-economic studies should be carried out within a 5 km buffer zone from the mining activity. 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.
40. Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.
41. Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc.
42. If any quarrying operations were carried out in the proposed quarrying site for which now the EC is sought, the Project Proponent shall furnish the detailed compliance to EC conditions given in the previous EC with the site photographs which shall duly be certified by MoEF&CC, Regional Office, Chennai (or) the concerned DEE/TNPCB.
43. Concealing any factual information or submission of false/fabricated data and failure to comply with any of the conditions mentioned above may result in withdrawal of this Terms of Conditions besides attracting penal provisions in the Environment (Protection) Act, 1986.


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Appendix - I
List of Native Trees Suggested for Planting

No	Scientific Name	Tamil Name	Tamil Name
1	<i>Aegle marmelos</i>	Vilvam	வில்வம்
2	<i>Adenaanthera pavonina</i>	Manjadi	மஞ்சாடி, ஆனைக்குன்றிமணி
3	<i>Albizia lebbek</i>	Vaagai	வாகை
4	<i>Albizia amara</i>	Usil	உசில்
5	<i>Bauhinia purpurea</i>	Mantharai	மந்தாரை
6	<i>Bauhinia racemosa</i>	Aathi	ஆத்தி
7	<i>Bauhinia tomentos</i>	Iruvathi	இருவாத்தி
8	<i>Buchanania axillaris</i>	Kattuma	காட்டுமா
9	<i>Borassus flabellifer</i>	Panai	பனை
10	<i>Butea monosperma</i>	Murukkamaram	முருக்கமரம்
11	<i>Bobax ceiba</i>	Ilavu, Sevvilavu	இலவு
12	<i>Calophyllum inophyllum</i>	Punnai	புன்னை
13	<i>Cassia fistula</i>	Sarakondrai	சரக்கொன்றை
14	<i>Cassia toxburghii</i>	Sengondrai	செங்கொன்றை
15	<i>Chloroxylon sweitenia</i>	Purasamaram	புரசு மரம்
16	<i>Cochlospermum religiosum</i>	Kongu, Manjallavu	கோங்கு, மஞ்சள் இலவு
17	<i>Cordia dichotoma</i>	Naruvuli	நருவுளி
18	<i>Creteva adansoni</i>	Mavalingun	மாவிலங்கம்
19	<i>Dillenia indica</i>	Uva, Uzha	உசா
20	<i>Dillenia pentagyna</i>	SiruUva, Sitruzha	சிறு உசா
21	<i>Diospyro sebenum</i>	Karungali	கருங்காலி
22	<i>Diospyro schloroxylon</i>	Vaganai	வாகனை
23	<i>Ficus amplissima</i>	Kalltchi	கல் இச்சி
24	<i>Hibiscus tiliaceou</i>	Aatrupoovarasu	ஆற்றுப்புவரசு
25	<i>Hardwickia binata</i>	Aacha	ஆச்சா
26	<i>Holoptelia integrifolia</i>	Aayili	ஆயா மரம், ஆயிலி
27	<i>Lannea coromandelica</i>	Odhiam	ஓதியம்
28	<i>Lagerstroemia speciosa</i>	Poo Marudhu	பூ மருது
29	<i>Lepisanthus tetraphylla</i>	Neikottainaram	நெய் கொட்டை மரம்
30	<i>Limonia acidissima</i>	Vila maram	விலா மரம்
31	<i>Litsea glutinos</i>	Pisinpattai	அரம்பா, பிசின்பட்டை
32	<i>Madhuca longifolia</i>	Illuppai	இலுப்பை
33	<i>Manilkara hexandra</i>	UlakkaiPaalai	உலக்கை பாலை
34	<i>Mimuseps elengi</i>	Magizhamaram	மகிழ்மரம்
35	<i>Mitragyna parvifolia</i>	Kadambu	கடம்பு
36	<i>Morinda pubescens</i>	Nuna	நுணா
37	<i>Morinda citrifolia</i>	Vellai Nuna	வெள்ளை நுணா
38	<i>Phoenix sylvestre</i>	Eachai	ஈச்சமரம்
39	<i>Pongamia pinnat</i>	Pungam	புங்கம்

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40	<i>Premna mollissima</i>	Munnai	முன்னை
41	<i>Premna serratifolia</i>	Narumunnai	நறு முன்னை
42	<i>Premna tomentosa</i>	Malaipoovarasu	மலை பூவரசு
43	<i>Prosopis cinerea</i>	Vanni maram	வன்னி மரம்
44	<i>Pterocarpus marsupium</i>	Vengai	வேங்கை
45	<i>Pterospermum canescens</i>	Vennangu, Tada	வெண்ணாங்கு
46	<i>Pterospermum xylocarpium</i>	Polavu	புலவு
47	<i>Puthranjiva roxburghii</i>	Karipala	கறிபாலா
48	<i>Salvadora persica</i>	Ugaa Maram	ஊகா மரம்
49	<i>Sapindus emarginatus</i>	Manipungan, Soapukai	மணிப்புங்கன் சோப்புக்காய்
50	<i>Saraca asoca</i>	Asoca	அசோகா
51	<i>Streblus asper</i>	Piray maram	பிராய் மரம்
52	<i>Strychnos nuxvomica</i>	Yetti	எட்டி
53	<i>Strychnos potatorum</i>	Therthang Kottai	தேத்தான் கொட்டை
54	<i>Syzygium cumini</i>	Naval	நாவல்
55	<i>Terminalia bellerica</i>	Thandri	தான்றி
56	<i>Terminalia arjuna</i>	Ven marudhu	வெண் மருது
57	<i>Toona ciliata</i>	Sandhana vembu	சந்தன வேம்பு
58	<i>Thespesia populnea</i>	Puvarasu	பூவரசு
59	<i>Walsuratrifoliata</i>	valsura	வால்கரா
60	<i>Wrightia tinctoria</i>	Veppalai	வெப்பாலை
61	<i>Pithecellobium dulce</i>	Kodukkapuli	கொடுக்காப்புளி

Discussion by SEIAA and the Remarks:-

The subject was placed in 612th authority meeting held on 17.04.2023 & 18.04.2023. The authority noted that the subject was appraised in 365th meeting of SEAC held on 24.03.2023. SEAC has furnished its recommendations for grant of Terms of Reference (TOR) with Public Hearing.

After detailed discussions, the Authority accepts the recommendations of SEAC and decided to grant Terms of Reference (TOR) with Public Hearing for the quantity of 64,760 Cu.m of rough stone & 84,222 cu.m. of Gravel by restricting the depth of mining upto 33m BGL subject to the standard


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conditions stipulated by MOEF&CC, other standard conditions & all other specific conditions as recommended by SEAC in addition to the following conditions and the conditions in Annexure 'B' of this minutes.

1. The PP shall submit NOC from Agricultural department that the proposed mining lease area is not fit for agriculture purpose and NOC for Local panchayat.
2. The PP shall furnish details of impacts and mitigation measures on agricultural fields, drainage pattern, water table around the proposed mining area.

Annexure 'B'

Cluster Management Committee

1. Cluster Management Committee shall be framed which must include all the proponents in the cluster as members including the existing as well as proposed quarry.
2. The members must coordinate among themselves for the effective implementation of EMP as committed including Green Belt Development, Water sprinkling, tree plantation, blasting etc.,
3. The List of members of the committee formed shall be submitted to AD/Mines before the execution of mining lease and the same shall be updated every year to the AD/Mines.
4. Detailed Operational Plan must be submitted which must include the blasting frequency with respect to the nearby quarry situated in the cluster, the usage of haul roads by the individual quarry in the form of route map and network.
5. The committee shall deliberate on risk management plan pertaining to the cluster in a holistic manner especially during natural calamities like intense rain and the mitigation measures considering the inundation of the cluster and evacuation plan.
6. The Cluster Management Committee shall form Environmental Policy to practice sustainable mining in a scientific and systematic manner in accordance with the law. The role played by the committee in implementing the environmental policy devised shall be given in detail.
7. The committee shall furnish action plan regarding the restoration strategy with respect to the individual quarry falling under the cluster in a holistic manner.
8. The committee shall furnish the Emergency Management plan within the cluster.
9. The committee shall deliberate on the health of the workers/staff involved in the mining as well as the health of the public.
10. The committee shall furnish an action plan to achieve sustainable development goals with reference to water, sanitation & safety.
11. The committee shall furnish the fire safety and evacuation plan in the case of fire accidents.


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Impact study of mining

12. Detailed study shall be carried out in regard to impact of mining around the proposed mine lease area covering the entire mine lease period as per precise area communication order issued from reputed research institutions on the following
- Soil health & soil biological, physical land chemical features .
 - Climate change leading to Droughts, Floods etc.
 - Pollution leading to release of Greenhouse gases (GHG), rise in Temperature, & Livelihood of the local people.
 - Possibilities of water contamination and impact on aquatic ecosystem health.
 - Agriculture, Forestry & Traditional practices.
 - Hydrothermal/Geothermal effect due to destruction in the Environment.
 - Bio-geochemical processes and its foot prints including environmental stress.
 - Sediment geochemistry in the surface streams.

Agriculture & Agro-Biodiversity

13. Impact on surrounding agricultural fields around the proposed mining Area.
14. Impact on soil flora & vegetation around the project site.
15. Details of type of vegetations including no. of trees & shrubs within the proposed mining area and. If so, transplantation of such vegetations all along the boundary of the proposed mining area shall committed mentioned in EMP.
16. The Environmental Impact Assessment should study the biodiversity, the natural ecosystem, the soil micro flora, fauna and soil seed banks and suggest measures to maintain the natural Ecosystem.
17. Action should specifically suggest for sustainable management of the area and restoration of ecosystem for flow of goods and services.
18. The project proponent shall study and furnish the impact of project on plantations in adjoining patta lands, Horticulture, Agriculture and livestock.

Forests

19. The project proponent shall detailed study on impact of mining on Reserve forests free ranging wildlife.
20. The Environmental Impact Assessment should study impact on forest, vegetation, endemic, vulnerable and endangered indigenous flora and fauna.


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21. The Environmental Impact Assessment should study impact on standing trees and the existing trees should be numbered and action suggested for protection.
22. The Environmental Impact Assessment should study impact on protected areas, Reserve Forests, National Parks, Corridors and Wildlife pathways, near project site.

Water Environment

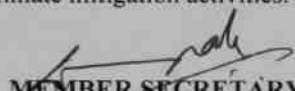
23. Hydro-geological study considering the contour map of the water table detailing the number of ground water pumping & open wells, and surface water bodies such as rivers, tanks, canals, ponds etc. within 1 km (radius) so as to assess the impacts on the nearby waterbodies due to mining activity. Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided, covering the entire mine lease period.
24. Erosion Control measures.
25. Detailed study shall be carried out in regard to impact of mining around the proposed mine lease area on the nearby Villages, Water-bodies/ Rivers, & any ecological fragile areas.
26. The project proponent shall study impact on fish habitats and the food WEB/ food chain in the water body and Reservoir.
27. The project proponent shall study and furnish the details on potential fragmentation impact on natural environment, by the activities.
28. The project proponent shall study and furnish the impact on aquatic plants and animals in water bodies and possible scars on the landscape, damages to nearby caves, heritage site, and archaeological sites possible land form changes visual and aesthetic impacts.
29. The Terms of Reference should specifically study impact on soil health, soil erosion, the soil physical, chemical components and microbial components.
30. The Environmental Impact Assessment should study on wetlands, water bodies, rivers streams, lakes and farmer sites.

Energy

31. The measures taken to control Noise, Air, Water, Dust Control and steps adopted to efficiently utilise the Energy shall be furnished.

Climate Change

32. The Environmental Impact Assessment shall study in detail the carbon emission and also suggest the measures to mitigate carbon emission including development of carbon sinks and temperature reduction including control of other emission and climate mitigation activities.


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33. The Environmental Impact Assessment should study impact on climate change, temperature rise, pollution and above soil & below soil carbon stock.

Mine Closure Plan

34. Detailed Mine Closure Plan covering the entire mine lease period as per precise area communication order issued.

EMP

35. Detailed Environment Management Plan along with adaptation, mitigation & remedial strategies covering the entire mine lease period as per precise area communication order issued.

36. The Environmental Impact Assessment should hold detailed study on EMP with budget for Green belt development and mine closure plan including disaster management plan.

Risk Assessment

37. To furnish risk assessment and management plan including anticipated vulnerabilities during operational and post operational phases of Mining.

Disaster Management Plan

38. To furnish disaster management plan and disaster mitigation measures in regard to all aspects to avoid/reduce vulnerability to hazards & to cope with disaster/untoward accidents in & around the proposed mine lease area due to the proposed method of mining activity & its related activities covering the entire mine lease period as per precise area communication order issued.

Others

39. The project proponent shall furnish VAO certificate with reference to 300m radius regard to approved habitations, schools, Archaeological sites, Structures, railway lines, roads, water bodies such as streams, odai, vaari, canal, channel, river, lake pond, tank etc.

40. As per the MoEF& CC office memorandum F.No.22-65/2017-IA.III dated: 30.09.2020 and 20.10.2020 the proponent shall address the concerns raised during the public consultation and all the activities proposed shall be part of the Environment Management Plan.

41. The project proponent shall study and furnish the possible pollution due to plastic and microplastic on the environment. The ecological risks and impacts of plastic & microplastics on aquatic environment and fresh water systems due to activities, contemplated during mining may be investigated and reported.


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A. 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.
- 2) A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.
- 3) All documents including approved mine plan, EIA and Public Hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management, mining technology etc. and should be in the name of the lessee.
- 4) All corner coordinates of the mine lease area, superimposed on a High Resolution Imagery/ topo sheet, topographic sheet, geomorphology and geology of the area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).
- 5) Information should be provided in Survey of India Topo sheet in 1:50,000 scale indicating geological map of the area, geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil characteristics.
- 6) Details about the land proposed for mining activities should be given with information as to whether mining conforms to the land use policy of the State; land diversion for mining should have approval from State land use board or the concerned authority.
- 7) It should be clearly stated whether the proponent Company has a well laid down Environment Policy approved by its Board of Directors? If so, it may be spelt out in the EIA Report with description of the prescribed operating process/procedures to bring into focus any infringement/deviation/ violation of the environmental or forest norms/ conditions? The hierarchical system or administrative order of the Company to deal with the environmental issues and for ensuring compliance with the EC conditions may also be given. The system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the Company and/or shareholders or stakeholders at large, may also be detailed in the EIA Report.
- 8) Issues relating to Mine Safety, including subsidence study in case of underground mining and slope study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided.


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- 9) The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc. should be for the life of the mine / lease period.
- 10) Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.
- 11) Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given.
- 12) Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests, the site may be inspected by the State Forest Department along with the Regional Office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the Expert Appraisal Committees.
- 13) Status of forestry clearance for the broken up area and virgin forestland involved in the Project including deposition of Net Present Value (NPV) and Compensatory Afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.
- 14) Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.
- 15) The vegetation in the RF / PF areas in the study area, with necessary details, should be given.
- 16) 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.
- 17) Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/ Elephant Reserves/(existing as well as proposed), if any, within 10 km of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the Standing


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Committee of National Board of Wildlife and copy furnished.

- 18) A detailed biological study of the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] shall be carried out. Details of flora and fauna, endangered, endemic and RET Species duly authenticated, separately for core and buffer zone should be furnished based on such primary field survey, clearly indicating the Schedule of the fauna present. In case of any scheduled-I fauna found in the study area, the necessary plan along with budgetary provisions for their conservation should be prepared in consultation with State Forest and Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.
- 19) 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 Department should be secured and furnished to the effect that the proposed mining activities could be considered.
- 20) 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 with respect to 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).
- 21) R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need based sample survey, family-wise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the State Government. It may be clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to shifting of village(s) including their R&R and socio-economic aspects should be discussed in the Report.
- 22) 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

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- EMP Report. Site-specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the pre-dominant downwind direction. The mineralogical composition of PM10, particularly for free silica, should be given.
- 23) Air quality modeling should be carried out for prediction of impact of the project on the air quality of the area. It should also take into account the impact of movement of Vehicles for transportation of mineral. The details of the model used and input parameters used for modeling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind roses showing pre-dominant wind direction may also be indicated on the map.
 - 24) The water requirement for the Project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the Project should be indicated.
 - 25) Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.
 - 26) 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.
 - 27) 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.
 - 28) Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect groundwater table, a detailed Hydro Geological Study should be undertaken and Report furnished. The Report inter-alia, shall include details of the aquifers present and impact of mining activities on these aquifers. Necessary permission from Central Ground Water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished.
 - 29) 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.
 - 30) 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.
 - 31) A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form


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(indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the Project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given. The plant species selected for green belt should have greater ecological value and should be of good utility value to the local population with emphasis on local and native species and the species which are tolerant to pollution.

- 32) Impact on local transport infrastructure due to the Project should be indicated. Projected increase in truck traffic as a result of the Project in the present road network (including those outside the Project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be covered. Project Proponent shall conduct Impact of Transportation study as per Indian Road Congress Guidelines.
- 33) Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.
- 34) 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.
- 35) Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.
- 36) 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.
- 37) 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.
- 38) Detailed Environmental Management Plan (EMP) to mitigate the environmental impacts which, should inter-alia include the impacts of change of land use, loss of agricultural and grazing land, if any, occupational health impacts besides other impacts specific to the proposed Project.
- 39) Public Hearing points raised and commitment of the Project Proponent on the same along with


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time bound Action Plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project.

- 40) Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.
- 41) The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.
- 42) A Disaster management Plan shall be prepared and included in the EIA/EMP Report.
- 43) Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc.
- 44) Besides the above, the below mentioned general points are also to be followed:-
 - a) Executive Summary of the EIA/EMP Report
 - b) All documents to be properly referenced with index and continuous page numbering.
 - c) Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources should be indicated.
 - d) Project Proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the MoEF&CC/NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the Project.
 - e) Where the documents provided are in a language other than English, an English translation should be provided.
 - f) The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted.
 - g) While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF&CC 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.
 - h) Changes, if any made in the basic scope and project parameters (as submitted in Form-I and the PFR for securing the TOR) should be brought to the attention of MoEF&CC with reasons for such changes and permission should be sought, as the ToR may also have to be altered. Post Public Hearing changes in structure and content of the draft EIA/EMP (other than modifications arising out of the P.H. process) will entail conducting the PH again with the revised documentation.
 - i) As per the circular no. J-11011/618/2010-IA.II (I) dated 30.5.2012, certified report of the status of compliance of the conditions stipulated in the Environment Clearance for the


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existing operations of the project, should be obtained from the Regional Office of Ministry of Environment, Forest and Climate Change, as may be applicable.

- j) 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.

In addition to the above, the following shall be furnished:-

The Executive summary of the EIA/EMP report in about 8-10 pages should be prepared incorporating the information on following points:

1. Project name and location (Village, District, State, Industrial Estate (if applicable)).
2. Process description in brief, specifically indicating the gaseous emission, liquid effluent and solid and hazardous wastes.
3. Measures for mitigating the impact on the environment and mode of discharge or disposal.
4. Capital cost of the project, estimated time of completion.
5. The proponent shall furnish the contour map of the water table detailing the number of wells located around the site and impacts on the wells due to mining activity.
6. A detailed study of the lithology of the mining lease area shall be furnished.
7. Details of village map, "A" register and FMB sketch shall be furnished.
8. Detailed mining closure plan for the proposed project approved by the Geology of Mining department shall be submitted along with EIA report.
9. Obtain a letter /certificate from the Assistant Director of Geology and Mining standing that there is no other Minerals/resources like sand in the quarrying area within the approved depth of mining and below depth of mining and the same shall be furnished in the EIA report.
10. EIA report should strictly follow the Environmental Impact Assessment Guidance Manual for Mining of Minerals published February 2010.
11. Detail plan on rehabilitation and reclamation carried out for the stabilization and restoration of the mined areas.
12. The EIA study report shall include the surrounding mining activity, if any.
13. Modeling study for Air, Water and noise shall be carried out in this field and incremental increase in the above study shall be substantiated with mitigation measures.
14. A study on the geological resources available shall be carried out and reported.
15. A specific study on agriculture & livelihood shall be carried out and reported.



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16. Impact of soil erosion, soil physical chemical and biological property changes may be assumed.
17. Site selected for the project - Nature of land - Agricultural (single/double crop), barren, Govt./ private land, status of its acquisition, nearby (in 2-3 km.) water body, population, within 10km other industries, forest, eco-sensitive zones, accessibility, (note - in case of industrial estate this information may not be necessary)
18. Baseline environmental data - air quality, surface and ground water quality, soil characteristic, flora and fauna, socio-economic condition of the nearby population
19. Identification of hazards in handling, processing and storage of hazardous material and safety system provided to mitigate the risk.
20. Likely impact of the project on air, water, land, flora-fauna and nearby population
21. Emergency preparedness plan in case of natural or in plant emergencies
22. Issues raised during public hearing (if applicable) and response given
23. CER plan with proposed expenditure.
24. Occupational Health Measures
25. Post project monitoring plan
26. The project proponent shall carry out detailed hydro geological study through intuitions/NABET Accredited agencies.
27. A detailed report on the green belt development already undertaken is to be furnished and also submit the proposal for green belt activities.
28. The proponent shall propose the suitable control measure to control the fugitive emissions during the operations of the mines.
29. A specific study should include impact on flora & fauna, disturbance to migratory pattern of animals.
30. Reserve funds should be earmarked for proper closure plan.
31. A detailed plan on plastic waste management shall be furnished. Further, the proponent should strictly comply with, Tamil Nadu Government Order (Ms) No.84 Environment and forests (EC.2) Department dated 25.06.2018 regarding ban on one time use and throw away plastics irrespective of thickness with effect from 01.01.2019 under Environment (Protection) Act, 1986. In this connection, the project proponent has to furnish the action plan.


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Besides the above, the below mentioned general points should also be followed:-

- a. A note confirming compliance of the TOR, with cross referencing of the relevant sections / pages of the EIA report should be provided.
- b. All documents may be properly referenced with index, page numbers and continuous page numbering.
- c. Where data are presented in the report especially in tables, the period in which the data were collected and the sources should be indicated.
- d. While preparing the EIA report, the instructions for the proponents and instructions for the consultants issued by MoEF & CC 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 also be followed.
- e. The consultants involved in the preparation of EIA/EMP report after accreditation with Quality Council of India (QCI)/National Accreditation Board of Education and Training (NABET) would need to include a certificate in this regard in the EIA/EMP reports prepared by them and data provided by other organization/Laboratories including their status of approvals etc. In this regard circular no F. No.J -11013/77/2004-IA-II(I) dated 2nd December, 2009, 18th March 2010, 28th May 2010, 28th June 2010, 31st December 2010 & 30th September 2011 posted on the Ministry's website <http://www.moef.nic.in/> may be referred.
 - After preparing the EIA (as per the generic structure prescribed in Appendix-III of the EIA Notification, 2006) covering the above mentioned points, the proponent will take further necessary action for obtaining environmental clearance in accordance with the procedure prescribed under the EIA Notification, 2006.
 - The final EIA report shall be submitted to the SEIAA, Tamil Nadu for obtaining Environmental Clearance.
 - The TORs with public hearing prescribed shall be **valid for a period of three years** from the date of issue, for submission of the EIA/EMP report as per OMNo.J-11013/41/2006-IA-II(I)(part) dated 29th August, 2017.


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Copy to:

1. The Additional Chief Secretary to Government, Environment, Climate Change and Forests Department, Govt. of Tamil Nadu, Fort St. George, Chennai - 9.

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2. The Chairman, Central Pollution Control Board, Parivesh Bhavan, CBD Cum-Office Complex, East Arjun Nagar, New Delhi - 110 032.
3. The Chairman, Tamil Nadu Pollution Control Board, 76, Mount Salai, Guindy, Chennai - 600 032.
4. The APCCF (C), Regional Office, MoEF & CC (SZ), 34, HEPC Building, 1st & 2nd Floor, Cathedral Garden Road, Nungambakkam, Chennai - 34.
5. Monitoring Cell, IA Division, Ministry of Environment, Forests & CC, Paryavaran Bhavan, CGO Complex, New Delhi - 110 003.
6. The District Collector, Thoothukudi District.
7. Stock File.

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POINT WISE COMPLIANCE OF TOR CONDITIONS

S.No	TOR Point	Compliance	
1.	In the case of proposed lease in an existing (or old) quarry where the benches are not formed (or) partially formed as per the approved Mining Plan, the Project Proponent (PP) shall prepare and submit an 'Action Plan' for carrying out the realignment of the benches in the proposed quarry lease after it is approved by the concerned Asst. Director of Geology and Mining during the time of appraisal for obtaining the EC.	Not Applicable This project is a proposed new quarry lease, not an existing project. The quarrying operation is proposed to be carried out by Opencast semi-Mechanized Mining Method by jack hammer drilling, slurry blasting by forming 5.0 m bench height and 5.0 m bench width. Excavator and tippers are proposed for Loading and transportation. The mining plan was approved by Assistant Geologist/ Assistant Director (i/c), Geology and Mining, Thoothukudi vide Roc.No. G.M.1/387/2022, dated 22.11.2022. The mine plan approved copy is enclosed in Annexure – 2.	-
2	PP shall produce EC compliance report from Competent Authority in the EIA Report for the mining activity already done in the same site.	Not Applicable This project is a proposed new quarry lease, not an existing project.	-
3	The PP shall include the letter received from DFO concerned stating the proximity details of Reserve Forests, Protected Areas, Sanctuaries, Tiger reserve etc., upto a radius of 25 km from the proposed site.	Letter from DFO stating the distance of the Eco sensitive zone and sanctuary is enclosed in Annexure – 5. As per DFO Letter, the Eco sensitive zone of Vallanadu Blackbuck Sanctuary is located at a distance of 10.25 km in NE direction and Vallanadu Blackbuck Sanctuary is in 11.82 km (NE).	-
4	Details of odai (water course), viz nature of odai, origin, category etc.,	There is an odai crossing the project site from west to east (64m and 63m AMSL, respectively). All project activities are carried out on the southern side of the project area, with a safety distance of 50m provided. Figure 2.7 shows a map of the study area's land use pattern and the safety distance provided for odai.	-
5	The Proponent shall submit a conceptual 'Slope Stability Plan' for the proposed quarry during the appraisal while obtaining the EC, as the depth of the working is extended beyond 30 m below ground level.	The general Slope Stability Plan are detailed in Section 7.6. However, detailed slope stability study will be carried out after commencement of the mining operation while reach mine depth after 25 m.	169
6	The PP shall furnish the affidavit stating that the blasting operation in the proposed quarry is carried out by the statutory competent person as per the MMR 1961 such as blaster, mining mate, mine foreman, IUI Class mines manager appointed by the proponent.	It will be incorporated in the final Environmental Impact Assessment (EIA) / Environmental Management Plan (EMP) Report.	-

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7	The EIA Coordinators shall obtain and furnish the details of quarry/quaries operated by the proponent in the past, either in the same location or elsewhere in the State with video and photographic evidences.	This proposed quarry is the only one being advocated for, with no other existing quarries.	-
8	If the proponent has already carried out the mining activity in the proposed mining lease area after 15.01.2016, then the proponent shall furnish the following details from AD/DD, mines,	Not Applicable This project is a proposed new quarry lease, not an existing project.	-
9	What was the period of the operation and stoppage of the earlier mines with last work permit issued by the AD/DD mines? a. Quantity of minerals mined out. b. Highest production achieved in any one year. c. Detail of approved depth of mining. d. Actual depth of the mining achieved earlier. e. Name of the person already mined in that leases area. f. If EC and CTO already obtained, the copy of the same shall be submitted. g. Whether the mining was carried out as per the approved mine plan (or EC if issued) with stipulated benches.	Not Applicable This project is a proposed new quarry lease, not an existing project.	-
10	All comer coordinates of the mine lease area, superimposed on a High -Resolution Imagery/Topo sheet, topographic sheet, geomorphology, lithology and geology of the mining lease area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).	Project coordinates superimposed in satellite imagery and given as Figure No – 2.4 in Chapter – 2. The geology and geomorphology map are provided in Figure No.3.12, 3.13, Chapter 3. The Soil map are provided under Figure No. 3.8 Chapter-3. The 10km Radius Index plan showing buffer zone is given in Figure No.3.1 & Figure 3.2 in Chapter – 3.	79, 124,125, 109,91 & 92
11	The PP shall carry out Drone video survey covering the cluster, green belt, fencing etc.,	Under Process	-
12	The proponent shall furnish photographs of adequate fencing, green belt along the periphery including replantation of existing trees & safety distance between the adjacent quarries & water bodies nearby provided as per the approved mining plan.	Photographs on Project site are provided in chapter2 and greenbelt will be provided once the project has started. Greenbelt plan of the project is detailed in section 4.2.6.3 of Chapter 4. Figure 2.7 shows a map of the lease area's land use pattern and the safety distance provided for odai.	82 & 150
13	The Project Proponent shall provide the details of mineral reserves and mineable reserves, planned production capacity, proposed working methodology with justifications, the anticipated impacts of the mining operations	This project proposed to produce 4,64,760 Cu.m of rough stone & 84,222 cu.m. of Gravel and the annual peak production 93620 cu.m. of Rough Stone(4th Year) & 21945 Cu.m of Gravel (1st year)and for the period of 5 years with ultimate depth upto 33m.	71 & 130

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	on the surrounding environment and the remedial measures for the same.	Yearwise production plan is given in section 2.8.5 and Technology and process description is given in section 2.8. Anticipated impacts and their mitigation measure for the applicable environmental attributes is given in Chapter 4.	
14	The Project Proponent shall provide the organization chart indicating the appointment of various statutory officials and other competent persons to be appointed as per the provisions of Mines Act, 1952 and the MMR, 1961 for carrying out the quarrying operations scientifically and systematically in order to ensure safety and to protect the environment.	Noted & Agreed	-
15	The Project Proponent shall conduct the hydro-geological study considering the contour map of the water table detailing the number of ground water pumping & open wells, and surface water bodies such as rivers, tanks, canals, ponds etc. within 1 km (radius) along with the collected water level data for both monsoon and non-monsoon seasons from the pwD / TWAD so as to assess the impacts on the wells due to mining activity. Based on actual monitored data it may clearly be shown whether working will intersect ground water. Necessary data and documentation in this regard may be provided.	The details of hydro geological scenario of the study area has been provided under para 7.7, Chapter-7.	170
16	The proponent shall furnish the baseline data for the environmental and ecological parameters with regard to surface water/ground water quality, air quality, soil quality & flora/fauna including traffic/vehicular movement study.	The baseline data on micro- meteorology, ambient air quality, Water quality, noise level, soil and flora & fauna are collected during Summer Season, (March to May 2023) and detailed in Chapter 3.	88
17	The Proponent shall carry out the cumulative impact study due to mining operations carried out in the quarry specifically with reference to the specific environment in terms of air pollution, water pollution, & health impacts. Accordingly, the Environment Management plan should be prepared keeping the concerned quarry and the surrounding habitations in the mind.	There are only one existing Quarry and 4 Abandoned quarries within a radius of 500 m from this proposed project area. The letter received from Dept. of Geology and Mining, Thoothukudi stating the quarries detail within 500m radius is enclosed in Annexure – 3. Section 7.4 provides more information on the cumulative effect study for the one existing and this planned quarry.	165
18	Rain water harvesting management with recharging details along with water balance (both monsoon & non-monsoon) be submitted.	Rain water will be diverted into bottom of the quarry by constructing drains to store and use for dust suppression and greenbelt development. Details are presented in section 4.2.3.4. The total water requirement per project will be 4.0 KLD comprising Drinking 0.4 KLD, Dust suppression 1.5 KLD, Greenbelt 1.5 KLD and Domestic purpose 0.6 KLD. The water will be	136 & 134

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		sourced from outside agencies. Later the rainwater collected in the mine pit sump will be used for this purpose. The water balance diagram for the same is shown in Figure No 4.1.	
19	Issues relating to Mine Safety, including slope geometry in case of Granite quarrying, blasting parameters etc. should be detailed. The proposed safeguard measures in each case should also be provided.	Not Applicable	-
20	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.	Land use pattern of the study area is detailed in Section 3.6.6.1. The anticipated impact on land and its mitigative measure are detailed in Section 4.2.1.	113 & 131
21	Details of the land for storage of Overburden/Waste Dumps (or) Rejects outside the mine lease, such as extent of land area distance from mine lease, its land use, R&R issues, if any, should be provided.	There is no waste anticipated in this rough stone and gravel Quarry. The entire quarried minerals will be utilized. The proposed project area is own patta land and the name of applicant and there is no any habitation within the M.L area. So, R&R issues will not arise.	-
22	Since non-saleable waste /OB / intermediate waste etc. is huge in the granite quarry, the Proponent shall provide the details pertaining to management of the above material with year wise utilization and average moving inventory be submitted.	Not Applicable	-
23	Proximity to Areas declared as ' Critically Polluted'(or) the Project areas which attracts the court restrictions for mining operations, should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the TNPCB (or) Dept. of Geology and Mining should be secured and furnished to the effect that the proposed mining activities could be considered.	Not Applicable	-
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.	Rain water will be diverted into bottom of the project area by constructing drains to store and use for dust suppression and greenbelt development. Details are presented in section 4.2.3.4.	136
25	Impact on local transport infrastructure due to the Project should be indicated.	Impact on Local Transport is detailed in Section 7.4.2.	167
26	A tree survey study shall be carried out (nos., name of the species, age, diameter etc.,) both within the mining lease applied area & 300m	The details of flora in the core zone, project impact zone (PIZ) and the buffer zone are provided in section 3.6.7.	115

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	buffer zone and its management during mining activity.		
27	The project proponent shall study and furnish the details on potential fragmentation impact on natural environment, by the activities	The post mining land use has been provided in Table No. 4.1. The post mining land use plan showing afforestation and water body is shown in Figure No- 2.12.	131 & 87
28	The project proponent shall study and furnish the impact on aquatic plants and animals in water bodies and possible scars on the landscape, damages to nearby caves, heritage site, and archaeological sites possible land form changes visual and aesthetic impacts.	An ecological survey of the study area was conducted with reference to listing of species and assessment of the existing baseline ecological conditions. Details are provided under section 3.6.7, Chapter-3. Greenbelt / Plantation will be carried out to enhance the vegetative growth and aesthetic in the safety zone area. About 400 trees will be planted in and around the lease area.	115
29	The Terms of Reference should specifically study impact on soil health, soil erosion, the soil physical, chemical components and microbial components.	The baseline data on soil Quality is presented in Section 3.6.5. The anticipated impact and mitigation measures on Soil Environment are detailed in Section 4.2.2.	109 & 132
30	The Environmental Impact Assessment should study on wetlands, water bodies, rivers streams, lakes and farmer sites.	Thamirabarani River – 7.86 km, NE Brothers Lake – 12.34 km, NW There is an odai crossing the project site from west to east (64m and 63m AMSL, respectively). All project activities are carried out on the southern side of the project area, with a safety distance of 50m provided.	-
31	Energy The measures taken to control Noise, Air, Water, Dust Control and steps adopted to efficiently utilise the Energy shall be furnished.	Agreed	-
32	Climate Change The Environmental Impact Assessment shall study in detail the carbon emission and also suggest the measures to mitigate carbon emission including development of carbon sinks and temperature reduction including control of other emission and climate mitigation activities.	The equipment's will be properly and regularly maintained. Regular vehicular emission tests will be done for the transport vehicles to ensure minimal impact due to carbon emissions. Greenbelt / Plantation will be carried out to enhance the vegetative growth and aesthetic in the safety zone area. About 400 trees will be planted in and around the lease area.	-
33	The Environmental Impact Assessment should study impact on climate change, temperature rise. pollution and above soil & below soil carbon stock.		-
34	Mine Closure Plan Detailed Mine Closure Plan covering the entire mine lease period as per precise area communication order issued	Mine closure plan is detailed in Section 7.5 and Conceptual Plan is given in Figure 2.12.	169 & 87
35	EMP Detailed Environment Management Plan along with adaptation, mitigation & remedial strategies covering the entire mine lease period as per precise area communication order issued.	Detailed environmental management plan is provided in Chapter-10.	177

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36	EMP The Environmental Impact Assessment should hold detailed study on EMP with budget for Green belt development and mine closure plan including disaster management plan.	The capital cost of Rs. 28,35,400/- and the recurring cost of Rs. 12,19,510/- have been allocated under the EMP budget.	
37	Risk Assessment To furnish risk assessment and management plan including anticipated vulnerabilities during operational and post operational phases of Mining.	Risk assessment details are provided in Section – 7.2.	160
38	Disaster Management Plan To furnish disaster management plan and disaster mitigation measures in regard to all aspects to avoid/reduce vulnerability to hazards & to cope with disaster/untoward accidents in & around the proposed mine lease area due to the proposed method of mining activity & its related activities covering the entire mine lease period as per precise area communication order issued.	The disaster management plan is contained in Section 7.3.	163
39	The project proponent shall furnish VAO certificate with reference to 300m radius regard to approved habitations, schools, Archaeological sites, Structures, railway lines, roads, water bodies such as streams, odai, vaari, canal, channel, river, lake pond, tank etc.	VAO letter for environmental settings of the project site covering 300m radius is enclosed in Annexure – 4.	-
40	As per the MoEF& CC office memorandum F.No.22-65/2017-IA.III dated: 30.09.2020 and 20.10.2020 the proponent shall address the concerns raised during the public consultation and all the activities proposed shall be pan of the Environment Management Plan.	Noted & Agreed	-
41	The project proponent shall study and furnish the possible pollution due to plastic and micro-plastic on the environment. The ecological risks and impacts of plastic & micro-plastics on aquatic environment and fresh water systems due to activities, contemplated during mining may be investigated and reported.	The plastic Waste management are detailed in Section 4.2.9.4.	155
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	Not applicable. This is Not a violation category project. This is a New Proposal for Quarrying Rough Stone and Gravel. This proposal falls under B1 Category (Cluster Situation).	-
2	A copy of the document in support of the fact that the proponent is the rightful lessee of the mine should be given.	The applied land for quarrying is patta land. Patta copy is enclosed along with Approved Mining Plan enclosed in Annexure – 7.	-
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	Noted & agreed. All documents including approved mine plan, EIA and Public Hearing are compatible with one another in terms of the mine lease area, production levels, waste	-

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	its management, mining technology etc. and should be in the name of the lessee.	generation and its management, mining technology etc. and is in the name of the lessee.	
4	All corner coordinates of the mine lease area, superimposed on a High -Resolution Imagery/ topo sheet, topographic sheet, geomorphology and geology of the area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).	Project area is superimposed on Satellite imagery is enclosed in Figure No.2.4. Project area boundary coordinates superimposed on Toposheet & Surface Features around the project area covering 10km radius – Figure No. 3.1 and 3.2. Geology map of the project area covering 10km radius - Figure No. 3.12. Geomorphology Map of the Study Area covering 10 km radius – Figure No. 3.13.	79, 91, 92,124 & 125
5	Information should be provided in Survey of India Topo sheet in 1:50,000 scale indicating geological map of the area, geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil characteristics.	The following map in 1:50,000 Scale: Geology map of the project area covering 10km radius – Figure No. 3.12. Geomorphology Map of the Study Area covering 10 km radius – Figure No. 3.13.	124 & 125
6	Details about the land proposed for mining activities should be given with information as to whether mining conforms to the land use policy of the State; land diversion for mining should have approval from State land use board or the concerned authority.	The Precise area Communication has been granted by District Collector vide Rc.No.GM.1/387/2022, dated 10.11.2022. The mining plan was approved by Assistant Geologist/ Assistant Director (i/c), Geology and Mining, Thoothukudi vide Roc.No. G.M.1/387/2022, dated 22.11.2022.	-
7	It should be clearly stated whether the proponent company has a well laid down Environment Policy approved by its Board of Directors? If so, it may be spelt out in the EIA Report with description of the prescribed operating process/procedures to bring into focus any infringement/deviation/ violation of the environmental or forest norms/ conditions? The hierarchical system or administrative order of the Company to deal with the environmental issues and for ensuring compliance with the EC conditions may also be given. The system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the company and/or shareholders or stakeholders at large, may also be detailed in the EIA Report.	The proponent will frame a well-planned environmental policy. Its details are provided under Section 10.1, Chapter-10. Monitoring Mechanism is detailed under Section 9.3.	177 & 180
8	Issues relating to Mine Safety, including subsidence study in case of underground mining and slope study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided.	Various risks likely to arise due to mining activities are detailed under section 7.2, Chapter-7. This being an opencast mine, subsidence is not applicable. The impact due to ground vibrations due to blasting is given in para 4.2.5.3, Chapter-4.	160 & 148
9	The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste	Noted & Agreed The study area considered for this study is 10 km radius and all data contained in the EIA	-

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	generation etc. should be for the life of the mine / lease period.	report such as waste generation etc., is for the Life of the Mine / lease period.	
10	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary. national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.	The land use of the study area was studied to demarcate various LULC categories and its details are provided under section 3.6.6.1 Of Chapter-3. The land use pattern at present and at the end of the quarrying period has been provided in Table 4.1, Chapter-4. The Conceptual plan of mine lease area is shown in Figure No- 2.12.	113, 131 & 87
11	Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given.	There is no waste generation anticipated in this quarry operation since the entire excavated material will be utilized. Hence, there is no external overburden dump involved. Besides, there is no proposal for overburden dump outside the lease area.	-
12	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.	There is no Forest Land involved in the proposed project area. The proposed project area is a patta land. Approved Mining Plan is enclosed in Annexure – 2.	-
13	Status of forestry clearance for the broken-up area and virgin forestland involved in the Project including deposition of Net Present Value (NPV) and Compensatory Afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.	Not Applicable. The proposed project area does not involve any Forest Land.	-
14	Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act,2006 should be indicated.	Not Applicable. The project doesn't attract Recognition of Forest Rights Act, 2006.	-
15	The vegetation in the RF / PF areas in the study area, with necessary details, should be given.	Vallanadu R.F – 12.59 km, NE Wolf Hill RF – 7.5 km, NNW	-
16	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.	The mining lease area and the 10 km buffer zone from the periphery of the core zone is devoid of declared ecologically sensitive features like national parks, biospheres, sanctuaries, etc. Koonthankulam Bird Sanctuary – 12.55 km, SW Vallanadu Black Buck Sanctuary – 11.82 km, NE	-

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		Vallanadu Black Buck Sanctuary – ESZ – 10.25 km, NE	
17	Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/ Elephant Reserves/(existing as well as proposed), if any, within 10 km of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the Standing Committee of National Board of Wildlife and copy furnished.	Not Applicable. There are No National Parks, Biosphere Reserves, Wildlife Corridors, and Tiger/Elephant Reserves within 10 km Radius from the periphery of the project area.	-
18	A detailed biological study of the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] shall be carried out. Details of flora and fauna, endangered, endemic and RET Species duly authenticated, separately for core and buffer zone should be furnished based on such primary field survey, clearly indicating the Schedule of the fauna present' In case of any scheduled fauna found in the study area. the necessary plan along with budgetary provisions for their conservation should be prepared in consultation with State Forest and wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.	A detailed study of flora and fauna composition in the core and buffer zone of the project has been made. The details are furnished in section 3.6.7.	115
19	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 Department should be secured and furnished to the effect that the proposed mining activities could be considered.	Not Applicable	-
20	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 with respect to 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	-
21	R&R Plan/compensation details for the project Affected people (PAP) should be furnished. While preparing the R&R Plan, the relevant State/ National Rehabilitation & Resettlement	The mining activities will be carried out within the mine lease area only. The entire mine lease area of 4.21.5 Ha is a patta land.	-

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	<p>policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need based sample survey, family-wise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the state Government. It may be clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to shifting of village(s) including their R&R and socio-economic aspects should be discussed in the Report.</p>	<p>There is no population within the ML area. Hence, the question of R& R does not arise.</p>	
22	<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 direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the pre-dominant downwind direction. The mineralogical composition of PM10, particularly for free silica, should be given.</p>	<p>Baseline Data were collected for One Season (Summer Season) March – May 2023 as per CPCB Notification and MoEF & CC Guidelines and Detailed in Chapter - 3.</p>	88
23	<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 pre-dominant wind direction may also be indicated on the map.</p>	<p>Air Quality Modelling for prediction of incremental GLC's of pollutant was carried out using AERMOD view 9.6.1 Model and Detailed in Section 4.2.4.3.</p>	140
24	<p>The water requirement for the Project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the Project should be indicated.</p>	<p>The quantum water required for Thiru.K. Subbaiah Quarry is 4.0 KLD and for Thiru.K. Vijayakumar Quarry is around 4.5 KLD. Though it may be sourced from outside agencies initially, for these projects it is planned to use the rain water collected in the mine sump water. The water balance</p>	134

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		diagram for the same is shown in Figure No 4.1.					
25	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.	Not Applicable Water for dust suppression, greenbelt development and domestic use will be sourced from accumulated rainwater/seepage water in mine pits and purchased from local water vendors through water tankers on daily requirement basis.	-				
26	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.	Rain water will be diverted into working area by constructing drains to store and use for dust suppression and greenbelt development. Details are presented in section 4.2.3.4. The total water requirement per project will be 4.0 KLD comprising Drinking 0.4 KLD, Dust suppression 1.5 KLD, Greenbelt 1.5 KLD and Domestic purpose 0.6 KLD. The water will be sourced initially from outside agencies. Later the rainwater collected in the mine pit sump will be used for this purpose. The water balance diagram for the same is shown in Figure No 4.1.	136 & 134				
27	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 Studies and Mitigation Measures of Water Environment including Surface Water and Ground Water are discussed in Section 4.2.3.	133				
28	Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect groundwater table, a detailed Hydro Geological Study should be undertaken and Report furnished. The Report inter-ali4 shall include details of the aquifers present and impact of mining activities on these aquifers. Necessary permission from Central Ground water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished.	The quarrying activity will not intersect ground water table as quarrying is proposed upto a depth of 33 m bgl and water table is found at a depth of 80 - 85m BGL.	-				
29	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.	There is an odai crossing the project site from west to east (64m and 63m AMSL, respectively). All project activities are carried out on the southern side of the project area, with a safety distance of 50m provided. Figure 2.7 shows a map of the study area's land use pattern and the safety distance provided for odai.	-				
30	Information on site elevation, working depth, groundwater table etc. Should be provided	<table border="1"> <tr> <td>Site Elevation above MSL</td> <td>38 m from MSL (96 m RL)</td> </tr> <tr> <td>Ultimate Depth</td> <td>33m bgl</td> </tr> </table>	Site Elevation above MSL	38 m from MSL (96 m RL)	Ultimate Depth	33m bgl	-
Site Elevation above MSL	38 m from MSL (96 m RL)						
Ultimate Depth	33m bgl						

Draft EIA EMP report of Proposed Rough stone and Gravel Quarry of Mr. K. Subbaiah at SF No 507 & 508 over a Extent of 4.21.5 Ha in Therkukarseri Village, Srivaikundam Taluk, Thoothukudi District, Tamil Nadu

	both in AMSL and bgl. A schematic diagram may also be provided for the same.	Ground water	80 - 85m BGL.	
31	A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the Project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given. The plant species selected for green belt should have greater ecological value and should be of good utility value to the local population with emphasis on local and native species and the species which are tolerant to pollution.	Greenbelt Development Plan & Recommended Species proposed for Greenbelt Development are detailed in Section 4.2.6.3.		150
32	Impact on local transport infrastructure due to the Project should be indicated. Projected increase in truck traffic as a result of the Project in the present road network (including those outside the Project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be covered. Project Proponent shall conduct Impact of Transportation study as per Indian Road Congress Guidelines.	Impact on local Transport infrastructure are detailed in Section 7.4.2.		167
33	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.	Infrastructure & other facilities will be provided to the Mine Workers after the grant of quarry lease and the same has been discussed in Section 2.10.5 of Chapter 2.		76
34	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.	At the conceptual stage the quarried-out land will be fenced and lower benches will be allowed to collect rain water to act as a temporary reservoir and Greenbelt development will be carried out on the top bench, unutilized areas and haul roads. Mine closure plan is detailed in Section 2.11 of Chapter 2.		74
35	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation	Details of occupational health and safety aspects are given under the Section 4.2.8 & Section 10.4.		152 & 181

Draft EIA EMP report of Proposed Rough stone and Gravel Quarry of Mr. K. Subbaiah at SF No 507 & 508 over a Extent of 4.21.5 Ha in Therkukarseri Village, Srivaikundam Taluk, Thoothukudi District, Tamil Nadu

	measures with required facilities proposed in the mining area may be detailed.		
36	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.	No Public Health Implications anticipated due to this project. Details of CER and CSR are discussed under Chapter No. 8,	175
37	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.	By means of carrying out the socio- economic development activities, local community development is expected. Towards the same, the proponent has planned to allocate Rs.5.75/- Lakhs for various activities under CER.	-
38	Detailed Environmental Management Plan (EMP) to mitigate the environmental impacts which, should inter-alia include the impacts of change of land use, loss of agricultural and grazing land, if any, occupational health impacts besides other impacts specific to the proposed Project.	Detailed Environment Management Plan for the project to mitigate the anticipated impacts described IN Chapter 4 & Chapter 10.	130 & 177
39	Public Hearing points raised and commitment of the Project Proponent on the same along with time bound Action Plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project.	Noted & Agreed	-
40	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 litigation is pending in any court against this project.	-
41	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.	Project Cost is Rs. 2,84,51,760/- CER Cost is Rs.5.75/- lakhs The capital cost of Rs. 28,35,400/- and the recurring cost of Rs. 12,19,510/- have been allocated under the EMP budget.	-
42	A Disaster management Plan shall be prepared and included in the EIA/EMP Report.	Disaster management plan are provided under section 7.3 of Chapter-7.	163
43	Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc.	Detailed in Chapter 8.	175
44			
a)	Executive Summary of the EIA/EMP Report	Yes, Enclosed	-
b)	All documents to be properly referenced with index and continuous page numbering.	All the documents are properly referenced with index and continuous page numbering.	-
c)	Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources should be indicated.	List of Tables and source of the data collected are given properly.	-

Draft EIA EMP report of Proposed Rough stone and Gravel Quarry of Mr. K. Subbaiah at SF No 507 & 508 over a Extent of 4.21.5 Ha in Therkukarseri Village, Srivaikundam Taluk, Thoothukudi District, Tamil Nadu

d)	Project Proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the MoEF&CC/ NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the Project,	Baseline monitoring results are detailed in Chapter No. 3. Original Baseline monitoring reports will be made available during appraisal of the project.	-
e)	Where the documents provided are in a language other than English, an English translation should be provided.	Not Applicable	-
f)	The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted.	Complied	-
g)	While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF&CC vide O.M. No. J- I 1013/41/2006-IA.11 0) dated 4th August, 2009, which are available on the website of this Ministry, should be followed.	Noted & Agreed	-
h)	Changes, if any made in the basic scope and project parameters (as submitted in Form-I and the PFR for securing the TOR) should be brought to the attention of MoEF&CC with reasons for such changes and permission should be sought, as the ToR may also have to be altered. Post Public Hearing changes in structure and content of the draft EIA/EMP (other than modifications arising out of the P.H. process) will entail conducting the pH again with the revised documentation.	Noted & Agreed	-
i)	As per the circular no. J-I IOI I161812010-1A.II (I) dated 30.5.2012, certified report of the status of compliance of the conditions stipulated in the Environment Clearance the existing operations of the project, should be obtained from the Regional office of Ministry of Environment, Forest and Climate Change, as may be applicable.	Not Applicable This is a proposed project.	-
j)	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.	Surface Plan – Figure No. 2.8, Geological Plan – Figure No 2.8, Working Plan – Figure No 2.10.	83 & 85

1.0 INTRODUCTION

1.1 PURPOSE OF THE REPORT

Environmental Impact Assessment (EIA) is the management tool to ensure the sustainable development and it is a process, used to identify the environmental, social and economic impacts of a project prior to decision making. It is a decision-making tool, which guides the decision makers in taking appropriate decisions for any project.

EIA systematically examines both beneficial and adverse consequences of the project and ensures that these impacts are taken into account during the project designing. It also reduces conflicts by promoting community participation, information, decision makers, and helps in developing the base for environmentally sound project.

Rough Stone and Gravel are the major requirements for construction industry. This EIA report is prepared by considering Cumulative load of all proposed & existing quarries located within 500 m radius of the project area.

This cluster includes the nearby existing Quarry of Thiru.K. Vijayakumar at Survey No. 519/1, 519/3 and 520 over an area of 4.59.50 Ha. Total Cluster area is 8.81.00 Ha. As such Common EIA for the 2 projects falling in the cluster with assessment of impacts and EMP separately is carried out. Cumulative impact study has been carried out and furnished in Para 7.4, Chapter-7. Cluster area calculated as per MoEF & CC Notification S.O. 2269(E) Dated 1st July 2016.

This EIA Report is prepared for Thiru. K. Subbaiah Rough Stone & Gravel Quarry in compliance with ToR obtained vide Lr No.SEIAA-TN/F.No.9684/SEAC/TOR-1424/2022 Dated 18.04.2023 and the Baseline Monitoring study has been carried out during the period of March – May 2023. Satellite image of Quarries in Cluster is shown in Fig 1.1.

PROPOSED ROUGH STONE AND GRAVEL QUARRY OF THIRUK SUBBAIAH OVER AN EXTENT 4.215 HA LOCATED AT SF NOS 507 & 508 OF THEKKUKARSERI VILLAGE, SRIVAKUNDAM TALUK, THOOTHUKUDI DISTRICT, TAMILNADU STATE



APPLICANT: THIRUK SUBBAIAH 507 & 508 THEKKUKARSERI VILLAGE SRIVAKUNDAM TALUK THOOTHUKUDI DISTRICT	
QUARRY LEASE APPLIED AREA: SF NOS : 507 & 508 EXTENT : 4.215 HAs VILLAGE : THEKKUKARSERI TALUK : SRIVAKUNDAM DISTRICT : THOOTHUKUDI	
INDEX TOPO SHEET NO : 58 H/14 & 111 LATITUDE : 9° 52' 33.26" N 46° 08' 34.85" E LONGITUDE : 77° 46' 19.34" E 47° 46' 02.55" E	
300m Radius	:
500m Radius	:
Q.L. Applied Area	:
EXISTING QUARRIES	:
INDEX	
ODM	:
WELL	:
Global Geomatics Solutions	

Figure 2.1 Satellite Image showing cluster quarries

1.2 IDENTIFICATION OF PROJECT AND PROJECT PROPONENT

1.2.1 IDENTIFICATION OF PROJECT

Table 1.1 Project Identification

Name of the Project	Thiru. K. Subbaiah Rough Stone & Gravel Quarry
S.F No.	507 & 508
Location of the Project	Therkukarseri Village, Srivaukundam Taluk, Thoothukudi District Tamil Nadu.
Extent	4.21.5 Ha.
Type of Land	Patta Land

1.2.2 IDENTIFICATION OF PROJECT PROPONENT

Table 1.2- Details of Project PropONENT

Name of the Project PropONENT	Thiru.K. Subbaiah
Communication address	S/o. Karunakaran 8/11, Nadu Theru, Mavadi Pannai, Then Thirupperai Post, Tiruchendur Taluk, Thoothukudi District – 628 623.
Mail ID	subbiahroughstone@gmail.com
Mobile No.	9444206840

1.3 BRIEF DESCRIPTION OF THE PROJECT

1.3.1 NATURE AND SIZE OF THE PROJECT

The quarrying operation is proposed to be carried out by Opencast semi Mechanized Mining Method by jack hammer drilling, slurry blasting by forming 5.0 m bench height and 5.0 m bench width. Excavator and tippers are proposed for Loading and transportation.

1.3.2 NATURE OF THE PROJECT

Sector	1(a) Non-Coal Mining
Type	Fresh Project
Category	B1 (Cluster Situation)
Mineral	Minor mineral of Rough Stone and Gravel

1.3.3 LOCATION OF PROJECT

The proposed Quarry lease area is situated about 1km south of Therkukarseri – Sivanthipatti sub road and at S.F.Nos. 507 & 508, Therkukarseri Village, Srivaikundam Taluk, Thoothukudi District Tamil Nadu. The area lies in the north latitude of **8°35'53.36"N to 8°36' 05.57"N** and eastern longitude of **77°48'19.34"E to 77°48'29.55"E**. Location of the proposed project is shown in Figure 2.1 and the satellite imagery of the project site is shown in Figure 2.4.

1.4 IMPORTANCE OF THE PROJECT TO THE REGION

Gravel and Rough stone will continue to be a staple in construction, decoration and industry for years to come. As recycling picks up, mining and quarries may slow down, but we will always need rough stone in general construction and industry.

Natural gravel is often used in walkways, driveways and decorative hardscaping for several reasons.

1.5 REGULATORY COMPLIANCES

Understanding of the applicable environmental legislative framework is crucial for understanding the scope of the EIA study. With respect to prevention and control of environmental pollution, the following Acts and Rules of MoEF&CC (Ministry of Environment Forests and Climate Change), GoI (Government of India) govern the proposed project. The applicable environmental legislation for the proposed mining project is detailed below,

- Environment protection Act, 1986
- EIA Notification, 2006 & Subsequent amendments
- Water Pollution (Prevention & Control) Act, 1974
- Air Pollution (Prevention & Control) Act, 1981
- Noise Pollution (Regulation & Control) Rules, 2000
- Mines Act, 1952
- Tamil Nadu Minor Mineral Concession Rules, 1959
- Tamil Nadu Minor Mineral Concession Rules, 1959

- Mines and Minerals (development and regulation) Act,1957
- Minor Minerals Conservation and Development Amendment Rules 2018
- State Minor Mineral Concession Rules (GMMCR), 2017
- Explosive Act ,1884
- Explosive Rules,2008
- Hazardous and other Wastes (management and Transboundry Movement) Rules, 2016
- Batteries (Management and Handling) Rules 2010
- Solid Waste Management Rule 2016

1.5.1 PRESENT LEGAL STATUS

The Precise area Communication has been granted by District Collector vide Rc.No.GM.1/387/2022, dated 10.11.2022 to get approval of Mining Plan and Environment Clearance from SEIAA, TN. **Enclosed in Annexure -1.**

The mining plan was approved by Assistant Geologist/ Assistant Director (i/c), Geology and Mining, Thoothukudi vide Roc.No. G.M.1/387/2022, dated 22.11.2022. **Enclosed in Annexure -2.**

The project proponent has obtained an official letter from Assistant Geologist/ Assistant Director(i/c), Dept. of Geology & Mining, Thoothukudi for **500 m radius features** vide Roc.No.G.M.1/387/2022, dated 19.12.2022. **The letter copy enclosed as Annexure – 3.**

VAO certification regarding 300 meter features of the project area. There are no historical places, schools, cemeteries, HT and LT lines, temples, bird sanctuaries, and wildlife sanctuaries within 300 metres of the proposed project area. In this regard, the project proponent has received an official letter from the Village Administrative Officer, Therkukarseri village. **The letter copy enclosed as Annexure – 4.**

Letter from DFO stating the distance of the Eco sensitive zone and sanctuary vide C.No.D/5878/2022, Dated 23.11.2022. **Enclosed in Annexure – 5.**

Blasting Agreement:

The Project Proponent have agreement with National Trading Company to carry out the blasting operation for the proposed quarry. **The Blasting Agreement is enclosed as Annexure – 6.**

Land document of the proposed lease area:

Entire mine lease area is a Patta land and is in applicant name. **The copy of the Land document are enclosed as Annexure -7.**

1.5.2 SCREENING

As per the Environmental Impact Assessment (EIA) Notification dated 14th September 2006 and its subsequent amendments the proposed quarry mining project falls under 'Category B1(Cluster Situation)', which requires Environmental Clearance from the State Environmental Impact Assessment Authority (SEIAA). The project proponent as part of the compliance from SEIAA has appointed M/s. Global Mining Solutions, Salem as Environmental Consultants who are accredited by National Accreditation Board for Education and Training (NABET), Quality Council of India (QCI), New Delhi vide NABET/EIA/2326/IA 0110.

1.5.3 SCOPE OF THE STUDY

In line with the prescribed Terms of Reference (TOR), the area comprising 10 km radius around the proposed mine lease boundary is considered as the study area. The EIA/EMP report has been prepared following the generic structure specified in the EIA Notification 2006. The detailed studies have been conducted as per prescribed Standard TOR issued by SEIAA, TamilNadu vide Lr No.SEIAA-TN/F.No.9684/SEAC/ToR-1424/2022 Dated: 18.04.2023. The point wise compliance for the ToR has been incorporated in section 1.5.4 of this EIA/EMP report.

The main scope of the EIA study is to quantify the cumulative impact in the study area due to cluster quarries and formulate the effective mitigation measures for this applied project area. A detailed account of the emission sources, emissions control equipment, background Air quality levels, Meteorological measurements, Dispersion model and all other aspects of pollution like effluent

discharge, Dust generation etc., have been discussed in this report. The baseline monitoring study has been carried out during the Period of March to May 2023 for various environmental components so as to assess the anticipated impacts due the cluster quarry projects on the environment and suggest suitable mitigation measures for likely adverse impacts due to this proposed project.

The scope of study broadly covered as below

- ◆ Literature review and collection of secondary data relevant to the study area.
- ◆ Establish the baseline environmental aspects in and around the proposed project covering 10 km radius.
- ◆ Identify various existing pollution loads due to various mining activities.
- ◆ Predict incremental levels of pollutants in the study area due to the proposed operations.
- ◆ Establishing and analyzing demographic profile including sex ratio, literacy rate, SC/ST, workers classification, land use categorization, etc in the project influenced area
- ◆ Evaluate the predicted impacts on various environmental attributes in the study area by using scientifically developed and widely accepted environmental impact assessment methodologies.
- ◆ Prepare an Environment Management Plan (EMP) outlining the measures for improving the environmental quality and identify critical environmental attributes that are required to be monitored in the post-project scenario.
- ◆ To assess the impacts on human settlement in the project influence area Socio-Economic Assessment
- ◆ Cumulative impact assessment for the quarries in cluster.

1.6 NEED AND JUSTIFICATION OF THE PROJECT

- Proposed mining project will fulfill the local market requirement for real estate and infrastructure industry. This project will also provide employment to local people helping them earn livelihood.
- Employment generated consequent to the mining activity in the project will be benefit local and rural population and will have multiplier effects on local economy.

- The Project will give tremendous boosts to the local and regional economy benefiting the population.
- The social benefits arising out of this proposal can be expressed in terms of increase in the standards of living of local population, educational opportunities, training and development of skills etc.

1.7 STRUCTURE OF THE REPORT

As per the new guidelines of the MoEF & CC the report has been divided into the following chapters and presented as follows:

1. Introduction

This chapter describes the profile of the project proponent, name and contact address with email, project consultants, the purpose of the project, brief description of the project, applicable environmental regulations, objectives and methodology for EIA studies etc.

2. Project Description

This chapter gives a brief description of the project such as the type of project, need for the project, its location, approachability, layout, etc of the proposed project, the project implementation schedule, estimated cost of development etc

3. Description of the Environment

This chapter presents details of the baseline environmental status for microclimate, air quality, noise, water quality (surface and ground), soil quality, flora, fauna and socioeconomic status etc.

4. Anticipated Environmental Impacts & Mitigation Measures

This chapter discusses the possible sources of pollution and environmental impacts due to the project during operation phases and suggests the mitigation measures.

5. Analysis of Alternatives (Site And Technology)

This chapter discusses the analysis of the various alternatives for the technology as well as the site and gives the selection of the most feasible alternative.

6. Environmental Monitoring Program

This chapter discusses the details about the environmental monitoring program during operation phases. The technical aspects of monitoring the effectiveness of mitigation measures are covered in this chapter.

7. Additional Studies

This chapter covers information about the additional studies conducted for this project such as the Risk Analysis, Emergency Response and Disaster Management Plan.

8. Project Benefits

This chapter presents the benefits from this project

9. Environmental Management Plan

This chapter deals with the EM for the proposed sand mining projects and indicates the measures proposed to minimize the likely impacts on the environment during and operation phases and budgetary allocation for the same.

10. Summary and Conclusion

This chapter deals with the overall justification for implementation of the project and explanation of how, adverse effects have been mitigated.

11. Disclosure of Consultant

This chapter deals with the details of consultants engaged and the NABET accreditation details of environmental consultants.

2.0 PROJECT DESCRIPTION

2.1 TYPE OF THE PROJECT

The proposed activity is the extraction of Rough Stone and Gravel by open cast semi mechanized mining method.

This project proposed to produce 4,64,760 Cu.m of rough stone & 84,222 cu.m. of Gravel and the annual peak production 93620 cu.m. of Rough Stone(4th Year) & 21945 Cu.m of Gravel (1st year)and for the period of 5 years with ultimate depth upto 33m.

2.2 LOCATION OF THE PROJECT

The proposed Quarry lease area is situated about 1km south of Therkukaraseri – Sivanthipatti sub road and at S.F.Nos. 507 & 508, Therkukaraseri Village, Srivaikundam Taluk, Thoothukudi District Tamil Nadu. The area lies in the north latitude of 8°35'53.36"N to 8°36'05.57"N and eastern longitude of 77°48'19.34"E to 77°48'29.55"E. Location of the proposed project is shown in Figure 2.1 the satellite imagery of the project site is shown in Figure 2.4.

This proposed project area is classified as Patta land (Non-Forest Land) & does not fall within 10 km radius of any Eco – sensitive zone, Wild life Sanctuary, National Park, Tiger Reserve, Elephant Corridor and Biosphere Reserves. The Eco sensitive zone of Vallanadu Blackbuck Sanctuary is located at a distance of 10.25 km in NE direction and Vallanadu Blackbuck Sanctuary is in 11.82 km (NE). Letter from DFO stating the distance of the Eco sensitive zone and sanctuary is enclosed in Annexure – 9.

Table 2.1 Site Connectivity

Nearest Roadway	The National Highway (NH-138) Tirunelveli to Thoothukudi is about 15 km on Northern side. The sub road towards Mulakaraipatti which is about 1 km on the Northern side.
Nearest Village	Therkukaraseri – 1.5 km (South)
Nearest Railway	Karunkulam – 11 km
Nearest Airport	Thoothukudi – 45 km

Table 2.2 Boundary Coordinates of the Project

Boundary Pillar No.	Latitude	Longitude
1	8°36'05.57"N	77°48'23.76"E
2	8°36'05.31"N	77°48'25.62"E
3	8°35'57.62"N	77°48'24.12"E
4	8°35'56.84"N	77°48'26.87"E
5	8°35'55.46"N	77°48'30.20"E
6	8°35'53.36"N	77°48'29.55"E
7	8°35'53.37"N	77°48'27.97"E
8	8°35'56.20"N	77°48'19.60"E
9	8°35'58.20"N	77°48'19.34"E
10	8°35'58.88"N	77°48'19.65"E
11	8°35'58.87"N	77°48'20.78"E
12	8°35'58.24"N	77°48'21.86"E
13	8°36'02.72"N	77°48'22.96"E

2.3 LAND USE PATTERN OF THE PROJECT AREA

The entire project site is Patta land in the applicant's name. The land use pattern of the mine lease area as of today and conceptual stage given in Table No. 2.3.

Table 2.3 Land use pattern of the study area

Description	Present Area in Ha.	Area at the end of life of Quarry in Ha.
Quarrying pit	NIL	2.55.0
Infrastructure	NIL	0.01.0
Roads	NIL	0.03.0
Greenbelt	NIL	0.52.5
Unutilized	4.21.5	1.10.0
Total	4.21.5	4.21.5

There is an odai crossing the project site from west to east (64m and 63m AMSL, respectively). All project activities are carried out on the southern side of the project area, with a safety distance of 50m provided. Figure 2.7 shows a map of the study area's land use pattern and the safety distance provided for odai.

2.4 SIZE AND MAGNITUDE OF THE OPERATION

The proposed activity is the extraction of Rough Stone and Gravel by open cast semi mechanized mining method over an extent of 4.21.5 Ha and to produce 4,64,760 Cu.m of rough stone & 84,222 cu.m. of Gravel and the annual peak production 93620 cu.m. of Rough Stone(4th Year) & 21945 Cu.m of Gravel (1st

year)and for the period of 5 years with ultimate depth upto 33m. The details of geological and mineable reserves in the lease area has been provided below in the subsequent sub section.

2.5 TOPOGRAPHY AND DRAINAGE

The project area is a plain terrain covered by massive rough stone formation, with gentle slope towards southeast side. No major river is found nearby the applied area.

2.6 GEOLOGY

2.6.1 REGIONAL GEOLOGY

Thoothukudi district represents a well-developed lithopackage of meta-sedimentary sequence inter banded with charnockite Group of rocks. The rock types exposed are of quartzite, calc-granulite, garnet-biotite-sillimanite gneiss, garnet quartzo-feldspathic gneiss and garnet-biotite-cordierite gneiss belonging to Khondalite Group of rock. Charnockite and pyroxene Granulite are the Charnockite Group. Hornblende-biotite gneiss belongs to Migmatitic Complex. Besides, basic intrusive (pyroxenite) and acid intrusive (granite) are noticed. The younger intrusive are represented by pegmatite and quartz veins. Evidence of development of incipient / patchy charnockite along the shear plane is noticed in the district along the Western Ghat high hills. Rock type found in the area belong to the Khondalite and Charnockite groups and Migmatite Complex of Easter Ghats Super group (Archaean Age),which are unconformably overlain by Tertiary and Quaternary sediments.Garnet-biotie-sillimanite gneiss, quartzite, calc-granulite and limestone of Khondalite group with epidiorite occurring as narrow linear bands.Charnockite group is represented by acid variants. These rock types occur as xenoliths within the Migmatite Complex occupies a major part of the area, comprising medium grained hornblende-biotite gneiss and garnet-biotitegneiss.Gypsum, limestone, beach sand, kankar and shell limestone are the Economic minerals of the district.

2.6.2 LOCAL GEOLOGY

The area is underlain by the wide range of metamorphic rocks of peninsular gneissic complex. These rocks are extensively weathered and overlain by the valley fills and alluvium at places. The rock type noticed in the area for lease is Charnockite which contains mostly Quartz and Feldspar with some ferromagnesian minerals. The Charnockite part of peninsular Gneisses, a high-grade metamorphic rock.

2.7 RESOURCES AND RESERVES

The Resources and Reserves of Rough Stone and Gravel were calculated based on Cross-Section Method to cover the maximum lease area.

Table 2.4 Available Geological Resources

Geological Resources	Rough Stone	Gravel
	12,62,820 m ³	1,26,282 m ³

2.7.1 MINEABLE RESERVES

The mineable reserves are calculated by considering bench formation and leaving 7.5 m (Safety Barrier all around the applied area) and 50 m (Odai in northern side) safety distance in applied lease areas. The mineable reserves is calculated considering there is no waste / overburden / Side burden.

Table 2.5 – Available Mineable Reserves

Mineable Reserves	Rough Stone	Gravel
	4,64,760 m ³	84,222 m ³

2.8 TECHNOLOGY AND PROCESS DESCRIPTION

2.8.1 PROCESS DESCRIPTON

The quarry operations involve opencast semi mechanized mining using shallow jack hammer drilling, blasting, excavation, loading and transportation of Rough stone and gravel to needy buyers. The massive formation shall be broken into pieces of portable size by drilling and blasting using jack hammer and shot hole blasting by forming 5.0 m Bench height & 5.0m width. The

Burden of hole	0.6m
Pattern of hole	Zigzag
Inclination of hole	70 ⁰ from horizontal

No.of holes to be drilled per day:

Volume of Rough Stone will be excavated from one hole – 6 tonnes

Total volume from this Quarry - 4,64,760 m³ of rough stone

Therefore, number of holes per day - 145

2.8.3 TYPE OF EXPLOSIVE

Slurry explosive is proposed for shattering and heaving effect for removal of rough stone. No deep hole drilling or primary blasting is proposed. The Project Proponent have agreement with National Trading Company to carry out the blasting operation for the proposed quarry. The Blasting Agreement is enclosed as Annexure – 6.

2.8.4 STORAGE OF EXPLOSIVES

No proposal for storage of explosives within the project area, the applicant will engage authorized explosive agency to carry out the blasting and it will be supervised by competent and statutory foreman / mines manager as per DGMS guidelines.

2.8.5 PRODUCTION SCHEDULE

The year wise production schedule upto lease period of 5 years is given below, the year wise production is given in Figure 2.9 & 2.10.

Table 2.7 Year wise Production Plan

Year	Rough stone in m ³	Gravel in m ³
I	92,450	21,945
II	93,150	15,939
III	92,750	15,198
IV	93,620	19,044
V	92,790	12,096
Total	4,64,760	84,222

2.8.6 DISPOSAL OF WASTE

There is no waste anticipated in this rough stone and gravel Quarry. The entire quarried minerals will be utilized. The excavated rough stone and gravel will be excavated and loaded into tipper to the needy buyers. If there is any top soil, it will be used for leveling.

2.9 CONCEPTUAL MINING PLAN / FINAL MINE CLOSURE PLAN

Conceptual mining plan is prepared with an object of five years of systematic development of bench layouts, selection of ultimate pit limit, depth of quarrying, ultimate pit slope, selection of sites for construction of infrastructure etc.

The ultimate pit size is designed based on certain practical parameters such as economical depth of mining, safety zones, permissible area, etc. Conceptual cross section and mine closure plan is given in 2.11 & 2.12.

Table 2.8 Ultimate Pit Dimension

Pit	Length in m (Max)	Width in m (Max.)	Depth in m (Max.)
I	76	57	23 bgl
II	118	72	33 bgl
III	198	77	33bgl

- At the end of life of mine, the excavated mine pit / void of 2.55.0 Ha. will act as artificial reservoir for collecting rain water and helps to meet out the demand or crises during drought season.
- After mine closure the greenbelt (0.52.5 Ha.) will be developed along the safety barrier and top benches and 0.03 ha is approach road.

- Remaining 1.11 ha. of land will be covered with vegetation.

2.10 PROJECT REQUIREMENT

2.10.1 WATER REQUIREMENT AND SOURCE

The total water requirement estimated for the quarry is 4.0 KLD. The estimated water requirement and its source for each activity is given in Table 2.8. The required water will be procured from outside agencies initially and later rainwater harvested in the mine pit shall be used other than drinking purpose.

Table 2.9 Details of Water requirement

Activity	Water Requirement in KLD
Drinking	0.4
Dust Suppression	1.5
Greenbelt Development	1.5
Domestic	0.6
Total	4.0

2.10.2 POWER REQUIREMENT

All the equipment will be diesel operated. No electricity is needed for mining operation. The minimum power requirement for office, etc will be met from state grid.

2.10.3 FUEL REQUIREMENT

High speed Diesel (HSD) will be used for mining machineries.

i) For Gravel

Per hour excavator will consume 10 liters /hr

Per hour excavator will excavate 100 m³ of top gravel

For 84222 m³ 84222/100

= 842

So, Diesel consumption =842 X 10 litres
=8420 litres of HSD

ii) For Rough Stone

Per hour excavator will consume 16 liters /hr

Per hour excavator will excavate 50 m³ of Rough Stone

For 4,64,760 m³ 4,64,760/50

= 9295

So, Diesel consumption =9295 X 16 litres

=1,48,720 litres of HSD

The Total fuel consumption is around 1,57,140 litres of HSD for the entire period of life (5 years).

2.10.4 EMPLOYMENT GENERATION

The project will provide employment opportunities totally to 20 persons directly and 20 indirectly.

2.10.5 INFRASTRUCTURE REQUIREMENT

This is a proposed project. Site services like mine office, first aid room, toilets etc. will be provided as semi-permanent structures.

2.10.6 PROJECT COST

The total project cost of this Rough stone and Gravel Quarry is Rs. 2,84,51,760/- which is including EMP cost.

2.10.7 PROJECT IMPLEMENTATION SCHEDULE

The proponent proposes to implement the production immediately after obtaining all the statutory approvals.

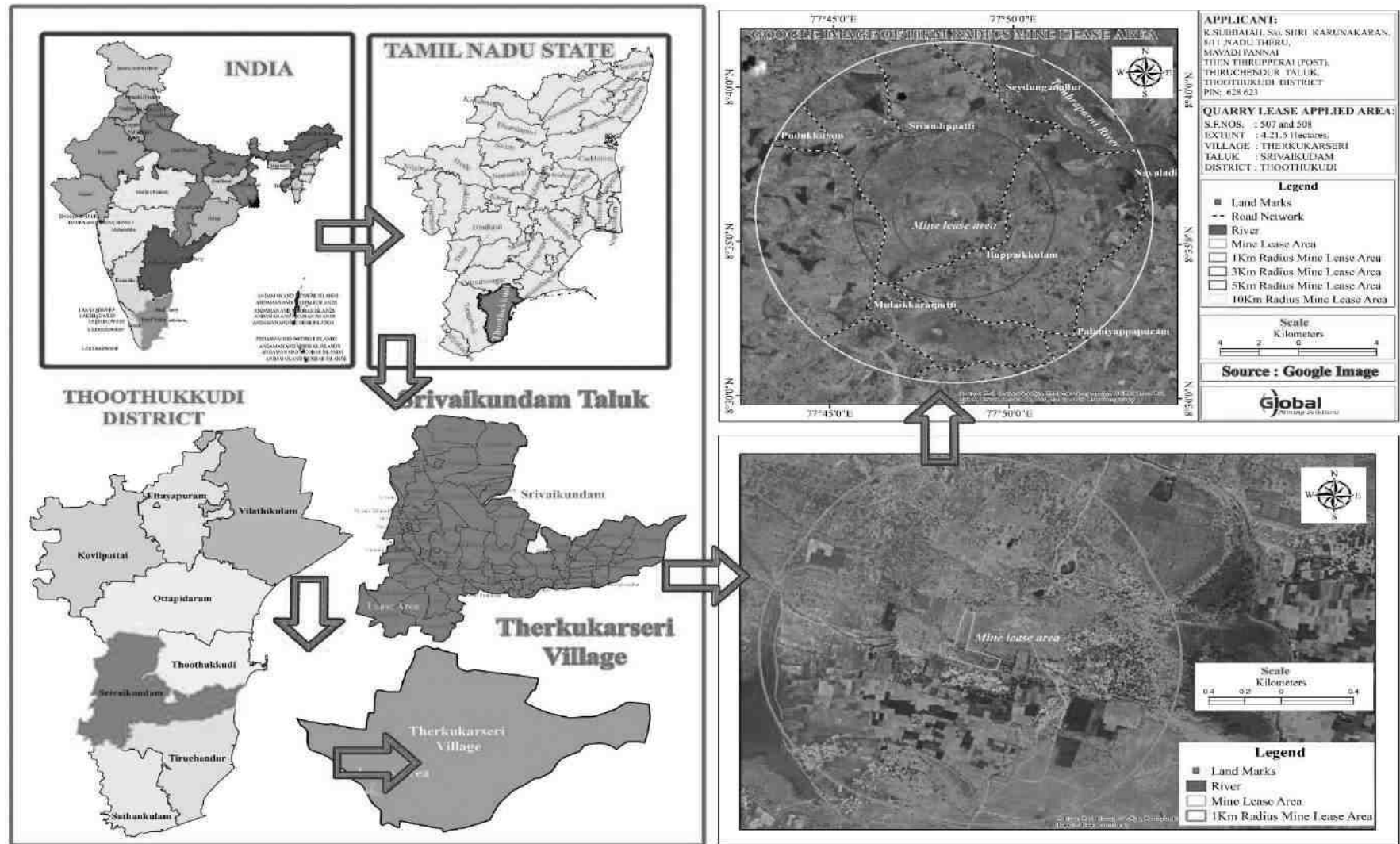


Figure 2.2 Location Map

Draft EIA EMP report of Proposed Rough stone and Gravel Quarry of Mr. K. Subbaiah at SF No 507 & 508 over a Extent of 4.21.5 Ha in Therkukarseri Village, Srivaikundam Taluk, Thoothukudi District, Tamil Nadu

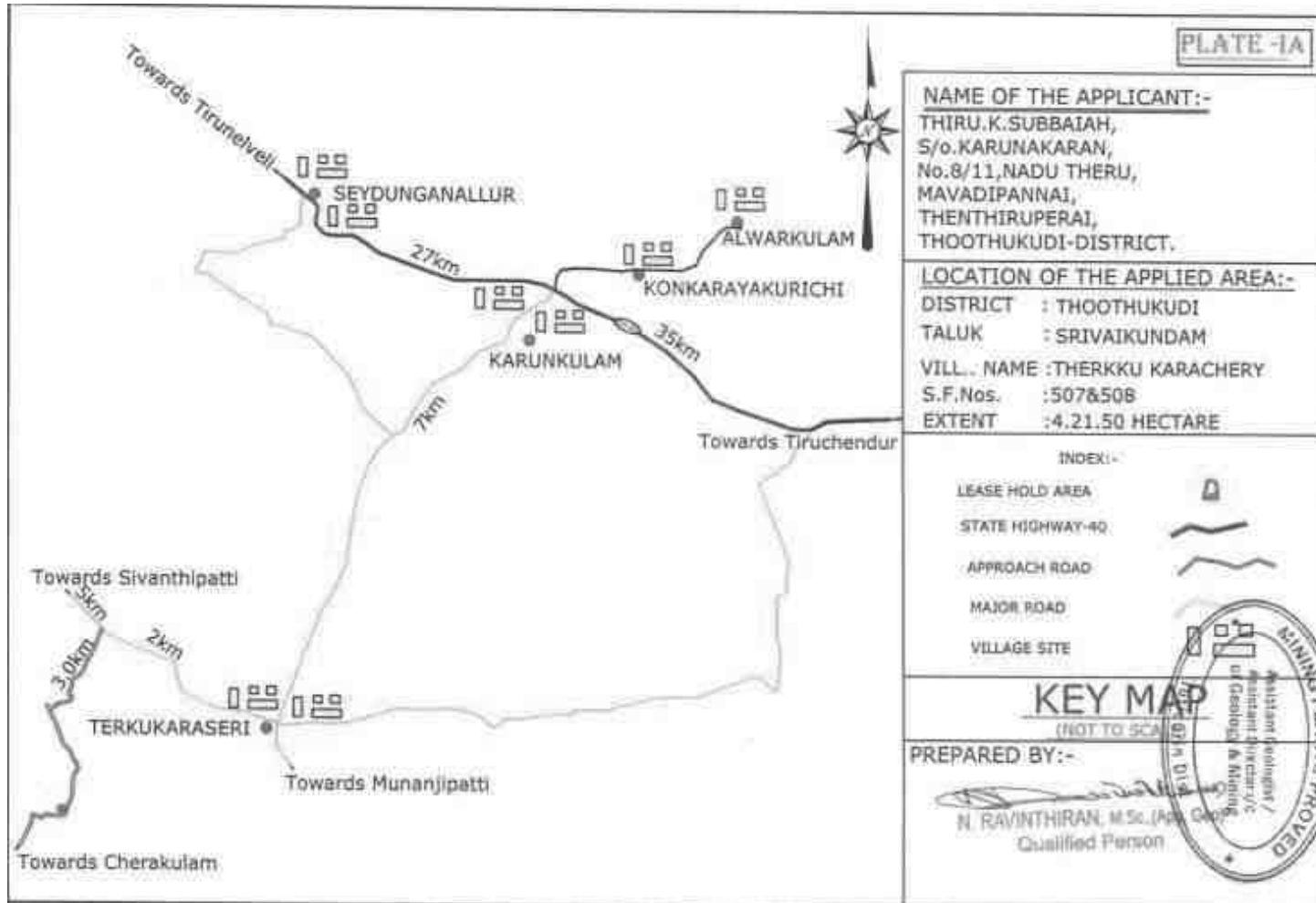


Figure 2.3 Key Map showing Connectivity of the project

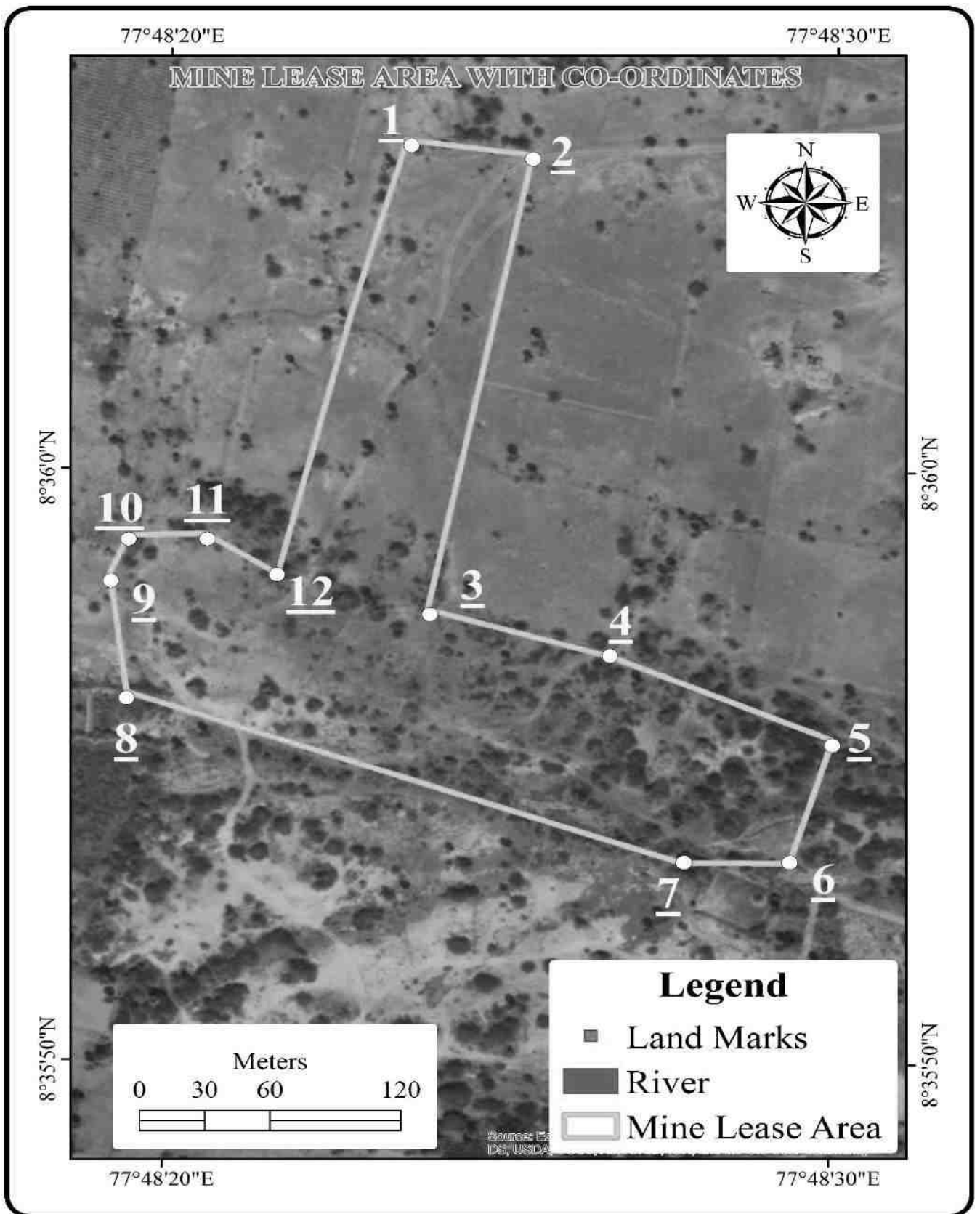


Figure 2.4 Google image showing Corner Coordinates of the project site

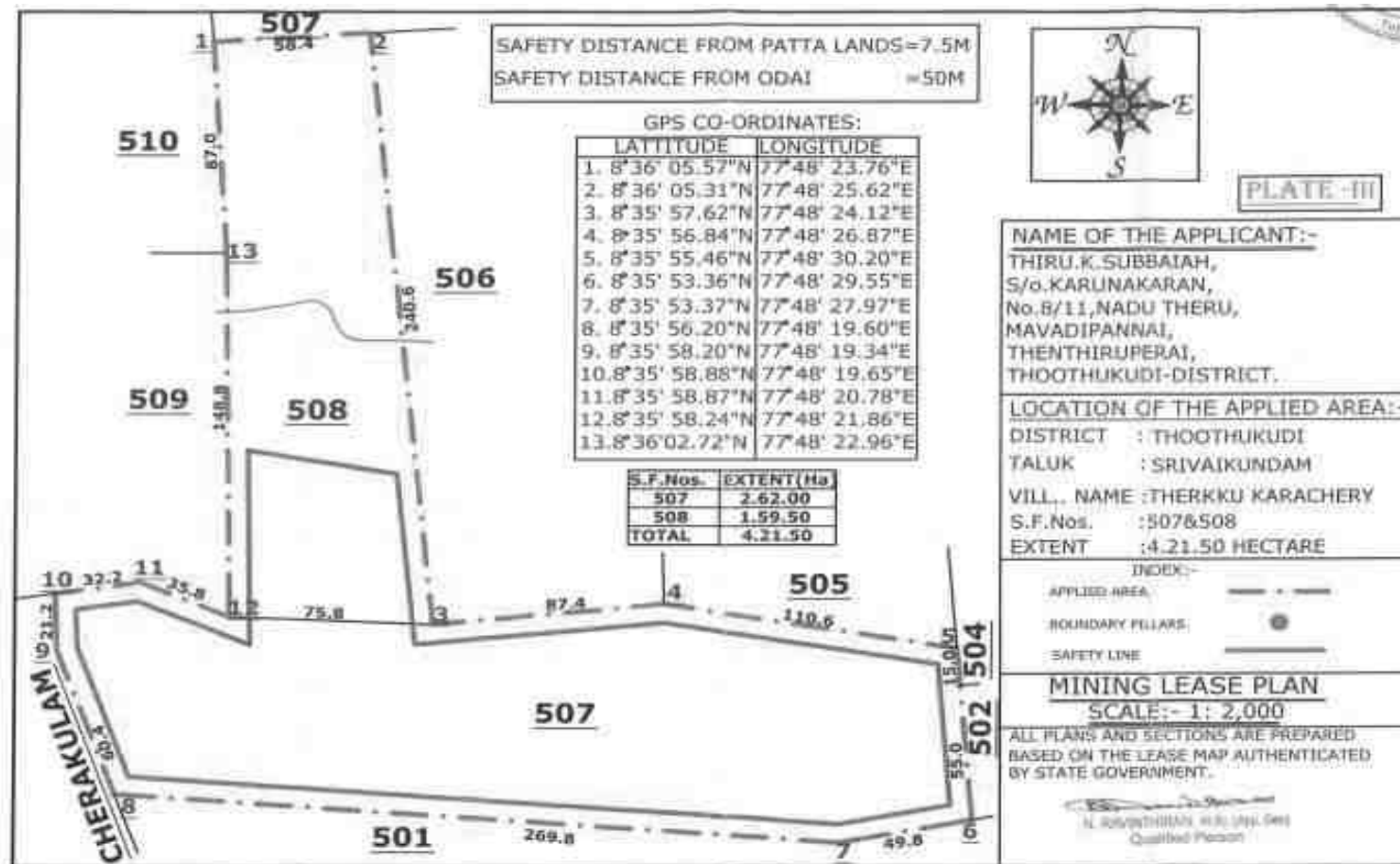


Figure 2.5 Lease Plan

Draft EIA EMP report of Proposed Rough stone and Gravel Quarry of Mr. K. Subbaiah at SF No 507 & 508 over a Extent of 4.21.5 Ha in Therkukarseri Village, Srivaikundam Taluk, Thoothukudi District, Tamil Nadu

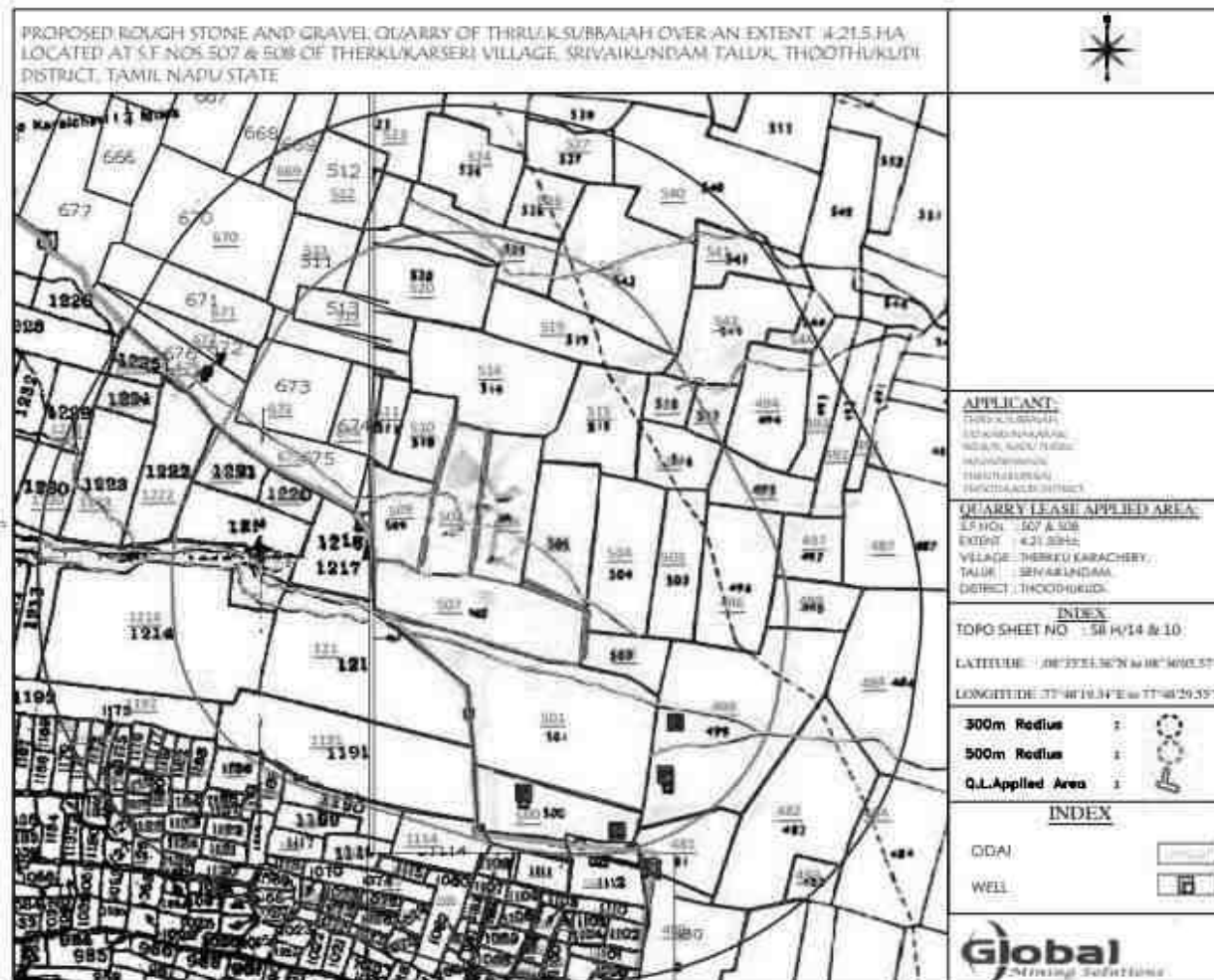


Figure 2.6 Village Map

Draft EIA EMP report of Proposed Rough stone and Gravel Quarry of Mr. K. Subbaiah at SF No 507 & 508 over a Extent of 4.21.5 Ha in Therkukarseri Village, Srivaikundam Taluk, Thoothukudi District, Tamil Nadu

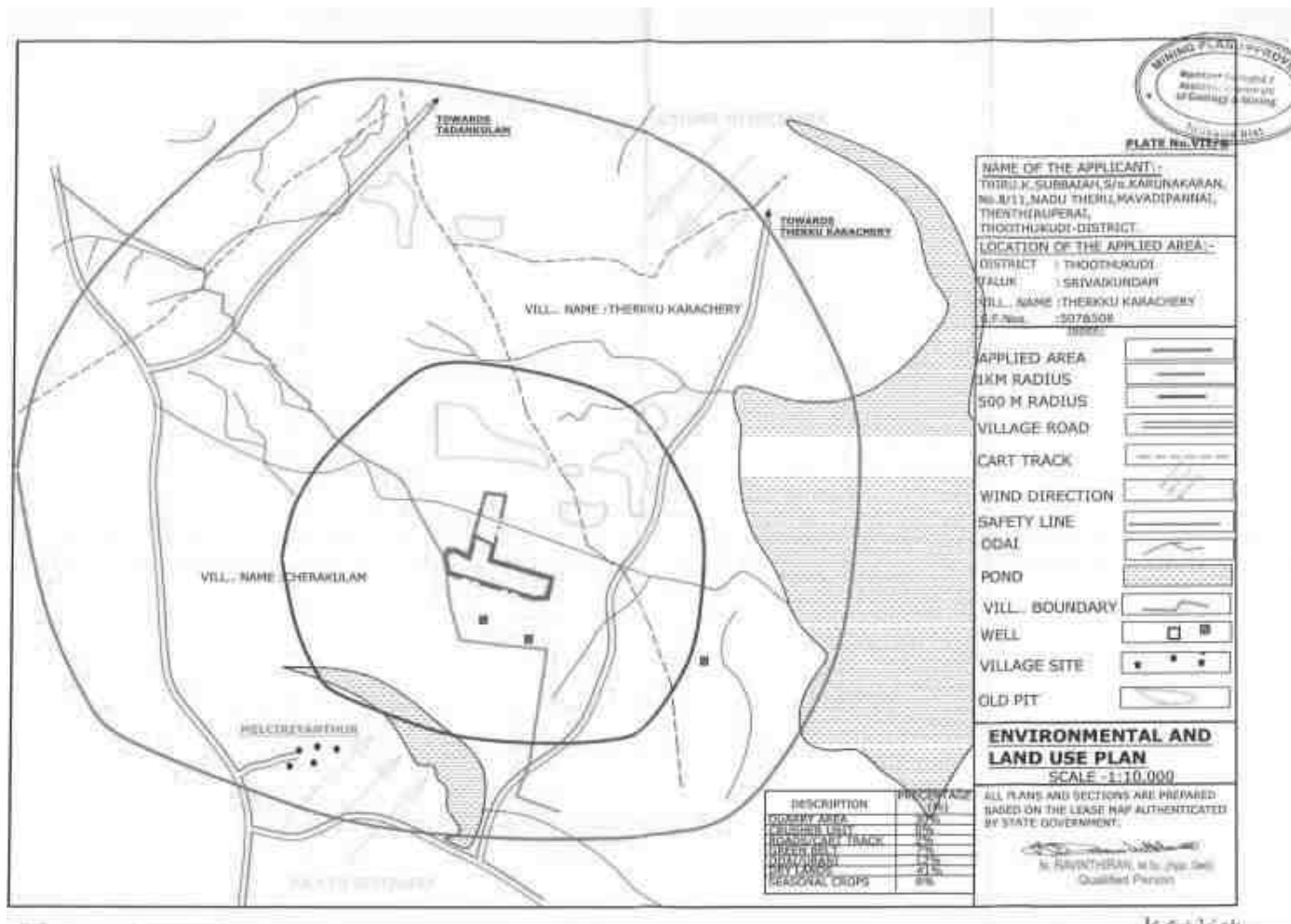


Figure 2.7 Surrounding Features of the project site

Draft EIA EMP report of Proposed Rough stone and Gravel Quarry of Mr. K. Subbaiah at SF No 507 & 508 over a Extent of 4.21.5 Ha in Therkukarseri Village, Srivaikundam Taluk, Thoothukudi District, Tamil Nadu

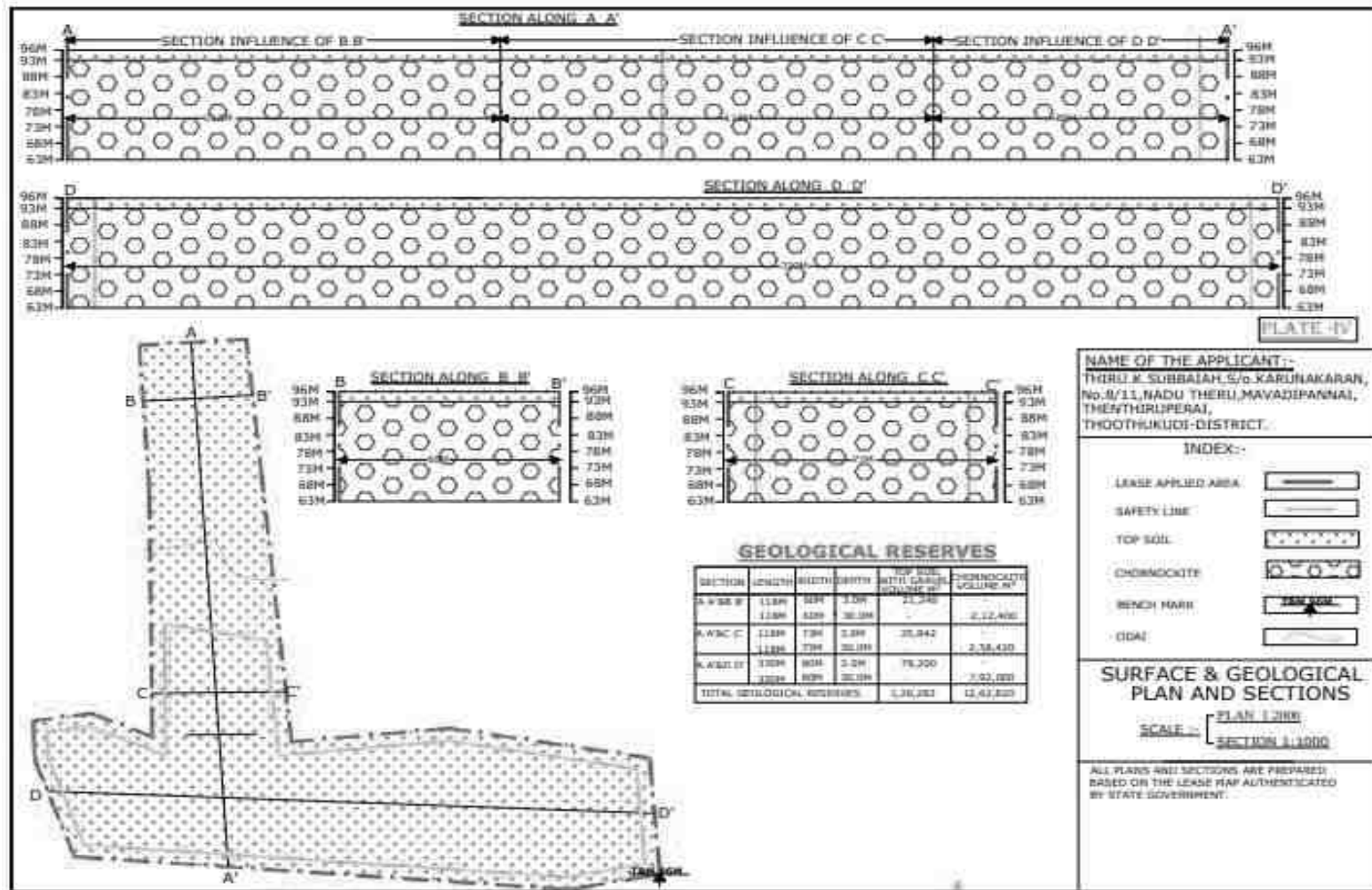


Figure 2.8 Surface Plan and Geological Plan

Draft EIA EMP report of Proposed Rough stone and Gravel Quarry of Mr. K. Subbaiah at SF No 507 & 508 over a Extent of 4.21.5 Ha in Therkukarseri Village, Srivaikundam Taluk, Thoothukudi District, Tamil Nadu

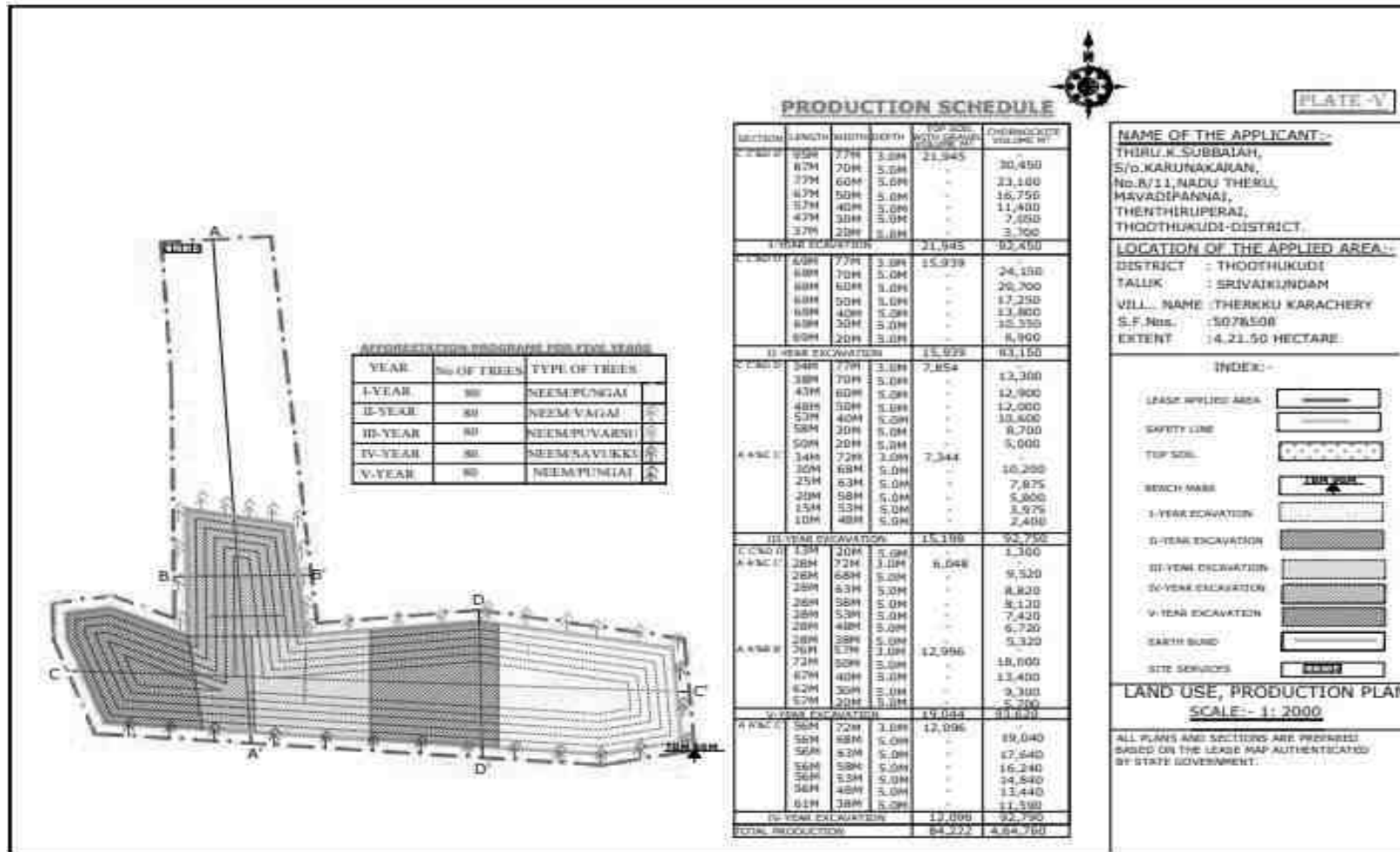


Figure 2.9 Production Plan

Draft EIA EMP report of Proposed Rough stone and Gravel Quarry of Mr. K. Subbaiah at SF No 507 & 508 over a Extent of 4.21.5 Ha in Therkukarseri Village, Srivaikundam Taluk, Thoothukudi District, Tamil Nadu

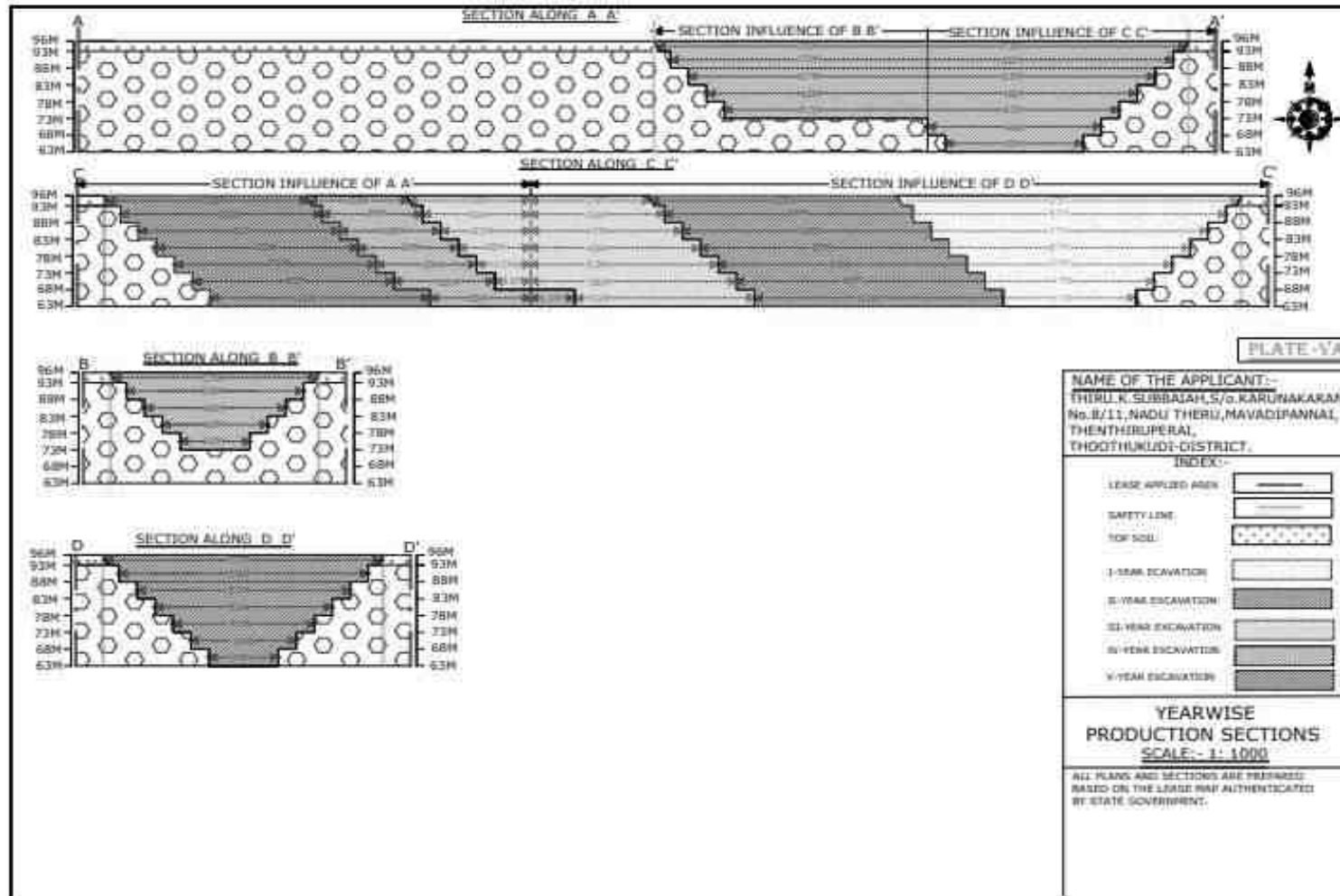


Figure 2.10 Production Plan Sections

Draft EIA EMP report of Proposed Rough stone and Gravel Quarry of Mr. K. Subbaiah at SF No 507 & 508 over a Extent of 4.21.5 Ha in Therkukarseri Village, Srivaikundam Taluk, Thoothukudi District, Tamil Nadu

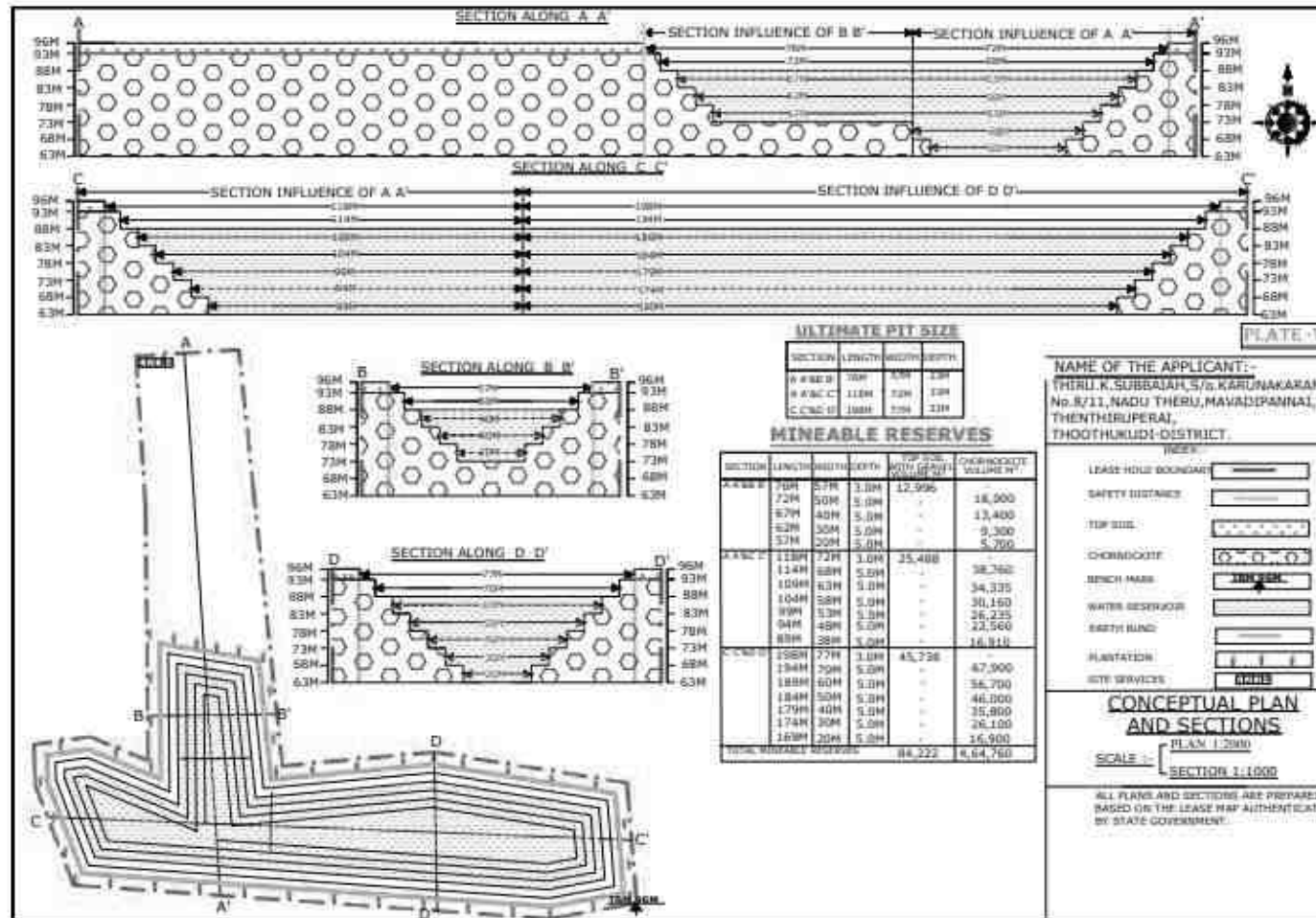


Figure 2.11 Conceptual Cross Sections

Draft EIA EMP report of Proposed Rough stone and Gravel Quarry of Mr. K. Subbaiah at SF No 507 & 508 over a Extent of 4.21.5 Ha in Therkukarseri Village, Srivaikundam Taluk, Thoothukudi District, Tamil Nadu

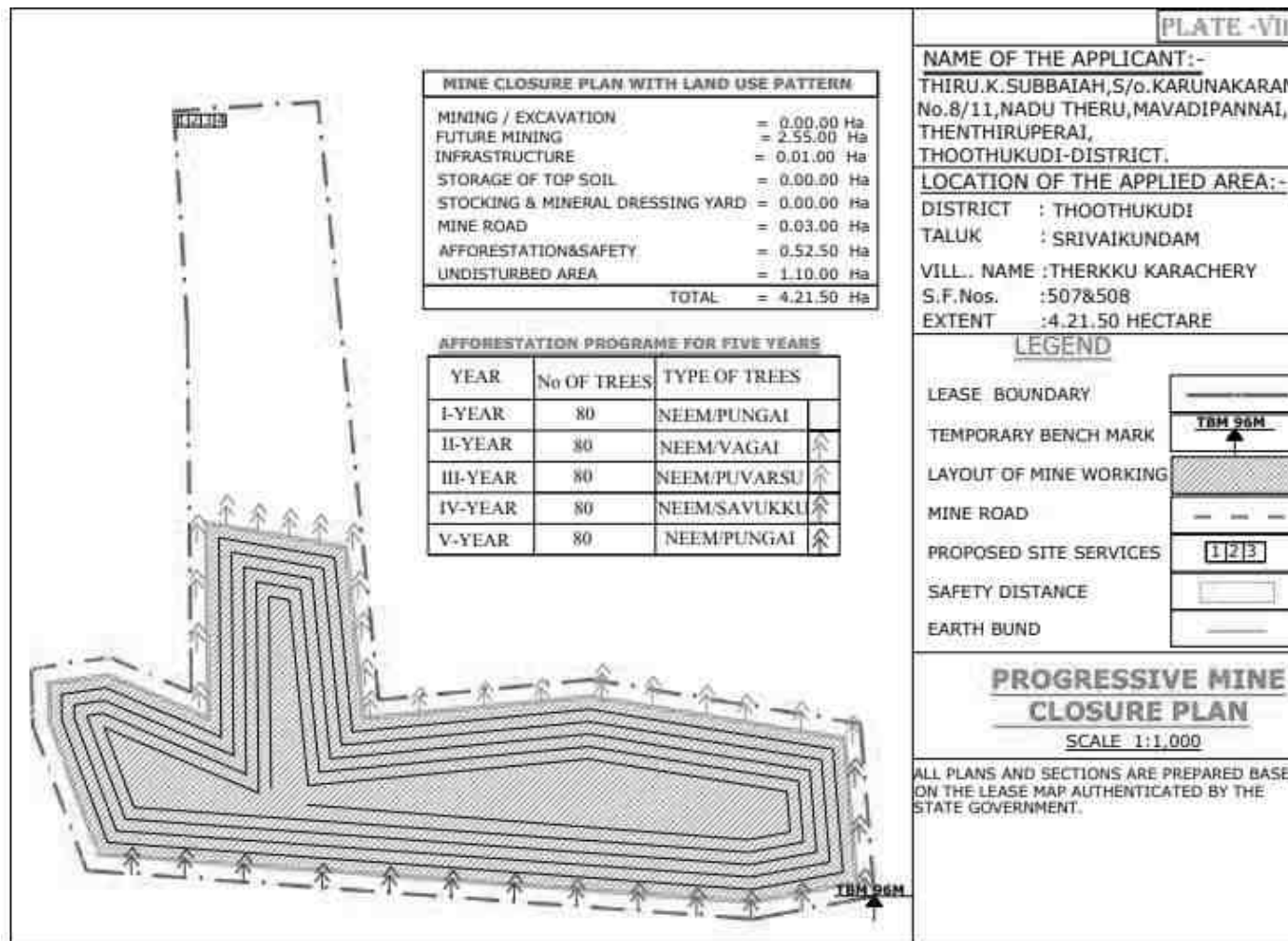


Figure 2.12 Conceptual Plan

3.0 DESCRIPTION OF THE ENVIRONMENT

3.1 INTRODUCTION

As a precursor for the prediction of various types of environmental impacts likely to arise due to implementation of the project, it is essential to establish the baseline environmental setting of the project. Details of the baseline environmental parameters are required for decision making for the project design, implementation and operation from the environmental point of views. The data is to be generated through primary data collection (direct monitoring) and secondary sources (published data).

This chapter describes the environmental baseline data of core zone and surrounding areas of the project. The environmental baseline data includes the physical environment (comprising climate & meteorology, air, water, Noise and land components), biological environment and socio-economic environment, which may get affected due to the this proposed project.

3.2 STUDY AREA

The study area has been divided into two zones, namely, core and buffer zones. Core zone is considered as the total lease area of mine lease, while buffer zone encompasses an area of 10 km radius distance from the periphery of core zone. This chapter incorporates the description of existing environmental status in an area encompassed within 10 km radius from the boundary of mine lease. The environmental data for the following Environmental components were collected in the study area:

- Micro-meteorological monitoring in one of the representative locations.
- Ambient air quality study comprising gaseous, particulate matter at 5 different locations.
- Water quality analysis in 5 different locations.
- Noise levels monitoring in 5 different locations
- Soil quality analysis in 3 locations.
- Flora & Fauna status.
- Land use & Land Cover.
- Hydrological study.
- Socio-economic survey.

3.3 STUDY PERIOD

The above-mentioned studies have been carried out systematically and meticulously as per relevant IS codes, CPCB, MoEF&CC guidelines during March to May 2023.

3.4 MONITORING LAB

The baseline information for air, water, noise, and soil was analysed by M/s. Swasti Enviro Solutions Pvt Ltd, # J-86, Bharathi Street, Pari Nagar, Jafferkhanpet, Ashok Nagar (Accredited by NABL as ISO/IEC/17025:2017) between March and May of 2023.

3.5 ENVIRONMENTAL SETTINGS OF THE PROJECT

The Environmental settings of the project covering 10km radius of study area is given in Table 3.1. The study area map is given in Figure- 3.1

Table 3.1 Environmental Settings of the Study Area – 10 km radius

S.NO	Particulars	Description
1.	Latitude & Longitude	8°35'53.36"N to 8°36' 05.57"N 77°48'19.34"E to 77°48'29.55"E.
2.	Site Elevation above MSL	38 m from MSL (96 m RL)
3.	Topography	Plain Terrain
4.	Land use of M.L. area	Barren Patta Land
5.	Extent of the Lease area	4.21.5 Ha.
6.	Nearest Highway	SH 40 – Tiruchendur – Palayamkottai road – 7.51 km, NE NH 44 – Srinagar- Kanyakumari Highway – 13.18 km, W
7.	Nearest Railway Station	Thathankulam Railway Station – 4.88 km, NE
8.	Nearest airport	Tuticorin Airport – 27.03 km, NE Trivandrum International Airport – 98.61 km
9.	Nearest Town / City	Town – Srivaikundam – 12.04 km, NE City – Srivaikundam – 12.04 km, NE District – Tirunelveli – 16.60 km, NW District Thoothukudi – 37.75 km, NE
10.	Water Bodies	Core Zone An Odai crossing within the project site in northern side, for which 50 m safety distance has been provided as per condition stipulated in the precise order.

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		Buffer Zone Thamirabarani River – 7.86 km, NE
11.	Hills / Valleys	NIL in 15 km radius
12.	Historical Places/Places of Tourist/ Archeological site	NIL in 15 km radius
13.	National Park/ Wildlife Sanctuaries/Biosphere Reserves/Tiger Reserves/Migratory Corridors; Migratory routes etc	Vallanadu Black Buck Sanctuary – ESZ – 10.25 km, NE Vallanadu Black Buck Sanctuary – 11.82 km, NE Koonthankulam Bird Sanctuary – 12.55 km, SW
14	Industrial Areas/Cluster (Reference MoEF & CC OM dated 13th Jan,2010	Yes, only one existing quarry of Thiru. K. Vijayakumar Rough Stone & Gravel Quarry is situated within 500 m radius, and there are no other proposed quarries within 500 m radius, except this quarry of Thiru. K. Subbaiah.
15	Seismic Zone	Zone II
16	Reserved/Protected Forest	Wolf Hill RF – 7.5 km, NNW Vallanadu R.F – 12.59 km, NE
17	Interstate boundary	NIL

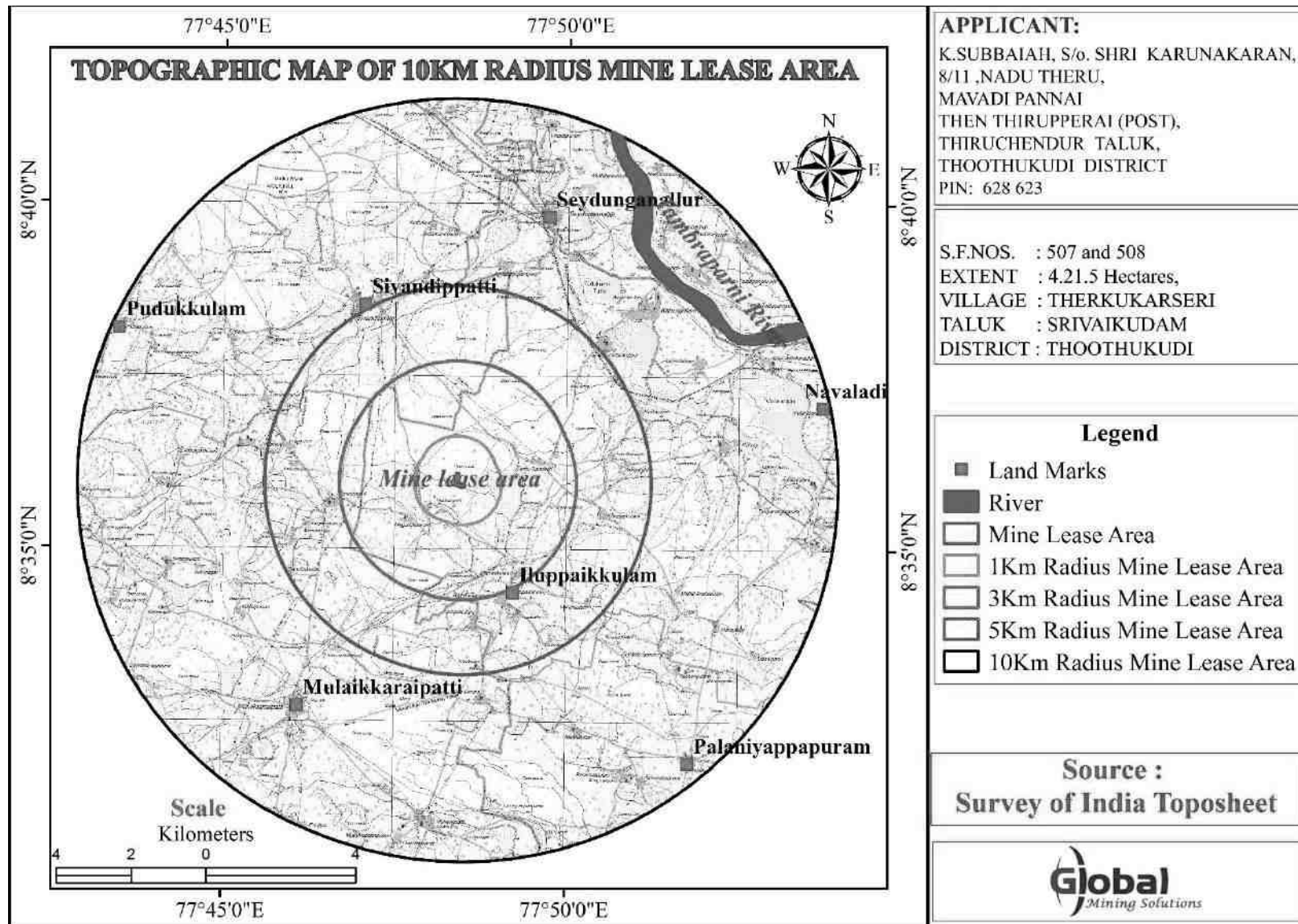


Figure 3.1 Topo map Showing Study Area

Draft EIA EMP report of Proposed Rough stone and Gravel Quarry of Mr. K. Subbaiah at SF No 507 & 508 over a Extent of 4.21.5 Ha in Therkukarseri Village, Srivaikundam Taluk, Thoothukudi District, Tamil Nadu

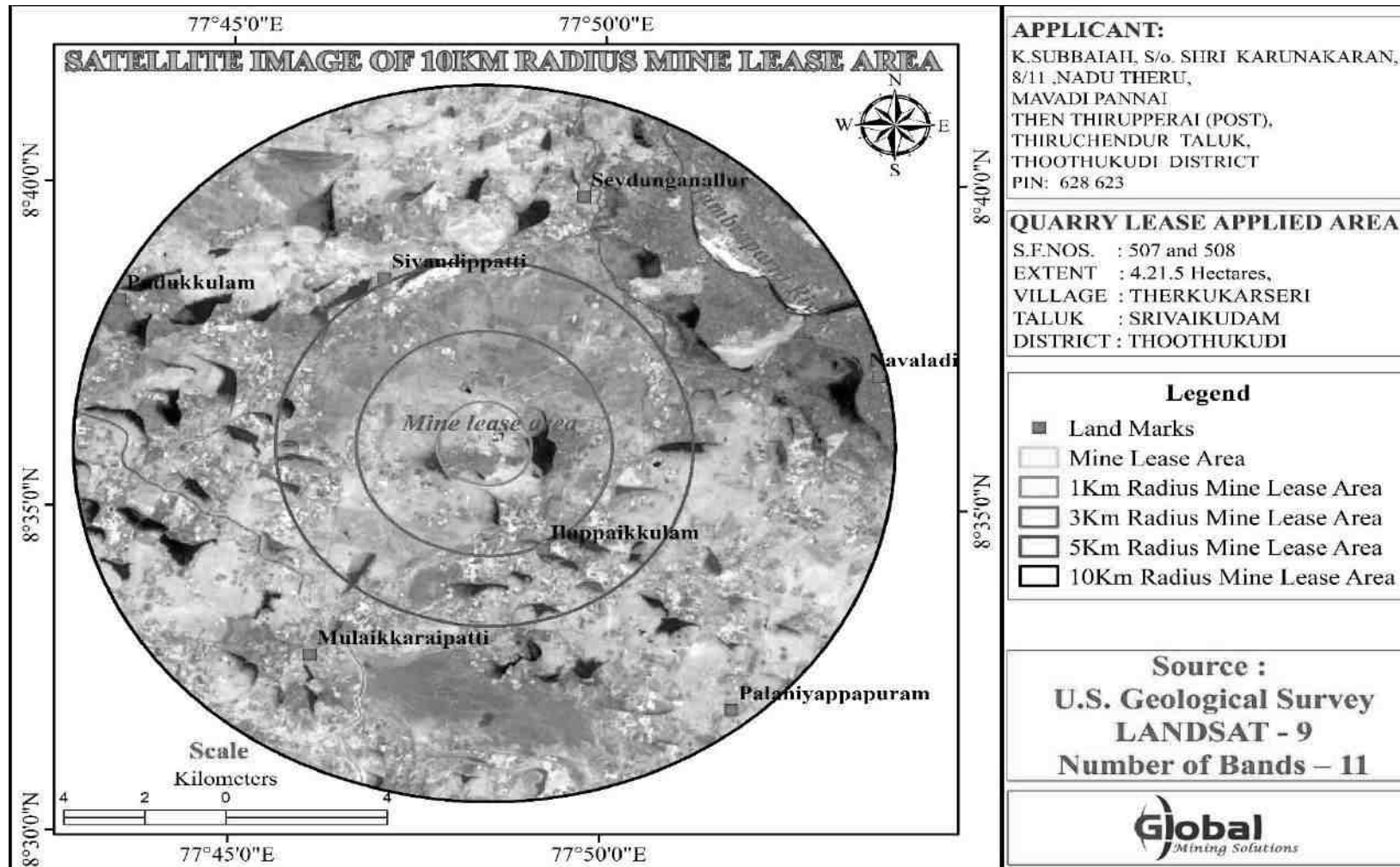


Figure 3.2 Satellite Image of the Study Area

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Figure 3.3 Satellite Image showing 500 m radius

3.6 EXISTING ENVIRONMENTAL SCENARIO

3.6.1 MICRO- METEOROLOGY

Meteorology is the key to understand the Air quality. The essential relationship between meteorological condition and atmospheric dispersion involves the wind in the broadest sense. Wind fluctuations over a very wide range of time, accomplish dispersion and strongly influence other processes associated with them.

3.6.1.1 CLIMATE AND RAINFALL DATA

Rainfall

The district receives the rain under the influence of both southwest and northeast monsoons. The northeast monsoon chiefly contributes to the rainfall in the district. Most of the precipitation occurs in the form of cyclonic storms caused due to

the depressions in Bay of Bengal. The southwest monsoon rainfall is highly erratic and summer rains are negligible. Rainfall data from seven stations over the period 2011- 2020 were utilized and a perusal of the data shows that the annual rainfall in the district during the above period varies from 800 mm to 900 mm.

Seismic Sensitivity

The proposed project site falls in the seismic Zone II, low damage risk zone as per BMTPC, Vulnerability Atlas of Seismic zone of India IS: 1893 – 2002.

Temperature

The district enjoys a hot tropical climate. The annual mean minimum and maximum temperature are 23°C and 34°C respectively. Summer High temperature of 41 °C also observed.

Table 3.2 Meteorological Data Recorded at Site

25	Parameters		March 23	April 23	May 23
1.	Temperature (°C)	Min	15	23	25
		Max.	34	39	39
		Avg	81	89	89
2.	Relative Humidity (%)	Avg	64	59	67
3.	Wind Speed (m/s)	Min	1	1	0
		Max	17	16	23
4.	Wind direction	Predominant	NNE	SE & SSW	W & SW

scientifically designed ambient air quality monitoring network considering the followings:

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

3.6.2.1 SAMPLING & ANALYTICAL TECHNIQUES

Table 3.3 Methodology for Air Quality Monitoring

Parameter	Method
PM2.5	Gravimetric Method Beta -attenuation Method
PM10	Gravimetric Method Beta -attenuation Method
SO2	IS-5182 Part II (Improved West & Gaeke method)
NOx	IS-5182 Part II (Jacob & Hochheiser modified method)

3.6.2.2 FREQUENCY AND PARAMETERS FOR SAMPLING

Ambient air quality monitoring has been carried out with a frequency of two samples per week at seven (5) locations, adopting a continuous 24 hourly (3 shift of 8-hour) schedule for the period March to May, 2023. The baseline data of ambient air has been generated for PM10, PM2.5, Sulphur Dioxide (SO2), Nitrogen Dioxide (NO2) and Carbon Monoxide Monitoring has been carried out as per the CPCB, MoEF guidelines and notifications.

It was ensured that the equipment was placed preferably at a height of at least 1.8 to 2.2 m above the ground level at each monitoring station, for negating the effects of wind-blown ground dust. The equipment was placed at open space free from trees and vegetation which otherwise act as a sink of pollutants resulting in lower levels in monitoring results.

3.6.2.3 AMBIENT AIR QUALITY MONITORING STATIONS

Five (5) monitoring stations were set up in the study area as depicted in Figure 3.3 for assessment of the existing ambient air quality. Details of the sampling locations are as per given below.

Table 3.4 – Ambient Air Quality Monitoring Locations

S.NO	Location Code	Monitoring Locations	Latitude & Longitude
1	A1	Mine Lease Area	8°35'56.84"N & 77°48'26.87"E
2	A2	Arasakulam	8°35'32.33"N & 77°50'31.61"E
3	A3	Therkukarseri	8°36'04.85"N & 77°49'09.55"E
4	A4	Siriyanthur	8°35'31.25"N & 77°48'05.95"E
5	A5	Cherakulam	8°34'41.89"N & 77°49'17.01"E

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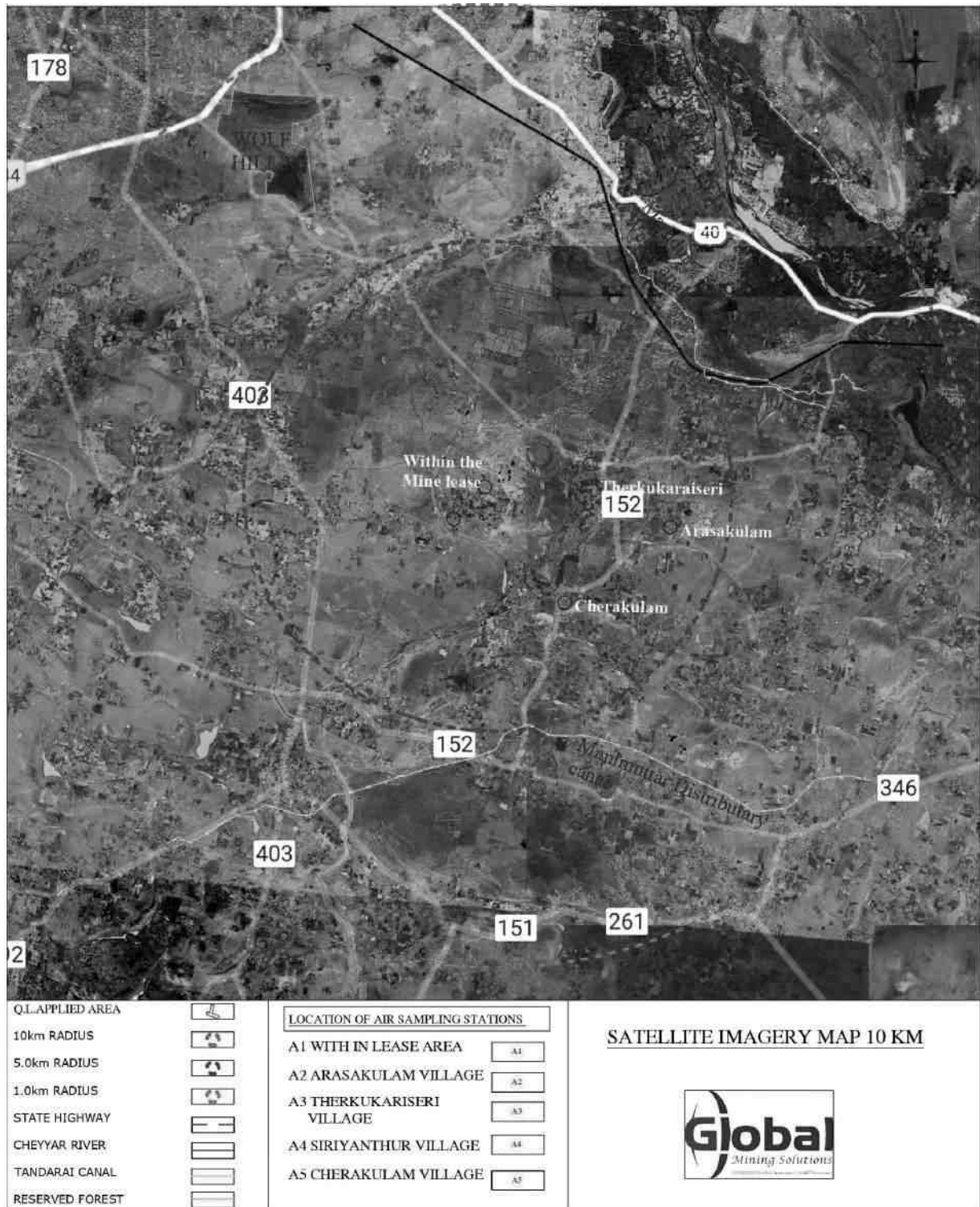


Figure 3.5 Ambient Air Quality Monitoring Locations

Table 3.5 Ambient Air Quality Data

S.NO	Parameters	Ambient Air Quality									All Value in $\mu\text{g}/\text{m}^3$		
		PM10			PM2.5			SO2			NO2		
	Locations	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max
1	A1-Mine Lease Area	34.9	42.66	50.6	17.4	20.96	25.5	3.2	3.55	3.9	5.7	7.37	9.1
2	A2-Arasakulam	39.4	49.16	55.7	17.5	23.28	26.5	3.1	3.6	4.2	6.7	8.4	10.4
3	A3-Therkukarseri	41.1	50.41	57.2	19.4	23.18	26.5	3.3	3.5	4.3	7.3	8.8	11.1
4	A4-Siriyanthur	42.7	52.72	61.4	19.8	24.46	28.9	3.1	3.8	4.6	7.3	9.2	12.5
5	A5-Cherakulam	48.3	54.62	64.9	19.5	26.03	26.9	3.4	4.1	4.9	7.5	9.7	13.3
	CPCB NAAQS 2009	100			60			80			80		

3.6.2.4 DISCUSSION

From the table it is seen that, in the ambient air, the PM10 values were in the range of 34.9 – 54.62 µg/m³. PM2.5 values were in the range of 17.4 – 28.9 µg/m³. SO₂ levels were ranging from 3.1– 4.1 µg/m³. NO₂ levels were ranging from 5.7 – 13.3 µg/m³. While comparing with the NAAQ Norms laid by MoEF, all monitored values of PM10, PM2.5, SO₂, NO₂ & CO were found to be well within the prescribed standards. The CO values in the all locations found to be below detectable limit (DL – 1144 µg/m³).

3.6.3 WATER ENVIRONMENT

The water resources, both surface and groundwater play a significant role in the development of the area. The purpose of this study is to assess the water quality characteristics for critical parameters and evaluate the impacts on agricultural productivity, domestic community usage, recreational resources and aesthetics in the vicinity. The water samples were collected and transported as per the standard guidelines issued by CPCB for analysis.

3.6.3.1 METHODOLOGY

Reconnaissance survey was undertaken and monitoring locations were selected based on:

- Location of the major water bodies
- Location of project site, their water intake and effluent disposal locations
- Likely areas that can represent baseline conditions
- The water samples were collected and were analyzed for physical, chemical, and biological characteristics as per guidelines issued by IS code No.10500/2012.

3.6.3.2 SAMPLING LOCATIONS

Two (2) surface water samples and Five (5) ground water samples were collected from the study area and were analysed for physio-chemical, heavy metals and bacteriological parameters in order to assess the effect of mining and other activities on ground water. The samples were analysed as per the procedures specified by CPCB, IS-10500:2012. The water sampling locations are given in Table 3.6 and shown as Figure 3.6.

Table 3.6 Water Sampling Locations

S.NO	Location Code	Monitoring Locations	Latitude & Longitude
Ground Water			
1	W1	Mine Lease Area	8°35'56.84"N & 77°48'26.87"E
2	W2	Arasakulam	8°35'32.33"N & 77°50'31.61"E
3	W3	Therkukarseri	8°36'04.85"N & 77°49'09.55"E
4	W4	Siriyanthur	8°35'31.25"N & 77°48'05.95"E
5	W5	Cherakulam	8°34'41.89"N & 77°49'17.01"E
Surface Water			
1	SW1	Thamirabarani River -Up stream	8°38'26.3"N & 77°52'29.57"E
2	SW2	Thamirabarani River -Down stream	8°38'14.69"N & 77°54'10.28"E

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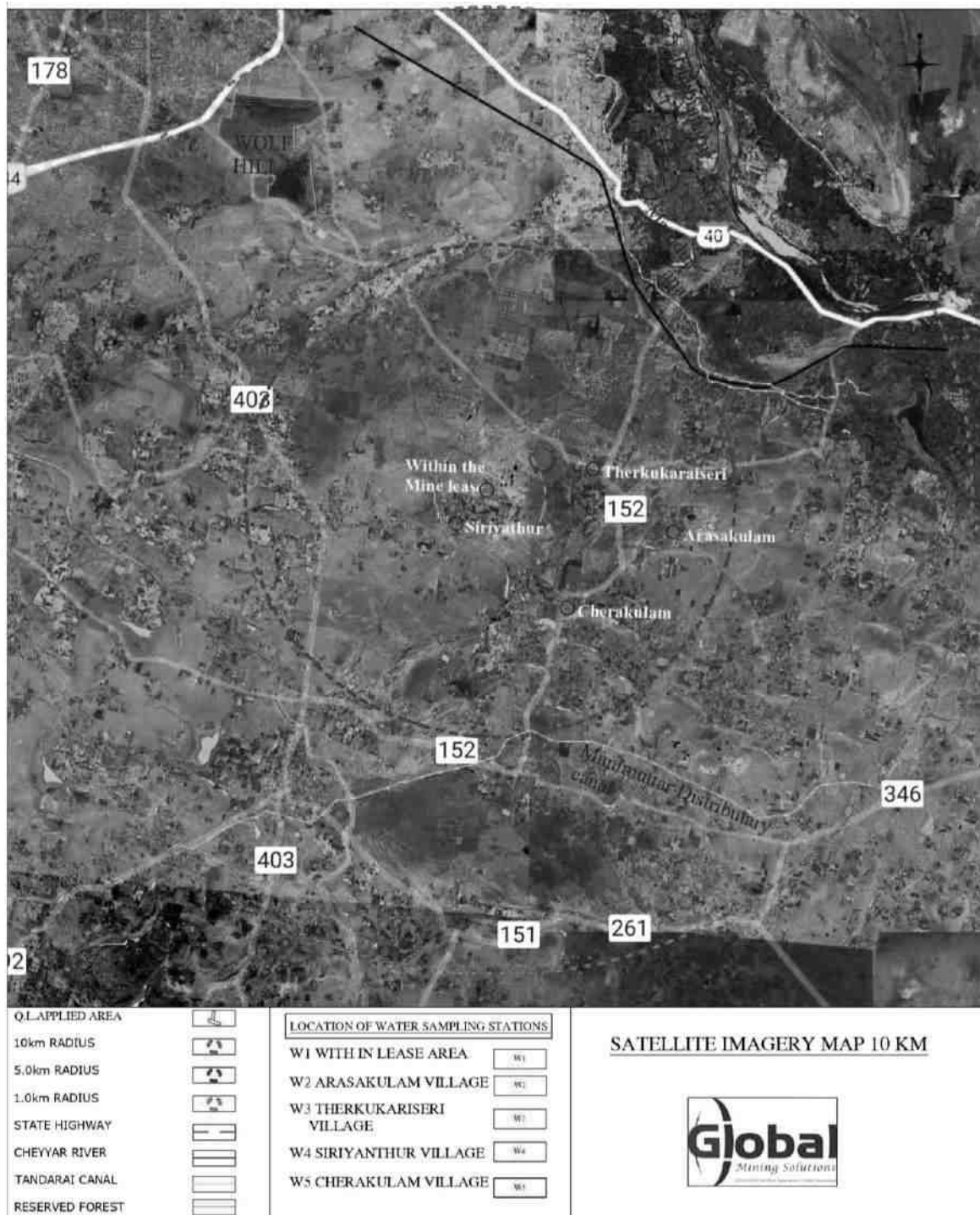


Figure 3.6 Water Sampling Locations

Table 3.7 Surface Water Analysis Results

S.NO	Parameter	Unit	SW1	SW2	DW Standards (IS 10500:2012) Acceptable Limit
1	Source	-	Thamirabarani River – upstream	Thamirabarani River – Downstream	-
2	Colour	Hazen	BDL (DL1)	BDL (DL1)	5
3	pH at 25°C	-	8.1	7.8	6.5 to 8.5
4	Turbidity	NTU	1.1	1.3	1
5	Total Suspended Solids	mg/l	85	56	-
6	Electrical Conductivity@25°C	µmhos/cm	142	210	-
7	Total Dissolved Solids	mg/l	90	120	500
8	Total Alkalinity as CaCO3	mg/l	20	17	200
9	Total Hardness as CaCO3	mg/l	30	27	200
10	Calcium as Ca	mg/l	8.0	5.0	75
11	Magnesium as Mg	mg/l	6.0	3.0	30
12	Chloride as Cl ⁻	mg/l	19	11	250
13	Sulphates as SO ₄ ²⁻	mg/l	7	4	200
14	Iron as Fe	mg/l	0.21	0.24	0.3
15	Nitrate as NO ₃	mg/l	3.3	1.4	45
16	Fluoride as F	mg/l	0.8	0.7	1
17	Manganese as Mn	mg/l	BDL (DL0.05)	BDL (DL0.05)	0.1

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Table 3.8 Ground Water Analysis Results

Parameter	Unit	W1	W2	W3	W4	W5	Standards as Per IS 10500: 2012	
							Acceptable Limits	Permissible Limits
Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
Turbidity	NTU	<1	<1	<1	<1.0	<1	1	5
pH at 25 °C	-	7.75	7.78	8.03	7.88	8.39	6.5- 8.5	No Relaxation
Electrical Conductivity		732	695	624.7	549.4	501.6	-	-
Total Dissolved Solids	mg /l	416	396	360	326	298	500	2000
Total hardness as CaCO ₃	mg /l	127	142	194	125	9.6	200	600
Calcium as Ca	mg /l	23.0	34.6	39.9	30.7	3.5	75	200
Magnesium as Mg	mg /l	16.6	13.4	22.6	11.5	BDL(DL-1.0)	30.0	100
Calcium as CaCO ₃	mg /l	57.6	86.4	99.8	76.8	8.6	-	-
Magnesium as CaCO ₃	mg /l	69.1	55.7	94.1	48.0	BDL(DL-1.0)	-	-
Total alkalinity as CaCO ₃	mg /l	105	188	239	194	285	200	600
Chloride as Cl ⁻	mg /l	96.9	155	106	48.9	21.0	250	1000
Free Residual chlorine as Cl ⁻	mg /l	BDL(D.L-0.2)	BDL(D.L-0.2)	BDL (D.L - 0.2)	BDL(D.L-0.2)	BDL(D.L-0.2)	0.2	1
Sulphates as SO ₄ ²⁻	mg /l	39.6	81.5	31.1	28.8	18.1	200	400
Iron as Fe	mg /l	0.05	0.05	0.11	0.12	0.09	0.3	No Relaxation
Nitrate as NO ₃	mg /l	4.43	BDL(DL-1.0)	8.12	2.85	1.69	45	No Relaxation
Fluoride as F	mg /l	0.29	0.39	0.48	0.55	0.75	1	1.5
Manganese as Mn	mg /l	BDL(D.L-0.05)	BDL(D.L-0.05)	BDL (D.L - 0.05)	BDL(D.L-0.05)	BDL(D.L-0.05)	0.1	0.3

3.6.3.3 DISCUSSION

Surface Water

The pH varied from 7.8 to 8.1 while turbidity found within the standards (Optimal pH range for sustainable aquatic life is 6.5 to 8.5 pH). Total Dissolved Solids varied from 90 to 120 mg/l. Chloride varied between 11 mg/l and 19 mg/l. Nitrates varied from 1.4 to 3.3 mg/l, while sulphates varied from 4 to 7 mg/l.

Ground Water

Suitability of ground water for drinking/irrigation/industrial purposes is determined keeping in view the effects of various chemical constituents present in water as required human use, plant use. Though many ions are very essential for the growth of plants and human body but when present in excess, have an adverse effect on health and growth.

As Per the data it has been observed that the pH value varies from 7.7- 8.3, Chlorides Ranges From 21-155 mg/l, Sulphates value found to be between 18.1-81.5 mg/l, Fluoride Ranges low in lease area i.e. 0.29 – 0.75, Hardness varies from 9.6-194 mg/l, and Total dissolved solid 298-416 mg/l. The ground water has been analyzed as per IS10500: 2012 and found to be suitable for drinking purpose. So the results of chemical and bacteriological analysis of water samples are classified under good class for drinking purpose with respect to total dissolved solids. Total hardness of the samples ranged from soft to moderately hard waters and can be fairly used for drinking. Regular ground water monitoring is suggested as the quality of ground water may fluctuate with groundwater consumption and seasonal variations.

3.6.4 NOISE ENVIRONMENT

The vehicular movement on road and mining activities is the major sources of noise in study area, the environmental assessment of noise from the mining activity and vehicular traffic can be undertaken by taking into consideration various factors like potential damage to hearing, physiological responses, and annoyance and general community responses.

3.6.4.1 SAMPLING LOCATIONS

In order to assess the ambient noise levels within the study area, noise monitoring was carried out at five (5) locations. The noise level of monitoring locations were carried out by covering 10 km radius of the project area. A noise monitoring methodology was chosen such that it best suited the purpose and objectives of the study. The noise monitoring locations are given in Figure 3.5 and in below table.

Table 3.9 Noise Monitoring Locations

S.NO	Location Code	Monitoring Locations	Latitude & Longitude
1	N1	Mine Lease Area	8°35'56.84"N & 77°48'26.87"E
2	N2	Arasakulam	8°35'32.33"N & 77°50'31.61"E
3	N3	Therkukarseri	8°36'04.85"N & 77°49'09.55"E
4	N4	Siriyanthur	8°35'31.25"N & 77°48'05.95"E
5	N5	Cherakulam	8°34'41.89"N & 77°49'17.01"E

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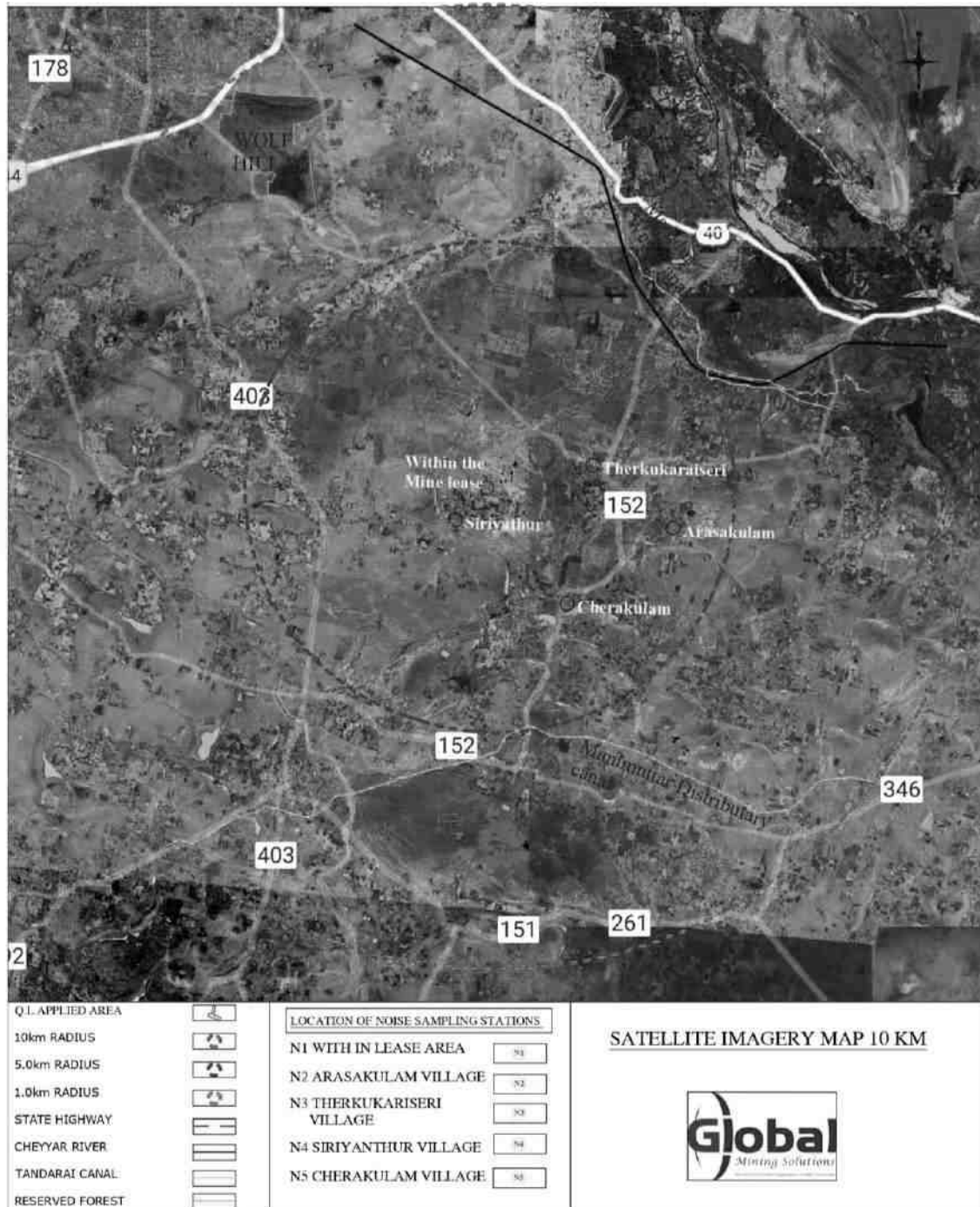


Figure 3.7 Noise Monitoring Location

3.6.4.2 METHOD OF MONITORING

Noise levels were measured using sound level meter manufactured by (Model No - SL4001, Make - Lutron). Sound Pressure Level (SPL) measurements were measured at all locations where ambient air quality monitored; one reading for every hour was taken for 24 hours.

3.6.4.3 NOISE MONITORING RESULT

An analysis of the different Leq data obtained during the study period has been made. Variation was noted during the day-time as well as night-time. The results are presented in below Table 3.10.

Table 3.10 Noise Monitoring Result

Monitoring Location	N1	N2	N3	N4	N5
DAY EQUIVALENT	46.3	49.0	48.3	49.2	50.6
NIGHT EQUIVALENT	40.2	37.3	41.6	43.1	39.0
DAY & NIGHT EQUIVALENT	45.1	47.4	47.0	48.0	48.9
Limits as per MoEF&CC					
Day equivalent - 55 dB (A); Night equivalent - 45 dB (A); Work zone Exposure in 8 hr - 90 dB (A)					

3.6.4.4 DISCUSSION

From the table it is observed that the day Equivalent Noise (Leq-d) level were ranging from 46.3 to 49.2 dB(A) and Night Equivalent Noise (Leq-n) level were ranging from 37.3 to 43.1 dB(A). Day and Night Equivalent Noise (Leq-n) level were ranging from 45.1 to 48.9 dB(A). While comparing with the MoEF Norm of 55 dB(A) for day time and 45 dB(A) for night time in Residential areas, the monitored ambient noise levels are within the limit values.

After commencement of mine operation the anticipated noise level will be 52 dB – 65 dB in the N1 location. (Project Site). It is very negligible and within the prescribed standards of MoEF & CC and DGMS.

3.6.5 SOIL ENVIRONMENT

Soil quality of the study area is one of the important components of the land environment. The composite soil samples were collected from the study area and analyzed for different parameters. The locations of the monitoring sites are detailed in Table 3.11 and Figure 3.9. soil type of the study area are detailed below.

Sl.No.	Soil Type	Area in Sq.km
1	Brown Soil	279.18
2	Black Soil	45.89

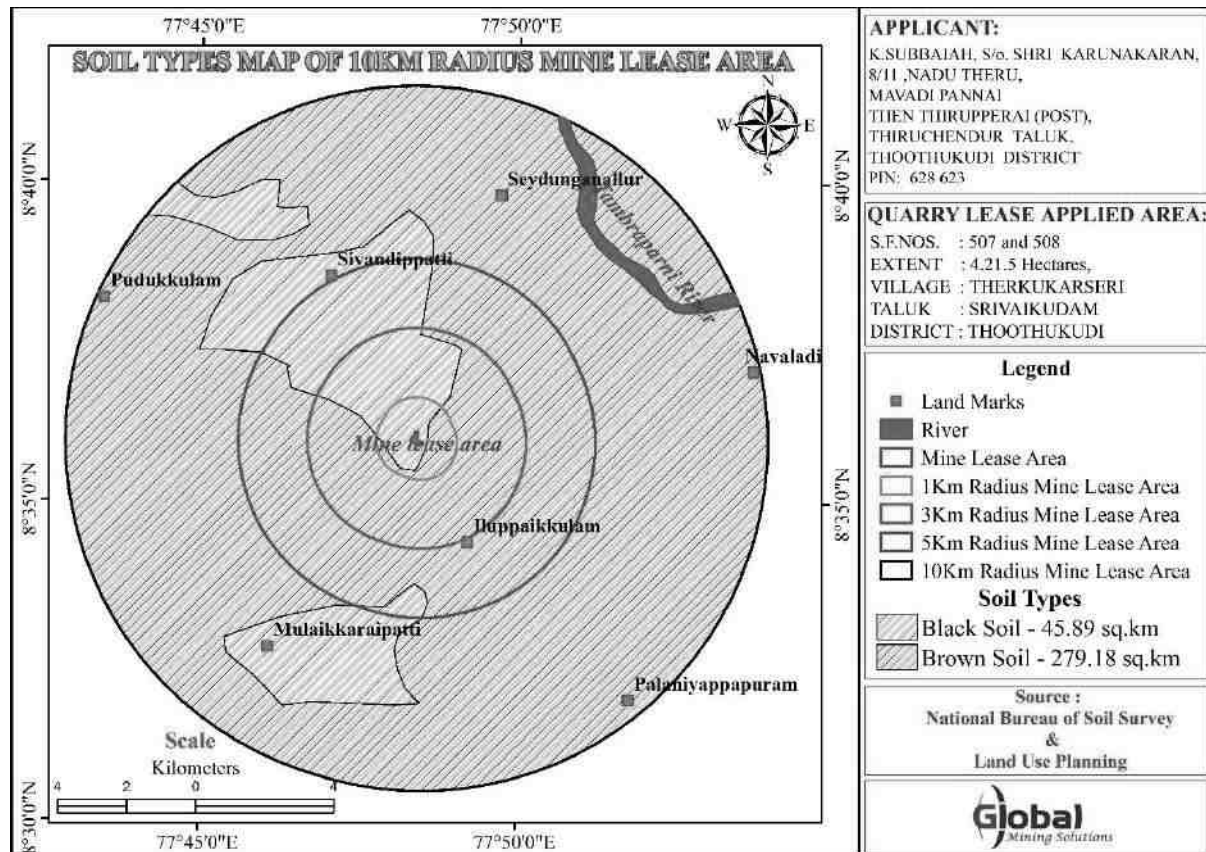


Figure 3.8 Soil Map of the Study Area

3.6.5.1 MONITORING LOCATIONS

Soil samples were collected from 3 locations to assess the soil quality in and around the mines. Soil samples collected using sampling augers and field capacity apparatus.

Table – 11 Soil Sampling Locations

S.No	Location Code	Monitoring Locations	Latitude & Longitude
1	S1	Mine lease area	8°35'56.84"N & 77°48'26.87"E
2	S2	Arasakulam	8°35'32.33"N & 77°50'31.61"E
3	S3	Terkukarseri	8°36'04.85"N & 77°49'09.55"E

3.6.5.2 METHODOLOGY

For studying soil quality, sampling locations were selected to assess the existing soil conditions in and around the project site representing various land use conditions. The samples were collected by auger boring into the soil up to 90-cm depth. Three locations were selected for soil sampling on the basis of soil types, vegetative cover, industrial & residential activities including infrastructure facilities, which would accord an overall idea of the soil characteristics.

Composite grab samples of the topsoil were collected by specified depth, and mixed to provide a representative sample for analysis. They were stored in airtight Polythene bags and analyzed at the laboratory.

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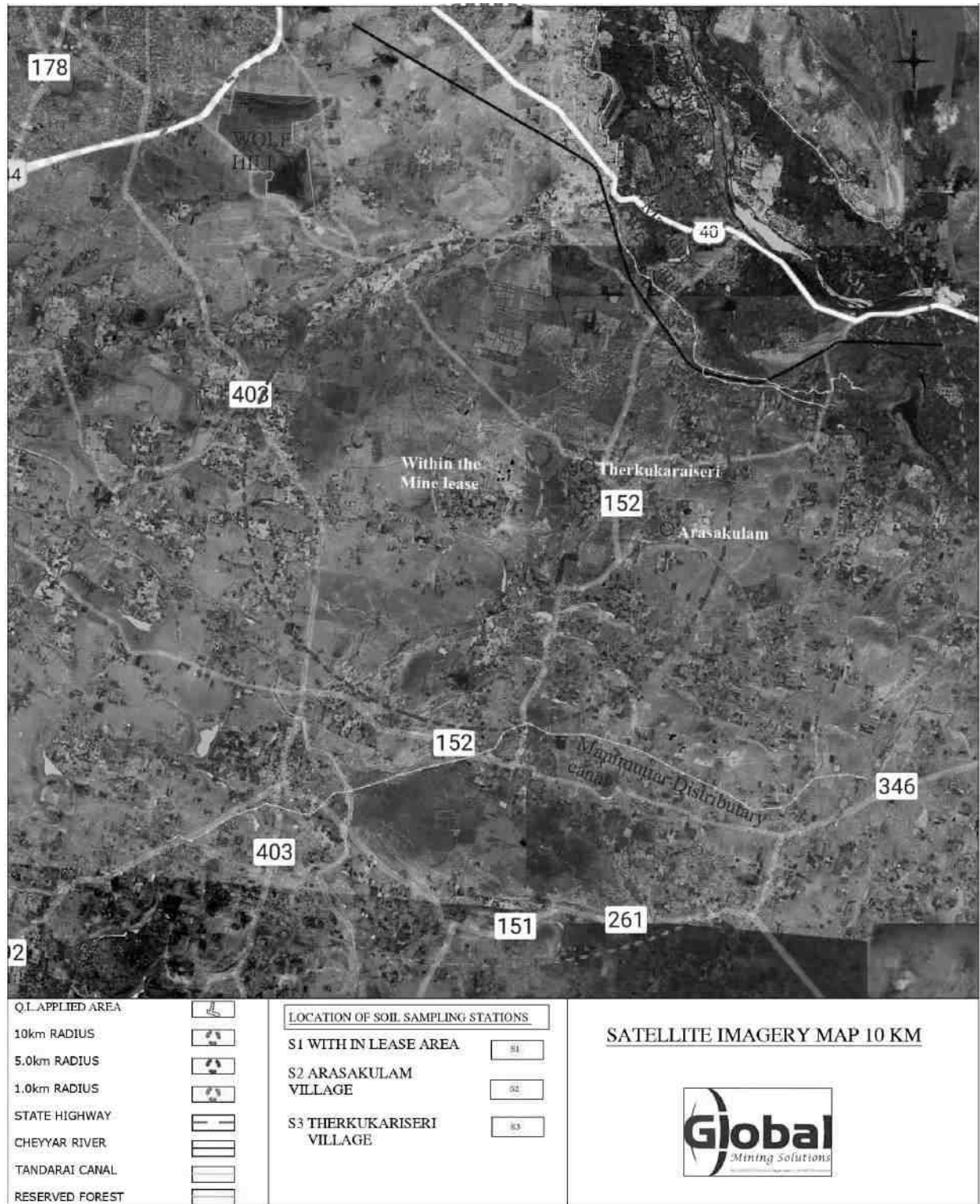


Figure 3.9 Soil Sampling Stations

3.6.5.3 SOIL TESTING RESULT

Results of the soil samples show that the pH values were found to be 7.35 to 7.89 and Electrical Conductivity values were ranging between 111.0 – 145 µmhos/cm. Soils are generally Silt Loam. Organic matter values were ranging between 0.87 – 2.55 %. Total Nitrogen values were ranging between 231- 751mg/kg. Phosphorus values were ranging between 0.57 – 3.26 µg/g. Potassium values were ranging between 596 – 766 mg/kg. Sodium values were ranging between 121 – 199 mg/kg. Total Sulphur values were observed to be BDL. The soil quality data for the 3 samples collected and analyzed are provided in Table no – 3.12.

Table 3.12 Soil Testing Result

S.NO	Parameter	Unit	S1	S2	S3
1	PH at 25°C	-	7.89	7.35	7.61
2	Electrical Conductivity	(µmhos/cm)	145	181.6	111.0
3	DRY MATTER	%	99.44	90.20	84.47
4	WATER CONTENT	%	0.56	9.80	15.53
5	ORGANIC MATTER	%	1.17	2.55	0.87
6	SOIL TEXTURE	-	SILT LOAM	SILT LOAM	SILT LOAM
7	SAND%	%	36.14	39.45	28.68
8	SILT%	%	54.16	55.31	65.58
9	CLAY%	%	9.70	5.24	5.75
10	PHOSPHORUS	µg/g	3.26	1.34	0.57
11	SODIUM	mg/kg	149	199	121
12	POTASSIUM	mg/kg	596	766	635
13	KJELDHAL NITROGEN	mg/kg	313	751	231
14	SULPHUR	%	BDL(D.L - 0.02)	BDL(D.L - 0.02)	BDL(D.L - 0.02)

3.6.6 LAND ENVIRONMENT

The main objective of this section is to provide a baseline status of the study area covering 10km radius around the project periphery; so that temporal changes due to the mining activities on the surroundings can be assessed in future.

Land use Pattern of the Project Area

The present and the post mining land use pattern is shown below.

Table 3.13 Land use pattern of the project site

Description	Present Area in Ha.	Area at the end of life of Quarry in Ha.
Quarrying pit	NIL	2.55.0
Infrastructure	NIL	0.01.0
Roads	NIL	0.03.0
Greenbelt	NIL	0.52.5
Unutilized	4.21.5	1.10.0
Total	4.21.5	4.21.5

- At the end of life of mine, the excavated mine pit / void of 2.55.0 Ha. will act as a water harvesting pit and collected water will be used for plantation and dust suppression during dry season.
- A greenbelt of 0.52.5 hectares will be developed along the safety barrier.
- Remaining 1.11 ha. of land will be covered with vegetation.

3.6.6.1 LAND USE PATTERN OF THE STUDY AREA

A visual interpretation technique has been adopted for land use classification based on the keys suggested in the chapter – V of the guidelines issued by NNRMS Bangalore & Level III classification with 1:50,000 scale for the preparation of land use mapping. Land use pattern of the area was studied through LISS III imagery of Bhuvan (ISRO). The 10 km radius map of study area was taken for analysis of Land use cover. The land use map of the study area is given in Figure 3.10.

Table 3.14 Land use pattern of the Study area of 10 km radius

Sl.No.	LULC_CLASS	Area in Sq.km	Percentage (%)
1	Crop Land	12.61	3.879
2	Built-up Land	10.53	3.239
3	Canal	0.01	0.003
4	Plantations	73.56	22.628
5	Fallow Land	6.13	1.887
6	Hill and Forest	2.67	0.822
7	Land with scrub	34.69	10.671
8	Land without scrub	147.48	45.370
9	Mining process	2.98	0.917
10	River	2.86	2.862
11	Tanks	31.54	9.703
Total		325.06	100

Source : Survey of India Toposheet and Landsat Satellite Imagery

From above table it is inferred that the majority of the land in the study area is Scrub land followed by Plantation.

AGRICULTURE

The northern part (above 5km from lease boundary) especially near Tambraparani river is fertile land. Land use study using satellite imagery shows that the crop land cover about 3.87 % and Plantation cover about 22.62 %.

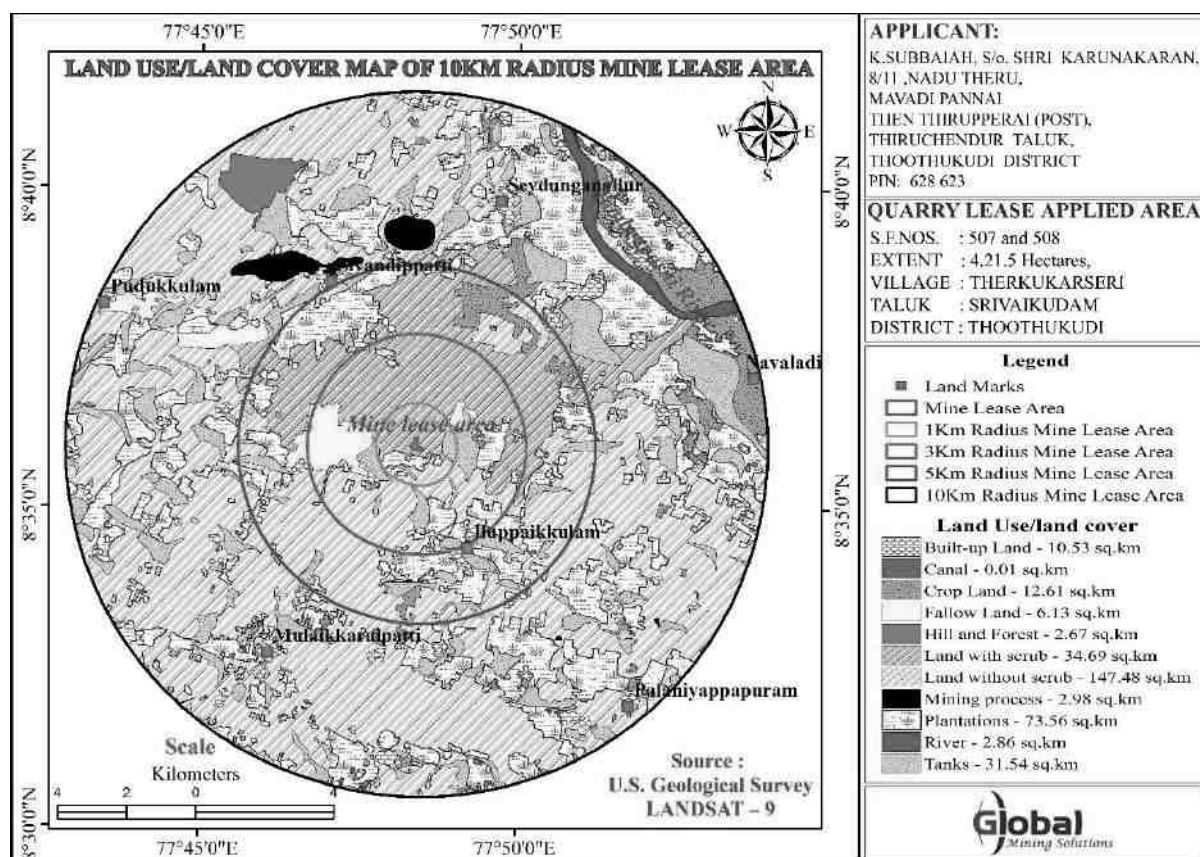


Figure 3.10 Land use map of the study area

3.6.7 BIOLOGICAL ENVIRONMENT

Study of the biological environment of any area comprises of well-planned ecological survey for the floristic and faunal composition of the areas through various scientifically planned techniques. Accordingly, the ecological survey for the proposed Rough stone and gravel quarry area including core and buffer zone were carried out to identify various species occurring in the area.

3.6.7.1 FLORA

An ecological survey of the study area was conducted with reference to listing of species and assessment of the existing baseline ecological (Terrestrial and Aquatic Ecosystems) conditions. The objective of the survey is as follows:

- Generate existing data from field observations of various terrestrial floristic occurrences.

- Collect secondary data from Government records as well as through discussion with Forest officials, knowledgeable public etc.,
- Compare the data with authentic past records to identify changes, if any.
- Identify the impact of project operations on the biological aspects.

To accomplish the above objectives, a general ecological survey covering an area of 10 km radius was conducted. The locations were identified for phyto-sociological aspects to assess the current status.

3.6.7.2 FLORISTIC COMPOSITION IN CORE ZONE

The lease area is a non- forest, private land with scrub and thorny bushes. In the core zone, there are no trees.

3.6.7.3 FLORISTIC SCENARIO IN BUFFER ZONE AREA

The present report gives the review of published secondary data and the results of field sampling conducted during March to May 2023 and there are no forest blocks in study area. The detailed ecological assessment of the study area has been carried out and are presented in below Table.

Table 3.15 List of Flora

S.NO	Botanical Name	Family Name	Local Name
Trees			
1	<i>Casuarina equisetifolia L.</i>	Casuarinaceae	Savukku
2	<i>Albizia amara</i>	Fabaceae	Unja
3	<i>Acacia latronum</i>	Fabaceae	Velikaruvai
4	<i>Azadirachta indica (L.) Adr. Juss</i>	Meliaceae	Vembu
5	<i>Acacia planifrons</i>	Fabaceae	Karuvelan
6	<i>Acacia nilotica (L.) Wild. Ex. Delile</i>	Fabaceae	Karuvelan
7	<i>Albizzia odoratissima (L.) Benth</i>	Fabaceae	Vaagai
8	<i>Acras sapota L.</i>	Sapotaceae	Sapota
9	<i>Bougainvillea spectabilis Comm.ex Juss</i>	Nyctaginaceae	Kaagitha poo
10	<i>Citrus melenoxylon L.</i>	Rutaceae	Lemon
11	<i>Borassus flabellifer L.</i>	Arecaceae	Panai maram
12	<i>Areca catechu L.</i>	Arecaceae	Pakku maram
13	<i>Albizia lebek L.</i>	Fabaceae	Vaagai
14	<i>Tamarindus indicus L.</i>	Fabaceae	Puli

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15	<i>Terminalia bellerica Ruxb.</i>	Combretaceae	Tanri
16	<i>Polyalthia longifolia Sonn.</i>	Annonaceae	Nettilingam
17	<i>Peltophorum pterocarpum (DC.) K. Heyne</i>	Fabaceae	Copper pod
18	<i>Annona squamosa L.</i>	Annonaceae	Sithapalzhm
19	<i>Artocarpus integrifolia Lam.</i>	Moraceae	Pala maram
20	<i>Cocos nucifera L.</i>	Arecaceae	Thennai
21	<i>Murriya koengii (L.) Sprengel.</i>	Rutaceae	Kariveppilai
22	<i>Dichrostachys cinereal</i>	Fabaceae	Anaitter
23	<i>Dalbergia multiflora</i>	Fabaceae	
24	<i>Ficus hispida L.</i>	Moraceae	Arasa maram
25	<i>Delonix regia (Boj. Ex Hook) Raf.</i>	Cesalpiniaceae	Flame of Forest
26	<i>Trema orientalis L.</i>	Ulmaceae	Potta maram
27	<i>Phyllanthus officinalis Gaerntn.</i>	Euphorbiaceae	Goose berry
28	<i>Murriya koengii (L.) Sprengel.</i>	Rutaceae	Kariveppilai
29	<i>Borassus flabellifer L.</i>	Arecaceae	Panai maram
30	<i>Lagerstroemia macrocarpa</i>	Cupressaceae	Pavalakkurinji
31	<i>Cretava religiosa L.</i>	Caparidiaceae	Maavilangamaram
32	<i>Eucalyptus lanciolatus Dehnh.</i>	Myrtaceae	Thaila maram
33	<i>Ficus bengalensis L.</i>	Moraceae	Aalla maram
34	<i>Grewia tiliifolia L.</i>	Tiliaceae	Unu
35	<i>Mangifera indica L.</i>	Anacardiaceae	Mango
36	<i>Odaina wodiari L.</i>	Fabaceae	Othiyan
37	<i>Prunus amygdalus L.</i>	Rosaceae	Badam
38	<i>Terminalia paniculata Ruxb</i>	Combretaceae	Pumarutu
39	<i>Zizyphus maurutiana</i>	Rhamnaceae	Indian Plum
40	<i>Moringa olifera Lam.</i>	Moringaceae	Murungai
41	<i>Samanea saman</i>	Mimosodeae	Thoongumoonjj maram
Shrubs			
1	<i>Carrica papaya L.</i>	Caricaceae	Pappali
2	<i>Morinda tinctoria L.</i>	Rubiaceae	Nuna
3	<i>Calotrophis gigantia (L.) R. Br.</i>	Asclepiadaceae	Yerukku
4	<i>Aerva scandens (L.) Juss. ex. Schult</i>	Amaranthaceae	Kulzhipoo
5	<i>Cassia auriculata L.</i>	Cesalpiniaceae	Avarampoo
6	<i>Allamanda cathertica L.</i>	Apocyanaceae	Golden trumpet
7	<i>Parthenium hysterophorus L.</i>	Asteraceae	Whitetop weed
8	<i>Jatropha grandulfera Roxb.</i>	Euphorbiaceae	Oil plant
9	<i>Acalypha wilkesiana L.</i>	Euphorbiaceae	Copper leaf
10	<i>Dodonea viscosa L.</i>	Sapindaceae	Virali
11	<i>Allamanda violacea Gradn& Field.</i>	Apocyanaceae	Violet allamanda
12	<i>Celosia cristata L.</i>	Amaranthaceae	Cockscomb

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13	<i>Ocimum sanctarum (L.) R.Br.</i>	Amaranthaceae	Thulasi
14	<i>Hibiscus rosa-sinensis L.</i>	Malvaceae	Sembaruthi
15	<i>Lawsamia innermis L.</i>	Lythraceae	Maruthani
16	<i>Datura metal L.</i>	Solanaceae	Oomaththai
17	<i>Duranta repens L.</i>	Verbanaceae	Golden dew drop
Herbs			
1	<i>Achyranthus aspera L.</i>	Amaranthaceae	Nayuruvi
2	<i>Boerhavia diffusa L.</i>	Nyctaginaceae	Erect spiderling
3	<i>Althea rosea L.</i>	Malvaceae	Hollyhock
4	<i>Luzula canprestris (L.) R.Br.</i>	Asteraceae	Field wood-rush
5	<i>Gomphrena globosa L.</i>	Amaranthaceae	Vadamalli
6	<i>Asperagus racemosus Wild.</i>	Asparagaceae	Shatawari plant
7	<i>Eclipta alba (L.) Hassk.</i>	Asteraceae	False Daisy
8	<i>Acalipha indica L.</i>	Amaranthaceae	Kupaimeni keerai
9	<i>Clerodendrum serratum L.f.</i>	Lamiaceae	Glory bower
10	<i>Alternanthera sesilis (L.) R.Br ex DC.</i>	Amaranthaceae	Joy weed
11	<i>Crotalaria juncea L</i>	Fabaceae	Vakkunnar
12	<i>Aerva lanata (L.) Juss. ex Schult</i>	Amaranthaceae	Kapunjadi
13	<i>Croton spaciflorus Morong.</i>	Euphorbiaceae	Croton
14	<i>Amaranthus viridis (L.) R.Br.</i>	Amaranthaceae	Green Amaranth
15	<i>Gynandropsis pentafilla L.</i>	Cleomaceae	Ajagandha
16	<i>Phyllanthus nirurii Schum&Thonn.</i>	Phyllanthaceae	Kilzhanelli
17	<i>Helecteris isora L.</i>	Malvaceae	Vadampiri
18	<i>Tephrosia purpurea (L.)</i>	Fabaceae	Poondu sedi
19	<i>Amaranthus sessile L.</i>	Amaranthaceae	Carpet Weed
20	<i>Gynandropsis pentafilla L.</i>	Cleomaceae	Ajagandha
21	<i>Caesalpinia mimosoides L.</i>	Caesalpinaceae	Pulinakkagonrai
22	<i>Euphorbia zylanica L.</i>	Euphorbiaceae	Kalika plant
23	<i>Canavalia sps (L.) R.Br.</i>	Convolvulaceae	
24	<i>Euphobia prostens Des Moul.</i>	Euphorbiaceae	Crown of thorns
25	<i>Tephrosia purpurea (L.)</i>	Fabaceae	Poondu sedi
Climbers			
1	<i>Citrullus vulgaris L.</i>	Cucubitaceae	Round gourd
2	<i>Trichosanthes anguina L.</i>	Cucubitaceae	Podalagkaai
3	<i>Coccinia indica L.</i>	Cucubitaceae	Kovai
4	<i>Cardiospermum halicacabum L.</i>	Sapindaceae	Ballon plant
5	<i>Cucurbita pepo L.</i>	Cucubitaceae	Poosani
Grasses			
1	<i>Carex filicina L.</i>	Cyperaceae	
2	<i>Andropogon fouldesii L.</i>	Poaceae	
3	<i>Kyllinga cylindrica (Jacq.) DC.</i>	Cyperaceae	
4	<i>Carex phacota L.</i>	Cyperaceae	

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5	<i>Aristida funiculata L</i>	Poaceae	
Agricultural Crops			
1.	<i>Cajanus cajan (L.) Millsp.</i>	Fabaceae	Dhuvarai
2.	<i>Sorghum vulgare L.</i>	Poaceae	Solam
3.	<i>Cyamopsis tetragonoloba L.</i>	Fabaceae	Kothavari
4.	<i>Oryza sativa L.</i>	Poaceae	Paddy
5.	<i>Hibiscus esculentus L</i>	Malvaceae	Ladies finger
6	<i>Phaseolus mungo L.</i>	Fabaceae	Oolunthu
7	<i>Saccharum officinarum L.</i>	Poaceae	Karumbu
8	<i>Arachis hypogaea L.f.</i>	Ground nut	Fabaceae

3.6.7.4 LIST OF FAUNA

The list of fauna within the study area is given in Table No – 3.16.

Table 3.16 List of Fauna

S.No	Common Name	Scientific Name	WPA Schedule
Butterflies			
1.	Common crow	Euploea core	IV
2.	Common grass yellow	Terias hecabe	IV
3.	Tawny coster	Telchinia violae	IV
4.	Common tree brown	Lethe rohria	IV
5.	Common rose	Tros aristolochiae	IV
REPTILES			
1.	Common Green whip snake	Ahaetulla nasuta	IV
2.	Grass or Land Snake	Natrix piscator	IV
3.	Common Cobra	Naja naja	II
Birds			
1.	Crow-Pheasant or Coucal	Centropus sinensis	IV
2.	Grey partridge	Francolinus pondicerianus	IV
3.	Indian Roller	Coracias benghalensis	IV
4.	Purplerumped Sunbird	Nectarinia zeylonica	IV
5.	Redwinged Bushlark	Mirafra erythroptera	IV
6.	Jungle Crow	Corvus macrorhynchos	V
7.	House Crow	Corvus splendens	V
8.	Green Bee eater	Merops orientalis	IV
9.	Common-hawk cuckoo	Cuculus varius	IV
10.	Black Drongo	Dicrurus adsimilis	IV
11	Whiteheaded Babbler	Turdoides affinis	IV
12	Ashy Wren Warbler	Prinia socialis	IV
13	Common Myna	Acridotheres tristis	IV
14	Crow-Pheasant or Coucal	Centropus sinensis	IV
15	Whitebreasted kingfisher	Halcyon smyrnensis	IV

16	Green Bee eater	Merops orientalis	IV
17	Large Grey Babbler	Turdoides malcolmi	IV
18	House Sparrow	Passer domesticus	V
19	Pariah Kite	Milvus migrans	IV
20	Cattle egrets	Bubulcus ibis	IV
Mammals			
1.	Common mongoose	Herpestes edwardsii	IV
2.	House rat	Rattus rattus	IV
3.	Bandicoot	Bandicoota indica	IV

3.6.7.5 VALLANADU BLACK BUCK SANCTUARY

The Vallanadu area was declared as Sanctuary as per G.O.Ms.No.1028 Forest & Fisheries Department dated 28.09.1987. This Sanctuary is located in Vallanadu village of Srivaikundam Taluk of Thoothukudi in district in Tamil Nadu on Tirunelveli-Thoothukudi road at a distance of 16 kilometers from Tirunelveli town. Latitude 8°39'45" North to 8° 44'00" North, Longitude 77°54'45" East to 77°57'10" East .

As per MoEF & CC's final notification S.O.2773(E) dated 31st July 2019, Vallanadu Black buck sanctuary is located at a distance of 11.82 km from the lease area. ESZ of the sanctuary lies at 10.25 km from the lease boundary. As such the project site is located outside the ESZ. Hence, wildlife clearance is not applicable.

3.6.7.6 FLORA AND FAUNA IN VALLANADU BLACK BUCK SANCTUARY

The sanctuary is a South Deccan Plateau dry deciduous forest.

Table 3.17 List of Floristic Species in Vallanadu Blackbuck Sanctuary

S.NO	Botanical Name	Local Name	Family Name
1.	<i>Dalbergia horrida</i>	Biradi	Fabaceae
2.	<i>Dichrostachys cinereal</i>	Vidatalai	Fabaceae
3.	<i>Vachellia horrida</i>	Cape gum	Fabaceae
4.	<i>Acacia planifrons</i>	Kudai Vel	Fabaceae
5	<i>Albizia amara</i>	Usilai Wunja	Fabaceae
6.	<i>Azadirachta indica</i>	Neem	Meliaceae
7.	<i>Dodonaea viscosa</i>	Virāli	Sapindaceae
8.	<i>Ziziphus</i>	Indian Plum	<u>Rhamnaceae</u>
9.	<i>Carissa carandas</i>	Perung Kala	<u>Apocynaceae</u>
10.	<i>Pterolobium hexapetalum</i>	Pulindu	<u>Fabaceae</u>
11.	<i>Euphorbia</i>	Spurge	<u>Euphorbiaceae</u>

List of Fauna in Vallanadu Blackbuck Sanctuary

S.NO	Common Name	Scientific Name	WPA Schedule
1.	Blackbuck	Antilope cervicapra	I
2.	Viper	Daboia russelii	III
3.	Night Jar	Caprimulgus asiaticus	IV
4.	Jungle Crow	Corvus macrorhynchos	IV
5.	Heron	Ardea cinereal	IV
6.	Rabbit	Oryctolagus cuniculus	IV
7.	Wild Cat	Felis chaus	II
8.	Rat Snake	Ptyas mucosa	III
9.	Sparrows	Passer domesticus	IV
10.	Indian peafowl	Pavo cristatus	I

3.6.8 PHYSIOGRAPHY

The area applied for quarry lease is exhibits almost plain topography covered by Gravel formation. The massive Hornblende biotite gneiss formation is noticed below 5m (Avg) Gravel and 1m weathered rock formation and sloping towards Southeastern side of the area.

3.6.9 DRAINAGE

There is Tambraparni river passing northeastern side of the area and is 8Km away from the area. There is a odai on northern side of the area and is 50m distance maintained. In the seasonal streams were observed in dry condition.

3.6.10 GEOLOGY

The Core and 10 Km buffered zone Geology map (Figure 2) shows that the Hornblende biotite gneiss, Charnockite, Calcareous sandstone and Quartzite. Major portion was covered in Hornblende biotite gneiss rock followed by Charnockite. A small portion were occurred in Quartzite; it is located in North-Western portion of the study area. Geology of the study area are detailed below.

Sl.No.	Geology	Area in Sq.km
1	Calcareous sandstone	16.23
2	Charnockite	18.69
3	Hornblende biotite gneiss	284.67
4	Quartzite	2.54
5	Tambraparni River	2.94

3.6.11 GEOMORPHOLOGY

The 10 Km radius of the area geomorphological features (Figure 3.13) shows that the followed by shallow burier pediplain covered an area is 229.83 sq.km. This feature mainly supports intensive agriculture activities in the study area. Moderate burier pediplain covered an area is 48.16 sq.km and Shallow flood plain covered an area is 4.35 sq.km, Pediplain covered an area is 7.47 sq.km, Pediment covered an area is 22.95 sq.km Alluvial plain is covered an area 10.50 sq.km and Linear ridge/Dyke covered an area is 1.81 sq.km. The geomorphology of the study area is given below.

Sl.No.	Geomorphology	Area in Sq.km
1	Alluvial Plain	10.50
2	Linear Ridge/ Dyke	1.81
3	Moderately buried Pediplain	48.16
4	Pediment	22.95
5	Pediplain	7.47
6	Shallow Flood Plain	4.35
7	Shallow buried Pediplain	229.83

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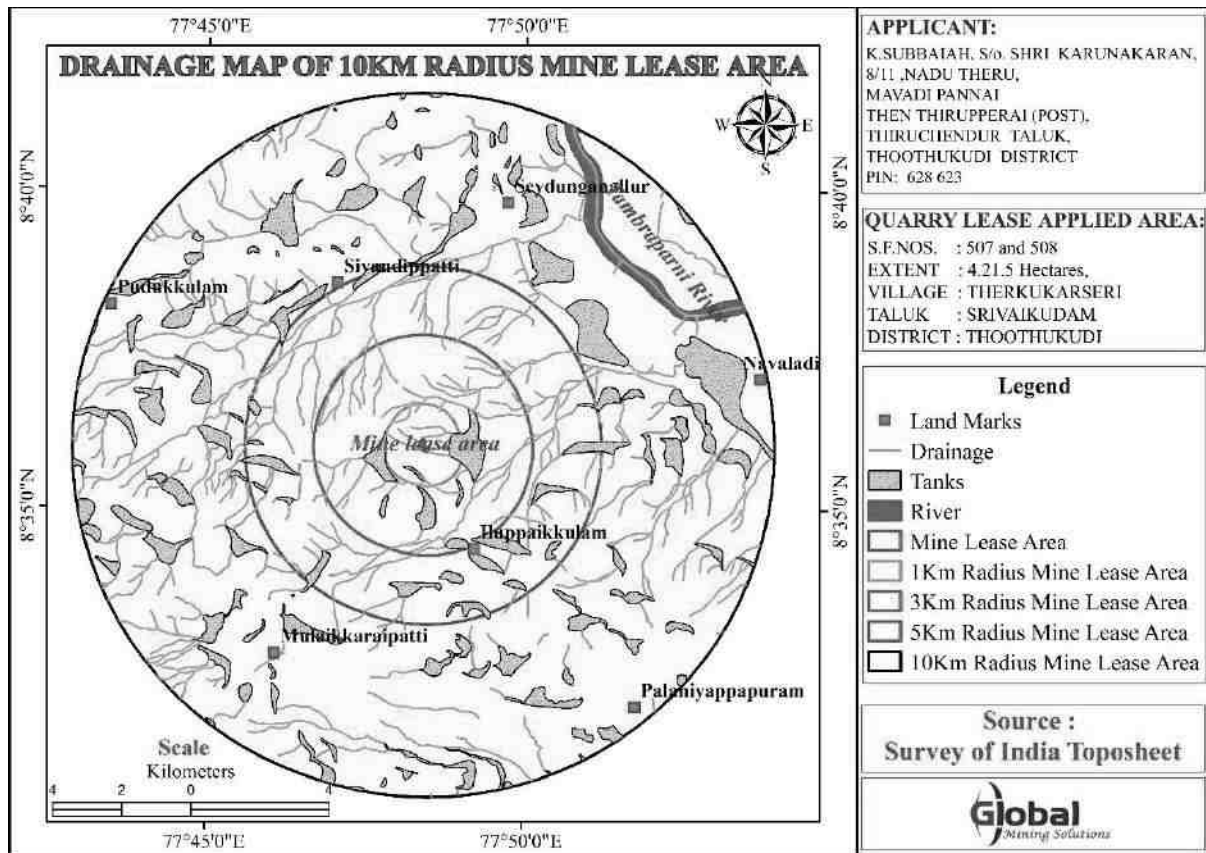


Figure 3. 11 Drainage Map of the Study Area

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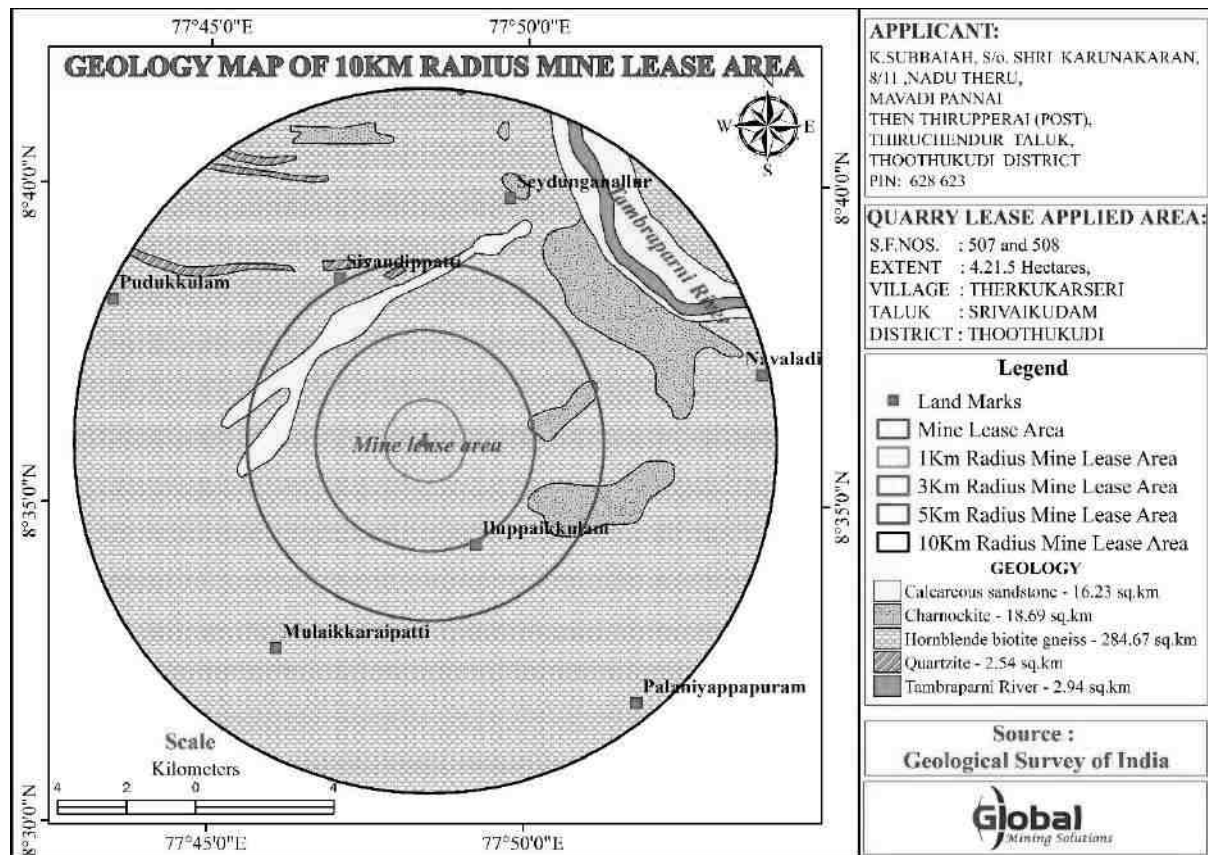


Figure 3.12 Geology Map of the Study Area

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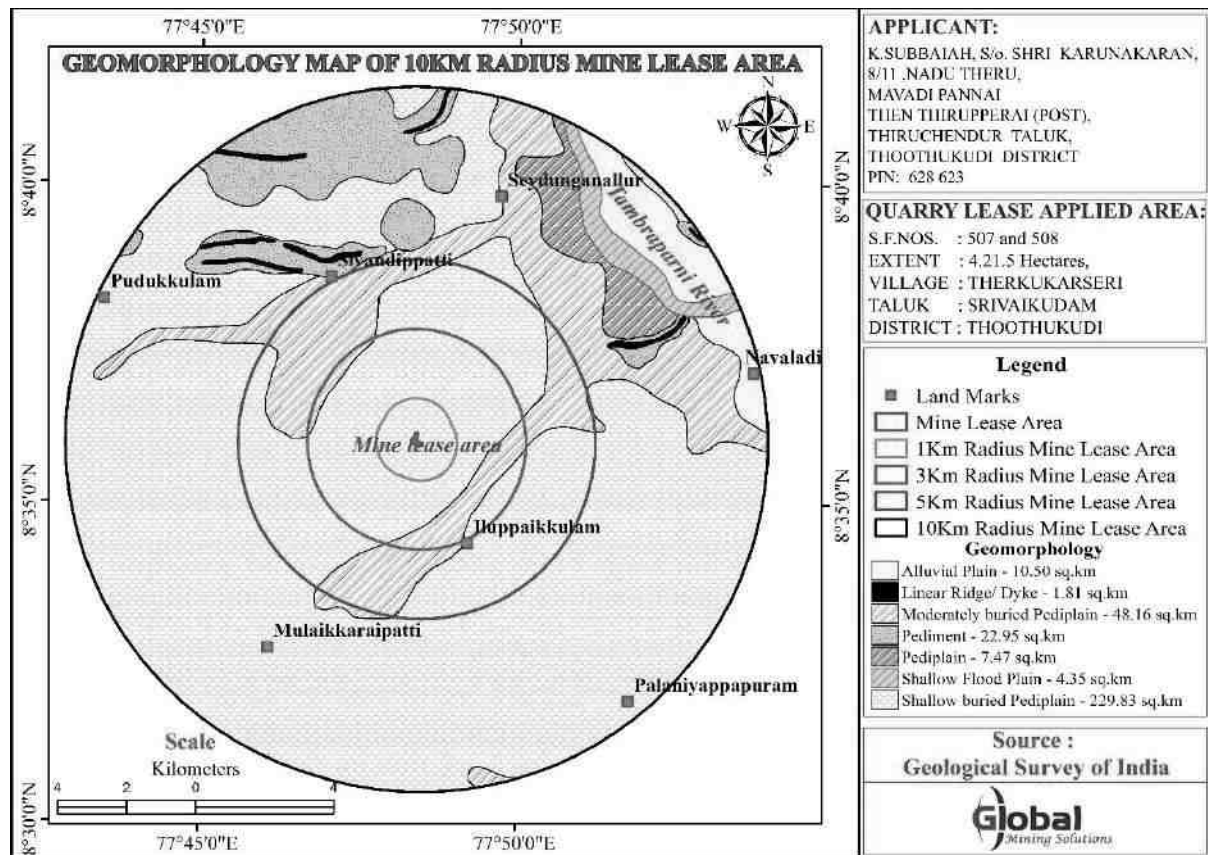


Figure 3.13 Geomorphology Map of the Study Area

3.6.12 SOCIO-ECONOMIC ENVIRONMENT

Socio-economic study is an essential part of environmental study. It includes demographic structure of the area, provision of basic amenities viz., housing, education, health and medical services, occupation, water supply, sanitation, communication, transportation, prevailing diseases pattern as well as feature like temples, historical monuments etc., at the baseline level. This will help in visualizing and predicting the possible impact depending upon the nature and magnitude of the project.

It is expected that the Socio-Economic Status of the area will substantially improve because of this proposed project. As the proposed project will provide direct and indirect employment and improve the infrastructural facilities in that area and, thus, improve their standard of living.

3.6.12.1 OBJECTIVES OF THE STUDY

The objectives of the socio-economic study are as follows:

- To study the socio-economic status of the people living in the study area of the proposed mining project
- To assess the impact of the project on Quality of life of the people in the study area
- To recommend Community Development measures needs to be taken up in the study Area.

3.6.12.2 SCOPE OF WORK

- To study the Socio-economic Environment of the area from the secondary sources;
- Data Collection & Analysis
- Prediction of project impact
- Mitigation Measures

3.6.12.3 ADMINISTRATIVE SETUP OF THOOTHUKUDI DISTRICT

Thoothukkudi district lies in the southern part of the Indian subcontinent. For revenue administration, the district is divided into 3 Revenue Divisions as Thoothukkudi, Tiruchendur and Kovilpatti. The district has 12 Community Development Blocks consisting of 403 Village Panchayats. There are 8 Taluks and 439 Revenue Villages. Out of this, 432 villages are inhabited. The district constitutes urban units with 1 Municipal Corporation, 2 Municipalities (Kovilpatti and Kayalpattinam), 19 Town Panchayats and 13 Census Towns in the district.

In 2011, Thoothukudi had population of 1,750,176 of which male and female were 885,155 and 865,021 respectively. In 2001 census, Thoothukudi had a population of 1,572,273 of which males were 766,823 and remaining 805,450 were females. There was change of 7.92 % in the population compared to population as per 2001.

As per the Population Census 2011, there are total 334 families residing in the village Therkukarseri. The total population of Therkukarseri village is 1236, of which 600 are males while 636 are females. literacy rate of Terkukariseri village was 78.27 % compared to 80.09 % of Tamil Nadu. In Terkukariseri Male literacy stands at 86.88 % while female literacy rate was 70.05 %.

Table 3.18 Therkukaraseri Data

Particulars	Total	Male	Female
Total No. of Houses	334	-	-
Population	1,236	600	636
Child (0-6)	159	74	85
Schedule Caste	190	92	98
Schedule Tribe	0	0	0
Literacy	78.27 %	86.88 %	70.05 %
Total Workers	625	377	248
Main Worker	602	-	-
Marginal Worker	23	6	17

In Terkukariseri village out of total population, 625 were engaged in work activities. 96.32 % of workers describe their work as Main Work (Employment or Earning more than 6 Months) while 3.68 % were involved in Marginal activity providing livelihood for less than 6 months. Of 625 workers engaged in Main Work, 4 were cultivators (owner or co-owner) while 509 were Agricultural labourer.

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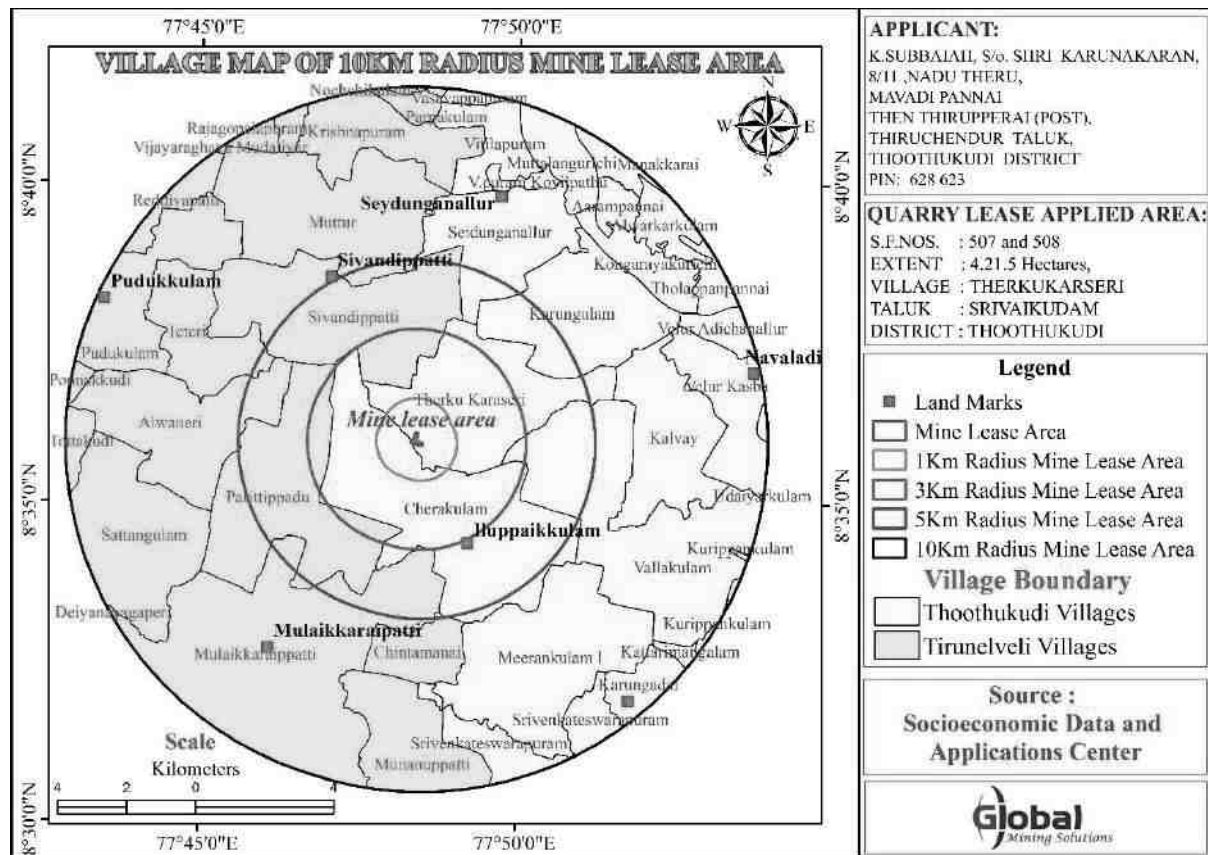


Figure 3.14 Village map of the Study Area

Table 3.19 Surrounding Village Data

Name of the Village	No.of Households	Population	Male Population	Female Population	SC Population Male	SC Population Female
Sivandipatti	574	1912	923	989	300	300
Kovilpatti	321	1031	508	523	243	254
Karungulam	574	1912	923	989	300	300
Cherakulam	1285	4837	2370	2467	151	163
Kalvey	830	3266	1588	1678	45	48
Ariyanayakipuram	183	664	319	345	196	204
Alwaner	686	2643	1310	1333	74	83
Chintamani	355	1329	679	650	94	90

Basic Amenities

A better network of physical infrastructure facilities (well-built roads, rail links, irrigation, power and telecommunication, information technology, market-network and social infrastructure support, viz. health and education, water and sanitation, veterinary services and co-operative) is essential for development of the rural economy. All basic amenities Education (higher education, colleges, universities, Medical college, Transport facilities, Railway station, Bus station area available

4.0 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 GENERAL

Environmental impacts both direct and indirect on various environmental attributes due to cluster quarries will be created in the surrounding environment, during the operational and post-operational phases. The occurrence of mineral deposits, being site specific, their exploitation, often, does not allow for any choice except adoption of eco-friendly operation. The methods are required to be selected in such a manner, so as to maintain environmental equilibrium ensuring sustainable development.

In order to maintain the environmental commensuration with the mining operation, it is essential to undertake studies on the existing environmental scenario and assess the impact on different environmental components. This would help in formulating suitable management plans sustainable resource extraction.

4.2 PROJECT SPECIFIC IMPACTS AND MITIGATION MEASURES

This is a proposed project and Semi – Mechanized Open Cast mining will be carried out to quarry out Rough Stone. The identified impacts during mining and associated activities have been studied in relation to various environmental components like Air, water, noise, vibration, land, transport etc., and the details of the same are elaborated in this chapter. The impact assessment is done for the peak production of the mine lease period and the entire area of quarry operation and can be construed as applicable for the entire lease period. Based on the baseline environmental status at the project site, the environmental factors that are likely to be affected (Impacts) are identified, quantified and assessed.

The following parameters are of significance in the Environmental Impact Assessment and are being discussed in detail in this chapter.

- Land environment
- Soil environment

- Water Environment
- Air Environment
- Noise Environment
- Socio economic environment
- Biological Environment

The proposed mining activity is small and not likely to have any serious impacts on the existing environment of the area. However, the potential impacts of the proposed mining and related activities on various environmental parameters are discussed.

4.2.1 LAND ENVIRONMENT

4.2.1.1 ANTICIPATED IMPACT

The main anticipated impact on the Land Environment due to quarrying operation is change in Landscape, change in Land – use Pattern.

The entire mine lease area of 4.21.5 Ha. is patta land. The project area of 3.11.5 Ha (except unutilized area - 7.5 m boundary barrier and 50m safety distance for odai) is proposed to be altered by effective quarrying area of 2.55.5 ha.; Infrastructure of 0.01.0 Ha.; Roads of 0.03.0 Ha ; and greenbelt of 0.52.5 Ha. The ultimate depth of quarrying is proposed by formation of 3 pits with maximum depth of 33 m below the ground level and will not intersect the ground water table. The mine closure plan is given in 2.12.

The present land use pattern and the post mining land use pattern is shown below.

Table 4.1 Land use pattern of the project site

Description	Present Area in Ha.	Area at the end of life of Quarry in Ha.
Quarrying pit	NIL	2.55.0
Infrastructure	NIL	0.01.0
Roads	NIL	0.03.0
Greenbelt	NIL	0.52.5
Unutilized	4.21.5	1.10.0
Total	4.21.5	4.21.5

- At the end of life of mine, the excavated mine pit / void of 2.55.0 Ha. will act as a water harvesting pit and collected water will be used for plantation and dust suppression during dry season.
- A greenbelt of 0.52.5 hectares will be developed along the safety barrier.
- Remaining 1.11 ha. of land will be covered with vegetation.

4.2.1.2 MITIGATION MEASURES

In the rough stone and gravel quarrying operation, land degradation is minimal. After completion of the quarrying operation, the land will be allowed to collect rainwater, This rough stone does not produce any toxic effluents in the form of solids, liquids, or gases.

It is a simple quarrying operation where 100% of stones will be removed systematically, according to the approved Mining Plan.

The periphery of the mining lease area will be converted to a greenbelt to prevent Noise and sound propagation to the nearby lands.

Entire mined out area will be properly fenced to prevent inadvertent entry of human and animals.

Since the entire material from the quarry face will be directly dispatched to the consumers, there will not be any stockpiles. There are no waste dumps in this quarry. As such there will not be any wash out due to stock pile or waste dumps. To manage surface runoff, a 600-meter-long garland drain will be constructed around the quarry and connected to a settling pond with silt traps.

4.2.2 SOIL ENVIRONMENT

4.2.2.1 ANTICIPATED IMPACT

Mining activities often disrupt the existing environment as they involve disturbing the untouched earth materials. There is no top soil anticipated in this project, the surface consists of gravelly formation followed by Rough stone which is proposed

to excavate completely during the quarrying operation, hence preservation of top soil does not exist. Erosion of top layer (gravel), extracted fine material can result in substantial sediment loading to surface waters and drainage ways. During rainy season surface run off may cause sedimentation in low lying areas.

4.2.2.2 MITIGATION MEASURES FOR SOIL EROSION AND SOIL CONSERVATION

- Runoff water will be collected in bottom of the quarry and used for plantation and dust suppression during dry season. no run off water will be discharged beyond lease area.
- Wet drilling and haul road water sprinkling will be carried out to minimise air born dust at source level, which may cause soil pollution due to sedimentation.
- Garland drains will be constructed around the project area with silt traps to control the soil erosion during rainy seasons.
- Greenbelt development (0.52.5 Ha.) all along the periphery of the project area (i.e., 7.5 m safety barrier) will ensure binding strength and minimizes soil erosion.
- Soil sampling will be carried out in the core zone for every six months to ensure the soil quality is not affected due to the quarrying activities.

4.2.3 WATER ENVIRONMENT

4.2.3.1 ANTICIPATED IMPACT ON SURFACE AND GROUND WATER

The impact due to quarrying on the water quality is expected to be insignificant because of no use of chemicals or hazardous substances during quarrying process. The quarrying activity will not intersect ground water table as quarrying is proposed upto a depth of 33 m bgl and water table is found at a depth of 80 - 85m BGL.

There is an odai crossing the project site from west to east (64m and 63m AMSL, respectively). All project activities are carried out on the southern side of the project area, with a safety distance of 50m provided. Figure 2.12 shows a map of

the study area's land use pattern and the safety distance provided for odai. No other water bodies close to the project site, The Thambraparani River is situated eight km to the northeast, flowing from north to north-east. Vellore Channal in 5km – NNE. There is no proposal for discharging of wastewater outside the project area. There is no proposal for a rough stone processing or workshop within the project area, so no effluent is anticipated in the mine.

During rainy season rain water will be collected in the quarry pit and later used for greenbelt development and for the water sprinkling in the haul roads.

ANTICIPATED IMPACT DUE TO WATER USE IN MINE'S

The total water requirement per project will be 4.0 KLD comprising Drinking 0.4 KLD, Dust suppression 1.5 KLD, Greenbelt 1.5 KLD and Domestic purpose 0.6 KLD. The water will be sourced initially from outside agencies. Later the rainwater collected in the mine pit sump will be used for this purpose. The water balance diagram for the same is shown in Figure No 4.1.

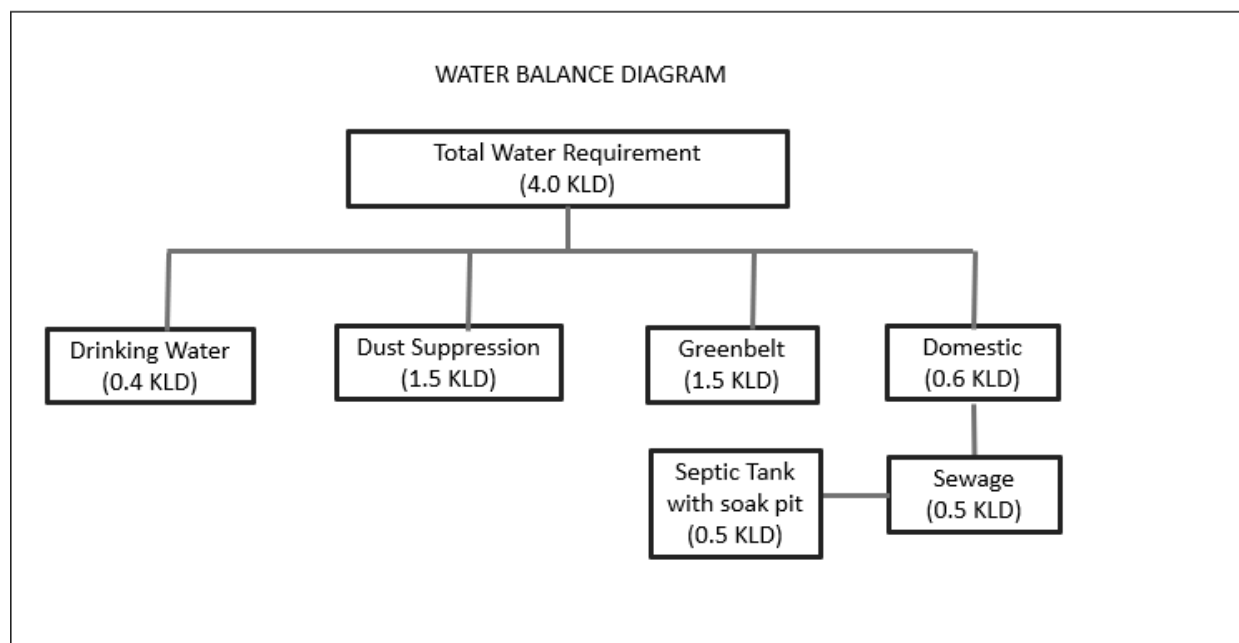


Figure 4.1 Water Balance Diagram

4.2.3.2 MITIGATION MEASURES

The following mitigation measures are suggested for water management

- Rainwater will be collected in lower part of the quarry pit by construction of garland drains to divert surface run-off and will be connected to setting tank of 6 m (l) x 6m (w) x 3m (d) to allow suspended solids to settle down if any. This collected water will act as a rain water harvesting system and will be used for dust suppression and greenbelt development.
- Regular water quality will be carried in nearby villages to ensure the water quality is not affected due to the quarrying activities.
- Domestic sewage from site office & urinals/latrines provided in project area will be discharged through septic tank followed by soak pit system.
- Only clear and settled water free from silt content will be used for dust suppression and greenbelt development.
- De-silting will be carried out before and immediately after the monsoon season and the settling tank and drains will be cleaned weekly, especially during monsoons.

4.2.3.3 REDUCING WATER CONSUMPTION

General Methods

The various methods proposed for reducing the water use is given below:

- Use of water will be monitored and used to the minimum required. Awareness will be spread to the employees about the importance of water conservation. Tap and showers will be turned off immediately after use and any leaks will be monitored and immediately controlled.
- Water requirement for greenbelt and dust suppression can be reduced by choosing the native plants/trees species with low water requirement and which can sustain in such conditions for greenbelt/ plantation and also optimum usage to the required minimum. While the dust suppression itself is an important method of pollution control for air pollution due to dust, the water consumption will be monitored strictly. The water tanker will be

examined for any sources of leaks and if found will be immediately sealed so that water can be utilized for dust suppression effectively without loss.

4.2.3.4 RAINWATER HARVESTING PLAN

Since the lease proximate areas are with less water potential and the rainwater is the major source for replenishment of ground water, effective rainwater harvesting and other water augmentation measures are proposed in this project.

- Development of garland drain around the quarry connected to settling tank.
- Cleaning of drain periodically to prevent siltation
- The supernatant clear water from the settling pond will drain into the nearby channel on the eastern side of the lease.
- Utilizing the rainwater harvested in the mine pit to meet the water requirement of the project.

The average annual rainfall of the area is 583 mm. Taking into consideration of 0.35 as runoff co-efficient for mining area, the total quantity of rain water can be harvested per annum from the area has been tabulated as below.

Table 4.2 Rainwater Harvesting Plan

S.NO	Rainwater Harvesting Area	Area in Sq.m	Average annual rainfall	Volume of harvestable quantity (Cum) of rain water per annum
1	Quarry Area	25500	0.58	5177
2	Unutilized Area	11000	0.58	2233
Total Harvested Rainfall				7410

Total surface water runoff is 7410 Cum per Annum. 10% of this amount will be evaporated and rest 6669 m³ will be recharged in the rain water harvesting pit.

The dimension of the rain water harvesting pond will be 30m x 30m x10m with capacity of 9000 cu.m. The rain water stored in the pond will be utilized for plantation, dust suppression activities. The capacity of Rain water harvesting post will be sufficient to arrest the surface runoff from the lease area considering the highest amount of rain fall.

4.2.4 AIR ENVIRONMENT

The existing ambient air quality in the area has been described in Chapter-III. Opencast semi-mechanized mining, using jackhammer drilling, blasting, and excavation through an excavator, as well as mineral transport through tippers, will be carried out for the excavation of rough stone and gravel.

4.2.4.1 ANTICIPATED IMPACT

The proposed mining and allied operations may cause deterioration of air quality due to pollution arising from the project operation if prompt care is not taken. The principal sources of air pollution in general due to mining and allied activities will be:

The air-borne particulate matter generated by quarrying operations and transportation is mainly PM₁₀ and PM_{2.5}, and emissions of sulfur dioxide (SO₂) and oxides of nitrogen (NO₂) due to excavation/loading equipment and vehicles plying on haul roads are the cause of air pollution in the project area.

Furthermore, the loading, unloading, and transportation of rough stone and gravel, as well as wind erosion of the exposed area and movement of light vehicles, will cause pollution within a 500-meter radius of the project area due to quarrying activities. This has a cumulative impact on the ambient air environment around the project area.

4.2.4.2 MITIGATION MEASURES

The following measures will be adopted to control impact on the air quality due to mining operations in the lease area due to adoption of which, no major impact on air quality is envisaged due to this proposed opencast mining operation.

Table 4.3 Mitigative Measures for Air Environment

S.NO	Activity	Consequence	Mitigative Measures
1	Drilling	Dust Emission	Usage of wet drilling
			Covering of drill holes with wet cloth
			Usage of sharp drill bits for drilling of holes.
			Provision of dust mask to workers working at highly dust prone and affected areas.
2	Blasting	Prompt dust emission	Well-designed blasting parameter, effective stemming to achieve optimum breakage occurs without generating fines.
			Use of appropriate explosives for blasting and avoiding overcharging of blast holes.
			Avoiding blasting during high wind periods where the fine dust is carried out away easily affecting the ambient air quality.
			Use of controlled blasting techniques with milli second delay detonators to keep the dust generation, noise as well as vibration level within the prescribed limits.
3	Excavation and Loading	Dust emission, Gaseous Emission	Proper maintenance of HEMM will be carried out to minimize dust and gaseous emission at the source level.
			Water sprinkling will be carried out at excavation and loading area.
			Imparting sufficient training to operators on safety and environmental parameters.
			Avoiding overloading of dumpers.
4	Transportation	Dust emission, Gaseous Emission	Regular wetting of transport road using mobile water tanker.
			Proper maintenance of haul road and other roads
			Avoiding overloading of tippers
			Covering of loaded tippers with tarpaulins during transportation

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			Vehicular emissions will be controlled through regular and proper preventive maintenance only PUC valid vehicles will be used for transportation.
5	Greenbelt	Dust emission, Gaseous Emission	Development of greenbelt / barriers around mine in the safety zone and carrying out plantation within the lease area.
6	Occupation Health	Dust emanation, Gaseous Emission	Dust mask will be provided to the workers and their use will be strictly monitored
			Annual medical checkups, trainings and campaigns will be arranged to ensure awareness about importance of wearing dust masks among all mine workers & tipper drivers
			Ambient Air Quality Monitoring will be conducted six months once to assess effectiveness of mitigation measures proposed.

4.2.4.3 AIR QUALITY MODELING

4.2.4.4 AIR QUALITY IMPACT PREDICTION

The AERMOD atmospheric dispersion modeling (AERMOD Cloud remote version) is used for assessment of incremental Ground level concentration (GLC) for the proposed production. Area source model taken into consideration taking into consideration of wet drilling and loading. Further line source model was taken into consideration for transportation through haul road. Baseline meteorological studies were conducted for the period of March to May 2023. The following sources are considered.

S. No.	Type of mining operation	Type of Source
1	Wet drilling	Point
2	Loading	Point
3	Transportation	Line

4.4.4.3.1 ARRIVING EMISSION FACTOR

Emission factor for PM₁₀ for different activities are given below.

S. No.	Activity	Emission factor	Unit
1	Wet drilling	0.00008	lb/s
2	Ore loading	0.0014	Kg/t/s
3	Transportation	0.26	Kg/VKT

Source

1. Jose I. Huertas & Dumar A, Camacho & Maria E. Huertas, Standardized emissions inventory methodology for openpit mining areas, Environmental Science Pollution Research, 2012.

AP-42. U.S Environmental Protection Agency, Office of Air Quality Planning and Standards

4.4.4.3.2 EMISSIONS FROM THE PROPOSED PROJECT

The emissions from each activity after the application of control and mitigation measures like water sprinkling, proper maintenance of transport vehicles, etc., are given below.

S. No.	Activity	PM10	PM2.5
1	Wet drilling	0.22	0.04
2	Ore loading	0.87	0.16
3	Transportation	0.23	0.05

4.4.4.3.3 MODEL INPUT DATA:

The air pollution modeling carried out represents the normal operating scenarios. As the project is a mining project the major source of pollution is particulate matter. The SO_x and NO_x emission will be very less only due to vehicular emission. So the pollutant taken for prediction of incremental concentration is particulate matter (PM 10 & PM 2.5). The predicted incremental Ground Level Concentrations (GLCs) for particulate matter is likely to be contributed by the proposed project. The average predicted 24 hr average concentration has been tabulated as below.

EMISSION ESTIMATION

The emission estimations for the activities are detailed below.

Table 4.7 - Area Emissions – Total Material handling (Gravel)

Quantity, TPA	43890
Operational Hours Per Year	2400
Activity Rate, t/hr.	18.2875
Emission of dust, g/t.	0.14
Emission of dust, g /hr.	2.56025
Area of influence, m ²	625
Uncontrolled emission rate g/s/m ²	0.0000011379
Controlled emission rate, PM10 g/s/m ²	0.0000001138
Controlled emission rate, PM2.5 g/s/m ²	0.000000048

Table 4.8 - Area Emissions – Total Material handling (Rough Stone)

Quantity, TPA	234050
Operational Hours Per Year	2400
Activity Rate, t/hr.	97.52083333
Emission of dust, g/t.	0.14
Emission of dust, g /hr.	13.65291667
Area of influence, m ²	625
Uncontrolled emission rate g/s/m ²	0.0000060680
Controlled emission rate, PM10 g/s/m ²	0.0000006068
Controlled emission rate, PM2.5 g/s/m ²	0.000000255

Table 4.9 - Line Source – Transport of Rough Stone from Pit to Boundary

Quantity, TPA	234050
Operational Hours Per Year	2400
Capacity of each Dumper (T)	10
Total No. of Tippers/ year	23405
Lead length/trip, Km	1.06
Total VKT/Year	24809.3
Emission Kg/VKT	0.26
Total emission Kg/Year	6450.418
Uncontrolled emission rate g/s/m	1.408634259
Controlled emission rate, PM10 g/s/m	0.140863426
Controlled emission rate, PM2.5 g/s/m	0.059162639

Table 4.10 - Line Source – Transport of Gravel from Pit to Boundary

Quantity, TPA	43890
Operational Hours Per Year	2400
Capacity of each Dumper (T)	10
Total No. of Tippers/ year	4389
Lead length/trip, Km	1.06
Total VKT/Year	4652.34
Emission Kg/VKT	0.26
Total emission Kg/Year	1209.6084
Uncontrolled emission rate g/s/m	0.264152778
Controlled emission rate, PM10 g/s/m	0.026415278
Controlled emission rate, PM2.5 g/s/m	0.011094417

*Note: *Emission factor computed based on wind speed of 2 m/s, and moisture content of 10 %.*

+ Emission factor computed based on silt content of 10 % and moisture content of 10 %

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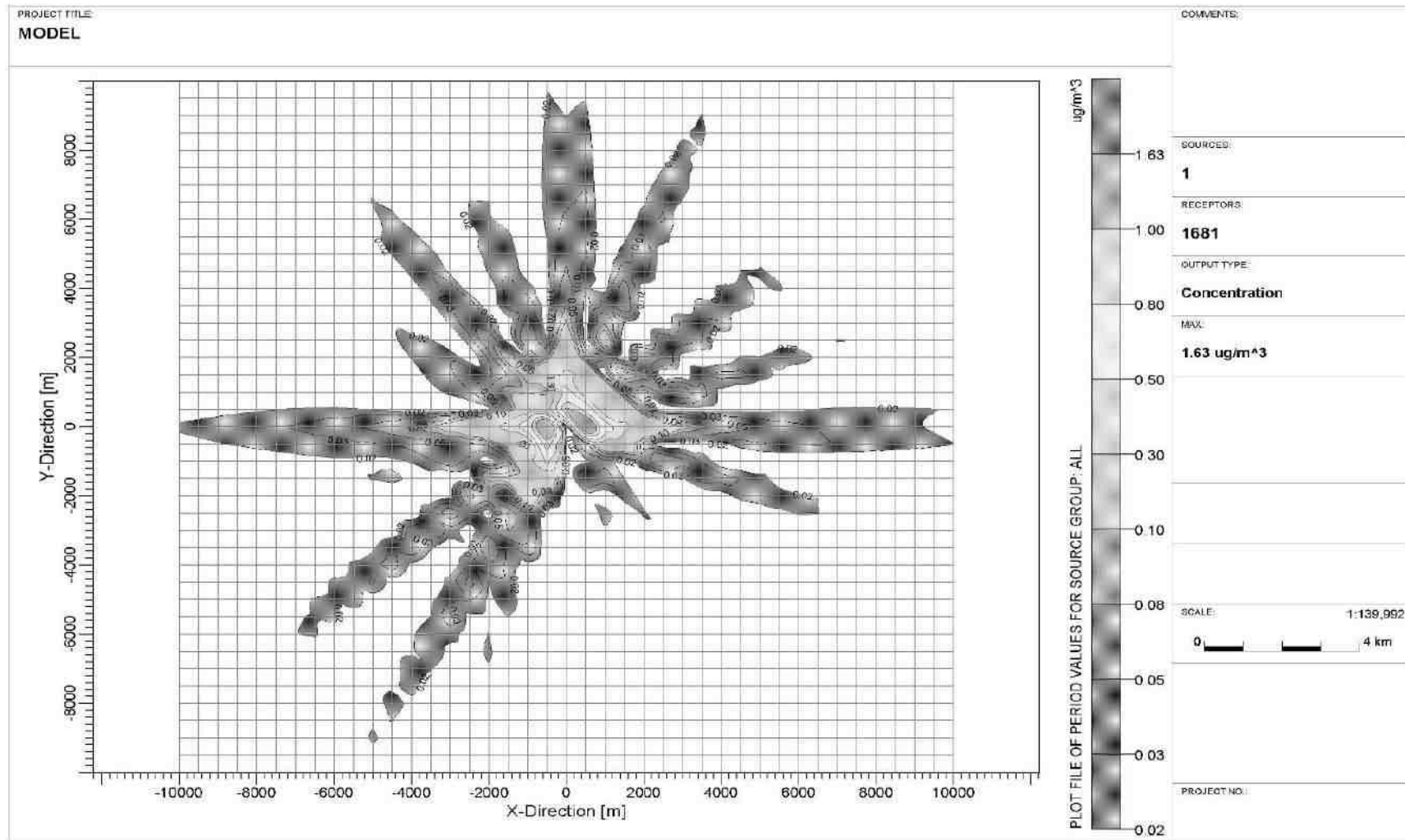


Figure 4.2 Isopleth of GLC Prediction for PM_{2.5}

Draft EIA EMP report of Proposed Rough stone and Gravel Quarry of Mr. K. Subbaiah at SF No 507 & 508 over a Extent of 4.21.5 Ha in Therkukarseri Village, Srivaikundam Taluk, Thoothukudi District, Tamil Nadu

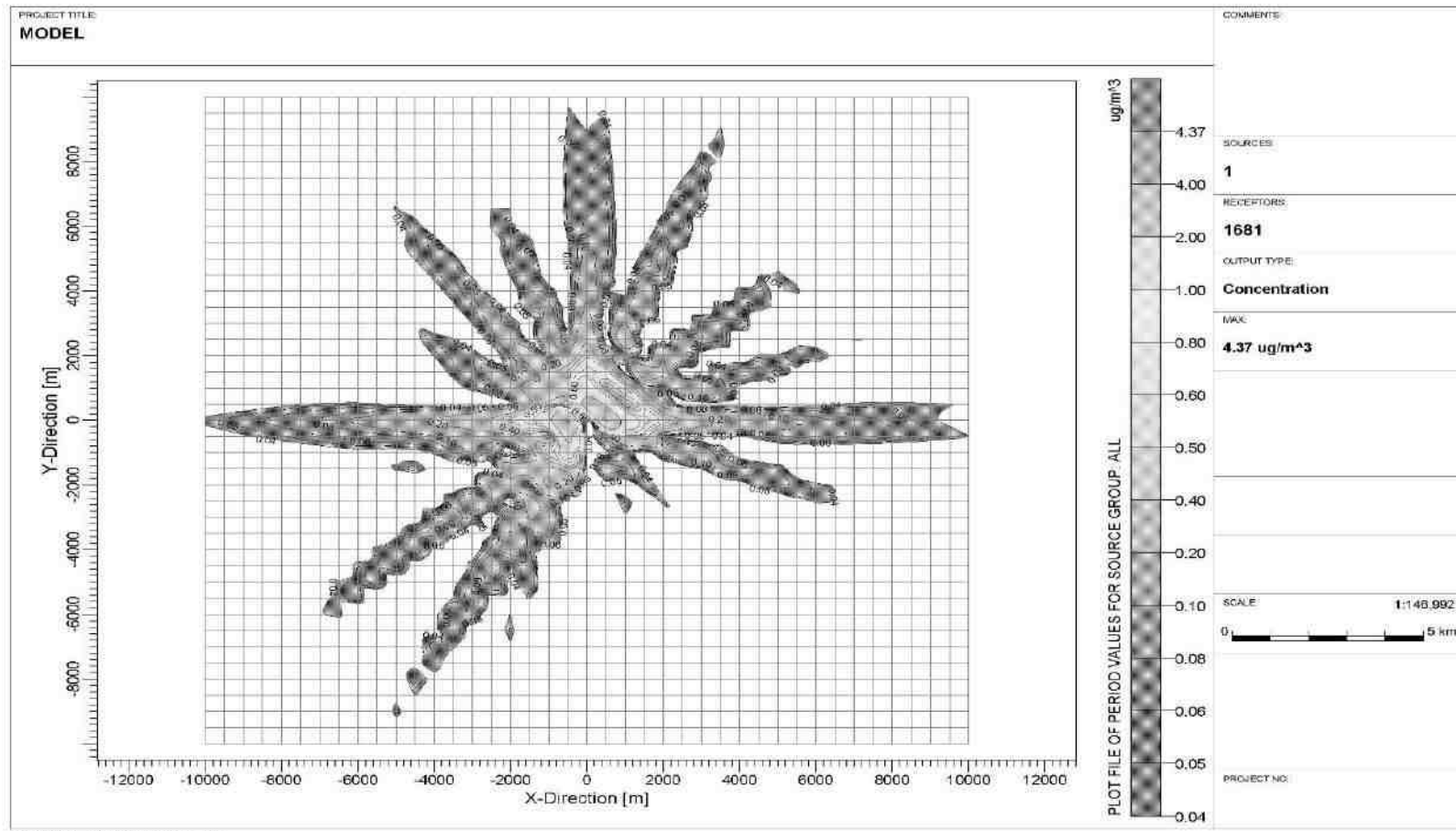


Figure 4.3 Isopleth of GLC Prediction for PM₁₀

4.4.4.3.4 PREDICTED AMBIENT AIR QUALITY:

The post project Concentrations of PM₁₀, PM_{2.5}, (GLC) (base line + incremental) after adopting necessary control measures is given in Table No - 4.11 to 4.12.

SL.No	Location	Background Concentration	Predicted incremental Concentration	Post Project Concentration	Statutory Limits in µg/m ³
1	Within Mine Lease area	25.5	1.63	27.1	60
2	Arasakulam	26.5	<1.0	27.5	
3	Therkukarseri	26.5	<1.0	27.5	
4	Siriyanthur	28.9	<1.0	29.9	
5	Cherakulam	26.9	<1.0	27.9	

SL.No	Location	Background Concentration	Predicted incremental Concentration	Post Project Concentration	Statutory Limits in µg/m ³
1	Within Mine Lease area	50.6	4.37	55.0	100
2	Arasakulam	55.7	<1.0	56.7	
3	Therkukarseri	57.2	<1.0	58.2	
4	Siriyanthur	61.4	<1.0	62.4	
5	Cherakulam	64.9	<1.0	65.9	

The above report seems that, even in the worst-case scenario, the resultant added concentrations with baseline figures show that the values of ambient air quality for PM₁₀ are in the range of 55.0 µg/m³ to 65.9 µg/m³ and for PM_{2.5} are in the range of 27.1 µg/m³ to 29.9 µg/m³ which are within the statutory limits in each case. The mitigation measures undertaken in the mine for control of air pollution are given below.

4.2.5 NOISE ENVIRONMENT

The ambient noise levels in the study area have been discussed in Chapter - III. The data shows that the existing noise levels are within statutory limits. The impact prediction and control measure for noise environment due to mining and allied activities is described below:

4.2.5.1 IMPACT DUE TO NOISE AND VIBRATION

The main noise generating source during mining operation and related activities are drilling, excavation, loading, unloading and transportation. Intermittent noise is generated due to operation of diesel generator.

Table 4.13 The likely noise level in the lease area

SL.No	Source Name	Noise Level in dB (A)
1	Diesel generator	102
2	Excavator Operation	95
3	Trucks movement	95
4	Drilling	105
5	Blasting	120

4.2.5.2 MITIGATION MEASURES FOR NOISE CONTROL

The following noise mitigation measures are proposed for control of Noise

- Usage of sharp drill bits while drilling which will help in reducing noise;
- Secondary blasting will be totally avoided and hydraulic rock breaker are utilized for breaking boulders;
- Controlled blasting with proper spacing, burden, stemming and optimum charge/delay will reduce noise;
- The blasting will be carried out during favourable atmospheric condition and less human activity timings by using nonelectrical initiation system;
- Proper maintenance, oiling and greasing of machines will be done every week to reduce generation of noise;

- Provision of sound insulated chambers for the workers working on machines (HEMM) producing higher levels of noise;
- Green Belt will be developed around the project areas and along the haul roads. The plantation minimizes propagation of noise;
- Personal Protective Equipment (PPE) like ear muffs/ear plugs will be provided to the operators of HEMM and persons working near HEMM and their use will be ensured through training and awareness.
- Regular medical check-up and proper training to personnel to create awareness about adverse noise level effects

4.2.5.3 GROUND VIBRATION

The vibration due to blasting can cause damage to the nearby structures if appropriate technology and control measures are not adopted in the blasting operation. Fly rock is another possible damage causing outcome of blasting. There are many factors which influence fly rock during blasting. Most important of these factors are long explosive column with little stemming column, improper burden, loose material or pebbles near the holes and long water column in the hole.

Mitigative Measures

- Proper quantity of explosive, suitable stemming materials and appropriate delay system should be adopted to avoid overcharging and for safe blasting;
- Adequate safe distance from blasting should be maintained as per DGMS guidelines;
- Blasting shelter should be provided as per DGMS guidelines;
- Blasting operations shall be carried out only during day time;
- The charge per delay shall be minimized and preferably more number of delays will be used per blasts;
- During blasting, other activities in the immediate vicinity shall be temporarily stopped;
- Drilling parameters like depth, diameter and spacing will be properly designed to give proper blast;

- Blasting will be carried out under the supervision of statutory persons as approved by DGMS.
- A well-defined SOP will be framed under the leadership of top management and the same will be followed for each blasting.
- Regular PPV monitoring will be carried out to ensure PPV limits i.e., 0.5 mm/s.

4.2.6 BIOLOGICAL ENVIRONMENT

4.2.6.1 ANTICIPATED IMPACT

- The deforestation, soil degradation, water, air, and noise pollution caused by mining operations typically have a direct or indirect negative impact on the fauna and floral composition of the project region.
- Although impacts on important habitat components will happen on a local level, they would not be crucial for the life cycle requirements of the species as seen or anticipated on a regional level.
- Additionally, during the conceptual stage, the top bench's mined-out areas will be re-vegetated by planting native or local species, and the lower benches will be converted into rainwater harvesting structures after the mining activities are finished, replacing habitat resources for fauna species in this area for a longer period of time.
- The Vallanadu Black Buck Sanctuary (Notified under Wildlife Protection Act 1972) is located 11.82 kilometres (NE) from the lease area, and the sanctuary's eco-sensitive zone is 10.25 km away. Additionally, Koonthankulam Bird Sanctuary is situated 12.55 kilometres away in a southwesterly direction. Therefore, NBWL clearance is not relevant. Letter from DFO stating the distance of the Eco sensitive zone and sanctuary is enclosed in Annexure – 8.
- Project may affect the agricultural activities in the region.

4.2.6.2 MITIGATION MEASURES

- No impact on this sanctuary is expected since it is located 10.0 km away from the mines and also there will not be any adverse impact due to mining

operations in this lease since all necessary mitigative measures will be implemented.

- Necessary mitigative measures like dust suppression, proper maintenance of equipment's, roads will be carried out to prevent dust generation.
- There is no proposal to discharge any effluent into nearby water bodies.
- Surface runoff management structures like garland drain, settling pond, protective bund on the northern side etc. as explained above will be constructed and as such there will not be any appreciable impact on surface water quality which in turn can affect the bio diversity of the area.
- Construction of barbed wire fencing all around the boundary to prevent falling of animals in the mine pits.
- The eastern part especially near the Tamirabarani river influenced by Tamirabarani exhibits fertile land, better cultivated. By carrying out scientific mining and implementation of all above said mitigative measures no adverse impact on this front is envisaged.

4.2.6.3 GREENBELT DEVELOPMENT PLAN

In order to compensate the loss of vegetation cover, it is suggested to carry out afforestation program mainly in proposed mine lease area earmarked for plantation program as per Approved Mining Plan in different phases. This habitat improvement program would ensure the faunal species to re-colonize and improve the abundance status in the core zone. Greenbelt / Plantation will be carried out to enhance the vegetative growth and aesthetic in the safety zone area.

Table – 4.14 GREENBELT DEVELOPMENT PLAN

Year	No. of trees proposed to be planted	Survival %	Name of the Species	No. of trees expected to be grown
I	80	80%	Neem, Casuarina, Pongamia pinnata, etc.,	64
II	80	80%		64
III	80	80%		64
IV	80	80%		64
V	80	80%		64

Nearly 0.52.5 Ha. of area is proposed for Greenbelt development by planting 80 Nos of trees during every year and expected growth is around 64 Nos @ survival rate of 80%.

The objectives of the green belt cover will cover the following:

- Noise abatement.
- Reuse of waste water to the extent possible.
- Prevention of soil erosion.
- Ecological restoration.
- Aesthetic, biological and visual improvement of area due to improved vegetative and plantations cover.

During plantation development, the following aspects are considered in different areas:

A) Green belt and safety zone:

- Tall growing, closely spaced, evergreen trees native to the area.
- Easy, quick early growth and establishment.
- Uniform spreading of crown habit.
- Trees with high foliage density, leaves with larger leaf area.
- Attractive appearance with both good flowering and fruit bearing.
- Suitable green cover with minimal maintenance.

4.2.7 SOCIO – ECONOMIC

From the primary Socio-economic survey & through secondary data available from established literature and census data 2011, it is found that there would be positive impact on Socio-economic condition of the nearby area. There is no habitation within 300 m of the proposed mining lease area. Therefore, no major impact is anticipated on the nearby habitation during the entire life of the mine. The entire lease area is in the proponent's possession. Hence, there are no habitations or hutments in the core zone area and no rehabilitation or resettlement problems will arise here.

The mining operations in the proposed mine will employ about 20 persons directly and 20 people on indirect basis through allied opportunities in logistics, trading, repairing works etc. good employment potential will arise, which will provide raising income levels and standards of living in the area through various service related activities connected with the project operations as shown under.

- Project related logistical operations for transport of Rough Stone & Gravel, etc,
- Various trading services for consumer goods, spare parts, sundry items, etc.
- Contractual services connected with the project.
- Green belt and horticultural works in the project.
- Casual labor needs for various activities.

The State and the Central governments will also get benefited through financial revenues by way of royalty, tax etc from this project.

Besides, there will be improvement in the following aspects due to project operation:

Improvement in nearby school facilities, providing education aids etc.

From above details, it is clear that the project operations will have highly beneficial positive impact in the area.

However, towards the socio economic development of the surrounding area, the proponent has earmarked an amount of Rs.5.75 Lakhs under Corporate Environmental Responsibility. This amount will be used only for the Govt. School development.

4.2.8 OCCUPATIONAL HEALTH AND SAFETY

Primary data collection through field survey conducted in the study area reveals that there is no reported incident of any occupational diseases in the area. Hazardous jobs like blasting, loading, etc. are planned to be executed safely and

with all precautionary measures as prescribed in Metalliferrous Mines Regulations of 1961, so as to minimize hazards and incidences of health problems.

Occupational health and safety hazards occur during the operational phase of mining and primarily include the following:

- Respiratory hazards
- Noise
- Physical hazards
- Explosive storage and handling

Respiratory Hazards

Long-term exposure to silica dust may cause silicosis the following measures are proposed:

- Cabins of excavators and tippers will be enclosed with AC and sound proof
- Use of personal dust masks will be made compulsory

Noise

Workers are likely to get exposed to excessive noise levels during mining activities.

The following measures are proposed for implementation

- No employee will be exposed to a noise level greater than 85 dB(A) for a duration of more than 8 hours per day without hearing protection
- The use of hearing protection will be enforced actively when the equivalent sound level over 8 hours reaches 85 dB(A), the peak sound levels reach 140 dB(C), or the average maximum sound level reaches 110 dB(A)
- Ear muffs provided will be capable of reducing sound levels at the ear to at least 85 dB(A)
- Periodic medical hearing checks will be performed on workers exposed to high noise levels

Occupational Health Survey

All the persons will undergo pre-employment and periodic medical examination as per DGMS and 12th National Mines Safety Council recommendation.

The PP will maintain occupational health history card for their Employees.

The PP will establish first aid station within project site.

Good Drinking Water specialty will be provided at the site level.

4.2.9 WASTE MANAGEMENT

4.2.9.1 SOLID WASTE

Since the entire mined out material will be utilized there will not be any solid waste generation from this project. However, the Solid waste (MSW) generated from administrative activities will be properly collected and disposed to Govt. Authorized yards / Re-cylers / Disposers.

4.2.9.2 LIQUID WASTE

There is no process effluent generation from this mine. Hence no liquid waste is generated. Domestic wastewater i.e 0.5 KLD will be discharged in soak pit via septic tank.

4.2.9.3 HAZARDOUS WASTE MANAGEMENT

In this project the following management practices will be followed:

In the quarrying operation, the source of hazardous waste is from machinery maintenance activities that are waste oil/ Waste lubricants / Used filters / Used Hydraulic hoses. The said hazardous waste are very negligible quantity , it will be properly collected in the source level, stored in impervious storage yards and disposed off as per the Hazardous waste (Trans-boundary Movement) Management Rules, 2016.

4.2.9.4 PLASTIC WASTE

Single use plastics/ use and throwaway plastics will be banned in the site as directed by the Tamil Nadu Government vide GO(Ms)No.84 regarding ban on use of plastic products. The employees will be encouraged to use compostable material or reusable material.

5.0 ANALYSIS OF ALTERNATIVES (TECHNOLOGY AND SITE)

5.1 ALTERNATE TECHNOLOGY:

The mining technology is semi mechanized open cast in single-shift operation without any change in technology. The operation will be carried out as per DGMS norms. No alternate technology will be used. Details of the technology used are given in Chapter II.

5.2 ALTERNATE SITE:

The project is a mining project and will be operated within the lease grant area. So no alternate sites have been assessed. Since the resource (Rough stone and Gravel) is site-specific, the chosen location is the only site to carry out Rough Stone & Gravel quarry.

6.0 ENVIRONMENTAL MONITORING PROGRAMME

6.1 GENERAL

The monitoring and evaluation of environmental parameters indicates potential changes occurring in the environment, which paves way for implementation of rectifying measures wherever required to maintain the status of the natural environment. Evaluation is also a very effective tool to judge the effectiveness or deficiency of the measures adopted and provides insight for future corrections.

The main objective of environmental monitoring is to ensure that the obtained results in respect of environmental attributes and prevailing conditions during operation stage are in conformity with the prediction during the planning stage. In case of substantial deviation from the earlier prediction of results, this forms as base data to identify the cause and suggest remedial measures. Environmental monitoring is mandatory to meet compliance of statutory provisions under the Environment (Protection) Act, 1986, relevant conditions regarding monitoring covered under EC orders issued by the SEIAA as well as the conditions set forth under the order issued by Tamil Nadu Pollution Control Board while granting CTE/CTO.

6.2 MONITORING MECHANISM

The PP will undertake effective monitoring and implementation of various environmental control measures promptly and effectively and to oversee various environmental management schemes for air quality control, water quality status, noise level control, plantation programme, social development schemes, etc in the mine.

6.3 ENVIRONMENTAL MONITORING SCHEDULE AND FREQUENCY

The monitoring schedules are planned for systematic study of various pollution levels with respect to air and water qualities, noise levels, etc. to ensure that they conform to the standards laid down by Environmental Protection Act and various statutory Limits. However, based on the need and priority it may be suitably modified / improved in consultation with local authorities. Monitoring may include socio-economic interaction, through local liaison activities or

even assessment of complaints. The monitoring schedules to be adopted in this quarry are given below.

Table 6.1 Environmental Monitoring Schedule

S.NO	Environmental Attribute	Parameters to be monitored	Monitoring Locations	Frequency
1	Air Quality	Particulate Matter (PM2.5 and PM10), Sulphur dioxide (SO ₂), Oxides of Nitrogen (NO ₂), Respirable.	4 locations in the buffer zone and 2 work zone locations.	Once in season
2	Water Quality	General, Physical, and chemical parameters	Ground Water samples (around the project area) and Mine Pit water samples	Once in season
3	Hydrogeology	Water Levels	Nearby wells and Borewells	On yearly basis pre and post monsoon level
4	Noise	Leq. Lmax Lmin, Leq Day & Leq Night dB(A)	Work zone locations and buffer zone villages	Once in Season
5	Vibration	Peak Particle Velocity	Mine periphery	Regular Interval
6	Soil	Physical and Chemical Characteristics	2 Locations (1 Core & 1 Buffer)	Once in Season.
7	Greenbelt	Maintenance	Within the lease area	Regular interval

6.4 BUDGET FOR IMPLEMENTAION

The cost in respect of monitoring of environmental attributes, parameter to be monitored, sampling/monitoring locations with frequency and Monitoring work will be outsourced to external laboratory approved by NABL / MoEF. The capital and recurring cost required for the project are detailed in below table.

Table 6.2 Environmental Management Plan Budget

SI .No	Budget planned for	Capital Cost Amount (INR)	Recurring Cost/Annum Amount (INR)
1	Air Environment	957150	262650
2	Water Environment	11500	5000
3	Noise monitoring	50000	2000
4	Implementation of EC, Mining Plan & DGMS Condition	1213750	886860
5	Greenbelt Development	603000	63000
Total		2835400	1219510

6.5 SUBMISSION OF PERIODICAL REPORTS

The monitored data on air quality, water quality, noise levels and other environmental attributes will be periodically examined by the Mine Management Coordinator and Respective Head of Organization for taking necessary corrective measures.

The monitoring data will be submitted to Tamil Nadu State Pollution Control Board in the Compliance to CTO Conditions & environmental audit statements every year to MoEF & CC and Half-Yearly Compliance Monitoring Reports to MoEF & CC Regional Office and SEIAA.

Periodical reports to be submitted to: -

- MoEF & CC – Six month EC compliance report
- TNPCB - Half yearly CTO Compliance report
- MOEF & CC & TNPCB – annual Environmental Statement Report. (Form – V)
- Annual Hazardous Waste Return(Form – IV)
- Department of Geology and Mining: quarterly, half yearly annual reports.

7.0 ADDITIONAL STUDIES

The following Additional Studies were done as per items identified by project proponent and the regulatory authority.

- Public Consultation
- Risk Assessment
- Disaster Management Plan
- Cumulative Impact Study
- Mine Closure Plan
- Slope Stability Plan
- Hydrogeological Study

7.1 PUBLIC CONSULTATION

This draft EIA/EMP report will be exposed to public consultation as per mandatory procedures through the District Collector and State Pollution Control Board officials after giving 30 days advance notice in two local newspapers about the scheduled date and time for conduct of the public hearing procedures. The opinions, concerns and objections of stakeholders will be recorded during the public hearing. All the public queries and the replies to the query by the project proponent and officials concerned will be recorded and incorporated in the EIA/EMP report for approval by SEIAA, Tamil Nadu.

7.2 RISK ASSESSMENT

The DGMS risk assessment process is intended to identify existing and probable hazards in the work environment and all operations and assess the risk levels of those hazards in order to prioritize those that need immediate attention. Further, mechanisms responsible for these hazards are identified and their control measures, set to timetable are recorded along with pinpointed responsibilities. The whole quarry operation will be carried out under the direction of a Qualified Competent person holding certificate of competency to manage a metalliferous mine granted by the DGMS. Factors of risks involved due to human induced activities in connection with this proposed mining & allied activity with detailed analysis of causes and control measures for the mine is given in below Table 7.1.

Table 7.1 Risk Assessment and Control Measures

S.NO	Risk Factor	Causes of risk	Control Measures
1	Accidents due to explosives and heavy mining machineries	Improper handling and unsafe working practice	<p>All safety precautions and provisions of Mine Act, 1952, Metalliferous Mines Regulation, 1961 and Mines Rules, 1955 will be strictly followed during all mining operations. Entry of unauthorized persons will be prohibited. Fire-fighting and first-aid provisions in the mine office complex and mining area. Provisions of all the safety appliances such as safety boot, helmets, goggles etc. will be made available to the employees and regular check for their use. Quarry operation will be done as per approved mining plan and other applicable statutory guidelines issued by DGMS, Dept. of Mining & Geology-TamilNadu. Handling of explosives, charging and firing shall be carried out under competent statutory persons. A comprehensive standard operating procedure (SOP) will be prepared as per DGMS guidelines and the same will be circulated to all the employees and it will be strictly followed in the all face of mining operation.</p>
2	Drilling	Improper and unsafe practices. Due to high pressure of compressed air, hoses may burst. Drill Rod may break.	<p>Safe operating procedure established for drilling (SOP) will be strictly followed. Only trained operators will be deployed. No drilling shall be commenced in an area where shots have been fired until the blaster/blasting foreman has made a thorough Examination of all places. Drilling shall not be carried on simultaneously on the benches at places directly one above the other. Periodical preventive maintenance and replacement of worn-out accessories in the compressor and drill equipment as per operator manual.</p>

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			Drills unit shall be provided with wet drilling to ensure efficient working.
3	Blasting	Fly rock, ground vibration, Noise and dust. Improper charging, stemming & Blasting/ fining of blast holes. Vibration due to movement of vehicles.	Restrict maximum charge per delay as per approved mining plan. Proper blasting design with optimum spacing & burden, Charge per delay and stemming. SOP for Charging, Stemming & Blasting/Firing of Blast Holes will be followed by blasting crew during initial stage of operation. Shots are fired during day time only. Charging and firing shall be carried out in the same day. Siren will be done for each blasting. Blasting evacuation plan prepared and executed. The danger zone will be distinctly demarcated (by means of red flags).
5	Transportation	Potential hazards and unsafe workings contributing to accident and injuries. Overloading of material. While reversal & overtaking of vehicle. Operator of truck leaving his cabin when it is loaded.	Before commencing work, drivers personally check the dumper/truck/tipper for oil(s), fuel and water levels, tyre inflation, general cleanliness and inspect the brakes, steering system, warning devices including automatically operated audio-visual reversing alarm, rear view mirrors, side indicator lights etc., are in good condition. Unauthorized person will not be allowed to operate or ride on the vehicle. Loading according to the vehicle capacity. Periodical maintenance of vehicles as per operator manual.
6	Natural calamities	Unexpected happenings	An emergency management plan will be prepared considering all possible national calamity and the same will be executed if any such situation occurs. Escape Routes will be provided to prevent inundation of storm water. Fire Extinguishers & Sand Buckets in the designated areas.
7	Failure of Mine Benches and Pit Slope	Slope geometry, Geological structure	Ultimate or over all pit slope shall be below 60° and each bench height shall be 5m height.

7.3 DISASTER MANAGEMENT PLAN

This being a small rough stone project that too working in a safe area, no major disaster is expected after following all the statutory rules and regulations.

7.3.1 MODEL DISASTER MANAGEMENT PLAN

The lessee has formulated the disaster Management plan keeping all eventualities in mind.

The mining operation will be carried out under the direction of qualified mines manager and supervisors, based on the guidelines and directions of Directorate General of Mines Safety (DGMS) and Indian Bureau of Mines. Code of practice of different operations will be formulated to ensure safety of men and machines and to avoid various hazards mentioned above. Mine workers will be provided training on safe work practices. The following natural/ industrial hazards may occur during normal operation; slope failure at the mine faces; accident due to heavy equipment/ machinery.

In order to prevent or take care of hazard / disasters if any the following control measures have been adopted.

- All safety precautions and provisions of Metalliferous Mines Regulations (MMR), 1961 is strictly followed during all mining operations.
- Observance of all safety precautions for blasting and storage of explosives as per MMR 1961.
- Entry of unauthorized persons into mine & allied areas is completely prohibited.
- Fire-fighting and first-aid provisions in the mines office complex and mining area are provided.
- Provisions of all the safety appliances such as safety boot, helmets, goggles, dust masks, ear plugs and ear muffs etc. are made available to the employees and the use of same is strictly adhered to through regular monitoring.
- Training and refresher courses for all the employees working in hazardous premises. Working of mine, as per approved plans and regularly

updating the mine plans.

- Handling of explosives, charging and blasting are carried out only by qualified persons following SOP.
- Checking and regular maintenance of garland drains and earthen bunds to avoid any inflow of surface water in the mine pit.
- Provision of high-capacity standby pumps with generator sets with enough quantity of diesel for emergency pumping especially during monsoon.
- A blasting SIREN is used at the time of blasting for audio signal.
- Before blasting and after blasting, red and green flags are displayed as visual signals. Warning notice boards indicating the time of blasting and NOT TO TRESPASS are displayed at prominent places.
- Regular maintenance and testing of all mining equipment were carried out as per manufacturer's guidelines.

7.3.2 OBJECTIVE OF DISASTER MANAGEMENT PLAN

The objective of disaster management plan is to identify mitigation measures to avoid hazards turning in to risk, the materials required for implementing the same, the personnel requirement and their roles and responsibilities, and the communication and operating procedures to be adopted in case of an emergency.

Communication System

The telephone numbers and addresses of mine sites in the vicinity, nearest fire station, police station, local hospital, electricity department, ambulance, and local public representatives and revenue officials shall be prepared and kept in custody of PP.

Facilities

The office shed will have provision of first aid centre to provide first aid in the event of an emergency. The office shed will also function as emergency control room. It will be provided with telephone and mobile phones, and a vehicle for emergency transport.

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Personnel

The PP is responsible for overall supervision of the disaster management plan. He will be assisted by supervisors, in implementing the emergency management plan and procedures.

Operating Procedures

The operating procedures during emergencies are related communication to the immediate supervisor, who would relay the same to PP. The PP may assess the requirement of first aid, external assistance, transportation to nearby hospital contingent on the emergency. In the absence of mines manager, the senior most supervisor will be made responsible for disaster management.

7.4 CUMULATIVE IMPACT STUDY

There are only one existing Quarry and 4 Abandoned quarries within a radius of 500 m from this proposed project area. The existing quarry and proposed quarries situated within 500 m radius are presented in below Table 7.2. and the letter received from Dept. of Geology and Mining, Thoothukudi stating the quarries detail within 500m radius is enclosed in Annexure – 3.

Table 7.2 Details of Quarries within 500m radius

S.NO	Name and address of the lessee	Quarry Location	Extent in Ha.	File no. & Lease period
Existing Quarry				
1	K.Vijayakumar, S/o. Karunakaran, Post Office Street, Thenthiruperai Village, Tiruchendur Taluk.	S.F.Nos. 519/1, 519/3 & 520 Therkukarseri Village, Srivaikundam Taluk	4.59.50	RC.No.464/G&M/2017,Dated: 24.08.2018 Period – 24.08.2018 – 23.08.2023
Proposed Quarry				
1.	Thiru.K.Subbiah, S/o. Karunakaran, 8/11, Nadu Theru, Mavadipannai,	S.F. Nos. 507 & 508, Therkukaraseri Village,	4.21.50	Under Processing (This Project)

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	Thoothukudi District- 628 623	Srivaikuntam Taluk		
Total Mine Lease area in cluster			8.81.00	-

As seen above, although the individual lease area of this project is less than 5 hectares, the existing Thiru.K.Vijayakumar Quarry within a 500-meter radius, along with this subject project, add up to more than 5 hectares. A map showing the existing and proposed quarry located within 500m radius is given in Figure 1.1.

The baseline monitoring conducted for this project reflects the cumulative impact of the existing quarry, considering that the lease period of the existing quarry will be coming to an end shortly.

Table 7.3 Salient Features of Existing and Proposed Quarries

Description	P1	P2
Name of the Quarry	Thiru.K.Vijayakumar Rough Stone & Gravel Quarry	Thiru.K.Subbaiah Rough Stone & Gravel Quarry
Land Type	Patta Land	Patta Land
S.F.Nos.	519/1, 519/3 & 520	507 & 508
Village	Therkukarseri	Therkukarseri
Extent	4.59.50 Ha.	4.21.5
Mineable Reserves	Rough Stone – 1,56,755 m ³ Gravel – 34,944 m ³	Rough tone – 4,64,760 m ³ Gravel – 84,222 m ³
Lease Period	5 years (24.08.2018 to 23.08.2023)	5 years
Water Requirement	4.5 KLD	4.0 KLD
Machinery	Jack Hammer, Compressor, Hydraulic Excavator & Tippers	Jack Hammer, Compressor, Hydraulic Excavator & Tippers

The drilling, blasting, excavation, and transportation activities in the two quarries (the proposed project and the existing quarry) within the cluster are expected to have the cumulative impact. These quarry operations are also expected to have significant effects on the air, water, noise environment, and Socio-economic environment.

7.4.1 AIR ENVIRONMENT

The cumulative production load of existing and proposed Rough stone and gravel quarries within cluster is shown in below table.

Table 7.4 Cumulative Production Load of Rough Stone

Quarry	Mineable Reserves	Per Year Production	Per Day Production	No. of Lorry Load per day
P2 (K.Subbaiah)	4,64,760 m ³	93620 m ³	312 m ³	32Trips / day
P1 (K.Vijayakumar)	1,56,755 m ³	31,351 m ³	105 m ³	11 Trips / day
Total	621,515 m³	1,24,971 m³	417 m³	43 Trips / day

Table 7.5 Cumulative Production Load of Gravel

Quarry	Mineable Reserves	Per Year Production	Per Day Production	No. of Lorry Load per day
P2 (K.Subbaiah)	84,222 m ³	21945 m ³	73 m ³	8Trips / day
P1 (K.Vijayakumar)	34,944 m ³	6989 m ³	23 m ³	3 Trips / day
Total	1,19,166 m³	28934 m³	96 m³	11 Trips / day

7.4.2 CUMULATIVE IMPACT ON TRAFFIC

The mined out minerals will be transported by means of trucks to the consumers like crusher units for producing stone aggregates of different sizes or construction of roads, bridges, buildings and other buyers etc. The cumulative impact on traffic due to transportation of minerals from both these leases are provided below:

Table 7.6 Impact on Traffic

Quarry	Description	Rough Stone	Gravel	Total
I	No. of Lorry Load per day	32	8	40
II		11	3	14
Total				54

Because the quarry II is already there, it is part of the current traffic. The proposed project will have 40 trips per day of traffic. The existing road can absorb this traffic due to this project. Various measures like proper maintenance of road, covering of

the loaded truck with tarpaulin, water sprinkling will be carried out to ensure no adverse impact on the logistical front.

7.4.3 WATER ENVIRONMENT

The quantum water required for Thiru.K. Subbaiah Quarry is 4.0 KLD and for Thiru.K. Vijayakumar Quarry is around 4.5 KLD. Though it may be sourced from outside agencies initially, for these projects it is planned to use the rain water collected in the mine sump water.

The ground water table in this area is very deep. Hence, ground water intersection in not envisaged and ground water will not be affected appreciably due to the quarrying operation.

In both these projects, the domestic sewage to be generated from the project will be collected in septic tank with soak pits.

Rainwater will be collected in lower part of the quarry pit by construction of garland drains to divert surface run-off and will be connected to setting tank of 6 m (l) x 6m (w) x 3m (d) to allow suspended solids to settle down if any. This collected water will act as a rain water harvesting system and will be used for dust suppression and greenbelt development.

Only clear and settled water free from silt content will be used for dust suppression and greenbelt development.

Tippers & HEMM will be washed in a designated area and the washed water will be routed through drains to a settling tank, which has an oil & grease trap, only clear water will be reused for greenbelt development.

7.4.4 CUMULATIVE IMPACT ON SOCIO-ECONOMIC ENVIRONMENT

Both lease areas are own patta land. Hence, there are no habitations or hutments in the core zone area and no rehabilitation or resettlement problems will arise. The mining operations in the 2 mines will provide direct employment opportunity and indirect employment opportunity for scores of people through allied

opportunities in logistics, contract workers, trading, repairing works etc. Towards development of the surrounding area, under Corporate Environmental Responsibility Rs 5.75 lakhs has been earmarked separately for both the projects. Various mitigative measures suggested in this report will be properly implemented to ensure that no adverse impact is felt on the socio economic and ecological front in the area.

7.5 CLUSTER MINE CLOSURE PLAN

In the mine closure stage all necessary measures will be taken as per Act & Rules, there is no proposal for back filling, reclamation and rehabilitation in any of the proposals. The quarried pits after the end of life of mine will be properly fenced all around to prevent inherent entry of public and cattle and all the statutory requirements will be fulfilled. As already explained, in the post mining stage the rainwater harvested in the mined out void shall be utilized for irrigation and domestic needs locally. The mine closure plan is provided in Figure 2.12.

7.6 SLOPE STABILITY PLAN

The factors that affect slope stability of the mine are detailed below.

- Geological structure comprising dip, intervening shear zone formation, clay intrusion, joints / discontinuities, faults etc.,
- Lithology of formation
- slope geometry
- Ground water availability which may cause increased thrust on the faces

Site Specific Analysis

- The quarry lease area is plain terrain which is covered by weathered rock formation. The rock type noticed in the lease area is Charnockite which contains mostly Quartz and Feldspar with some ferromagnesian.
- Since the formation is of homogeneous rock type probability of slope failure is low and can be avoided if proper measures are adopted.

- There will be a 7.5m safety zone which will form a ridge which can also take care of the top section and as such no risk is envisaged on this front.

Mitigation Measures

- Regular inspection of the mine faces to be carried out by pp for ensuring absence of any structural features like faults, joints, dyke, intrusive material in the rock strata which may affect the slope stability and cleared.
- No loose material or boulders is to be stacked on the mine top or pit benches.
- Height of the benches should be 5m.
- Haul road formation will be at 1 in 15 slope with adequate road width.
- There will be no ground water table intersection.
- No seepage is expected due to formation. Adequate drainage management system comprising peripheral garland drain, settling pond to regulate monsoon water will be created to prevent saturation of compact layers, apparent drainage over the bench slope to avert damages to quarry face and manage the water flow.

7.7 HYDROGEOLOGICAL STUDY

The district is underlain by both porous and fissured formations. The important aquifer systems in the district are constituted by i) unconsolidated & semi-consolidated formations and ii) weathered and fractured crystalline rocks. The porous formations in the district include sandstones and clays of Recent to subrecent and Tertiary age (Quaternary).

The Ground Water levels from the 46 number of observation wells of PWD have been monitored for every month. These monthly water level data was converted in season wise like winter (January and February), summer (March, April and May), southwest (June, July, August, September) and northeast (October, November and December) monsoon.

Monsoon and non-monsoon seasonal below groundwater level (BGL) in meter contour spatial maps (Figure 7.1 and 7.2).

Figure 7.1 shows spatial fluctuation of water level in monsoon season of the study area during 2013 to 2022. The overall pattern of groundwater level exhibits highly variation (2.66 m to 15.03 m) with the shallow water level condition of the study area during NE monsoon period. Over view of spatial fluctuation of NE monsoon season is increased shallow depth area compare with summer and SW monsoon season, due to the impact of southwest and northeast monsoon rainfall.

Figure 7.2 shows spatial fluctuation of water level in non-monsoon season of the study area during 2013 to 2022. The overall pattern of groundwater level exhibits highly variation (3.9 m to 15.62 m) with the shallow to moderate water level condition of the study area. Over view of spatial fluctuation of summer season is more are less similar to the winter season.

FIELD INVESTIGATION

There is Tambraparni river passing northeastern side of the area and is 8Km away from the area. There is a odai on northern side of the area and is 50m distance maintained. In the seasonal streams were observed in dry condition.

In this representation in the two seasons, the water level substantially gets fall-down in the Non-monsoon season, because of the rainfall impact and it extended up to the Monsoon season. Some of the wells water level is shallow depth in both seasons. These dug wells is located nearby water bodies. So, clearly shows that surface water is impact in these wells.

The shallow depth of groundwater level in the monsoon season. It is interesting to note that the water level is increased because of heavy rainfall during the southwest and northeast monsoon. The groundwater table level is substantially increased in the monsoon season.

In the study area, the shallow aquifer is developed through dug wells and deeper aquifer through tube wells. The study has revealed that potential fractures are encountered at deeper levels. The water in the wells are available mainly monsoon and it reduces during non-monsoon demanding the groundwater. Bore wells are deep and it reflects that the yield is only better at deeper water levels.

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The wet nature of weathered Hornblende biotite gneiss rock with water containing in less than 16 m. Therefore, this layer is classified as temporary aquifer (weathered Hornblende biotite gneiss rock with water).

Rain water collected in the tanks in the region acts as a good source of water during monsoon season. In order to increase the recharge, tanks, and percolation ponds may be provided with the recharge wells/recharge shafts penetrating this impervious layer to make it more effective in recharging the aquifer.

STAGE OF GROUNDWATER DEVELOPMENT

The groundwater resource data of Thoothukudi District was obtained from the data provided in DISTRICT GROUNDWATER BROCHURE THOOTHUKUDI DISTRICT, TAMIL NADU by A.BALACHANDRAN, SCIENTIST-D, Ministry of Water Resources, Central Ground Water Board, South Eastern Coastal Region, Chennai.

Ground Water Resources – Srivaikundam Taluk

Net Groundwater Availability (M.Cu.m)	Existing Gross use for Irrigation (M.Cu.m)	Existing Gross use for Domestic and industrial water supply (M.Cu.m)	Existing Gross use for all uses (M.Cu.m)	Stage of Ground water Development (%)	Category of Block
35.44	4.88	1.80	6.69	19	Safe

From the table it is seen that the stage of groundwater development of Srivaikundam Taluk where the study area falls is 19%. In view of this, this area can be categorized as 'Safe' from ground water development point of view. Thus there is scope for further ground water development.

The quarrying operation is proposed upto a depth of 33 m maximum below ground level, the water table in the area is 85m below ground level, hence the project will not intersect the Ground water table during entire quarry period.

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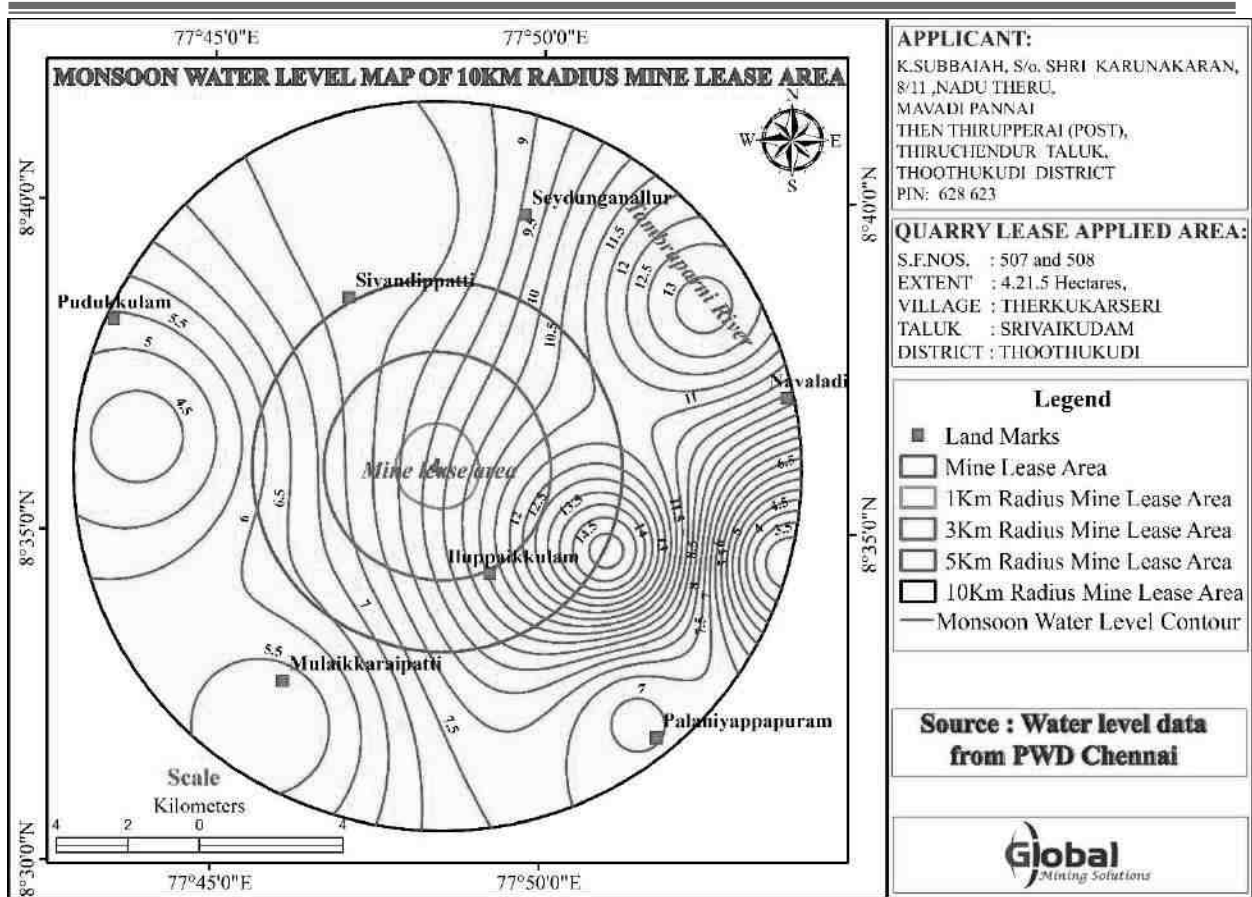


Figure 7.1 Monsoon Water Level of the Study Area

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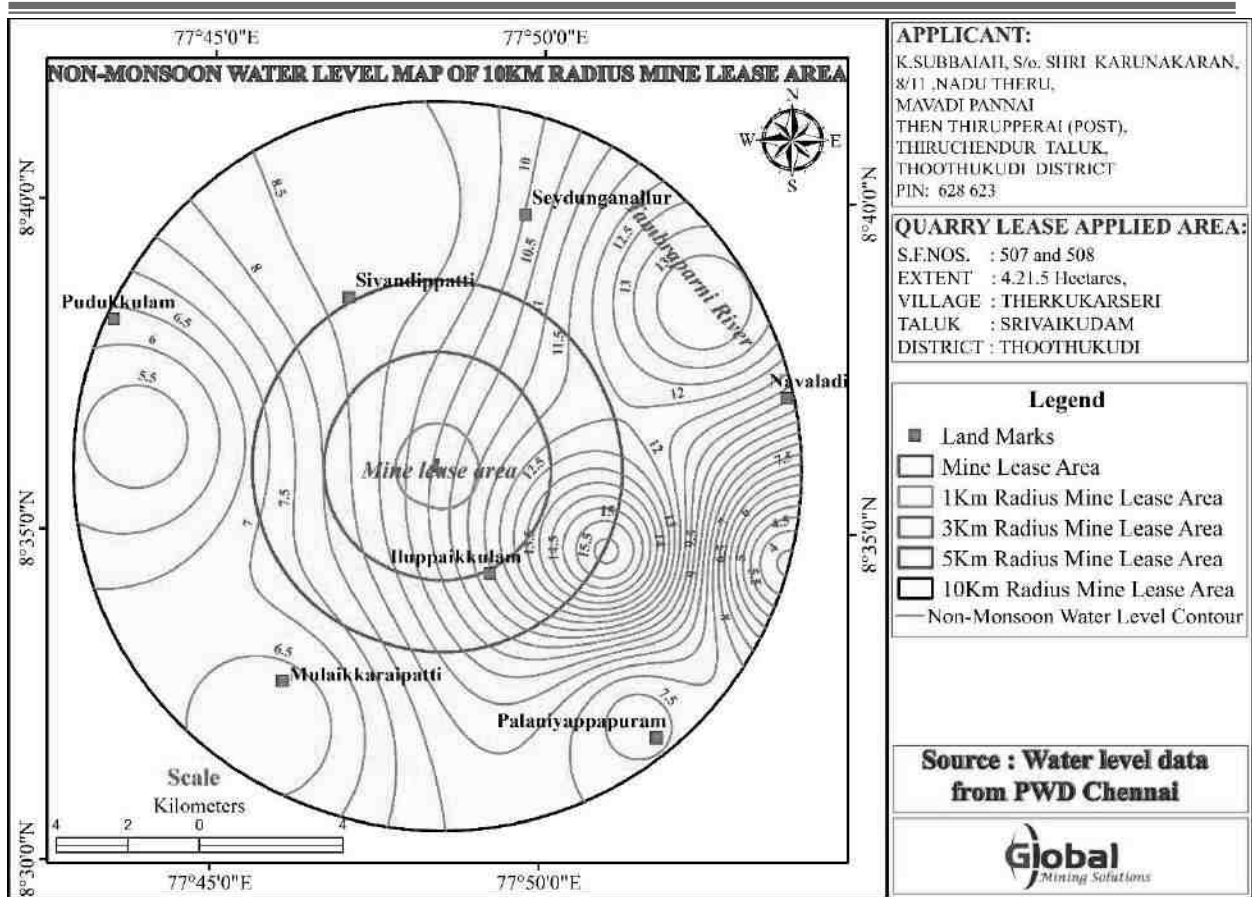


Figure 7.2 Non Monsoon Water Level of the Study Area

8.0 PROJECT BENEFITS

The project area is located on waste land, thereby causing no impact on the loss of agriculture or forest land. The project will create employment opportunities in the area. There will be no adverse effect of mining on the socioeconomic status of the people; rather, mining activities will improve their standard of living. The mining activity creates employment opportunities for the local people, and this definitely raises their economic status. Apart from the overall beneficial impact of the project on the local people of the region, it is felt necessary to augment facilities in the fields of education, health, and social awareness, including concern for the environment and ecosystem.

The mining activity at proposed Rough Stone & Grave of Thiru. K. Subbaiah cluster will create direct employment opportunity for 20 local people. The PP has proposed CER amount of Rs. 5.7 Lakhs for project surrounding schools development.

9.0 ENVIRONMENTAL COST BENEFIT ANALYSIS

Environmental Cost Benefit Analysis is recommended during the scoping stage, if needed. In the TOR granted by SEIAA, Tamil Nadu, it is not recommended. Hence not applicable.

10.0 ENVIRONMENTAL MANAGEMENT PLAN

The Environmental Management plan is a site-specific plan. It is developed to ensure that the project is implemented in an environmentally sustainable manner, where all contractors and subcontractors, including consultants if any, understand the potential environmental risks arising from the project and take appropriate actions to minimize those risks. EMP also ensures that the project implementation is carried out in accordance with the planned design and by taking appropriate mitigation measures to reduce adverse environmental impacts during project's life cycle.

10.1 ENVIRONMENTAL POLICY

The Project Proponent – Thiru. K. Subbaiah shall carry out all the quarrying operations and activities in an environmentally responsible manner and to continually improve environmental performance.

The Proponent will:

- Abide by all laws, ordinances, rules, and regulations that are pertinent to its operations and activities.
- Allocate the resources required to guarantee that the environmental policy is carried out.
- Implement a programme to educate employees about environmental issues in general and their personal environmental responsibilities at work.
- Set up monitoring systems to alert as soon as there is a problem or a performance that is unexpected in relation to environmental protections.

10.2 ENVIRONMENTAL MANAGEMENT PLAN

The impacts due to this mining project are detailed in chapter 4. Mitigation measures at the source level and an overall Management Plan at the site level are elaborated in this chapter. Details of EMP measures for implementation in the mine are given in the table 9.1.

Table 10.1 ENVIRONMENTAL MANAGEMENT PLAN

Environmental Parameter	Mitigation Measures
Air	Wet drilling to suppress the dust emission from drill machine
	Regular water sprinkling on haulage road through fixed water sprinkler.
	1.5 m ³ /day of water will be used for dust suppression.
	Avoiding blasting during high wind period, night times and temperature inversion periods.
	Regular grading of haul road to clear accumulation of loose material.
	It will be ensured that vehicles are properly maintained to comply with exhaust emission requirements
	Maintenance as per operator manual of the equipment and machinery in the mines to minimizing air pollution
	Ambient Air Quality Monitoring carried out in the project area and in surrounding villages to access the impact due to the mining activities and the efficacy of the adopted air pollution control measures.
	Afforestation for control of dust.
Water	
Surface water	<p>There is a Odai within M.L area in northside,for which 50 m safety distance has given.</p> <p>There are no perennial water sources very near to the project area. However, thamarabarani is located at a distance of 7.86 km in NE direction but there is no effluent discharge from this proposed Quarry. So no impact is anticipated.</p> <p>Surface runoff management structures like garland drain of required length which is connected to a settling pond will be constructed around the quarry to collect the rain water.</p> <p>Monthly or after rainfall, inspection for performance of water management structures and systems.</p> <p>There is no discharge of any effluent into nearby water bodies.</p>
Ground Water	The quarrying operation is proposed upto a depth of 33 m maximum below ground level, the water table in the area is 85m below ground level, hence the project will not intersect the Ground water table during entire quarry period.

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Water Consumption and Wastewater generation	The required water of 4.0 KLD will be procured from outside agencies initially and later rainwater harvested in the mine pit shall be used other than drinking purpose.
	Domestic wastewater generation of 0.5 KLD will be discharged in soak pit via septic tank.
	Conduct ground water and surface water monitoring for parameters specified by CPCB
Noise	The workers employed are provided with personal protective equipment (PPE) as such, earmuffs and ear- plugs for the protection from high noise level generated at the mine site wherever required.
	Noise levels are controlled by using optimum explosive charge, proper delay detonators and proper stemming to prevent blow out of holes.
	Development of thick greenbelt all along the Buffer Zone (7.5 Meters) of the project area to attenuate the noise and the same will be maintained.
	Preventive maintenance of mining machinery and replacement of worn-out accessories to control noise generation.
	Regular ambient noise level monitoring are carried out in the project area and in surrounding villages to access the impact due to the mining activities and the efficacy of the adopted noise control measures.
Ground Vibration and Fly Rock Control	Controlled blasting using delay detonators will be carried out to maintain the PPV value well within the prescribed standards of DGMS.
	Drilling and blasting will be carried under the supervision of qualified persons.
	ensure blast holes are adequately stemmed for the depth of the hole and stemmed with suitable angular material.
	Undertake noise or vibration monitoring.
Land Environment	There is no change will be in the land use pattern as mentioned in the approved mining plan a such mine pit, safety zone etc., At conceptual stage, the mining pits will be converted into Rain Water Harvesting. Remaining area will be converted into greenbelt area.
	Garland drains with catch pits / settlement traps to be provided all around the project area to prevent run off affecting the surrounding lands.
	The periphery of Project area will be planted with thick plantation to arrest the fugitive dust, which will also act as acoustic barrier.
	Frequent Soil and ground water testing as per Environmental Monitoring Plan.
Top Soil / Overburden	As per approved mining plan no top soil and over burden have been anticipated. During operation if, any top soil is being generated which will be preserved and used for plantation. In case of over burden generated it will be used for quarry bund formation.

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Biological Environment	During mining, three layer thick plantation will be carried out around the project periphery, on safety barrier zone, on top benches of quarried out area etc.,
	The main attributes that retard the survival of sapling is fugitive dust, this fugitive dust can be controlled by water sprinkling on the haul roads and installing a sprinkler unit near the newly planted area.
	Regular review on Green belt development programme.
	Year wise greenbelt development plan mentioned in Chapter IV

10.3 ADMINISTRATION AND TECHNICAL SETUP

The Environment Monitoring Cell discussed under Chapter 6 will ensure effective implementation of environment management plan and to ensure compliance of environmental statutory guidelines through Mine Management Level. The organizational chart for the same has been given below.

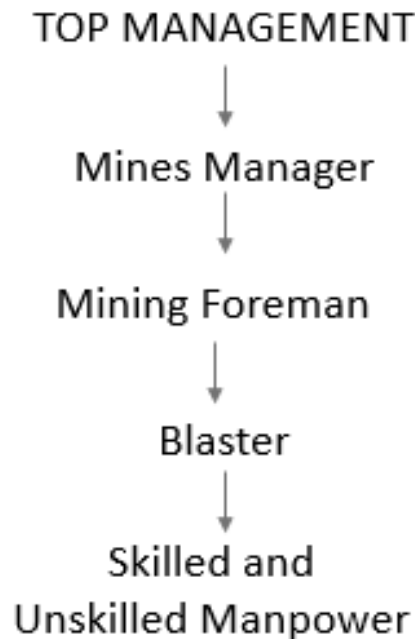


Figure 10.1 Organization Chart

The action plan for monitoring consists of monitoring of following environmental components.

- Monitoring of the water/ waste water quality, air quality and solid waste generated
- Analysis of the water and air samples collected through external laboratory
- Implementation and monitoring of the pollution control and protective measures/ devices which shall include financial estimation, ordering, installation of air pollution control equipment, waste water treatment plant, etc.
- Co-ordination of the environment related activities within the project as well as with outside agencies
- Green belt development
- Monitoring the progress of implementation of the environmental monitoring programme
- Compliance to statutory provisions, norms of State Pollution Control Board, Ministry of Environment and Forests and the conditions of the environmental clearance as well as the consents to establish and consents to operate.

10.4 OCCUPATIONAL SAFETY & HEALTH MANAGEMENT

Occupational safety and health are very closely related to productivity and good employer-employee relationship. The main factors of occupational health impact in quarries are fugitive dust and noise. Safety of employees during quarrying operation and maintenance of mining equipment will be taken care as per Mines Act 1952 and Rule 29 of Mines Rules 1955. To avoid any adverse effect on the health of workers due to dust, noise and vibration sufficient measures have been provided. The health status of workers in the mine shall be regularly monitored under an occupational surveillance program. Under this program, all the employees are subjected to a detail medical examination at the time of employment.

10.5 BUDGETARY PROVISION FOR ENVIRONMENTAL MANAGEMENT

Adequate budgetary provision has been made by the Company for execution of Environmental Management Plan. The below Table gives overall investment on the environmental safeguards and recurring expenditure for successful monitoring and implementation of control measures.

Table 10.2 Environmental Management Plan Budget

Sl .No	Budget planned for	Capital Cost Amount (INR)	Recurring Cost/Annum Amount (INR)
1	Air Environment	957150	262650
2	Water Environment	11500	5000
3	Noise monitoring	50000	2000
4	Implementation of EC, Mining Plan & DGMS Condition	1213750	886860
5	Greenbelt Development	603000	63000
Total		2835400	1219510

10.6 CONCLUSION

Various aspects of mining activities were considered and related impacts were evaluated. Considering all the possible ways to mitigate the environmental concerns, Environmental Management Plan was prepared and fund has been allocated for the same. The EMP is dynamic, flexible and subjected to periodic review. For project where the major environmental impacts are associated, EMP will be under regular review. Senior Management responsible for the project will conduct a review of EMP and its implementation to ensure that the EMP remains effective and appropriate. Thus, the proper steps will be taken to accomplish all the goals mentioned in the EMP and the project will bring the positive impact in the study area.

11 SUMMARY AND CONCLUSION

11.1 INTRODUCTION

Thiru. K. Subbaiah applied for Rough Stone and Gravel Quarry over an extent of 4.21.5 Ha in S.F.Nos. 507 & 508, Therkukaraseri Village, Srivaukundam Taluk, Thoothukudi District Tamil Nadu. The entire land is patta land.

As per EIA notification, 2006 and subsequent amendments the proposed "Rough Stone & Gravel" Quarry of Sudhakaran" mines cluster falls under Schedule Sl. No. 1(a) of EIA notification and subsequent amendments the project comes under Category B1. Terms of Reference with Public Hearing (ToR) for the project was issued vide Lr No.SEIAA-TN/F.No.9684/SEAC/ToR-1424/2022 Dated: 18.04.2023. Now, this Draft EIA / EMP Report is prepared for conducting Public Hearing as the projects falls under B1 Category.

Although the individual lease area of this project is less than 5 hectares, the existing Thiru.K.Vijayakumar Quarry within a 500-meter radius, along with this subject project, add up to more than 5 hectares. A map showing the existing and proposed quarry located within 500m radius is given in Figure 1.1. This cluster includes the nearby existing Quarry of Thiru.K. Vijayakumar at Survey No. 519/1, 519/3 and 520 over an area of 4.59.50 Ha. The lease period of this existing quarry will be coming to an end shortly.

This project proposed to produce 4,64,760 Cu.m of rough stone & 84,222 cu.m. of Gravel and the annual peak production 93620 cu.m. of Rough Stone(4th Year) & 21945 Cu.m of Gravel (1st year)and for the period of 5 years with ultimate depth upto 33m.

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11.2 PROJECT DESCRIPTION

Table 11.1 Salient Features of the Project

Description	Salient Feature
Name of the Project	Thiru. K. Subbaiah Rough Stone and Gravel Quarry
Location of the Project	S.F.Nos. 507 & 508, Therkukaraseri Village, Srivaikundam Taluk, Thoothukudi District Tamil Nadu.
Latitude & Longitude	Latitude: 8°35'53.36"N to 8°36' 05.57"N Longitude: 77°48'19.34"E to 77°48'29.55"E
Toposheet No.	58H/14
ML Area	S.F No. 507 – 2.62.0 Ha. S.F No. 508 – 1.59.5 Ha. Total – 4.21.5 Ha.
Type of Land	Patta Land
Geological Resource	Rough Stone – 12,62,820 m ³ Gravel – 1,26,282 m ³
Mineable Reserves	Rough Stone – 4,64,760 m ³ Gravel – 84,222 m ³
Life of the mine	5 years
Proposal for this mining plan	Rough Stone – 4,64,760 m ³ Gravel – 84,222 m ³
Proposed depth of mining	33 m
Method of Mining	Opencast semi mechanized mining involving drilling and blasting
Proposed bench height and width	Bench Height & Width – 5m.
Total Waste	NIL
Top Soil / Overburden	There is no waste generation anticipated in this quarry operation since the entire excavated material will be utilized.
Water Requirement & source	Total – 4.0 KLD. The required water will be procured from outside agencies initially. Later, water collected in the mine pit will be used to meet the needs.
Proposed Manpower Deployment	20 Nos
Total Project Cost	Rs. 2,84,51,760/-
Nearest Highway	SH 40 – Tiruchendur – Palayamkottai road – 7.51 km, NE NH 44 – Srinagar- Kanyakumari Highway – 13.18 km, W
Nearest Railway Station	Thathankulam Railway Station – 4.88 km, NE
Nearest Airport	Tuticorin Airport – 27.03 km, NE Trivandrum International Airport – 98.61 km
Nearest Major Water bodies	Core Zone

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	An Odai crossing within the project site in northern side, for which 50 m safety distance has been provided as per condition stipulated in the precise order. Buffer Zone Thamirabarani River – 7.86 km, NE
Environmental sensitive areas, Protected areas as per Wildlife Protection Act, 1972 (Tiger reserve, Elephant reserve, Biospheres, National parks, Wildlife sanctuaries, community reserves and conservation reserves)	Koonthankulam Bird Sanctuary – 12.55 km, SW Vallanadu Black Buck Sanctuary – 11.82 km, NE Vallanadu Black Buck Sanctuary – ESZ – 10.25 km, NE
Reserved / Protected Forests	Vallanadu R.F – 12.59 km, NE
Nearest Town	Town – Srivaikundam – 12.04 km, NE City – Srivaikundam – 12.04 km, NE District – Tirunelveli – 16.60 km, NW District Thoothukudi – 37.75 km, NE
Seismic Zone	Zone II

11.3 DESCRIPTION OF THE ENVIRONMENT

The baseline monitoring study was carried out during March to May 2023 to assess the existing environmental scenario in the area. For the purpose of EIA studies, project area was considered as the core zone and area outside the project area up to 10km radius from the periphery of the project site was considered as buffer zone. Baseline Environmental data has been collected for: -

- a) Land
- b) Water
- c) Air
- d) Noise
- e) Biological
- f) Socio-economic status

11.3.1 LAND ENVIRONMENT

The existing land use pattern of the study area is tabulated below in table 11.2.

11.2 Land use Pattern of the study area

Sl.No.	LULC_CLASS	Area in Sq.km	Percentage (%)
1	Crop Land	12.61	3.879
2	Built-up Land	10.53	3.239
3	Canal	0.01	0.003
4	Plantations	73.56	22.628
5	Fallow Land	6.13	1.887
6	Hill and Forest	2.67	0.822
7	Land with scrub	34.69	10.671
8	Land without scrub	147.48	45.370
9	Mining process	2.98	0.917
10	River	2.86	2.862
11	Tanks	31.54	9.703
Total		325.06	100

Source: Survey of India Toposheet and Landsat Satellite Imagery

11.3.2 SOIL CHARACTERISTICS

Results of the soil samples show that the pH values were found to be 7.35 to 7.89 and Electrical Conductivity values were ranging between 111.0 – 145 μ mhos/cm. Soils are generally Silt Loam. Organic matter values were ranging between 0.87 – 2.55 %. Total Nitrogen values were ranging between 231- 751mg/kg. Phosphorus values were ranging between 0.57 – 3.26 μ g/g. Potassium values were ranging between 596 – 766 mg/kg. Sodium values were ranging between 121 – 199 mg/kg. Total Sulphur values were observed to be BDL. The soil quality data for the 3 samples collected and analyzed are provided in Table no – 3.12.

11.3.3 AMBIENT AIR QUALITY

The results of ambient air quality monitoring for the period (March to May 2023) are presented in Chapter 3. The ambient air quality data for PM₁₀, PM_{2.5}, SO₂, NO₂, CO

studied at 5 locations as per prescribed guidelines/ methods. As per the monitoring data, the PM10 values were in the range of 34.9 – 54.62 $\mu\text{g}/\text{m}^3$. PM2.5 values were in the range of 17.4 – 28.9 $\mu\text{g}/\text{m}^3$. SO2 levels were ranging from 3.1– 4.1 $\mu\text{g}/\text{m}^3$. NO2 levels were ranging from 5.7 – 13.3 $\mu\text{g}/\text{m}^3$. While comparing with the NAAQ Norms laid by MoEF, all monitored values of PM10, PM2.5, SO2 and NO2 were found to be well within the prescribed standards. The CO values in the all locations found to be below detectable limit (DL – 1144 $\mu\text{g}/\text{m}^3$).

11.3.4 WATER ENVIRONMENT

As Per the data it has been observed that the pH value varies from 7.7- 8.3, Chlorides Ranges From 21-155 mg/l, Sulphates value found to be between 18.1-81.5 mg/l, Fluoride Ranges low in lease area i.e. 0.29 – 0.75, Hardness varies from 9.6-194 mg/l, and Total dissolved solid 298-416 mg/l. The ground water has been analyzed as per IS10500: 2012 and found to be suitable for drinking purpose. So the results of chemical and bacteriological analysis of water samples are classified under good class for drinking purpose with respect to total dissolved solids. Total hardness of the samples ranged from soft to moderately hard waters and can be fairly used for drinking. Regular ground water monitoring is suggested as the quality of ground water may fluctuate with groundwater consumption and seasonal variations.

11.3.5 NOISE ENVIRONMENT

Ambient noise levels were measured at 5 locations around the proposed project area. The day Equivalent Noise (Leq-d) level were ranging from 46.3 to 49.2 dB(A) and Night Equivalent Noise (Leq-n) level were ranging from 37.3 to 43.1 dB(A). Day and Night Equivalent Noise (Leq-n) level were ranging from 45.1 to 48.9 dB(A). While comparing with the MoEF Norm of 55 dB(A) for day time and 45 dB(A) for night time in Residential areas, the monitored ambient noise levels are within the limit values.

11.3.6 BIOLOGICAL ENVIRONMENT

There is no schedule I species of animals observed within study area as per Wildlife Protection Act 1972 as well as no species is in vulnerable, endangered or threatened

category as per IUCN. There is no endangered red list species found in the study area. Hence this small operation over short period of time will not have any significant impact on the surrounding flora and fauna.

11.3.7 SOCIO-ECONOMIC ENVIRONMENT

An attempt has been made to assess the impact of the proposed mining project at Therkukaraseri Village on Socioeconomic aspect of the study area. The various attributes that have been taken into account are population composition, employment generation, occupational shift, household income and consumption pattern. Implementation of the Proposed Mine Project will generate both direct and indirect employment. Besides, Mining operation will be legally valid and it will bring income to the state exchequer.

11.4 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

The main scope of the EIA study is to quantify the cumulative impact in the study area due to cluster quarries and formulate the effective mitigation measures for each individual leases. A detailed account of the emission sources, emissions control equipment, background Air quality levels, Meteorological measurements, Dispersion model and all other aspects of pollution like effluent discharge, Dust generation etc., have been discussed in Chapter 4 of this report.

The project proponent will adopt all the necessary mitigation measures and management plan mentioned in this report and also comply the conditions stipulated in Environmental clearance and CTO of this project.

11.5 ENVIRONMENTAL MONITORING PROGRAM

Environmental Monitoring program will be conducted for various environmental components as per conditions stipulated in Environmental Clearance Letter issued by SEIAA & Consent to Operate issued by TNPCB. Post project monitoring program is detailed in Chapter 6.

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PP will supervise the overall environmental management plan of the project during operation. The capital cost of Rs. 28,35,400/- and the recurring cost of Rs. 12,19,510/- have been allocated under the EMP budget.

11.6 ADDITIONAL STUDIES

Terms of Reference with Public Hearing (ToR) for the project was issued vide Lr No.SEIAA-TN/F.No.9684/SEAC/ToR-1424/2022 Dated: 18.04.2023. Now, this Draft EIA / EMP Report is prepared for conducting Public Hearing as the projects falls under B1 Category.

No high-risk accidents are anticipated as it is small scale semi-mechanized Quarry with essential light machinery. The area is not prone for landslides, seismic activities, subsidence, floods, inundation etc. As there are no rivers and habitation in the vicinity of probable disaster from the mine lease area. Elaborate description in respect of Risk Assessment and Mine closure plan are given in Chapter – 7.

Although the individual lease area of this project is less than 5 Ha, the other existing and proposed quarries within the 500m radius along with this subject project works out to >5 Ha. A Cumulative impact study is conducted to determine the impact of the existing and proposed quarries on the environment.

11.7 CONCLUSION

EIA study was performed as per the approved ToR. Various environmental attributes were studied relating with aspects of mining activities. The related impacts were identified and evaluated. Considering all the possible ways to mitigate the environmental concerns Environmental Management Plan was prepared and accordingly fund was allocated. The EMP has been dynamic, flexible and subject to periodic review.

The project will increase the revenue of the State Govt. as well as it will help in the social upliftment of the local community. The green belt development programme will

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help in increasing the green cover in the area. Thus, the proposed project is not likely to affect the environment or adjacent ecosystem adversely.

The Mine Management will be responsible for the project review of EMP and its implementation to ensure that the EMP remains effective and appropriate. Thus, the proper steps will be taken to accomplish all the goals mentioned in the EMP and the project will bring the positive impact in the study area.

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12 DISCLOSURE OF CONSULTANTS

Global Mining Solutions is a NABET Accredited EIA consultant as per NABET certificate NABET/EIA/2326/IA 0110. The registered office of Global Mining Solutions is at Plot No.6, S.F.No.13/2 A2, VS City, RC Chettypatty, Kottamettupatty, Omalur, Salem, Tamilnadu-636455.

Declaration by Experts contributing to the proposed Rough Stone & Gravel Quarry over an extent of 4.10.30 Ha, while total cluster area of 8.91.30 Ha at Keelnaickenpalayam Village, Vembakkam Taluk, Tiruvannamalai District, Tamil Nadu.

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

EIA Coordinator Name: M. Manikandan Manickam


Signature & Date

Period of involvement: March 2023 to May 2023.

Contact information:


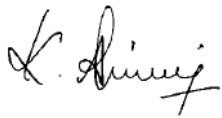


M/s Global Mining Solutions

Plot No.6, SF No. 13/2, A2, VS City, RC Chettypatty,



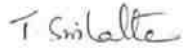


Kottamettupatty, Omalur,

Salem, Tamil Nadu – 636 455

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S. No.	Functional areas	Name of the expert/s	Involvement (period and task**)	Signature and Date
1	AP	Dhanalakshmi Ramanathan	Assessment of existing air quality, Impact of the project on ambient air and suggested mitigation measures for air pollution. <u>Period: March 2023 to May 2023.</u>	
2	WP	Abirami Kaliaperumal	Assessment of existing water quality, impact of the project on surface and ground water quality, suggested mitigation measures for minimizing the impact. <u>Period: March 2023 to May 2023.</u>	
3	SHW	Ramadoss N	Assessment of waste generated from the project, suggested waste management practices. <u>Period: March 2023 to May 2023.</u>	
4	SE	Sarasvathy K	Baseline SE study. Data compilation and assessment. Impact of the project on SE status of the area. Formulation of CER plan. <u>Period: March 2023 to May 2023.</u>	

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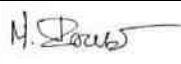

5	EB	Saravanan S	<p>Baseline data collection of related to ecology of the area.</p> <p><u>Period: March 2023 to May 2023.</u></p>	
6	HG	Ravinthiran N	<p>Hydrogeological feature of the area. Ground water depth and impact of project on ground water of the area.</p> <p><u>Period: March 2023 to May 2023.</u></p>	
7	AQ	Srilatha Thiruveedhula	<p>Air quality modeling utilizing the area source model. Predication of the ground level concentration of the dust. Suggesting suitable mitigation measures.</p> <p><u>Period: March 2023 to May 2023.</u></p>	
8	NV	Dhanalakshmi Ramanathan	<p>Ambient noise study of the area. Incremental noise generation due to quarry operation and impact of the noise due to the project.</p> <p><u>Period: March 2023 to May 2023.</u></p>	
9	LU	Srilatha Thiruveedhula	<p>Preparation of land use map based on satellite imagery. Land use classification and analysis. Impact prediction of the project on the surrounding land environment.</p>	

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			<u>Period: March 2023 to May 2023.</u>	
10	RH	S.V. Prashant	<p>Identification of the Risk related to the mining activities. Preparation of emergency disaster management plan. Plan for supply of safety equipment for the worker.</p> <p><u>Period: March 2023 to May 2023.</u></p>	<i>S.V. Prashant</i>
11	SC	Shisupal Sing	<p>Soil monitoring, secondary data collection on soil type, soil management practices, utilization of topsoil.</p> <p><u>Period: March 2023 to May 2023.</u></p>	<i>Shisupal Sing</i>
12	GEO	Valliappan Meyyappan	<p>Geological map, stability of quarry and dump, management plan for mine stability, after use of mining quarry and geological feature of the area.</p> <p><u>Period: March 2023 to May 2023.</u></p>	<i>Valliappan</i>

TM-FAE:

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S.No	Name of TM(FAE)	Functional Area	Approved FAE (to work under)	Period of involvement	Type of work	Signature
1	M. Prabu	LU	T.Srilatha	March to May2023	Associated with FAE in preparing Land use map based on satellite imagery, Land use classification and analysis, Impact prediction on surrounding land environment	
		HG	Ashok Kumar		Associated with FAE in studying hydro-geology pattern of study area, studying water and the impact of the project on ground water.	
2	Manikandan Manickam	EB	S.Saravanan	March to May2023	Associated with the expert in baseline data collection related to ecology of the study area.	
		SC	Shishupal Singh		Associated with the expert in soil monitoring, secondary data collection on soil type, soil management practices, utilization of top soil.	

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TM-FAA

S. No	Name of TM(FAE)	Functional Area	Approved FAE (to work under)	Period of involvement	Type of work	Signature
1	Suresh	WP	Abirami Kaliyaperumal	March to May 2023	Associated with the expert in assessing existing water quality, studying impact of the project on surface and ground water quality, suggesting mitigation measures for minimizing impact.	<i>M. Suresh</i>
		AP	Dhanalakshmi		Associated with expert in assessing existing air quality, impact of the project on ambient air and suggesting mitigation measures for air pollution.	
2	S.Kamara j	SC	Shishupal Singh	March to May 2023	Associated with the expert in soil monitoring, secondary data collection on soil type, soil management practices, utilization of top soil.	<i>S. Kamraj</i>
		RH	S.V.Prashant		Associated with the expert in identification of the risk related to the mining activities. Preparation of	

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					emergency disaster management plan, plan for supply of safety equipment for the workers.	
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