

DRAFT EIA / EMP REPORT

FOR

ROUGHSTONE, JELLY & GRAVEL QUARRY

EXTENT- 4.97.0 Ha

**FIVE YEAR PRODUCTION OF 7,57,111 m3 OF
ROUGHSTONE, 47,076 m3 OF WEATHERED ROCK
AND 24,080 m3 OF GRAVEL**

SURVEY NO – 530/3A,531/1A, 532, 533/1, 568/5A(P) and 569/3A

**VILLAGE - THARUVAI, TALUK - PALAYAMKOTTAI,
DISTRICT - TIRUNELVELI, STATE - TAMILNADU**

CATEGORY- B1

THIRU S. KASIRAJAN

**S/o. Subbaiah,
No.760, Bazaar Street,
Seevalaperi, Palayamkottai Taluk, Tirunelveli – 627101**

CREATIVE ENGINEERS & CONSULTANTS

NABET ACCREDITED, NABL ACCREDITED TESTING LABORATORY &

ISO 9001: 2015 CERTIFIED COMPANY

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JULY 2021

PROJECT PROPONENT DECLARATION

I, Thiru S.Kasirajan, received ToR under EIA Notification 2006 from SEIAA, Tamil Nadu vide their SEIAA-TN/F.No.7174/SEAC/ToR-841/2020 dated 17.02.2021 for mining lease for Roughstone, Jelly and Gravel Quarry at Survey No. 530/3A,531/1A, 532, 533/1, 568/5A(P) and 569/3A over an area of 4.97.0 Hectares in Tharuvai Village, Palayamkottai Taluk, Tirunelveli District, Tamil Nadu.

We have entrusted the EIA study to M/s. Creative Engineers & Consultants (CEC), Chennai who have been accredited by the National Accreditation Board for Education & Training (NABET), Quality Council of India with their accreditation valid upto 23.03.2023.

The Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) have been prepared as per the generic structure proposed in the EIA notification 2006, ToR issued by SEIAA, Tamil Nadu. The prescribed ToR along with compliance is also incorporated in the EIA Report.

This report is prepared based on the information and data obtained from the Mining Plan and other records and the field study carried out by the consultant. The data given in the EIA/EMP report are factually correct to the best of my knowledge.



Thiru.S.Kasirajan,



CREATIVE ENGINEERS & CONSULTANTS

(NABET ACCREDITED, NABL ACCREDITED TESTING LABORATORY,
ISO 9001: 2015 CERTIFIED & DEPARTMENT OF INDUSTRIES AND COMMERCE
REGISTERED COMPANY)

EIA Consultant Undertaking

[In compliance with MoEF Office Memorandum No. J-11013/41/2006-IA.II (I) dated 04.08.2009]

Creative Engineers & Consultants (CEC) is an ISO 9001:2015 certified company with NABL accredited testing Laboratory, and also NABET accredited Category–A environment consultancy organization for preparing EIA/EMP reports for the sectors Mining of minerals, Thermal power plants, Mineral Beneficiation & Cement plants.

CEC has been accredited by the National Accreditation Board for Education & Training (NABET), Quality Council of India for empanelment of EIA Consultants. The Certificate of Reaccreditation vide No – NABET/EIA/2023/RA 0187 dated 18.12.2020 is issued with validity up to 23.03.2023.

Thiru S.Kasirajan, received ToR under EIA Notification 2006 from SEIAA, Tamil Nadu vide their SEIAA-TN/F.No.7174/SEAC/ToR-841/2020 dated 17.02.2021 for mining lease for Roughstone, Jelly and Gravel Quarry at Survey No. 530/3A,531/1A, 532, 533/1, 568/5A(P) and 569/3A over an area of 4.97.0 Hectares in Tharuvai Village, Palayamkottai Taluk, Tirunelveli District, Tamil Nadu.

The prescribed TOR is complied with and incorporated in the EIA Report and submitted. This report is based on the information and data obtained from Approved Mining Plan, other records and data from the field study by CEC. The data generated and given in the EIA/EMP Report are factually correct. The sample analyses are carried out through CEC's laboratory.

(P. Giri)

Chief Executive & EIA Coordinator

Creative Engineers & Consultants

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TERMS OF REFERENCE & ITS COMPLIANCE



Thiru. K.V. GIRIDHAR, I.F.S.,
MEMBER SECRETARY

STATE LEVEL ENVIRONMENT IMPACT
ASSESSMENT AUTHORITY - TAMIL NADU

3rd Floor, Panagal Maaligai,
No.1, Jeenis Road, Saidapet,
Chennai-15.

Phone No. 044-24359973

Fax No. 044-24359975

TERMS OF REFERENCE (ToR)

Lr No.SEIAA-TN/F.No.7174/SEAC/ToR- 841/2020 Dated:17.02.2021

To

Thiru. S. KasiRajan
S/o. Subbaian
No. 760, Bazzar Street
Seevalaperi, Palayamkottai Taluk
Tirunelveli District - 627107

Sir / Madam,

Sub: SEIAA, Tamil Nadu - Terms of Reference with Public Hearing (ToR) for the Proposed Rough Stone, Jelly and Gravel quarry over an Extent of 4.97.0 Ha in at S.F.Nos. 530/3A, 531/1A, 532, 533/1, 568/5A(P) and 569/3A, Tharuvai Village- Palayamkottai Taluk, Tirunelveli District, Tamilnadu - By Thiru. S. KasiRajan under project category - "B1" 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/44114/2019, 03.10.2019.
 2. Your application submitted for Terms of Reference dated: 04.10.2019.
 3. Minutes of the 191st SEAC Meeting held on 30.12.2020.
 4. Minutes of the 420th SEIAA Meeting held on 04.02.2021.

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




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The proponent, Thiru. S. KasiRajan has submitted application for ToR on 04.10.2019, in Form-I, Pre- Feasibility report for the Rough Stone, Jelly and Gravel quarry over an extent of 4.97.0 Ha in at S.F.Nos. 530/3A, 531/1A, 532, 533/1, 568/5A(P) and 569/3A, Tharuvai Village, Palayankottai Taluk, Tirunelveli District, Tamil Nadu.

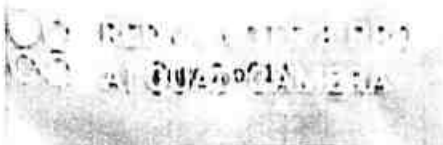
Discussion by SEAC and the Remarks:-

The proposal was placed in the 191st SEAC Meeting held on 30.12.2020. Based on the presentation and documents furnished by the project proponent, SEAC decided to recommend the proposal for the grant of standard Terms of Reference with public hearing for undertaking Environment Impact Assessment and preparation of Environment Management Plan subject to the following specific conditions in addition to the points mentioned in 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. Restricting the depth of mining to ultimate depth of 54m considering the hydro geological regime of the surrounding area.
2. The Project Proponent shall furnish the contour map of the water table detailing the number of wells located around the site and its impacts on the wells due to mining activity.
3. The Project Proponent shall conduct the hydro-geological study to evaluate the impact of proposed mining activity on the groundwater table, agriculture activity, and water bodies such as rivers, tanks, canals, ponds etc. located nearby by the proposed mining area.
4. The Project Proponent shall furnish the details on number of groundwater pumping and open wells within 1 km (radius) along with the water levels in both monsoon and non-monsoon seasons. The proponent also shall collect the data of water table level from the PWD / TWAD in this area in both monsoon and non-monsoon seasons.
5. The Proponent shall carry out the Cumulative impact study on the Agricultural area due to Mining, Crushers and other activities around the site area.
6. The details of surrounding well and the cumulative impact on the ground water shall be part of EIA study.
7. The Socio economic studies should be carried out within 10 km buffer zone from the mines.



[Signature]
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8. A tree survey study shall be carried out (nos. name of the species, age) in the mining lease applied area and its management during mining activity.
9. CER activities should be carried out taking into consideration the requirement of the local habitants available within the buffer zone as per Office Memorandum of MoEF&CC dated 01.05.2018.
10. A Detailed mining closure plan for the proposed project shall be submitted.
11. A detail report on the safety and health aspects of the workers and for the surrounding habitants during operation of mining for drilling and blasting shall be submitted.
12. The recommendation for the issue Terms of Reference is subject 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).
13. A detailed study of the lithology of the mining lease area shall be furnished.
14. The proponent shall carryout fugitive emission survey due to this quarry operation and furnish its mitigation measures in the EMP
15. The proponent shall provide fencing along the boundary of the mining lease area.
16. The proponent has to furnish the actual mining quantity carried year wise from the date of commissioning of quarry.

Discussion by SEIAA and the Remarks:-

The proposal was placed before the 420th SEIAA Meeting held on 04.02.2021. After detailed discussion, the Authority noted as follows.

1. The Proponent Thiru. S.Kasirajan has filed a proposal for obtaining Terms of Reference under cluster to carryout EIA study for Rough Stone, Jelly and Gravel Quarry over an Extent of 4.97.0 Ha at S.F.Nos. 530/3A, 531/1A, 532, 533/1, 568/5A (P) and 569/3A of Tharuvai Village, Paluyamkottai Taluk, Tirunelveli District. The proponent has also submitted the proposal through online proposal No. SIA/TN/MIN/44114/2018 dated 03.10.2019.
2. As per the 191st SEAC minutes (Agenda No.191-33), the project/activity is covered under Category "B" of I(a) Mining of minerals of the Schedule to the EIA Notification, 2006.




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3. In SEAC minutes, it has not been indicated whether the project is covered under 'B1' or 'B2' category and the SF.NO. 530/3A has been inadvertently mentioned as 503/3A.
4. As per the Assistant Director, Department of Geology & mining letter Re. No. M1/36182/2018 dated 07.08.2019, the extent of cluster of other quarries located within 500m radius from this quarry is more than 5.0 Ha and hence this proposal will come under 'B1' category under cluster situation.
5. As per the EIA Notification, 2006 as amended, All Category 'A' and Category B1 projects or activities shall undertake Public Consultation, except certain activity.
6. The SEAC in its 191st meeting has recommended the proposal for the grant of standard Terms of Reference with public hearing for undertaking Environment Impact Assessment and preparation of Environment Management Plan subject to the certain specific conditions in addition to the points mentioned in the standard terms of reference for EIA study and subject to some special conditions and one such is.
 - a. Restricting the depth of mining to ultimate depth of 54m considering the hydro geological regime of the surrounding area.

In view of the above, the Authority unanimously accepts the recommendation of SEAC and decided to grant Terms of Reference with public hearing for undertaking Environment Impact Assessment and preparation of Environment Management Plan for Rough Stone, Jelly and Gravel Quarry over an Extent of 4.97.0 Ha at S.F.Nos. 530/3A, 531/1A, 532, 533/1, 568/5A (P) and 569/3A of Tharuvai Village, Palayamkottai Taluk, Tirunelveli District subject to the conditions as recommended by SEAC & normal condition in addition to the following condition.

1. "As per the recommendation of SEAC, the ultimate depth of mining is restricted to 54m. Hence the proponent shall furnish the copy of revised mining plan with proportionate mineable quantity for the aforesaid restricted depth of 54m while submitting the proposal for Environmental Clearance.
2. 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.




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- and slope study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided.
- 9) The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc. should be for the life of the mine / lease period.
 - 10) Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.
 - 11) Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given.
 - 12) 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

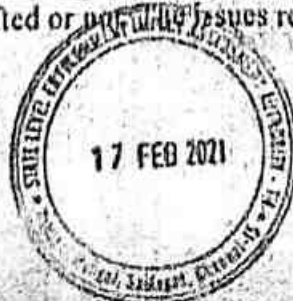



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- mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the Standing Committee of National Board of Wildlife and copy furnished.
- 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. Issues relating to shifting of village(s) including




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- 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 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




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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 (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 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




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- 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-11013/41/2006-1A.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-11011/618/2010-1A.II(I) dated 30.5.2012, certified report of the status of compliance of the conditions stipulated in the Environment Clearance for the existing operations of the project, should be obtained from the Regional Office of Ministry of Environment, Forest and Climate Change, as may be applicable.
- 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




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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.

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




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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 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 & Forests Department, Govt. of Tamil Nadu, Fort St. George, Chennai - 9.
2. The Chairman, Central Pollution Control Board, Parivesh Bhavan, CBD Cum-Office Complex, East Arjun Nagar, New Delhi 110032.
3. The Member Secretary, 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 & C.C., Paryavaran Bhavan, CGO Complex, New Delhi 110003
6. The District Collector, Tirunelveli District.
7. Stock File.



சென்னை, 17.02.2021
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DRAFT EIA/EMP REPORT FOR ROUGHSTONE, JELLY AND GRAVEL QUARRY OF THIRU. S.KASIRAJAN AT SURVEY NO. 530/3A, 531/1A, 532, 533/1, 568/5A(P) AND 569/3A OVER AN AREA OF 4.97.0 HA IN THARUVAI VILLAGE, PALAYAMKOTTAI TALUK, TIRUNELVELI DISTRICT, TAMIL NADU.

TOR COMPLIANCE

ToR received from SEIAA, vide letter No. SEIAA-TN/F.No.7174/SEAC/ToR-841/2020 dated 17.02.2021

S.NO	POINT WISE TOR	REPLY	PG NO
SECTOR SPECIFIC STANDARD TOR			
1	Restricting the depth of mining to ultimate depth of 54m considering the hydro geological regime of the surrounding area.	This project pertains to the production of 7,57,111m ³ of Rough Stone and 47,076m ³ of Weathered Rock and 24,080m ³ of Gravel upto a restricted depth of 54m for the period of Five years.	1-2
2	The Project Proponent shall furnish the contour map of the water table detailing the number of wells located around the site and its impacts on the wells due to mining activity.	The general depth to water level for is obtained from India-WRIS, Department of Water Resources, Ministry of Jal Shakti for Palayamkottai Block, Tirunelveli District, Tamil Nadu has been provided under Para 3.6.2, Chapter-III. Study of the depth of water table in 6 wells and 2 bore wells in the nearby areas show that the wells are as deep as 50ft to 60ft. Water level ranged from 25 feet to 45 feet. The pre monsoon and post monsoon depth to water level map has been provided in Figure No.3.21 and 3.22, Chapter-III.	3-52 3-56 & 57
3	The Project Proponent shall conduct the hydro-geological study to evaluate the impact of proposed mining activity on the groundwater table, agriculture activity, and water bodies such as rivers, tanks, canals, ponds etc. located nearby by the proposed mining area.	The details of hydro geological scenario of the study area has been provided under para 3.6.5, Chapter-III.	3-54
4	The Project Proponent shall furnish the details on number of groundwater pumping and open wells within 1 km (radius) along with the water levels in both monsoon and non-monsoon seasons. The proponent also shall collect the data of water table level from the PWD/TWAD in this urea in both monsoon and non-monsoon seasons.	Study of the depth of water table in 6 wells and 2 bore wells in the nearby areas show that the wells are as deep as 50ft to 60ft. Water level ranged from 25 feet to 45 feet. Bore wells are 250-300 ft deep , give better yield post monsoon whereas the yield becomes very less later.	3-55



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S.NO	POINT WISE TOR	REPLY	PG NO
5	The Proponent shall conduct the Cumulative impact study on the agricultural area due to Mining. Crushers and other activities around the site area.	<ul style="list-style-type: none"> • Geologically the area in and around the lease area contains charnokite type rock formation and as such no major vegetation is observed. However, patches of agricultural activities are observed in few places in the monsoon season based on water availability. • A Cumulative impact study is conducted to determine the impact of the existing and proposed quarries on the environment. Its details are given under para 7.3, Chapter-VII. 	7-1
6	The details of surrounding well and the cumulative impact on the ground water shall be part of EIA study.	<ul style="list-style-type: none"> • Geologically the area in and around the lease area contains rocky formation and as such no major vegetation is observed nearby. However, patches of agricultural activities are observed in few places in the monsoon season near the river and tanks based on water availability, which are away and will not be affected. • A Cumulative impact study is conducted to determine the impact of the existing and proposed quarries on the environment. Its details are given under para 7.3, Chapter-VII. 	7-1
7	The Socio economic studies should be carried out within 10km buffer zone from the mines.	The salient details of Socio economic survey conducted in nearby villages are provided under Para 3.2.4, Chapter-III.	3-10
8	A tree survey study shall be carried out (nos. name of the species. age) in the mining lease applied area and its management during mining activity.	<ul style="list-style-type: none"> • Details of flora pattern in core and buffer zones have been described in para 3.5.1, Chapter-III. • At the end of the life of the mine, entire 4.29.0 Ha of mined out area will be left as water body. 0.02.0Ha will be the mine roads and 0.66.0Ha will be covered 	3-45 4-20



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S.NO	POINT WISE TOR	REPLY	PG NO
		with vegetation. Its details are provided in Para 4.6.4, Chapter-IV.	
9	CER activities should be carried out taking into consideration the requirement of the local habitants available within the buffer zone as per Office Memorandum of MoEF&CC dated 01.05.2018	Towards the socio economic development of the surrounding area, the proponent has earmarked an amount of Rs.5.0 Lakhs towards community development. The activities will be implemented in a phased manner in the following areas:	4-23
10	A detailed mining closure plan for the proposed project shall be submitted.	Mine plan along with mine closure plan for this project was approved by Assistant Director, Geology & Mining, Tirunelveli vide Rc.No.M1/36182/2018, dated 22.07.2019. (Annexure-2)	A-4
11	A detail report on the safety and health aspects of the workers and for the surrounding habitants during operation of mining for drilling and blasting shall be submitted.	Details of occupational health and safety aspects are given under the subsections of Para 4.8, Chapter-IV. By means of carrying out scientific mining, safe blasting and implementing the mitigation measures detailed in the EIA/EMP report, no adverse impact of mining activities on the nearby villages is envisaged.	4-24
12	The recommendation for the issue Terms of Reference is subject to the outcome of the Hon'ble NCT, Principal Bench, New Delhi in O.A No.186 of 2016 (M.A.No.350/2016) and O.A. No.200/2015 and O.A.No.580/2016 (M.A.No.1182/2016) and O.A.No.102/2017 and °.A.No .404/2016(M.A.No .758/2016,M.A.No .92012016,M.A.No .1122/2016,M.A.No.t 212017 & 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).	Agreed	--
13	A Detailed study of the lithology of the mining lease area shall be furnished.	The geology, geomorphology, soil and lithology of the study area has been provided under the subsections of Para 3.6, Chapter-III.	3-50
14	The Proponent shall Carryout fugitive emission survey due to this quarry operation and furnish its mitigation measures in the EMP	<ul style="list-style-type: none"> • Air quality modeling details are furnished in para 4.2.1 and its continuous sub paras in Chapter-IV of EIA report. • The details of mitigation measures to be adopted to 	4-1



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S.NO	POINT WISE TOR	REPLY	PG NO
		control the impact on air quality due to mining operations in the lease area is given under Para 4.2.1, Chapter-IV.	
15	The Proponent shall Provide fencing along the boundary of the mining lease area.	Entire mined out area will be properly fenced to prevent inadvertent entry of men and animals.	--
16	The proponent has to furnish the actual mining quantity carried year wise from the date of commissioning of quarry.	This is a fresh project. Part of the lease area is already quarried out by the previous lessee Thiru S.Subbiah. Its details are provided in Para 2.1.1, Chapter-II.	2-1
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.	This is a fresh project. Part of the lease area is already quarried out in the previous lessee Thiru S.Subbiah. Its details are provided in Para 2.1.1, Chapter-II.	2-1
2	A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.	Precise area communication letter was obtained from the District Collector, Tirunelveli vide Rc.No.M1/36182/2018 dated 21.05.2019. (Annexure-1)	A-1
3	All documents including approved mine plan, EIA and Public Hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management, mining technology etc. and should be in the name of the lessee.	The production capacity, quantity of waste, its management and mining technology in mine plan and EIA, etc., are compatible with one another.	--
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 coordinates superimposed in lease plan and in a High Resolution Imagery are given as Figure No - 2.2 in Chapter - II & Figure No - 3.1 in Chapter - III. The 10km Radius Index plan showing buffer zone is given in Figure No.3.1 in Chapter - III.	2-3 3-2
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	The 10km Radius Index plan in survey of India Toposheet showing features is given in Figure No.3.1, Chapter - III. The Geomorphology map (Figure No.3.17), Geology of the study area (Figure No.3.18),	3-2 3-51



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S.NO	POINT WISE TOR	REPLY	PG NO
	mining history of the area, important water bodies, streams and rivers and soil characteristics.	Lithology (Figure No.3.19), Soil map (Figure No.3.20) are provided in Chapter-III.	& 54
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.	Not Applicable.	--
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.	In this proposed project, appropriate environmental monitoring programme are framed. Regular, systematic and sustained programme schedules for implementation and monitoring of various control measures are devised with clear cut guidelines of various concerned plans for keeping a continuous surveillance on the various environmental quality parameters in the area. The Mines Manager/Mine Incharge 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. Its details are provided in para 6.1, Chapter VI.	6-1
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 and the safeguard measures are detailed in para 7.4 of Chapter 7. This being an opencast mine, subsidence is not applicable. The impact due to ground vibrations due to blasting is given in para 4.4.2, Chapter-4.	7-13 4-15
9	The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc. should be for the life of the mine / lease period.	The study area chosen for collecting existing environmental status covers 10 km radial distance from the project periphery (Figure No - 3.1). Data given in the report is for the life of the mine.	3-2
10	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of	• Land use of the study area is studied through satellite imagery to demarcate forest area,	3-38



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S.NO	POINT WISE TOR	REPLY	PG NO
	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.	<p>agricultural land, etc. in the study area and the details are given in Para 3.4, Chapter – III.</p> <ul style="list-style-type: none"> • The present and post mining land use are detailed in para 4.5 and 4.5.1, Chapter - IV. • At the end of the life of the mine, entire 4.29.0 Ha of mined out area will be left as water body. 0.02.0Ha will be the mine roads and 0.66.0Ha will be covered with vegetation. • In the post mining stage the rainwater harvested in the mined out void shall be utilized in the water starved area. 	4-18
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 utilised. 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 in the lease area.	--
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.	--



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S.NO	POINT WISE TOR	REPLY	PG NO
14	Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.	Not Applicable.	--
15	The vegetation in the RF / PF areas in the study area, with necessary details, should be given.	Detailed floral list of the study area is given in para 3.5.1 of Chapter – III.	3-45
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.	3-3
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.	Same reply as ToR point no. 16	--
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 an&Wildlife Department and details furnished. Necessary allocation of funds for	A detailed study of flora and fauna composition in the core and buffer zone of the project has been made and the details are furnished in para 3.5, Chapter III.	3-45



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S.NO	POINT WISE TOR	REPLY	PG NO
	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.	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 w.r.t CRZ, coastal features such as mangroves, if any, should be furnished. (Note: The Mining Projects falling under CRZ would also need to obtain approval of the concerned Coastal Zone Management Authority).	Not Applicable	--
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 shilling of village(s) including their R&R and socio-economic aspects should be discussed in the Report.	The mining activities will be carried out within the mine lease area only. The entire mine lease area of 4.97.0Ha is a patta land. There is no population within the ML area. Hence, the question of R& R does not arise.	7-14



DRAFT EIA/EMP REPORT FOR ROUGHSTONE, JELLY AND GRAVEL QUARRY OF THIRU. S.KASIRAJAN AT SURVEY NO. 530/3A, 531/1A, 532, 533/1, 568/5A(P) AND 569/3A OVER AN AREA OF 4.97.0 HA IN THARUVAI VILLAGE, PALAYAMKOTTAI TALUK, TIRUNELVELI DISTRICT, TAMIL NADU.

S.NO	POINT WISE TOR	REPLY	PG NO
		<p>ambient air quality monitoring locations are given Table No-4.1 and 4.2.</p> <ul style="list-style-type: none"> From the modelling prediction it can be seen that the resultant added concentrations with baseline figures for PM10, PM2.5, after adopting necessary mitigative measures are within the prescribed limits. 	
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.	The total water requirement for this project will be 4.0 KLD comprising 0.5KLD drinking water, 2.0KLD for dust suppression, 0.5KLD for greenbelt, 1.0KLD for domestic use. The water will be sourced initially from outside agencies. Later the rainwater collected in the mine pit sump will be used for this purpose.	4-8
25	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.	Not applicable	--
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.	Water conservation measures and rain water harvesting plan are furnished in Para 4.3.4 in Chapter IV.	4-11
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.	<p>There are no seasonal drainage courses nearby. Pond / eri located in the nearby area will be additionally strengthened and periodical desilting activities under CER activities will be carried out to augment the storage capacity of the tank.</p> <p>The mining area consists of hard compact rock, hence no major water seepage within the mine is expected from the periphery. From the nearby working quarries it is observed there are no seepages in the mine faces because of the hard rock formation. Similar situation is expected in this lease also.</p>	4-10
28	Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and	<ul style="list-style-type: none"> The mining area consists of hard compact rock, hence no major water seepage within the mine is 	3-50



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S.NO	POINT WISE TOR	REPLY	PG NO
	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.	<p>expected from the periphery. From the nearby working quarries it is observed there are no seepages in the mine faces because of the hard rock formation. Similar situation is expected in this lease also.</p> <ul style="list-style-type: none"> • Details of hydro geological study are given in Para 3.6, Chapter – III. 	
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 are no seasonal drainage courses nearby. Pond / eri located in the nearby area will be additionally strengthened and periodical desilting activities under CER activities will be carried out to augment the storage capacity of the tank. This being a mining project there will be no effluent generation or discharge. As such no major impact is envisaged on the nearby water bodies due to project operations.	4-10
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.	<ul style="list-style-type: none"> • The area applied for quarry lease exhibits almost plain topography covered by Gravel formation. • The mining operations will be carried out to the restricted depth of 54 m for a period of 5 years. • The mining area consists of hard compact rock, hence no major water seepage within the mine is expected from the periphery. From the nearby working quarries it is observed there are no seepages in the mine faces because of the hard rock formation. Similar situation is expected in this lease also. 	2-7
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	Greenbelt / Plantation will be carried out in the safety zone area to enhance the vegetative growth and aesthetic in the safety zone area. In the post mining stage, an area of 0.66.0Ha will be under greenbelt and	4-20



DRAFT EIA/EMP REPORT FOR ROUGHSTONE, JELLY AND GRAVEL QUARRY OF THIRU. S.KASIRAJAN AT SURVEY NO. 530/3A, 531/1A, 532, 533/1, 568/5A(P) AND 569/3A OVER AN AREA OF 4.97.0 HA IN THARUVAI VILLAGE, PALAYAMKOTTAI TALUK, TIRUNELVELI DISTRICT, TAMIL NADU.

S.NO	POINT WISE TOR	REPLY	PG NO
	same will have to be executed up front on commencement of the. Project. Phasc-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.	plantation.	
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.	From this proposed quarry the entire output will be transported to the consumers like crusher units for producing stone aggregates of different sizes. The number of trips per hour works out to 8 trips/hr. The existing road can absorb this additional traffic due to this project. Details of the same are provided in Para 4.9, Chapter-IV.	4-24
33	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.	This is a proposed project. Site services like mine office, first aid room, rest shelters, toilets etc. will be provided as semi-permanent structures.	2-13
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 end of the life of the mine, entire 4.29.0 Ha of mined out area will be left as water body. 0.02.0Ha will be the mine roads and 0.66.0Ha will be covered with vegetation. Entire mined out area will be properly fenced to prevent inadvertent entry of men and animals. In the post mining stage the rainwater harvested in the mined out void shall be utilized in the area.	4-20



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S.NO	POINT WISE TOR	REPLY	PG NO
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.	Details of occupational health and safety aspects are given under the subsections of Para 4.8, Chapter-IV.	4-23
36	Public health implications of the Project and related activities for the population in the impact zone should measures should be detailed along with be systematically evaluated and the proposed remedial budgetary allocations	The salient details of Socio economic survey conducted in nearby villages are provided under Para 3.2.4, Chapter-III. Public health facilities will be further aimed to be developed through CER activities wherein periodic health checkups, medical camps for the locals will be conducted.	3-10
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.	Towards the socio economic development of the surrounding area, the proponent has earmarked an amount of Rs. 5.0 Lakhs under Corporate Environmental Responsibility. Its details are provided in Para 4.7, Chapter-IV	4-22
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 Environmental Management plan and its implementation, etc., are furnished in Chapter X.	10-1
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.	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.	7-1



DRAFT EIA/EMP REPORT FOR ROUGHSTONE, JELLY AND GRAVEL QUARRY OF THIRU. S.KASIRAJAN AT SURVEY NO. 530/3A, 531/1A, 532, 533/1, 568/5A(P) AND 569/3A OVER AN AREA OF 4.97.0 HA IN THARUVAI VILLAGE, PALAYAMKOTTAI TALUK, TIRUNELVELI DISTRICT, TAMIL NADU.

S.NO	POINT WISE TOR	REPLY	PG NO
		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.	
40	Details of litigation pending against the project, if any, with direction /order paced by any Court of Law against the Project should be given.	There is no litigation pending against the 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.	The cost of the project is Rs.1,09,98,000/- Towards EMP measures, Rs. 4.0 lakhs is allocated under capital cost. Besides, Rs. 25.50 lakhs per annum will be spent under recurring cost. All the recurring cost of maintenance of pollution control measures, environmental monitoring etc., will be met from revenue.	4-22
42	A Disaster management Plan shall be prepared and included in the EIA/EMP Report.	• Details of Risk Assessment and Disaster Management plan is given in Chapter -VII.	7-1
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.	<ul style="list-style-type: none"> • The proposed Rough Stone Quarry will benefit this region in the fields of employment opportunities, improved per capita income for local people, improved social welfare facilities in respect of education, health, infrastructural etc. • Employment opportunities to 36 people. • By means of carrying out the socio economic development activities, local community development is expected. Towards the same, the 	8-1



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S.NO	POINT WISE TOR	REPLY	PG NO
		proponent has planned to allocate Rs. 5 Lakhs for various activities under CER. From the CER activities allocated for various social welfare activities, the villages near the lease area will be benefited.	



CHAPTER - I

INTRODUCTION

CHAPTER – I INTRODUCTION

1.1 PURPOSE OF THE REPORT:

Thiru.S.Kasirajan proposes to operate a **Rough Stone, Jelly and Gravel Quarry** at Survey No. 530/3A,531/1A, 532, 533/1, 568/5A(P) and 569/3A over an area of 4.97.0 Hectares in Tharuvai Village, Palayamkottai Taluk, Tirunelveli District, Tamil Nadu and has initiated action towards obtaining environmental clearance. Entire lease area is a patta land in proponent's possession.

Although the individual lease area of this project is less than 5 Ha, the other existing quarries and proposed quarries within the 500m radius along with this subject project works out to > 5 Ha and as such this proposal is considered under Cluster Category – B1 and as per MoEF & CC notification necessitates preparation of EIA/EMP report and public hearing. This cluster includes the nearby proposed Roughstone, Jelly and Gravel Quarry of Tvl.Sri Durgambika Blue Metals at Survey No. 570(P) & 571(P) over an area of 1.95.5 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 7.3, Chapter-VII.**

SATELLITE IMAGERY OF PROPOSED QUARRIES IN CLUSTER

Figure No. 1.1



DRAFT EIA/EMP REPORT FOR ROUGHSTONE, JELLY AND GRAVEL QUARRY OF THIRU. S.KASIRAJAN AT SURVEY NO. 530/3A, 531/1A, 532, 533/1, 568/5A(P) AND 569/3A OVER AN AREA OF 4.97.0 HA IN THARUVAI VILLAGE, PALAYAMKOTTAI TALUK, TIRUNELVELI DISTRICT, TAMIL NADU.

ToR for this project has been received from SEIAA, Tamil Nadu vide their letter No. SEIAA-TN/F.No.7174/SEAC/ToR-841/2020 dated 17.02.2021 for a production capacity of 7,57,111m³ of Rough Stone and 47,076m³ of Weathered Rock and 24,080m³ of Gravel upto a restricted depth of 54m for the period of Five years. The EIA/EMP report is prepared based on standard and specific Terms of Reference issued by SEIAA, Tamil Nadu and is in conformance of the generic structure prescribed by MOEF&CC in their notification of September 2006 and approved Mining plan.

This draft EIA/EMP report will be exposed to public hearing as per rules and procedures in this respect, as per the EIA notification 2006. The opinions, concerns and objections, if any, of the surrounding public and other stake holders connected, will be taken into consideration and compliance report thereon will be submitted to SEIAA, Tamilnadu in the final EIA/EMP report.

1.2 IDENTIFICATION OF PROJECT & PROJECT PROPONENT:

1.2.1 IDENTIFICATION OF PROJECT:

This is a proposed Rough Stone, Weathered Rock and Gravel Quarry over an area of 4.97.0 Hectares in Tharuvai village, Palayamkottai Taluk, Tirunelveli District, Tamil Nadu.

The top overburden in the form of Gravel will be loaded into tipper and marketed to needy customers on payment of necessary Seigniorage Fees to Government. The excavated weathered rock and rough stone will be excavated and loaded into tipper to the needy buyers for producing crusher aggregates, M Sand.

1.2.2 IDENTIFICATION OF PROJECT PROPONENT:

Proponent Name	Thiru S.Kasirajan S/o. Subbaiah,
Address	No.760, Bazaar Street, Seevalaperi, Palayamkottai Taluk, Tirunelveli – 627101.
Contact Number	9843118272
Email-ID	kasirajaneia2019@outlook.com

The proponent is financially sound to meet the monetary requirements of this project.



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1.3 STATUTORY APPROVALS:

Precise area communication letter was obtained from the District Collector, Tirunelveli vide Rc.No.M1/36182/2018 dated 21.05.2019. (**Annexure-1**)

Mine plan for this project was approved by Assistant Director, Geology & Mining, Tirunelveli vide Rc.No.M1/36182/2018, dated 22.07.2019. (**Annexure-2**)

1.4 BRIEF DESCRIPTION OF NATURE, SIZE, LOCATION AND IMPORTANCE OF THE PROJECT:

1.4.1 NATURE, SIZE AND LOCATION OF THE PROJECT:

Brief description of nature of the project:

1.	Sector	1(a), Non-Coal Mining
2.	Type	Fresh Project
3.	Category	B1 (Cluster Situation)
4.	Mineral Mined	Rough stone
5.	Major/Minor Mineral	Minor

Location of the Project:

This is a Roughstone, Weathered Rock, Gravel Quarry located in Tharuvai village, Palayamkottai Taluk, Tirunelveli District, Tamil Nadu. The lease area can be approached from existing road from the area leads to Adaimithipankulam – Kandithankulam village road on Eastern side of the area. Its details are elaborated in Para **2.3, Chapter-II.**

S.No	Particulars	Details
1.	Corner Coordinates	Latitude : 08°38'34"N to 08°38'43"N Longitude : 77°40'50"E to 77°40'58"E
2.	Toposheet Number	58 H /10 & 14
3.	Extent	4.97.0Ha
4.	Survey Nos.	530/3A, 531/1A, 532, 533/1, 568/5A(P) and 569/3A

Cost of the project:

The Project cost is Rs.1,09,98,000/-

1.4.2 IMPORTANCE TO THE COUNTRY AND REGION:

Rough stone from this quarry will meet the domestic demand. The production and method of mining is planned considering the geological factors, availability of proven technology, demand



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for the material etc. Safety barriers as per State Government order is left in the planning stage itself. Systematic and scientific mining will be carried out. This project will give employment opportunities to 26 people permanently and 10 people temporarily. The proponent will carry out CER activities in which will help the surrounding villages to derive socio economic benefits. The activities will be customized based on local needs and prioritized. Hence, livelihood development and employment will arise due to this project.

1.5 SCOPE OF THE STUDY:

ToR for this project has been received from SEIAA, Tamil Nadu vide their letter No. SEIAA-TN/F.No.7174/SEAC/ToR-841/2020 dated 17.02.2021. The point wise compliance for the ToR has been incorporated in this EIA/EMP report. Baseline environmental data for the project has been undertaken by Creative Engineers & Consultants for **Summer Season (March – May 2021)** Based on the terms of reference, the Environmental Impact Assessment was carried out for the project area (core zone and the buffer zone (10km radius from the core zone) and the following studies were covered:

- Collection of primary and secondary data relevant to the project.
- One-Season baseline monitoring for environmental parameters such as air, water, noise, soil, flora & fauna, etc. Analysis of parameters in in-house laboratory.
- Documentation of EIA/EMP report with inclusion of relevant studies conducted by other bodies into the EIA/EMP report.
- Identification of significant environmental parameters that are prone to get affected due to pollution. Namely, Air, Water, Noise, Soil, Biological and Land Environment.
- Evaluation and determination of suitable mitigation measures to reduce and control the said pollution.
- Prediction of post project concentration (baseline + incremental) with respect to air environment for core zone and buffer zone.
- Formulation of an Environmental Management plan including administrative aspects for proposed implementation of mitigative measures in time.
- Cumulative impact assessment for the quarries in cluster.



CHAPTER - II

PROJECT DESCRIPTION

CHAPTER - II
PROJECT DESCRIPTION

2.1 TYPE OF PROJECT:

This proposal is for quarrying **Rough Stone, Jelly and Gravel** in Tharuvai Village, Palayamkottai Taluk, Tirunelveli District, Tamil Nadu by mechanized opencast mining operation involving drilling, blasting, excavation, loading by excavators and transportation by Tippers.

2.1.1 PAST WORKING DETAILS:

Part of the lease area is already quarried out by the previous lessee Thiru S.Subbiah, after receiving the proceedings from the District Collector vide Rc.No.M1/5115/2012 dated 06.05.2013, executed the lease for 5 years from 06.05.2013 to 05.05.2018 for mining of Roughstone, Jelly and Gravel Quarry over an area of 3.29.0 Ha in S.F.Nos.531/1A and 532 in Tharuvai village, Palayamkottai Taluk, Tirunelveli District, Tamil Nadu. The existing pit dimensions are given below:

Pit No	Length (Max) in m	Width (Avg) in m	Depth (Max) in m
I	114	98	24m bgl
II	78	58	14m bgl

Since more reserves are available for further mining this proposal is made

2.2 NEED & JUSTIFICATION FOR THE PROJECT:

A) Availability of good quality proved reserves:

Presence of exposed rocks in the nearby mined out area has proved the availability the material in the lease area. Geological reserves are estimated to be 27,81,184 m³ of Roughstone, 99,328m³ of weathered rock and 49,664m³ of gravel upto a depth of 59m bgl.

B) Techno economic viability of the scheme:

Mechanized opencast method of mining which is to be used in this project is a proven technology in our country. With good market demand it is economically viable. Under the above circumstances it can be concluded that techno economically this scheme is feasible.

DRAFT EIA/EMP REPORT FOR ROUGHSTONE, JELLY AND GRAVEL QUARRY OF THIRU. S.KASIRAJAN AT SURVEY NO. 530/3A, 531/1A, 532, 533/1, 568/5A(P) AND 569/3A OVER AN AREA OF 4.97.0 HA IN THARUVAI VILLAGE, PALAYAMKOTTAI TALUK, TIRUNELVELI DISTRICT, TAMIL NADU.

C) Better approachability to the project and availability of logistic facility in proximity to the site.

The lease area can be approached by an existing road from the area leads to Kandithankulam - Adaimithipankulam village road on eastern side of the area.

D) Economic and Socio Economic Benefits:

- Meeting the construction material demand of the area.
- Enhanced revenue to Government by way of Royalty, etc.,
- Socio economic benefit to the locals due to CER activities

Considering all the above said favorable factors it is practically possible to achieve the proposal within the planned period and this proposal is fully justified.

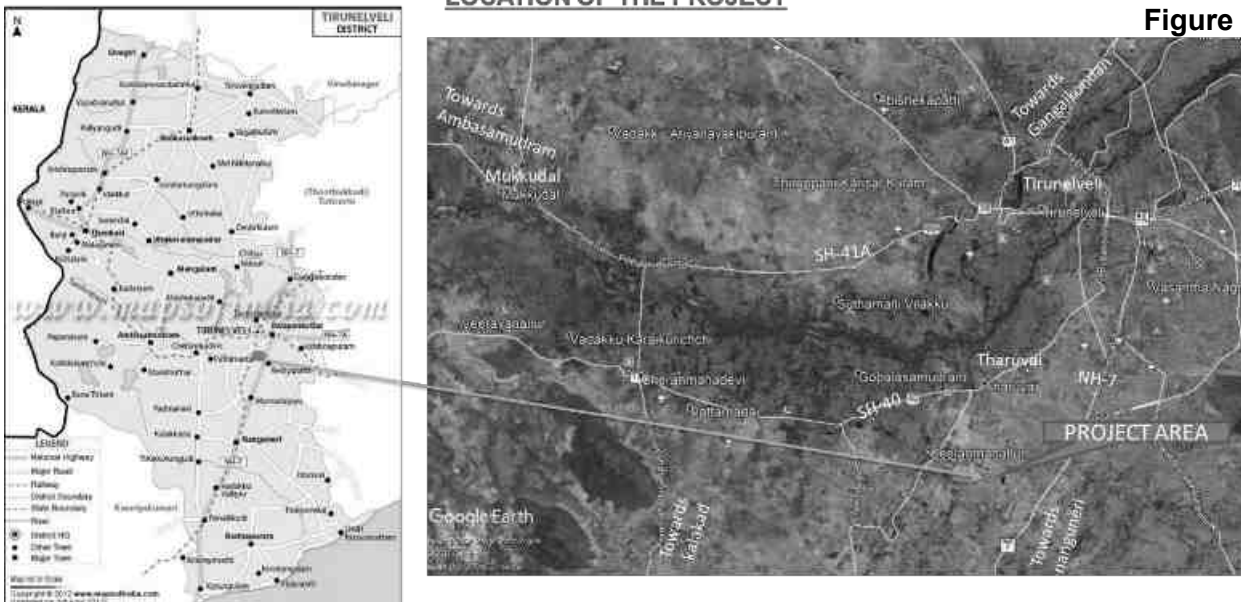
2.3 LOCATION:

2.3.1 ACCESSIBILITY:

This is a proposed Rough Stone, Jelly and Gravel Quarry over an area of 4.79.0 Ha in Tharuvai Village, Palayamkottai Taluk, Tirunelveli District, Tamil Nadu. The lease area can be approached from the existing road from the area leads to Kandithankulam - Adaimithipankulam village road on eastern side of the area which is connected to National Highway (NH-7) Tirunelveli – Kanniyakumari located about 2.0km on the eastern side of the area near ponnakudi **Figure No.2.1**. The approachability map is provided in **Figure No. 2.2**. Sengulam railway station is located 4.0Km on the south eastern side of the lease area.

LOCATION OF THE PROJECT

Figure No. 2.1



DRAFT EIA/EMP REPORT FOR ROUGHSTONE, JELLY AND GRAVEL QUARRY OF THIRU. S.KASIRAJAN AT SURVEY NO. 530/3A, 531/1A, 532, 533/1, 568/5A(P) AND 569/3A OVER AN AREA OF 4.97.0 HA IN THARUVAI VILLAGE, PALAYAMKOTTAI TALUK, TIRUNELVELI DISTRICT, TAMIL NADU.

APPROACHABILITY MAP

Figure No.2.2



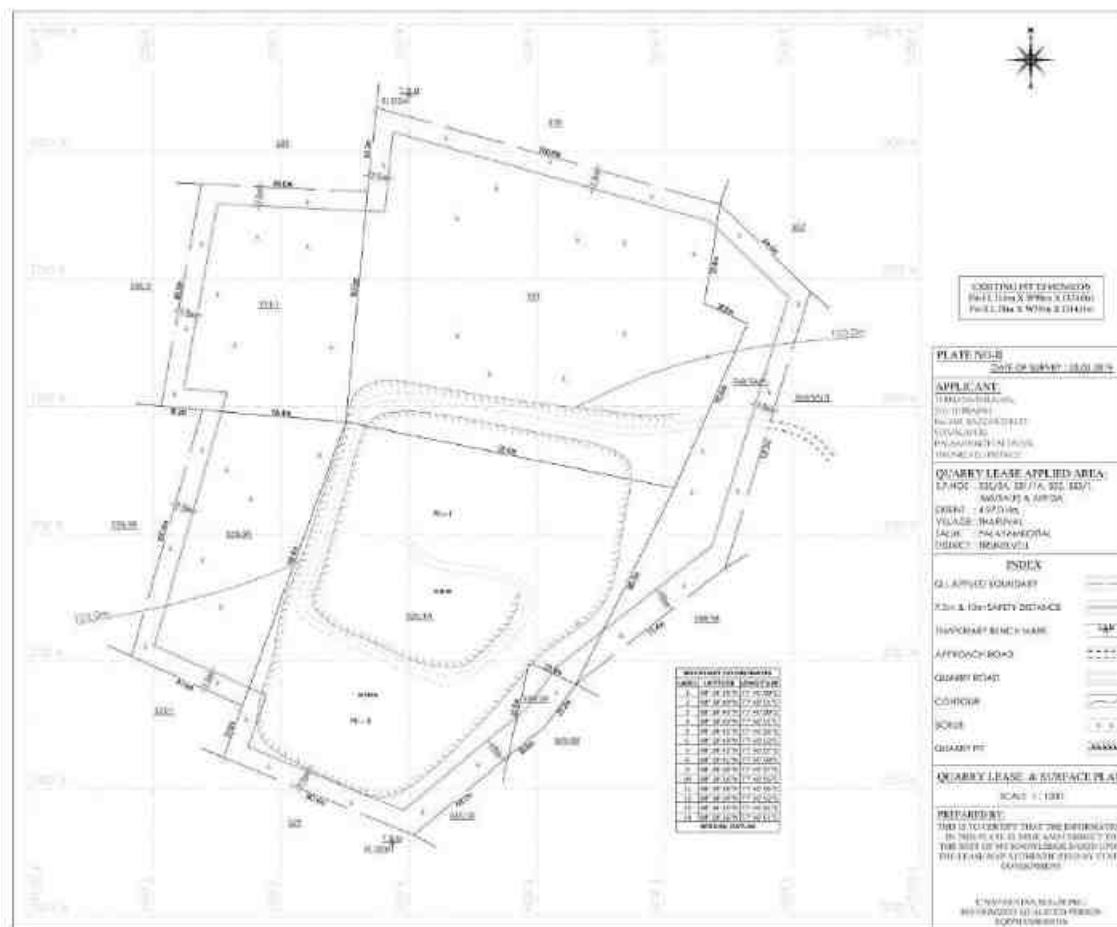
DRAFT EIA/EMP REPORT FOR ROUGHSTONE, JELLY AND GRAVEL QUARRY OF THIRU. S.KASIRAJAN AT SURVEY NO. 530/3A, 531/1A, 532, 533/1, 568/5A(P) AND 569/3A OVER AN AREA OF 4.97.0 HA IN THARUVAI VILLAGE, PALAYAMKOTTAI TALUK, TIRUNELVELI DISTRICT, TAMIL NADU.

2.3.2 LEASE BOUNDARY:

The lease area falls between latitude 08°38'34"N to 08°38'43"N and 77°40'50"E to 77°40'58"E. Corner co-ordinates of the project area boundary in map and satellite imagery are shown in **Figure No. 2.3 & 2.4** and site photos shown in **Figure No -2.5** respectively.

LEASE PLAN

Figure No. 2.3



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SATELLITE IMAGERY SHOWING CORNER CO-ORDINATES OF THE PROJECT AREA

Figure No. 2.4



Figure No. 2.5

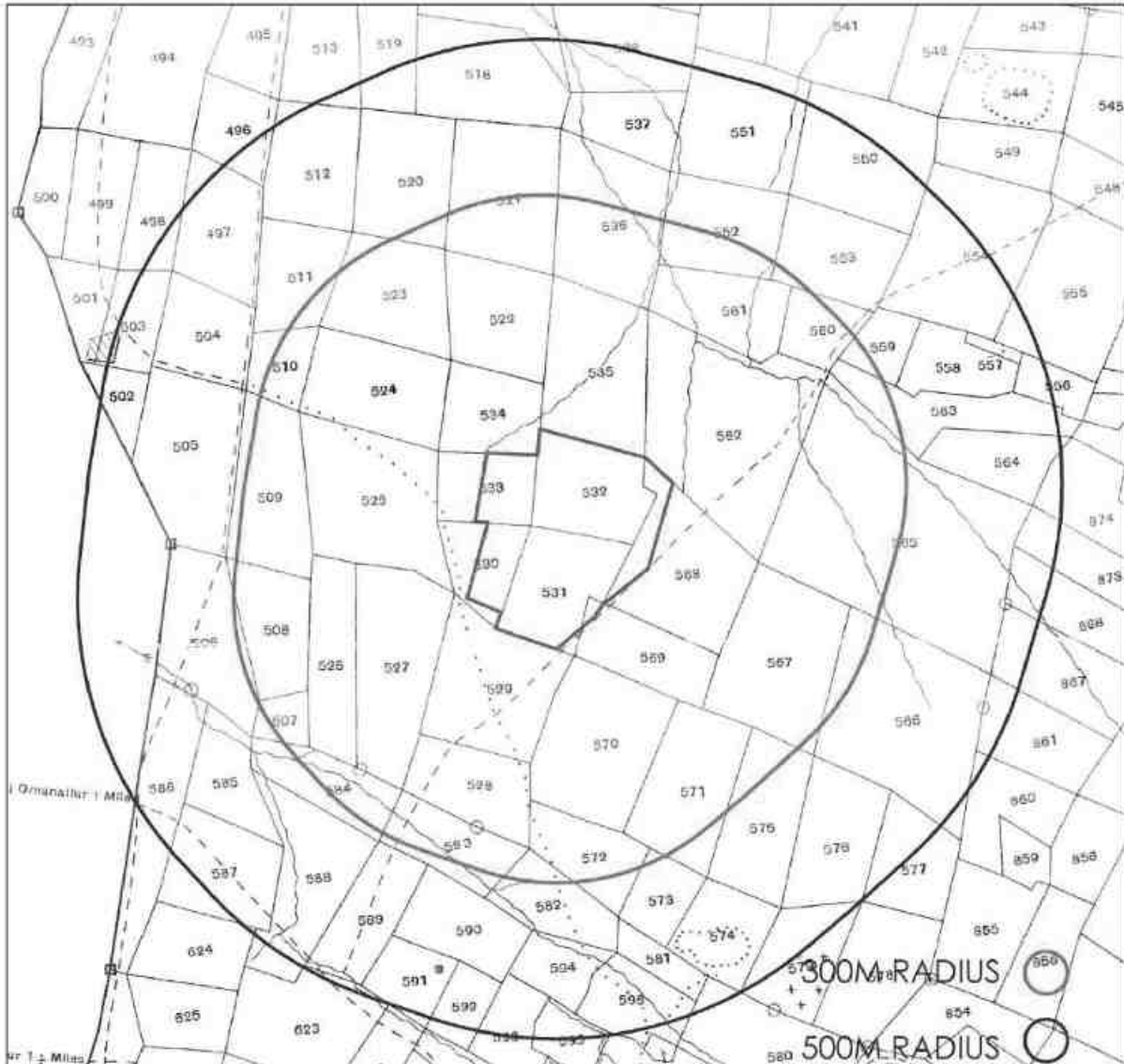
SITE PHOTOGRAPH



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VILLAGE MAP

Figure No. 2.6



DRAFT EIA/EMP REPORT FOR ROUGHSTONE, JELLY AND GRAVEL QUARRY OF THIRU. S.KASIRAJAN AT SURVEY NO. 530/3A, 531/1A, 532, 533/1, 568/5A(P) AND 569/3A OVER AN AREA OF 4.97.0 HA IN THARUVAI VILLAGE, PALAYAMKOTTAI TALUK, TIRUNELVELI DISTRICT, TAMIL NADU.

2.3.3 TOPOGRAPHY & DRAINAGE:

The area applied for quarry lease exhibits almost plain topography covered by Gravel formation.

Pachaiyar river lies at a distance of 2.3km and Tamiraparani river lies 4.5Km in the northern direction.

2.3.4 LAND USE:

It is a patta land jointly registered in the name of Thiru S.Subash Chandra Bose and Applicant (Thiru Kasirajan) vide patta nos.3508 and 3509. The applicant has obtained consent from the Co Pattadhar and got it registered.

District	Taluk	Village	Survey No	Area in Ha	Patta Name
Tirunelveli	Palayamkottai	Tharuvai	530/3A	0.545	Thiru.Subash Chandra Bose, and Thiru.Kasirajan
			531/1A	1.640	
			532	1.650	
			533/1	0.630	
			568/5A(P)	0.105	
			569/3A	0.400	
Total Area in (Hectares)				4.97.0	

Part of the lease area is already mined and the remaining part contains bushes and shrubs.

2.3.5 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 recent valley fills and alluvium at places. The geological formations found in the district are Archaean rocks like Gneisses, Granites, Charnockites basic granulites and calc-gneisses. The younger formations are Quartz veins and pegmatite.

The rock type noticed in the area for lease is Charnockite which contains mostly Quartz and Feldspar with some ferromagnesian minerals. The Charnockite is part of peninsular Gneisses, a high grade metamorphic rock.

The general geological succession of the area is given as under.

	Age	Rock Formation
1	Recent to Sub recent	Alluvium, Gravel
2	Archaean	Charnockite
3	Archaean	Peninsular Gneiss, and Calc Gneiss

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2.4 SIZE AND MAGNITUDE OF THE OPERATION:

The project is proposed over an extent of 4.97.0 Ha. This project pertains to the ToR approved production capacity of 7,57,111m³ of Rough Stone, 47,076 m³ of weathered rock formation and 24,080m³ of gravel upto a restricted depth of 54m for the period of Five years.. The details of geological and mineable reserves in the lease area as per approved mining plan has been provided below in the subsequent sub section.

2.4.1 RESERVES:

The geological and recoverable reserves are estimated by cross sectional method. Its details are given below:

S. No	Type of reserves	Rough stone (Cum)	Weathered Rock (cum)	Gravel (cum)
1	Geological reserves	27,81,184	99,328	49,664
2	Mineable reserves (upto 59m)	7,72,636	47,076	24,080
3	Mineable reserves (upto 54m)	7,57,111	47,076	24,080

The mineable reserves is arrived after considering the safety distance of 7.5m peripheral safety distance.

2.4.2 MINING METHOD:

Opencast semi mechanized mining using jackhammer drilling, blasting, excavation through excavator & mineral transport through tippers will be carried out. The top gravel is soft and can be directly excavated. The weathered rock and rough stone below will be blasted and then excavated. Bench height of 7.0m & 7.0m width is considered.

DETAILS OF MACHINERY:

S. NO	NAME OF THE EQUIPMENT	CAPACITY	REQUIREMENT
1	Excavator	TATA Hitachi EX200	2
2	Tipper	20 T	5
3	Tractor mounted compressor with jack hammer	175 CFM	2

2.5 PROPOSED SCHEDULE FOR APPROVAL AND IMPLEMENTATION:

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

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2.6 TECHNOLOGY AND PROCESS DESCRIPTION:

2.6.1 MINING:

The quarry operations involve jack hammer drilling, blasting, excavation, loading and transportation of Roughstone to needy buyers. The production of Roughstone in this quarry involves jackhammer drilling and blasting. The primary boulders are removed from the pits by excavators and further made to smaller sizes by rock breakers attached in excavators. It is a conventional opencast semi mechanized method of mining.

2.7 PROJECT DESCRIPTION:

2.7.1 PRODUCTION SCHEDULE:

The production schedule during the plan period has been given below:

Year	Roughstone (m3)	Weathered Rock (m3)	Gravel (m3)
I	153762	47076	24080
II	154557	--	--
III	155365	--	--
IV	155113	--	--
V	138314	--	--
Total	757111	47076	24080

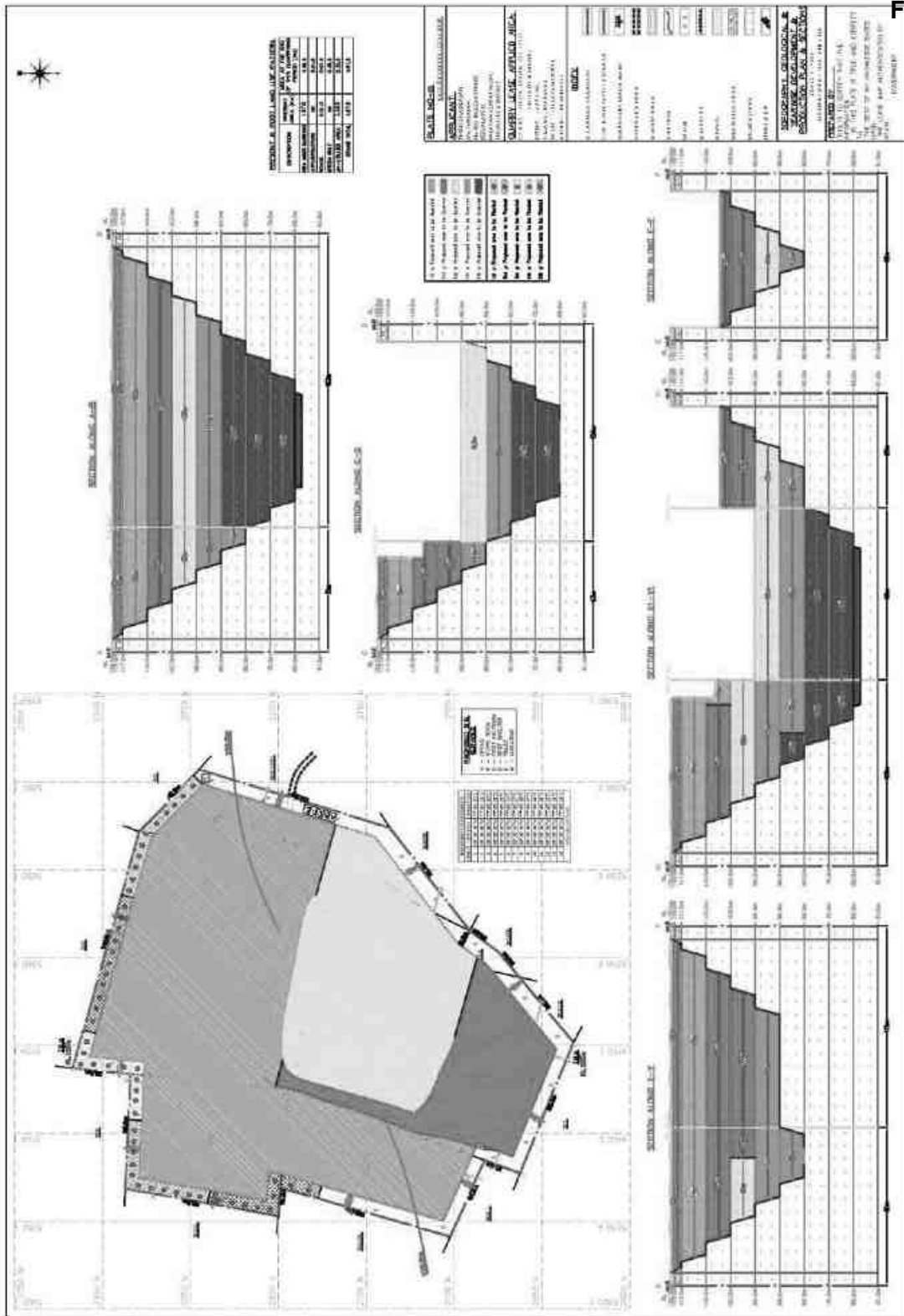
The applicant has proposed to carry out production of 7,57,111cum of Roughstone, 47,076cum of Weathered Rock and 24,080 cum of Gravel upto a ToR restricted depth of 54m.

The geological Plan / production plan & cross section and conceptual plan and cross section is given in **Figure No. 2.7 & 2.8**

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GEOLOGICAL CUM PRODUCTION PLAN AND CROSS SECTION

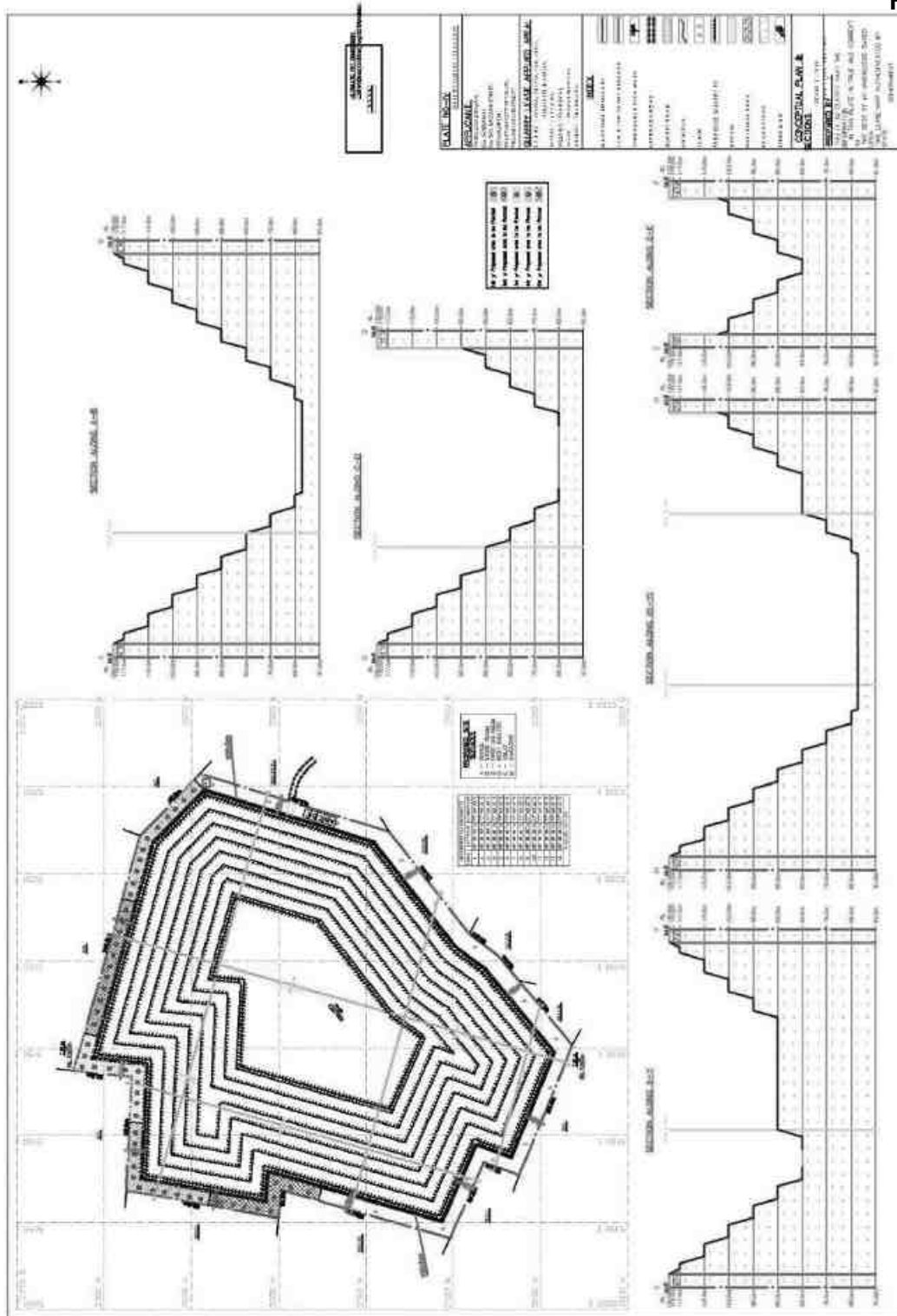
Figure No. 2.7



DRAFT EIA/EMP REPORT FOR ROUGHSTONE, JELLY AND GRAVEL QUARRY OF THIRU. S.KASIRAJAN AT SURVEY NO. 530/3A, 531/1A, 532, 533/1, 568/5A(P) AND 569/3A OVER AN AREA OF 4.97.0 HA IN THARUVAI VILLAGE, PALAYAMKOTTAI TALUK, TIRUNELVELI DISTRICT, TAMIL NADU.

CONCEPTUAL PLAN AND CROSS SECTION

Figure No. 2.8



DRAFT EIA/EMP REPORT FOR ROUGHSTONE, JELLY AND GRAVEL QUARRY OF THIRU. S.KASIRAJAN AT SURVEY NO. 530/3A, 531/1A, 532, 533/1, 568/5A(P) AND 569/3A OVER AN AREA OF 4.97.0 HA IN THARUVAI VILLAGE, PALAYAMKOTTAI TALUK, TIRUNELVELI DISTRICT, TAMIL NADU.

ULTIMATE PIT DEPTH:

Since the lease period is Five years, 5 years life consider as conceptual period.

The conceptual pit dimensions is provided below:

Length (max) in m	Width (Avg) in m	Depth(max) in (m)
254	169	54

2.7.1.1 Waste Disposal During Plan Period:

There is no waste generation anticipated in this quarry operation since the entire excavated material will be utilized. Even the overburden in the form of Gravel after excavation will be temporarily preserved if necessary and marketed to needy customers.

2.7.2 LAND DEGRADATION/UTILIZATION

Sl. No.	Land Use	Present Area (Hect)	Area in use during the quarrying period (Hect)
1.	Quarrying Pit	1.57.0	4.29.0
2.	Infrastructure	Nil	0.01.0
3.	Roads	0.01.0	0.02.0
4.	Green Belt	Nil	0.30.0
5.	Unutilized	3.39.0	0.35.0
	Total	4.97.0	4.97.0

At the end of the life of the mine, entire 4.29.0 Ha of mined out area will be left as water body. 0.02.0Ha will be the mine roads and 0.66.0Ha will be covered with vegetation.

2.7.3 RAW MATERIAL REQUIRED: Estimated Quantity, Likely Source, Marketing Area Of Final Products, Mode Of Transport Of Raw Material & Finished Product:

This project involves the excavation of Roughstone for a production capacity of 7,57,111m³ of Rough Stone, 47,076 m³ of weathered rock formation and 24,080m³ of gravel. The entire material excavated will be supplied to the nearby consumer by road.

2.7.4 WATER REQUIREMENT & ITS SOURCE:

The total water requirement for this project will be 4.0KLD. The required water will be procured from outside agencies initially and later rainwater harvested in the mine pit shall be used.

Details	Quantity (KLD)
Drinking water	0.5KLD
Dust Suppression	2.0KLD
Green belt	0.5KLD
Domestic	1.0KLD
Total	4.0KLD



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2.7.5 POWER REQUIREMENT& ITS SOURCE:

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.

2.7.6 EMPLOYMENT GENERATION:

The project will provide employment opportunities to about 36 people directly.

2.7.7 EXISTING INFRASTRUCTURE:

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

2.8 DESCRIPTION OF MITIGATION MEASURES:

Scientific and systematic development of mines will be carried out by the project authorities for preserving as well as improving the environmental conditions in and around the mining lease area. The following prevention and control measures will be undertaken during actual course of mining to ensure that there are no adverse effect on the environment:

- ❖ Regular water spraying on haul roads, and maintaining approach roads, to suppress the dust.
- ❖ Periodical maintenance of plant & machinery will be done.
- ❖ Green belt / plantation development inside lease area.

Elaborate analysis on impacts and mitigation measures to be adopted on implementation of this project and the same has been dealt in Chapter- IV.

2.9 ASSESSMENT OF NEW & UNTESTED TECHNOLOGY:

There is no new technology that is being implemented. Opencast method of mining is a proven technology which is technologically and economically viable.

2.10 CONCLUSION:

Good environmental preservation expected during the project activity will not have any major impact on environmental equilibrium in the study area.



CHAPTER - III

DESCRIPTION OF ENVIRONMENT

CHAPTER-III

EXISTING ENVIRONMENTAL SCENARIO

3.1 GENERAL:

The status of the existing environmental data was collected in the study area for the following environmental parameters:

- i. Socio-economic status and demographic details of the area
- ii. Micro-meteorological monitoring at one location
- iii. Ambient Air Quality study at 6 different locations in the core and buffer zone.
- iv. Water quality analysis at 6 different locations in the core and buffer zone.
- v. Noise levels monitoring at 6 locations in the core and buffer zone.
- vi. Soil quality analysis in 5 locations in the core and buffer zone.
- vii. Land use pattern
- viii. Flora & Fauna status and
- ix. Hydrological study

The studies and data collection have been carried out systematically and meticulously as per relevant IS codes, CPCB and MoEF&CC guidelines. The data collected during **Summer Season, March 2021 to May 2021**) for the above said parameters are given in this report.

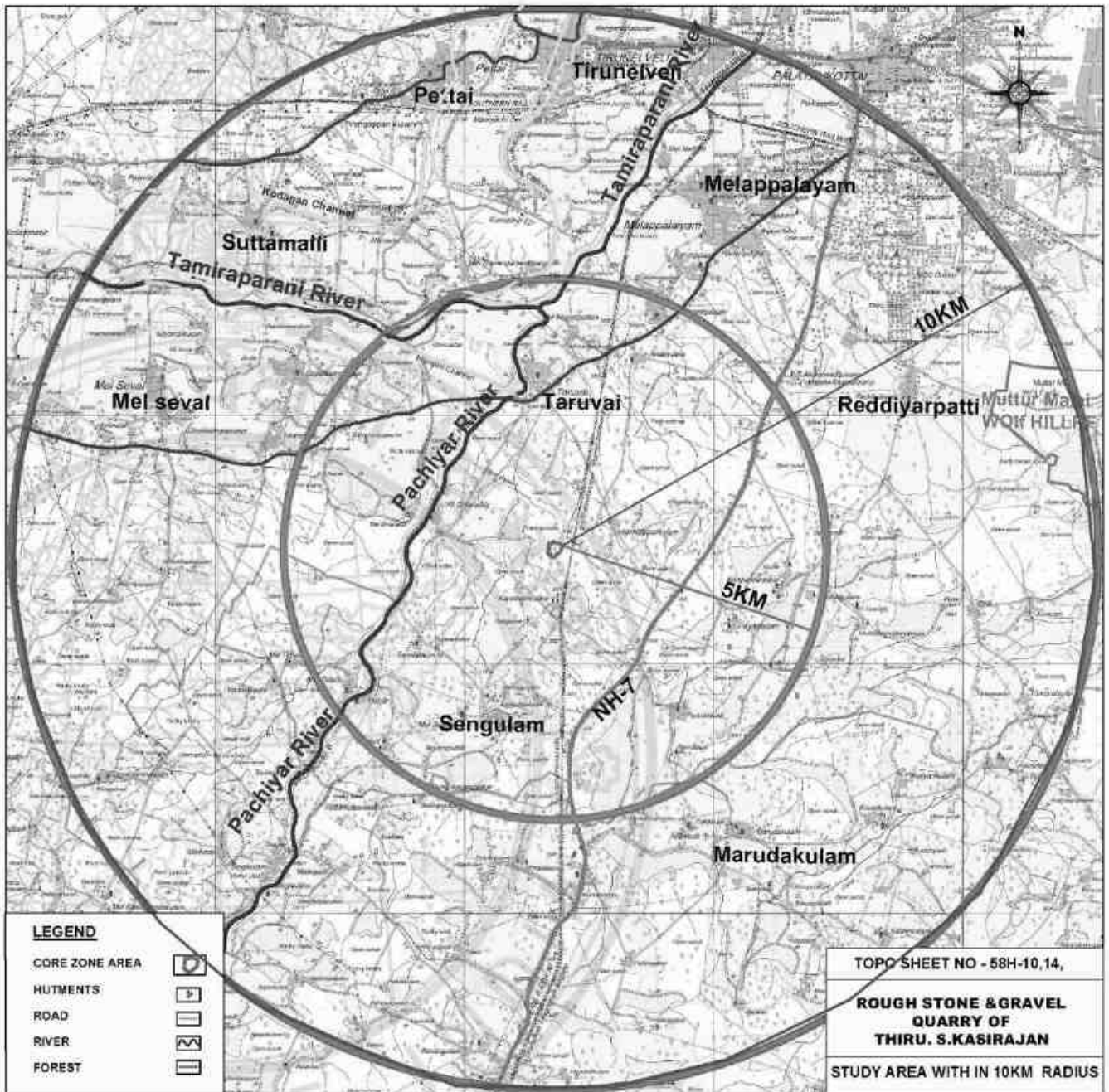
For the purposes of this study, the area has been divided into two zones, namely, core and buffer zones. Core zone covers 4.97.0Ha of Mine lease area. The buffer zone covers an area of 10 km radius from the periphery of the ML area cluster. Entire ML area is a patta land with no forest or an agricultural area involved.

The details of villages falling in the study area and other features are given in Index Plan in **Figure No- 3.1**.

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STUDY AREA WITH IN 10KM RADIUS(INDEX PLAN)

Figure No - 3.1



3.1.1 ENVIRONMENT SETTING OF THE STUDY AREA – 10 KM RADIUS:

SL.No	PARTICULARS	DETAILS
1	Nearest highway	(NH-7) Tirunelveli – Kanniyakumari - 2.1km - SE (SH-40) Tirunelveli – Pattamadai – 2.6km – N
2	Nearest Railway station	Sengulam - 4.0km - SE
3	Nearest Airport	Tuticorin – 40.0km - NE
4	Nearest major water bodies	Tank - 720m – (SE) Pachaiyar River 2.2km – (W) Palayan Channel 3.1km – (W) Tambraparni River 4.4km – (NW) Tirunelveli Channel 4.7km – (NW) Manimuttar Canal 8.8km – (S) Kodagan Channel 6.5km- (NW) Nainarkulam Channel 7.3km – (N)
5	Nearest town/City	Tirunelveli – 8.8km - N
6	Nearest villages	Kandithankulam - 850m - S
7	Hills / valleys	Nil within 10m radius
8	Notified Archaeologically important places, Monuments	Nil within 10m radius
9	Local Places of Historical and Tourism Interest	Nil within 10m radius
10	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)	Nil within 10m radius
11	Reserved / Protected Forests	Muttur Malai Wolf Hill R F - 8.4km - NE
12	Defence Installations	Nil within 10 km radius
13	Seismic Zone	Zone – II (Least Active)
14	Other Industries in the study area	Other than few rough stone quarries, Crusher, there are no other major industries in the region.

3.2 SOCIO-ECONOMIC CONFIGURATIONS OF THE AREA:

3.2.1 GENERAL:

The Socio-Economic details of the study area are collected through

- Identification of villages falling from the study area map with combined Taluk map.
- Collection of primary data through sample survey, village meetings and focused group discussions.
- Collection of the demographic pattern of villages falling in the area through NIC 2011 census data.
- Occupational structure of villages falling in the study area through NIC 2011 census data.
- Details of the amenities available in villages falling in the study area through NIC 2001 census data. The findings of the study area are illustrated below:

3.2.2 SECONDARY DATA DESCRIPTION:

The proposed Rough stone and gravel quarry is located in Tharuvai Village, Palayamkottai Taluk, Tirunelveli District, Tamil Nadu. Based on 2011 census data, in the 10km radius there are 45 Rural villages from Four Taluks namely Tirunelveli, Ambasamudram, Palayamkottai, Nanguneri, and 4 urban areas of two taluks namely, Gopalamudram (TP), Pathamadai (TP), Melacheval (TP) of Ambasamudram Taluk and Tirunelveli (M Corp.) of Tirunelveli Taluk.

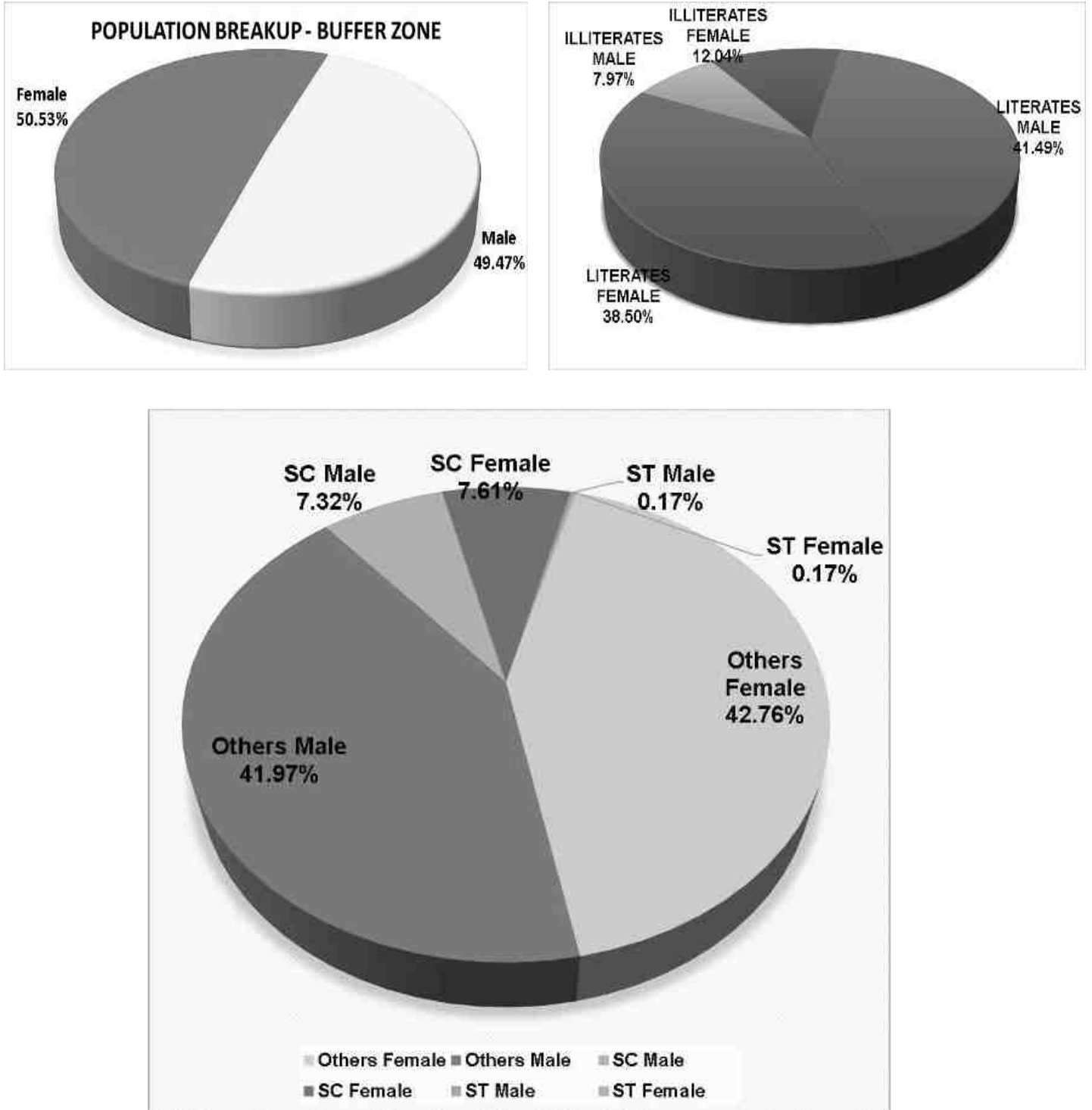
Population:

- The total population of these 45 rural villages and 4 urban areas is 619362 in which the male population is 306370 (49.47%) and the female population is 312992(50.53%). This shows that the male and female population ratio is almost equal.
- Among the total population 0.33% is Scheduled Tribes, 14.93% is Scheduled Caste and 84.73% people belong to other castes mainly the Most Backward Communities and Backward Communities.
- Among the total population, 79.99% of the people are literate and 20.01% of the people are illiterate. This shows that nearly quarter of the population is illiterate.
- The literates males are 41.49% and females are 35.50 in total population. This shows that the male literates are slightly more than the female literates.
- Totally the illiterate constitute 7.97% of males and 12.04% of Females in total population

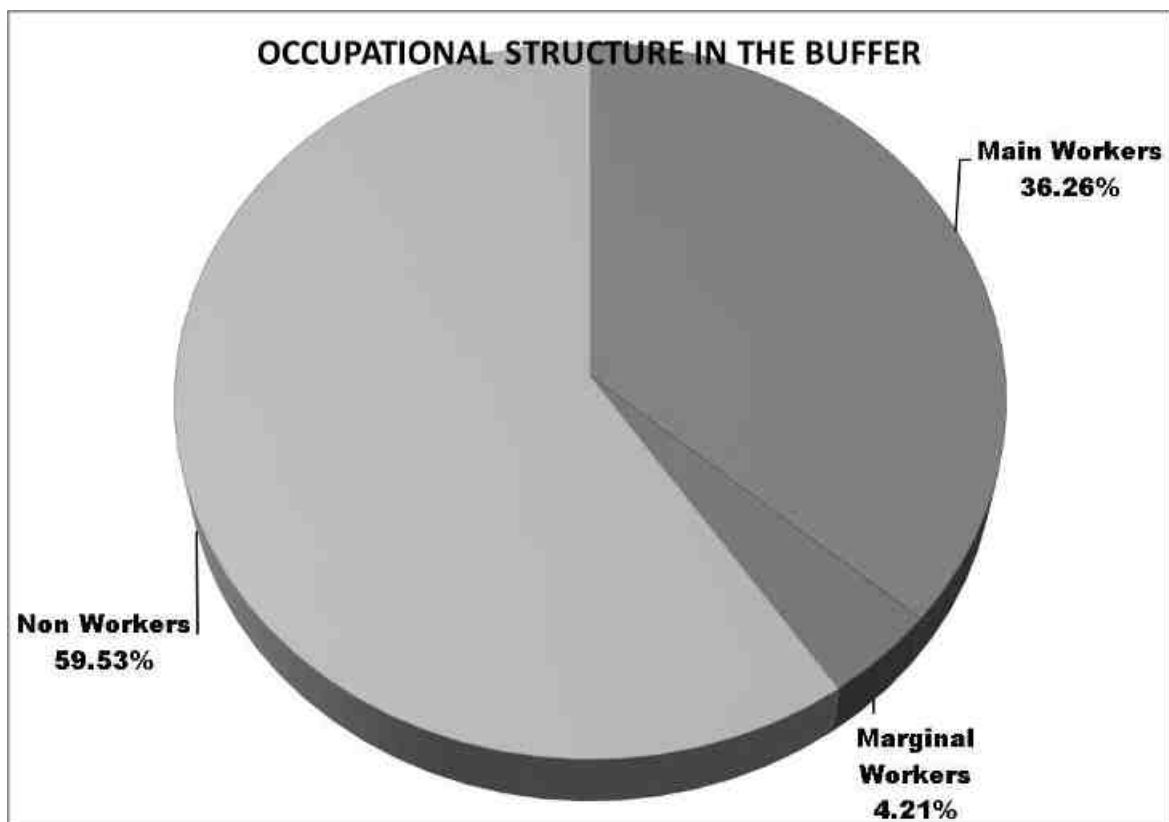
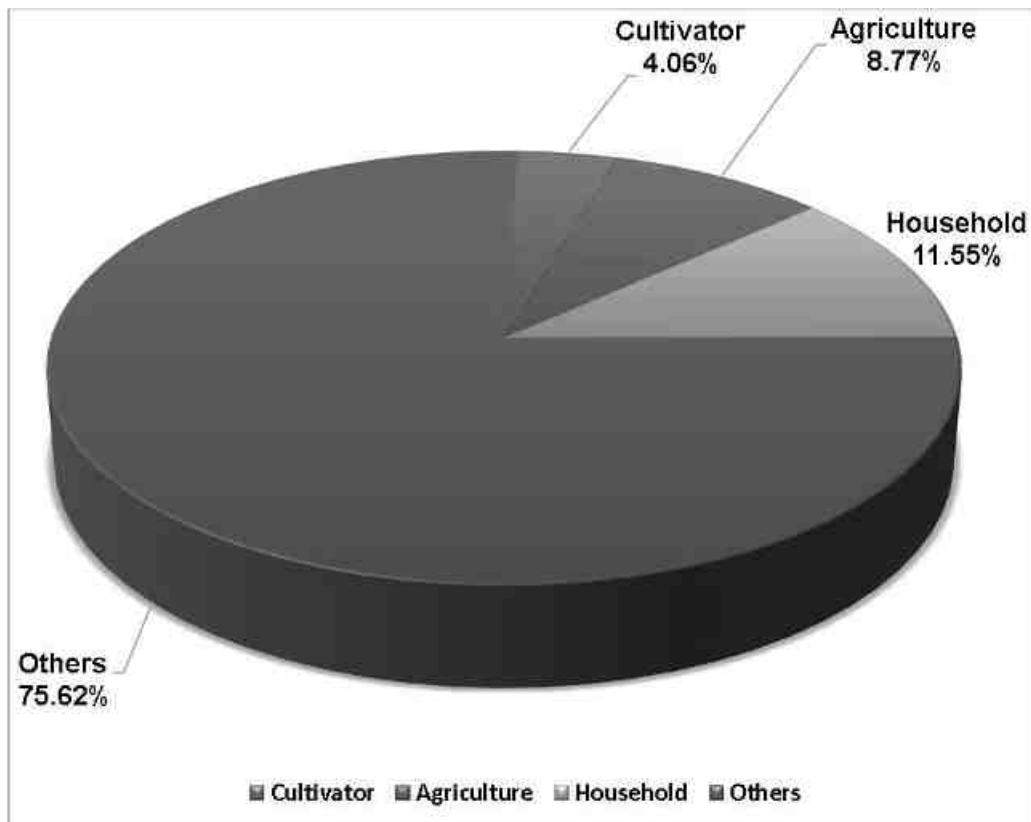
Occupational structure in the buffer zone:

- Among the total population, non workers are about 59.50% (368728) and remaining part constitute the working population i.e. 40.50% (250634).
- In total population about 36.30% are main workers (224560) and 4.20% are marginal workers (26074).
- Among the Main Workers 8.77% are Agri- Labours, 4.06% are Cultivators and remaining 87.17% are house hold and others.
- The village wise population, literacy levels and occupational structure details area are given in **Annexure No – 5 & 6**. The demographic structure within the buffer zone is shown diagrammatically in **Figure No – 3.2A&B**.

Figure No - 3.2A



Contd... Figure No - 3.2B



3.2.3 Details of Amenities:

Educational Facilities

Based on 2011 census data, regarding the educational facilities, among the 42 rural villages have this facility. 3 village have no educational facility. Details in the buffer zone of rural villages given below

1. <u>Educational Facilities:</u>					
A	Primary School	S. No	Villages	Number of primary schools	Total
		1	7	0	0
		2	16	1	16
		3	7	2	14
		4	5	3	15
		5	7	4	28
		6	3	5	15
		Total	45		88
<i>*urban area 5 towns data not available</i>					
B	Middle School	14 villages has this facility,			
C	Secondary School	8 villages has this facility Schools			
D	Senior Secondary	4 villages has this facility			
Remarks: Better education facilities are available in Tirunelveli. The details regarding educational facilities available in 2011 census data are given in Annexure – 7 .					
2. <u>Medical facilities:</u>					
A	Medical facilities	20 villages has this facility			
		25 Villages does not has this facility			
B	Dispensary	5 villages has this facility			
C	TB Clinic	5 villages has this facility			
D	Maternity and child welfare centre (MCW)	5 Village has this Facility			
E	Primary Health Centre	5 villages has this facility			
F	Primary Health Sub centers	20 villages has this facility			
G	Family welfare centre (FWC)	5 villages has this facility			
Remarks: Good medical facilities are available in Tirunelveli. The details of medical facilities available as per 2011 census data are given in Annexure – 8 .					

3. <u>Infrastructure Facilities:</u>		
A	Drinking water facility	All villages has this facility
B	Drinking water with tap facility	42 villages has this facility
C	Covered Well	12 villages has this facility
D	Tube Well	33 villages has this facility
E	Hand Pump Facility	29 villages has this facility
Remarks: Better infrastructural facilities are available in almost all the villages.		
4. <u>Post office</u>		
A	Post Office	3 villages has this facility
B	Sub Post Office	22 villages has this facility
C	Post And Telegraph Office	5 villages has this facility
5. <u>Banking facility:</u>		
A	Commercial bank	3 villages has this facility
B	Co-operative Bank	5 villages has this facility
C	Agricultural Credit Societies	5 villages has this facility
Remarks: As per the secondary data,all the villages have the bus facility. Only some hamlets are not having this facility. The details of Infrastructure facilities available as per 2011 census data are given in Annexure – 9 .		

3.2.4 SAMPLE SURVEY:

3.2.4.1 OBJECTIVE:

The objective of the study is to understand the present socio-economic condition, availability of existing infrastructure facilities in the area & to know the needs of the people in the project peripheral villages, to provide an implementable future CER proposal pertaining to specific needs addressing local requirements.

3.2.4.2 APPROACH:

Following nearby villages were visited for conducting survey to know about socio-economic conditions, including aspirations and requirements of the people for a better living and collected relevant data.

- Ponnagudi
- Samathuvapuram
- Alagulam
- Adaimithipankulam

Oral interview, and informal discussions were conducted in the villages to capture the overall scenario of the village including their socio economic problems and the aspirations, desires of the community in overall terms.

Salient details of the study are given below:

Salient study details are as follows:

- Studied villages have different community people which include different religion and different castes.
- Study area consists of a different land use comprising cultivation near the water available irrigated area and quarrying & associated activities in rocky Gneissic area.
- Plantation and agriculture are observed minly during the monsoon season.
- Paddy, Banana and vegetables are commonly cultivated.
- People are occupied as farmers, agricultural laborers and others are working in nearby industries, quarries, cruher .
- Reasonably better amenities like approach road bus facility, electricity, mobile phone connectivity, Public Distribution System , banks etc are available.
- Bore well is the main source for drinking water. There are OHT's, Ground level tanks, public taps are available .

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VAO Office, Ponakudi



Village Service Centre, Ponakudi



Anganwadi, Ponakudi



Water Tank, Alagulam

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Water Tank, Samnathapuram



Ration Shop, Samnathapuram



VAO, Samnathapuram



Water Tank, Ponakudi

3.2.5.4 IDENTIFIED CER ACTIVITIES:

- Improved drinking water facility (RO Plant) & betterment of sanitation facilities in neary Government schools .
- Smart class facilities for nearby Government school.
- Maintenance / Improvement in road facility.
- Desilting of village ponds.
- Assistance in conducting regular health camp, eye camp.

These activities shall be planned on a combined basis with the other nearby working quarries and crushers. The priority and need shall be finalized in consultation with the locals.

3.3 EXISTING ENVIRONMENTAL QUALITY

3.3.1 MICRO-METEOROLOGY

3.3.1.1 GENERAL

The meteorological conditions in an area regulate the dispersion of air pollutants being released into the atmosphere. The principal variables are horizontal convective transport i.e. wind speed and direction and vertical convective transport, i.e. mixing height, stability class and topography of the area.

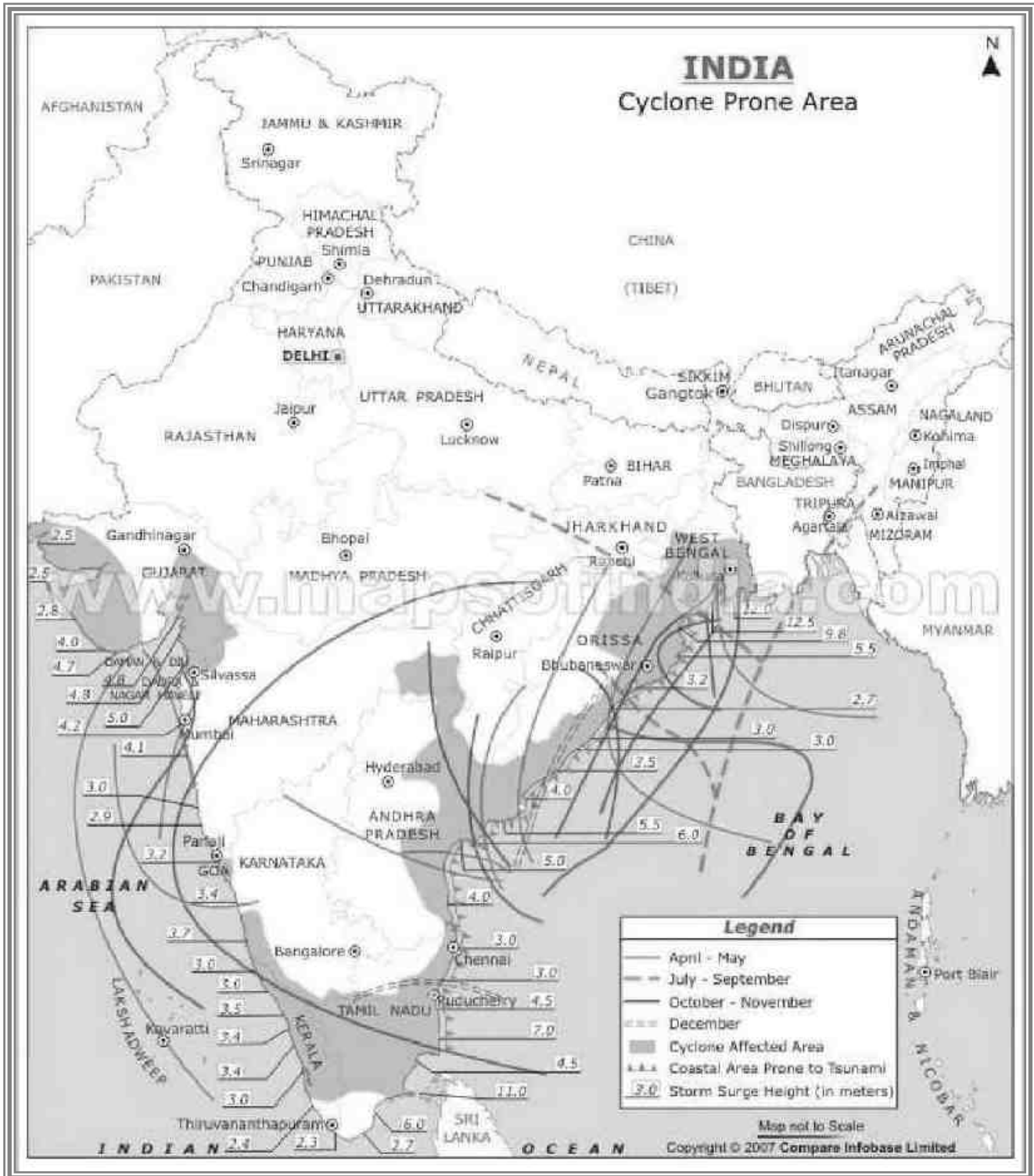
3.3.1.2 HISTORICAL METEOROLOGICAL DATA

3.3.1.2.1 CYCLONES AND DEPRESSIONS

Cyclonic storms and depressions in Bay of Bengal affect the East Coast of India. Isolated ones, forming in January to March in the South Bay of Bengal move West-North-westwards and hit Tamil Nadu coast. In April and May, cyclonic storms and depressions form in the South and adjoining Central Bay and move initially to the Northwest, then North and then recurve to the Northeast striking the Arakan coasts in April and Andhra Pradesh (AP)-Orissa-West Bengal (WB) – Bangladesh coasts in May. Most of the monsoon (June – September) storms develop in the central and in the north bay and move west – north - westwards affecting AP – Orissa – WB coasts. Post monsoon (October – December) storms form mostly in the south and central Bay, recurve between 150 and 180 N affecting Tamil Nadu – AP – Orissa – WB – Bangladesh coasts. **Figure No - 3.3** depicts the history of cyclonic storms, which have struck the Indian coast during the months of October, November and December during the last 75 years. (**Source: Vulnerability Atlas of India series, above figure accessed from www.maps of india.com**). East coast is prone to cyclonic storms round the year but mostly these occur prior to SW i.e., in May and after SW monsoon i.e., in October and November.

Figure No - 3.3

THE HISTORY OF CYCLONIC STORMS



3.3.1.2.2 SEISMIC DATA

From the seismic zone map of India as depicted in the **Figure No - 3.4**, it can be seen that the project site and study area falls in the Zone – II and is described as **least active zone**.



3.3.1.3 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. Rainfall data from IMD stations were utilized and a perusal of the data shows that the normal annual rainfall over the district is 879 mm. It is the maximum around Senkottai, Sankarankoil and all along the coast and it decreases towards inland. The areas around Ambasamudram, Tirunelveli and Kadayanallur receive minimum rainfall.

Temparture:

The district enjoys a Sub tropical climate. The period from May to June is generally hot and dry. The weather is pleasant during the period from December to January. The relative humidity is on an average between 79 and 84%. The mean minimum temperature is 22.9°C and mean maximum daily temperature is 33.5°C respectively

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Rainfall data collected by Tirunelveli Rain gauge station for the period of 2011 to 2020 is given in below Table:

Table No – 3.1

AVERAGE ANNUAL RAINFALL DATA (2011 – 2020)

DISTRICT	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Cumulative
	Actual (mm)	Actual (mm)	Actual (mm)	Actual (mm)	Actual (mm)	Actual (mm)	Actual (mm)	Actual (mm)	Actual (mm)	Actual (mm)	Actual (mm)	Actual (mm)	Actual (mm)
2011	69.94	116.57	52.07	199.35	98.13	322.59	184.19	136.16	170.7	117.29	224.41	195.49	1886.9
2012	17.48	17.75	42.73	214.02	76.58	147.87	183.04	234.44	118.61	171.64	157.85	32.99	1415
2013	4.49	59.06	69.29	29.83	19.08	37.42	14.34	24.62	22.73	64.77	186.46	75.49	607.58
2014	32.26	6.22	42.05	22.74	164.58	7.03	4.3	34.67	35.46	336.38	255.85	95.34	1036.9
2015	4.35	19.32	56.22	108.94	96.79	22.85	6.99	12.91	63.82	177.15	458.61	179.31	1207.3
2016	2.45	6.4	8.13	8.14	62.7	22.35	20.4	0.6	2.28	55.85	98.23	23.32	310.85
2017	14.69	1.03	13.6	4.38	18.63	8.7	0.8	9.84	19.4	24.61	81.83	31.43	228.94
2018	0.23	1.12	19.99	22.09	28.91	16.41	13.58	51.57	38.08	155	67.74	23.74	438.46
2019	3.46	10.39	9.29	22.12	11.48	22.78	5.65	49.91	104.09	243.94	193.07	152.04	828.22
2020	7.01	7.44	6.27	32.48	39.21	19.35	8.28	41.18	36.04	52.48	250.7	117.6	618.04
Normal	41.4	31.2	41.7	61.6	38.6	20.6	23.1	17.2	31.7	138.9	193.7	97.2	736.9

Source – IMD GRID – Tirunelveli report



Figure No - 3.5(A)

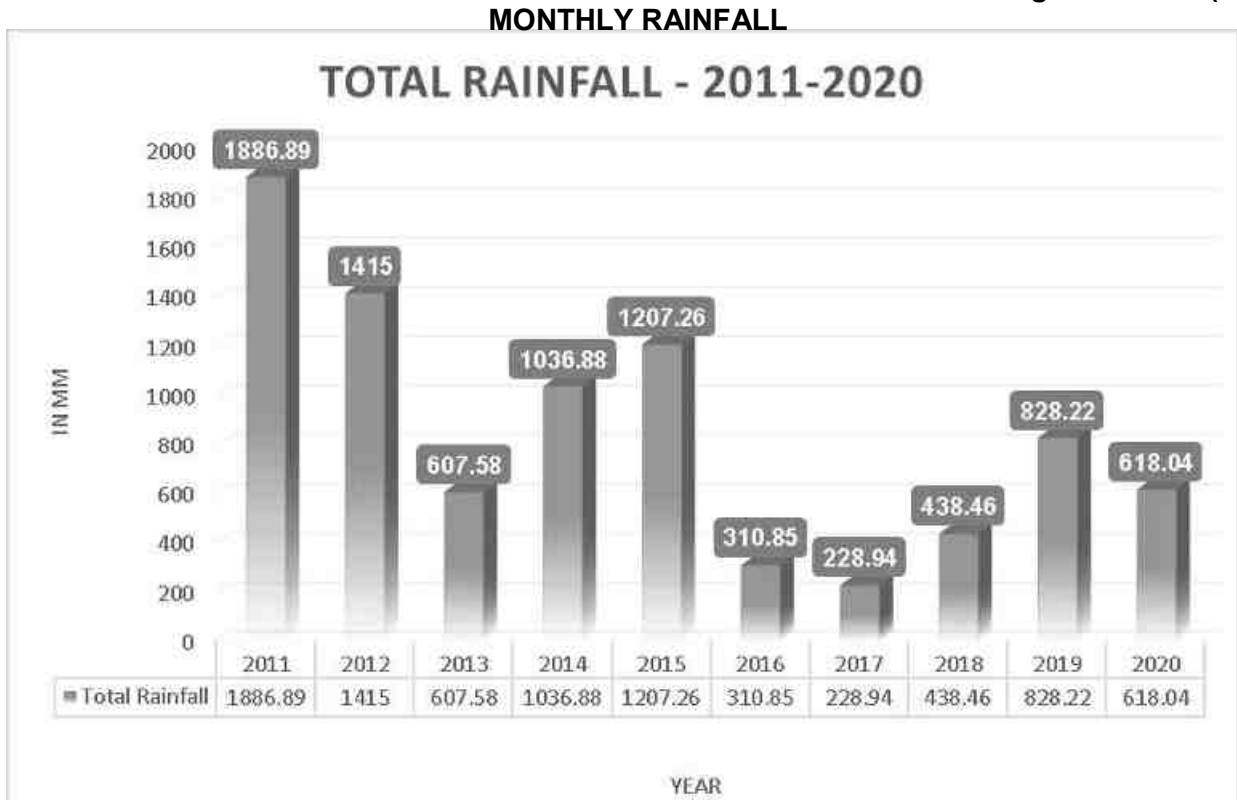
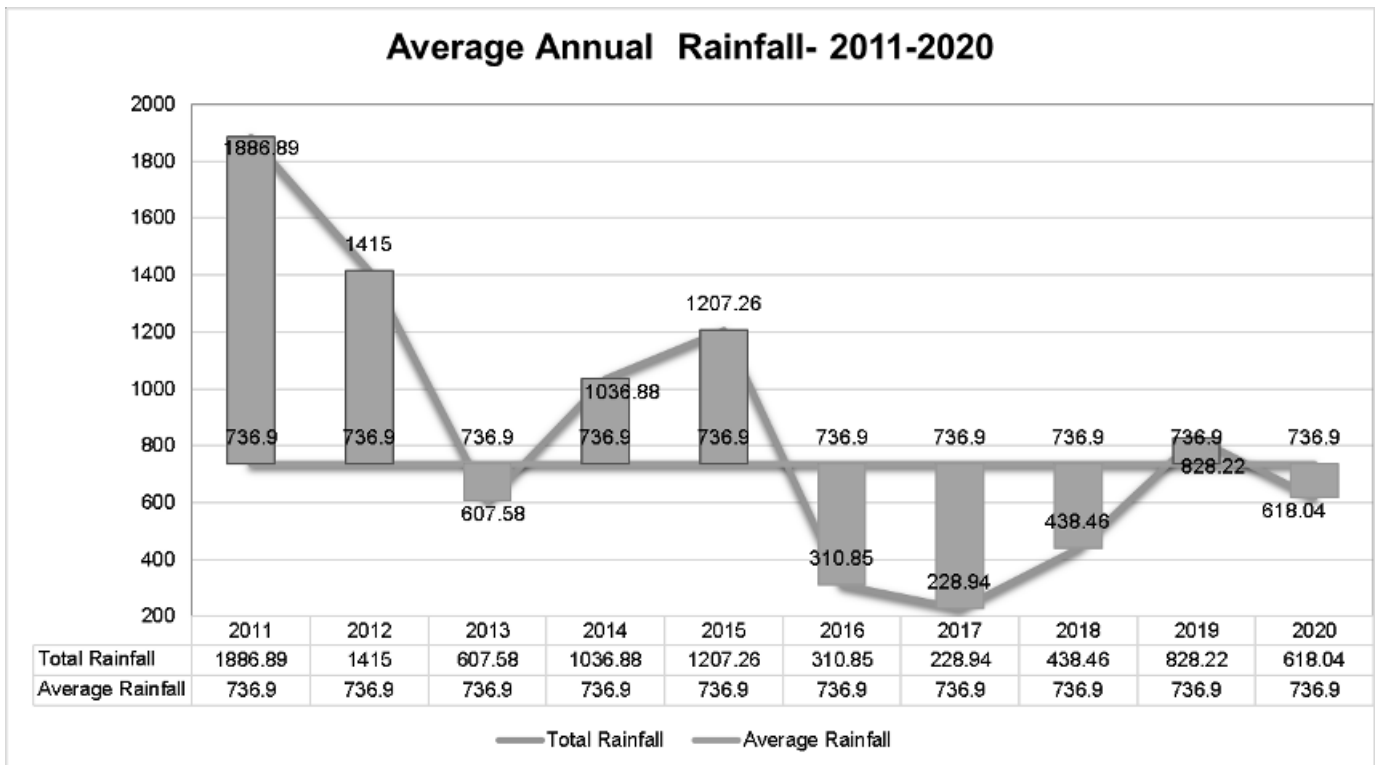


Figure No - 3.5(B)

AVERAGE ANNUAL RAINFALL



B. SITE SPECIFIC METEOROLOGICAL DATA:

Micrometeorology and microclimatic parameters were recorded by installing a weather monitoring station near mine lease area. Data of wind velocity, wind direction, ambient temperature, relative humidity, were recorded throughout the monitoring period.

C. DATA ANALYSIS:

The meteorological data are presented in **Table no – 3.2.**

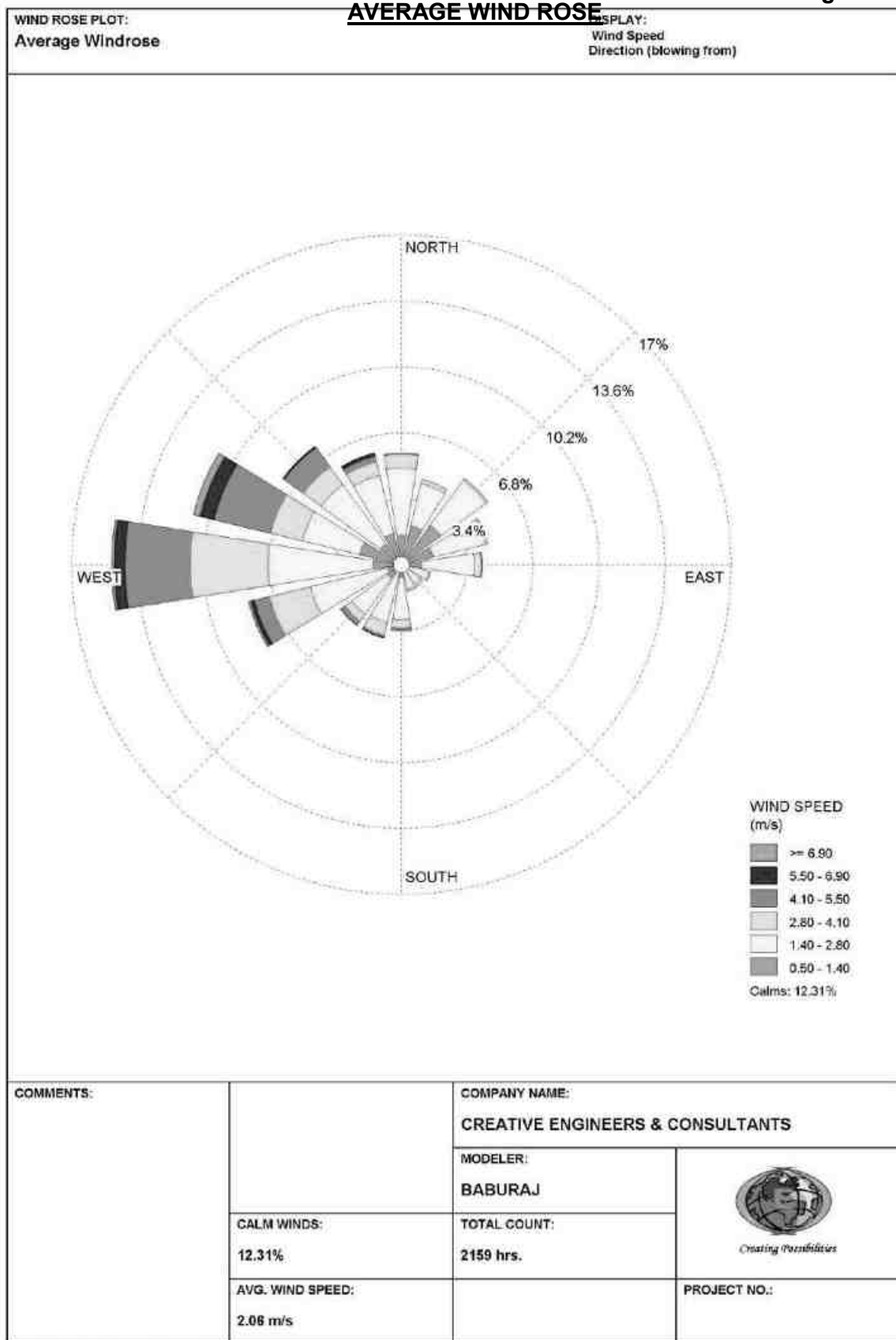
Table no – 3.2

Meteorological data

Sl.no	Parameters	Min	Max
1	Temperature in °c	23.9	40.2
2	Humidity in %	33.0	99
3	Wind speed in km/hr	<1.8	29.9
4	Predominant wind direction from	W, NW	

The average wind rose is depicted in **Figure No - 3.6.**

Figure No - 3.6



3.3.2 AMBIENT AIR QUALITY (AAQ):

3.3.2.1 GENERAL:

The principal objective of the Ambient Air Quality Monitoring (AAQM) is to assess the existing ambient air quality in and around the project area.

The ambient air quality depends upon the emission sources, meteorological conditions and the background concentration of specific contaminants. The study of the baseline ambient air quality data in the area is an essential and primary requirement for assessing the impact on air quality due to the mining activities and also to the potential environmental changes likely to occur due to this project.

With the above objective, the following parameters were analysed at the selected locations in the study area.

- ❖ Particulate Matter (PM₁₀)
- ❖ Particulate Matter (PM_{2.5})
- ❖ Sulphur Dioxide
- ❖ Oxides of Nitrogen
- ❖ Carbon Monoxide

3.3.2.2 DESIGN CRITERIA FOR AMBIENT AIR QUALITY MONITORING STUDY NETWORK:

Ambient Air quality has been assessed through a network of 6 ambient air quality stations. The following methodology has been considered for design of ambient air quality monitoring network in the area.

- ❖ Topography / terrain of study area.
- ❖ Populated areas within study area
- ❖ Residential /sensitive areas within study area
- ❖ Magnitude of surrounding industries
- ❖ Representation of regional background levels.
- ❖ Representation of cross sectional distribution in down wind direction
- ❖ Predominant wind direction and wind pattern

6 air sampling locations were selected for air quality study based on the above criteria.

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The details of the locations are given below:

SI.NO	LOCATION CODE	LOCATION	DISTANCE FROM CORE ZONE (KM)	DIRECTION
1	A1	Near Mine Lease Area	-	-
2	A2	Adaimithipankulam	1.0km	NE
3	A3	Kandithankulam	<0.8km	SW
4	A4	Samathuvapuram	2.2km	E
5	A5	Ponnakudi	3.6km	SE
6	A6	Alankulam	1.3km	SW

The location map, as above, for Ambient Air Quality study stations are shown in **Figure No - 3.7.**



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AMBIENT AIR QUALITY STUDY STATIONS

Figure No - 3.7



3.3.2.3 SAMPLING METHODOLOGY:

Standard monitoring and analysis procedures were adopted for determining the Air quality parameters. The methodology adopted is briefly described here under:

Particulate Matter (PM ₁₀)	-Gravimetric (IS 5182: Part 23:2006)
Particulate Matter (PM _{2.5})	- Gravimetric
Sulphur Dioxide	-Colorimetric (West & Gaeke Method) (IS 5182: Part 02: 2001)
Oxides of Nitrogen	-Colorimetric (Modified Jacob & Hocheiser Method) (IS 5182: Part 06:2006)
Carbon Monoxide	-CO Monitor

The PM₁₀, PM_{2.5}, SO₂, NO₂ and CO is monitored as per prescribed guidelines / methods for Summer 2020-21 season. The AAQ monitored data for all locations for above parameters are shown in **Table no - 3.3 and in Figure No – 3.8**

From the table it is seen that, in the ambient air, the PM₁₀ values were in the range of 49.9 – 79.2 µg/m³. PM_{2.5} values were in the range of 24.1 – 40.4 µg/m³. SO₂ levels were ranging from 4.3 – 7.8 µg/m³. NO₂ levels were ranging from 6.4 – 10.6 µg/m³. While comparing with the NAAQ Norms laid by MoEF, all monitored values of PM₁₀, PM_{2.5}, 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 µg/m³). Silica values in the study area are found to be below detectable limit (DL – 0.05mg/m³) which is within the prescribed limit of 5mg/m³. The baseline value of ambient air quality in the monitored locations also reflect the cumulative impact due to the nearby mining, crushers, other activities.

AMBIENT AIR QUALITY DATA

Table No - 3.3

NAME OF THE PROJECT: ROUGH STONE AND GRAVEL QUARRY OF THIRU. S. KASIRAJAN

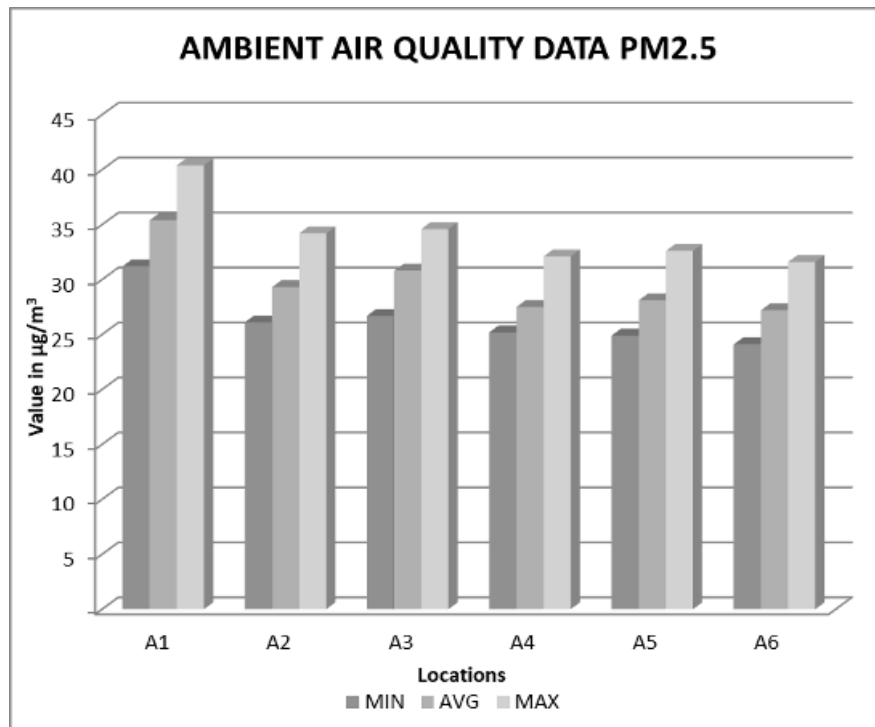
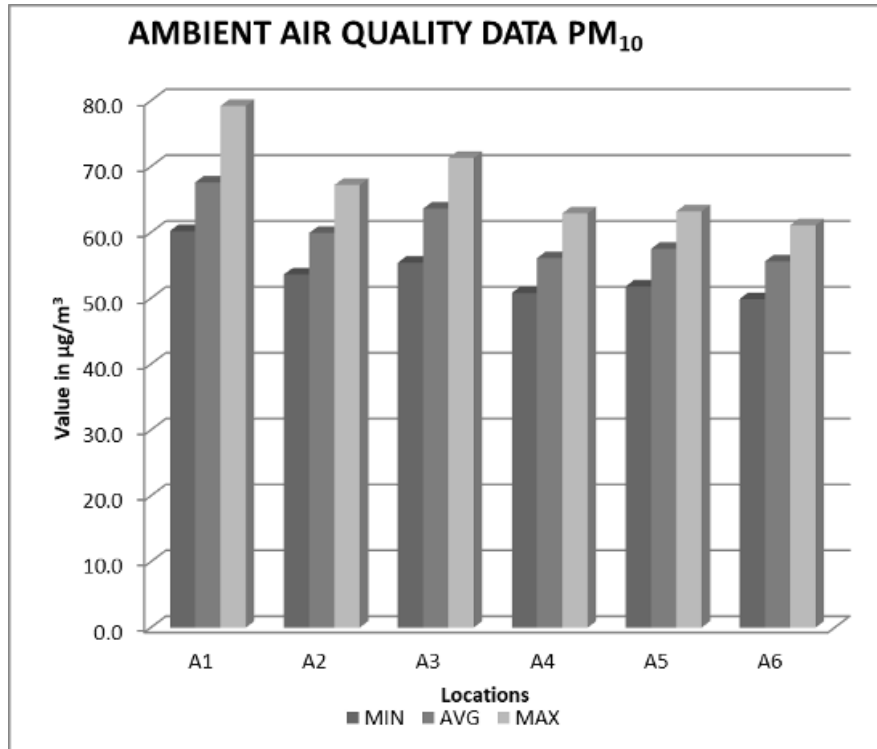
SEASON : SUMMER SEASON – MARCH 2021 TO MAY 2021

All Value in µg/m³

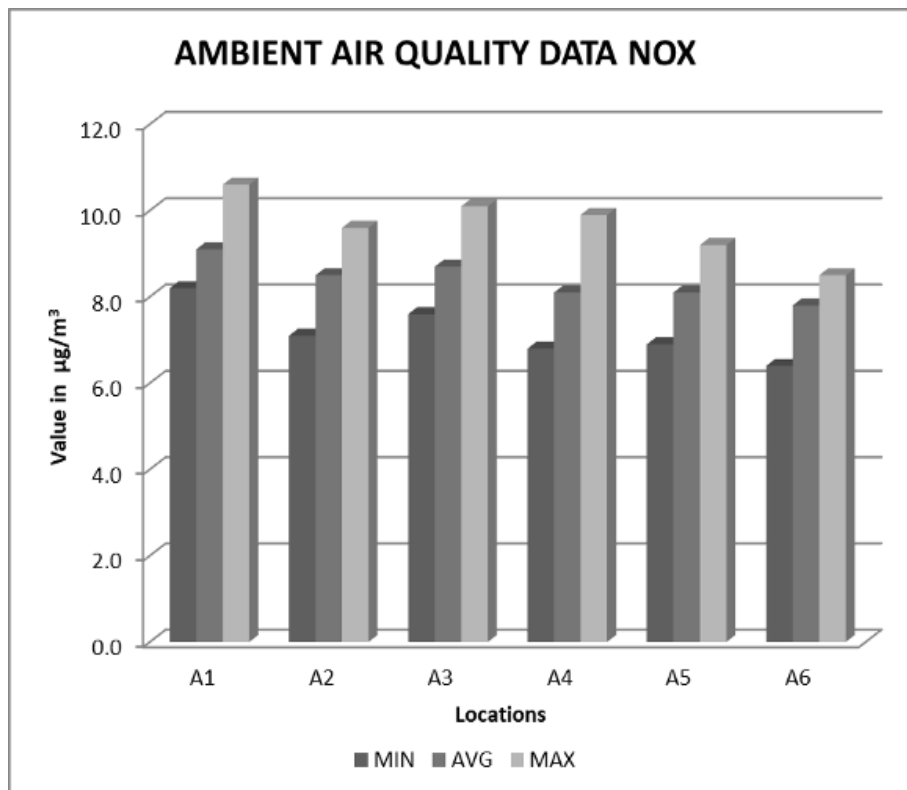
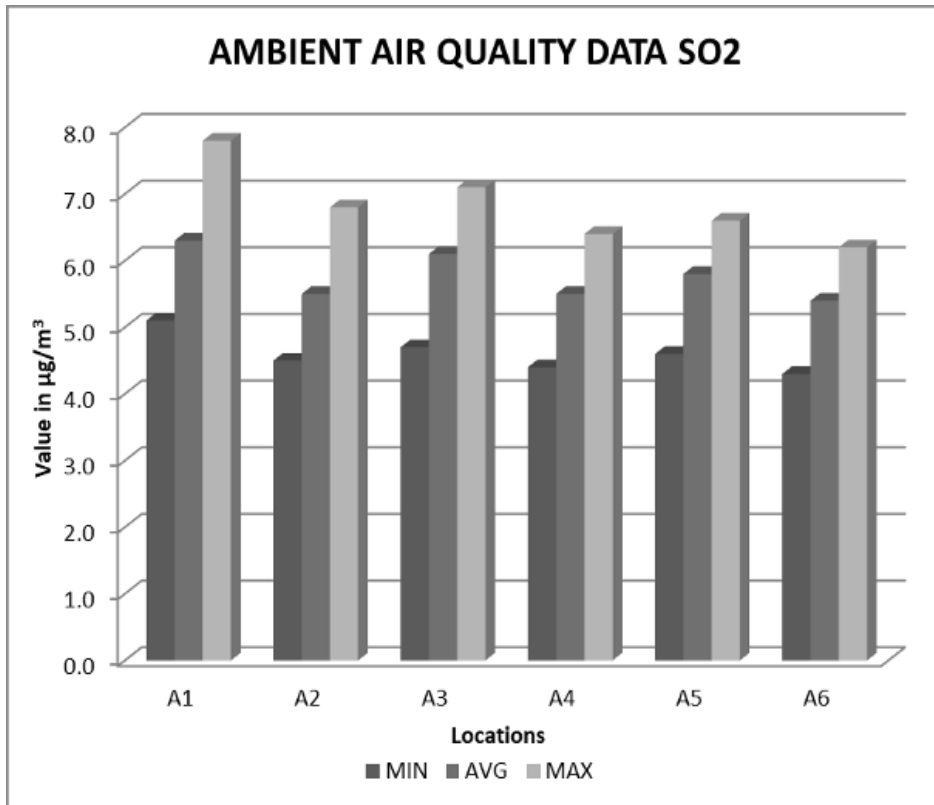
SL. NO	PARAMETERS	Cat.* (R, I, S)	PM ₁₀			PM _{2.5}			SO ₂			NO ₂		
	LOCATIONS		MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG	MAX
1	A1- Near Mine Lease Area	R	60.2	67.6	79.2	31.2	35.4	40.4	5.1	6.3	7.8	8.2	9.1	10.6
2	A2 - Adaimithipankulam	R	53.6	59.9	67.2	26.1	29.3	34.2	4.5	5.5	6.8	7.1	8.5	9.6
3	A3- Kandithankulam	R	55.4	63.6	71.3	26.7	30.8	34.6	4.7	6.1	7.1	7.6	8.7	10.1
4	A4- Samathuvapuram	R	50.8	56.1	62.9	25.2	27.5	32.1	4.4	5.5	6.4	6.8	8.1	9.9
5	A5- Ponnakudi	R	51.8	57.5	63.2	24.9	28.1	32.6	4.6	5.8	6.6	6.9	8.1	9.2
6	A6- Alankulam	R	49.9	55.6	61.1	24.1	27.2	31.6	4.3	5.4	6.2	6.4	7.8	8.5
CPCB LIMITS			PM₁₀			PM_{2.5}			SO₂			NO₂		
** 1994 Notification		(I)	150			-			120			120		
		(R)	100			-			80			80		
		(S)	75			-			30			30		
* 2009 Notification		(I & R)	100			60			80			80		
		(S)	100			60			80			80		

* **Note:** Category - R - Residential, I - Industrial, S - Sensitive

Figure No - 3.8



Contd... Figure No - 3.8



3.3.3 WATER ENVIRONMENT:

3.3.3.1 GENERAL:

Assessment of baseline data on water environment includes:

- Identification of water resources
- Collection of water samples
- Analyzing water samples collected for physico-chemical parameters as per standards.

3.3.3.2 SAMPLING STATIONS:

6 water samples were collected at the following locations:

- W1 - Near Mine lease area - Borewell
- W2 – Adaimithipankulam - Borewell
- W3 – Kandithankulam - Borewell
- W4 – Samathuvapuram- Borewell
- W5 – Ponnakudi - Borewell
- W6 – Alankulam- Borewell

The locations are shown in **Figure No - 3.9**

3.3.3.3 SAMPLING METHODOLOGY:

Water samples were collected in 2 litre capacity fresh cans as per IS 3025 Part - I and transported to the laboratory in Ice boxes.

3.3.3.4 SAMPLING AND ANALYTICAL METHODOLOGY:

The results of the 6 sample analysis (Bore Well water) are shown in **Table no - 3.4.**

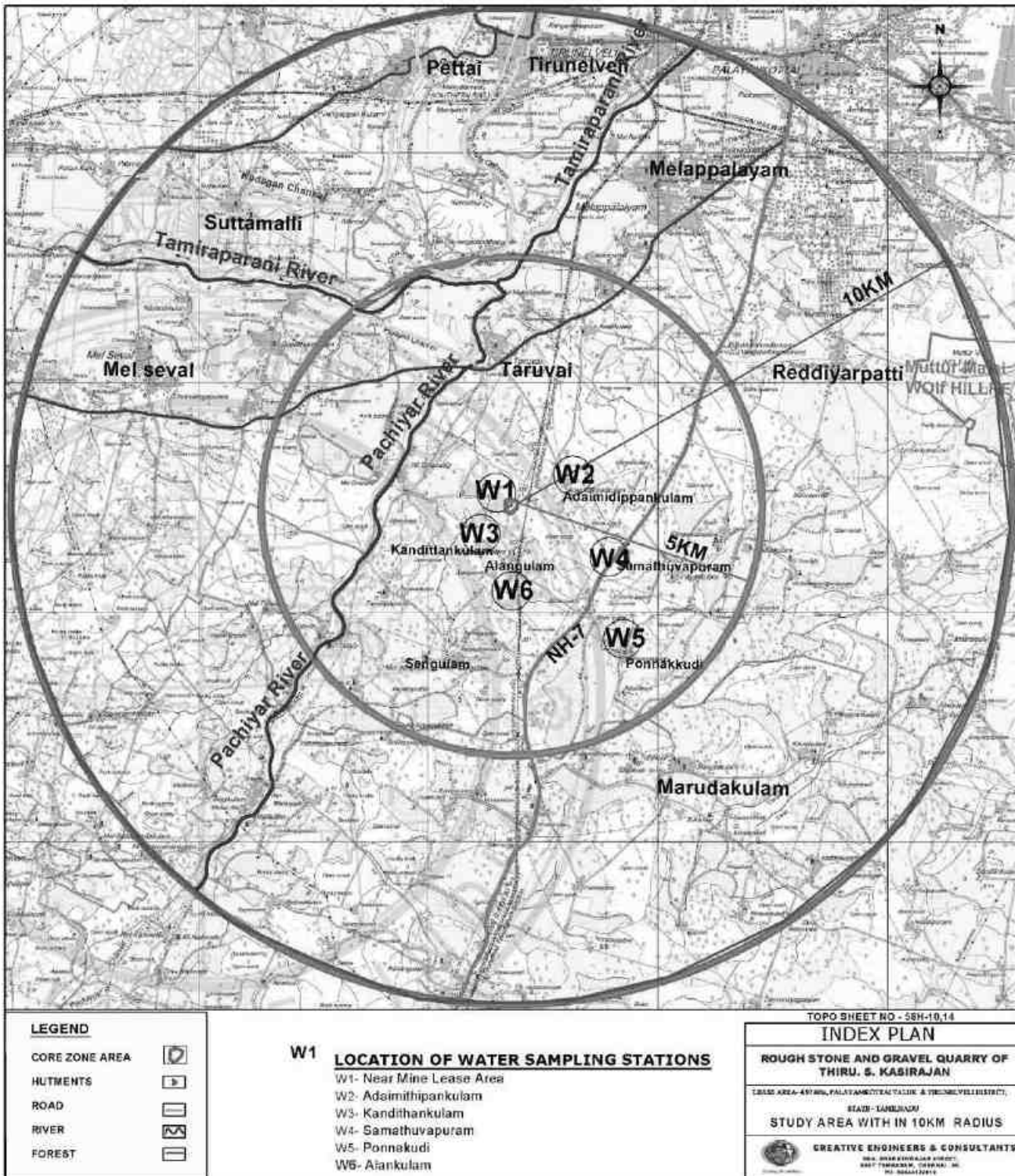
The pH values of bore well waters were ranging in between 7.01-7.82. TDS values were in the range of 364-736mg/L. Calcium (as Ca) and Magnesium (as Mg) values were in the range of 37.9 – 106. mg/L and 15.6 – 55.5 mg/L respectively. Chloride values were ranging from 56.7 - 212mg/L. Iron content was found to be in the range 0.02 – 0.14 mg/L.

From the above it is found that the water quality of ground water is found to be within the prescribed Permissible limits of IS: 10500 Norms in the absence of an alternative source as per Drinking Water Specifications. However, the TDS, Total Hardness, Calcium and Total Alkalinity values of certain water samples though they are above acceptable limits it is found to be within the prescribed Permissible limits of IS: 10500 Norms in the absence of an alternative source as per Drinking Water Specifications.

DRAFT EIA/EMP REPORT FOR ROUGHSTONE AND GRAVEL QUARRY OF THIRU.S.KASIRAJAN AT SURVEY NOS. 530/3A, 531/1A, 532, 533/1, 568/5A(P) AND 569/3A OVER AN AREA OF 4.97.0Ha IN THARUVAI VILLAGE, PALAYAMKOTTAI TALUK, TIRUNELVELI DISTRICT, TAMILNADU.

LOCATION OF WATER SAMPLING STATIONS

Figure No - 3.9



DRAFT EIA/EMP REPORT FOR ROUGHSTONE AND GRAVEL QUARRY OF THIRU.S.KASIRAJAN AT SURVEY NOS. 530/3A, 531/1A, 532, 533/1, 568/5A(P) AND 569/3A OVER AN AREA OF 4.97.0Ha IN THARUVAI VILLAGE, PALAYAMKOTTAI TALUK, TIRUNELVELI DISTRICT, TAMILNADU.

WATER QUALITY DATA

Table no – 3.4

SI. NO	PARAMETERS	Unit	Protocol	W1-NEAR MINE LEASE AREA	W2-ADAIMIT HIPANKU LAM	W3-KANDITHA NKULAM	W4-SAMATHUV APURAM	W5-PONNAKUDI	W6-ALANKULA M	*Limits	
										Acceptable	**Permissible
A.	Physical Parameters										
1	Odour	-	IS 3025 (P-5) 1983 (RA – 2002)	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
2	Turbidity	NTU	IS 3025 (P-10) 1984 (RA – 2002)	<1	<1	<1	<1	<1	<1	1	5
3	pH at 25 °C	-	IS 3025 (P-11) 1983 (RA – 2002)	7.25	7.64	7.25	7.82	7.01	7.55	6.5-8.5	No Relaxation
4	Electrical Conductivity	(µmhos /cm)	2510 B APHA 22nd Edition 2012	722.1	820.6	605.8	690.5	858.9	1217	-	-
B.	Chemical Parameters										
5	Total Dissolved Solids	mg/L	IS 3025 (P – 16) 1984 (RA 2006)	435	496	364	415	560	736	500	2000
6	Total hardness as CaCO ₃	mg/L	2340 C APHA 22nd Edition 2012	216	276	160	240	439	492	200	600
7	Calcium as Ca	mg/L	IS 3025 (P- 40) 1991 (RA 2003)	48	69.6	37.9	49.2	83.1	106	75	200
8	Magnesium as Mg	mg/L	3500 Mg B APHA 22nd Edition 2012	23	24.5	15.6	28.1	55.5	54.5	30	100
9	Calcium as CaCO ₃	mg/L	3500 Ca B APHA 22nd Edition 2012	120	174	94.8	123	208	265	-	-
10	Magnesium as CaCO ₃	mg/L	3500 Mg B APHA 22nd Edition 2012	96	102	65.2	117	231	227	-	-
11	Total alkalinity as CaCO ₃	mg/L	IS 3025 (P – 23) 1986 (RA – 2003)	211	234	160	190	314	284	200	600
12	Chloride as Cl-	mg/L	IS 3025 (P – 32) 1988	129	147	134	112	56.7	212	250	1000



DRAFT EIA/EMP REPORT FOR ROUGHSTONE AND GRAVEL QUARRY OF THIRU.S.KASIRAJAN AT SURVEY NOS. 530/3A, 531/1A, 532, 533/1, 568/5A(P) AND 569/3A OVER AN AREA OF 4.97.0Ha IN THARUVAI VILLAGE, PALAYAMKOTTAI TALUK, TIRUNELVELI DISTRICT, TAMILNADU.

SI. NO	PARAMETERS	Unit	Protocol	W1-NEAR MINE LEASE AREA	W2- ADAIMIT HIPANKU LAM	W3- KANDITHA NKULAM	W4- SAMATHUV APURAM	W5- PONNAKUDI	W6- ALANKULAM	*Limits	
										Acceptable	**Permissible
			(RA – 2003)								
13	Free Residual chlorine as Cl-	mg/L	4500 Cl- B APHA 22nd Edition 2012	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)	BDL (D.L - 0.2)	0.2	1.0
14	Sulphates as SO4	mg/L	4500 SO42- -E APHA 22nd Edition 2012	49.1	52.6	20.6	48.7	173	115	200	400
15	Iron as Fe	mg/L	3500 Fe B APHA 22nd Edition 2012	0.05	0.04	0.02	0.05	0.14	0.07	0.3	No Relaxation
16	Nitrate as NO3	mg/L	IS 3025 (P – 34) 1988 (RA 2003)	BDL (D.L - 1.0)	BDL (D.L - 1.0)	1.55	1.98	BDL (D.L – 1.0)	2.28	45	No Relaxation
17	Fluoride as F	mg/L	4500 F- D APHA 22nd Edition 2012	0.43	0.56	0.25	0.37	0.66	0.58	1.0	1.5
18	Manganese as Mn	mg/L	3500 Mn B APHA 22nd Edition 2012	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)	BDL (D.L - 0.05)	0.1	0.3

Note: * IS10500: 2012
**** Permissible limits in the absence of Alternate Source**



3.3.4 NOISE ENVIRONMENT:

3.3.4.1 GENERAL:

Sound can be defined as atmospheric or air vibration perceptible to ear. Noise is usually unwanted or undesired sound. Consequently, particular sound can be noise to one person and not to others or noise at one time and not at other time. Hence sound loud enough to be harmful is called noise without regard to its characteristics. Noise is a form of pollution because it can cause hearing impairment and psychological stress.

Operational phase of this project may lead to increase noise levels from the existing levels at least in and around the project area. As it is evident that noise level beyond permissible limits will cause adverse impacts on the environment, it has become imperative to assess the noise levels in and around the mine area.

Noise level measurements were taken at the selected locations using noise level meter both during day and night time. Noise level measurements were taken continuously for a day at hourly intervals.

3.3.4.2 MONITORING LOCATIONS:

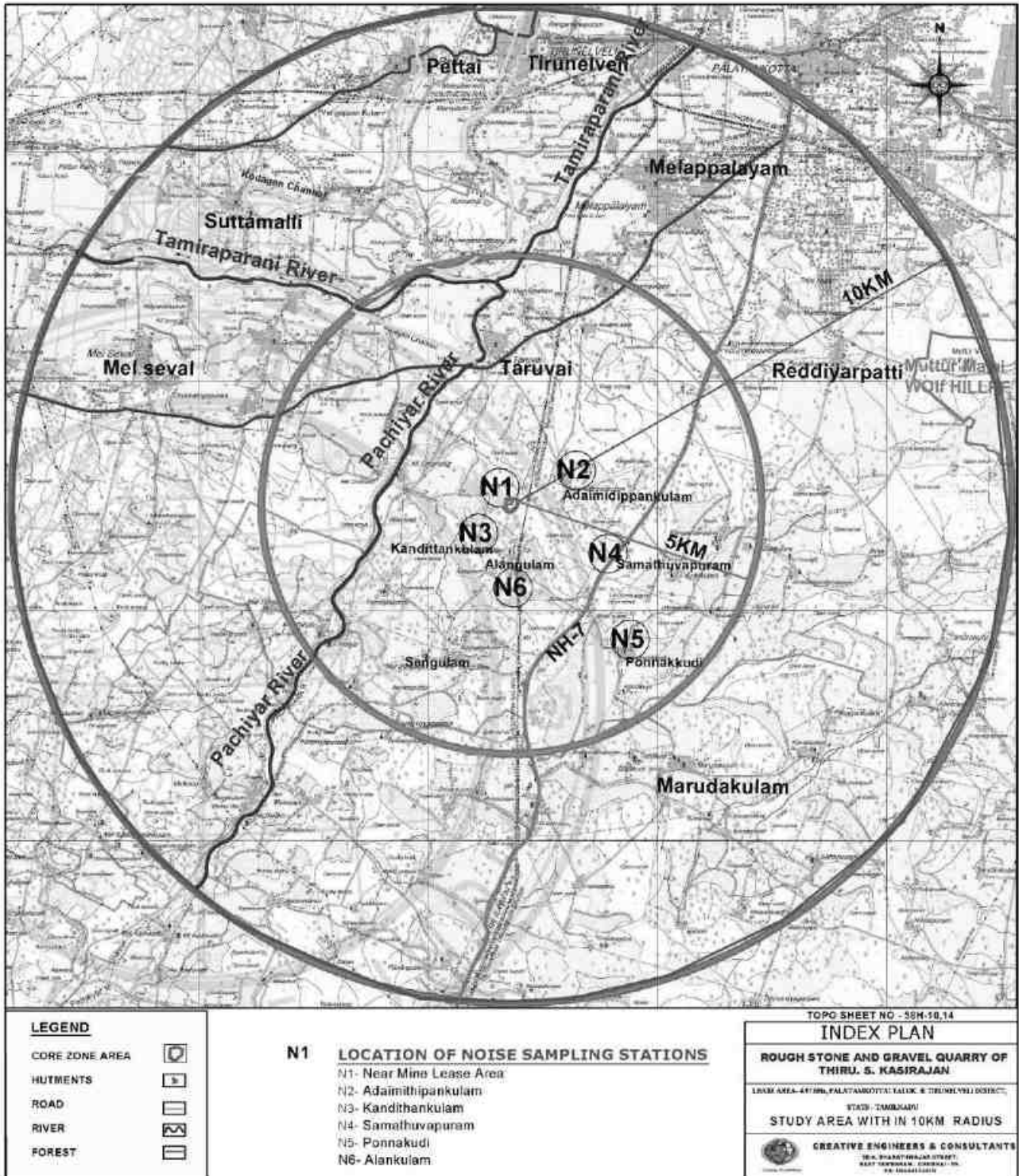
Noise measurements were carried out continuously for a day once in a Season at 6 locations. The locations are indicated in below:

SI.NO	LOATION CODE	LOCATION	DISTANCE FROM CORE ZONE(KM)	DIRECTION
1	N1	Near Mine Lease Area	-	-
2	N2	Adaimithipankulam	1.0km	NE
3	N3	Kandithankulam	<0.8km	SW
4	N4	Samathuvapuram	2.2km	E
5	N5	Ponnakudi	3.6km	SE
	N6	Alankulam	1.3km	SW

These Locations are shown in **Figure No - 3.10**.

Figure No - 3.10

LOCATION OF NOISE SAMPLING STATIONS



3.3.4.3 METHODOLOGY OF ASSESSMENT:

Noise levels were measured using sound level meter manufactured by (Model No - SL-4001, 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.

3.3.4.4 DATA ANALYSIS AND INTERPRETATION:

The results of hourly background noise levels for all locations are given in **Table no-3.5**. The noise values for all above locations are shown in a comparative chart given in **Figure No - 3.11**.

From the table it is observed that the day Equivalent Noise (Leq-d) level were ranging from 41.5 to 46.6 dB(A) and Night Equivalent Noise (Leq-n) level were ranging from 37.0 to 39.8dB(A). Day and Night Equivalent Noise (Leq-n) level were ranging from 40.5 to 45.1dB(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.

Table no – 3.5

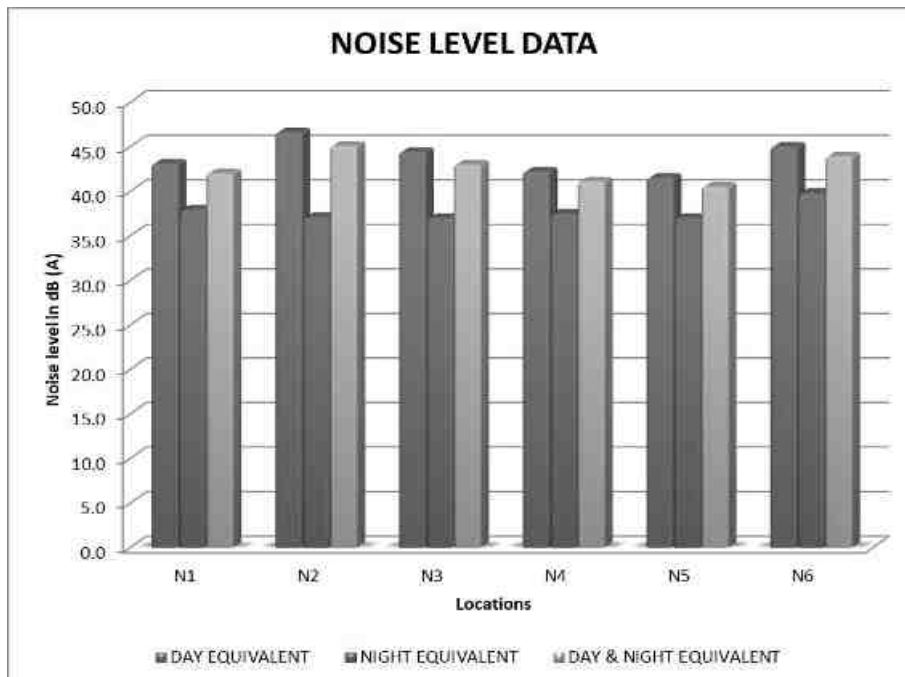
AMBIENT NOISE LEVEL IN dB (A)

MONITORING LOCATION	N1	N2	N3	N4	N5	N6
Day Equivalent	43.1	46.6	44.4	42.2	41.5	45.0
Night Equivalent	37.9	37.1	37.0	37.5	37.0	39.8
Day & Night Equivalent	42.0	45.1	43.0	41.1	40.5	43.9
Limits as per MOEF						
Day equivalent - 55 dB (A); Night equivalent - 45 dB (A); Work zone Exposure in 8 hr - 90 dB (A)						

Location name:

- N1 - Near Mine Lease Area
- N2 – Adaimithipankulam
- N3 – Kandithankulam
- N4 – Samathuvapuram
- N5 – Ponnakudi
- N6 - Alankulam

Figure No - 3.11



3.3.5 SOIL CHARACTERISTICS:

3.3.5.1 GENERAL:

Soil is defined as the naturally deposited, unconsolidated material which covers the earth's surface, whose chemical, physical properties are capable of providing growth to plants. Soil itself is very complex. Soil contains mineral particles, air, water and organic matter.

Soil pH supports a number of inorganic and organic chemical reactions. Soil fertility is directly influenced by pH through the solubility of many nutrients. Soil texture has an important role in nutrient management and size distribution of the mineral particles (sand, silt, clay). Depending on the size of the particles in soil, it can be classified in to sandy, silty, clay and loamy.

3.3.5.2 MONITORING LOCATIONS:

Soil samples were collected from 5 locations to assess the soil quality in and around the mines. Soil samples collected using sampling augers and field capacity apparatus.

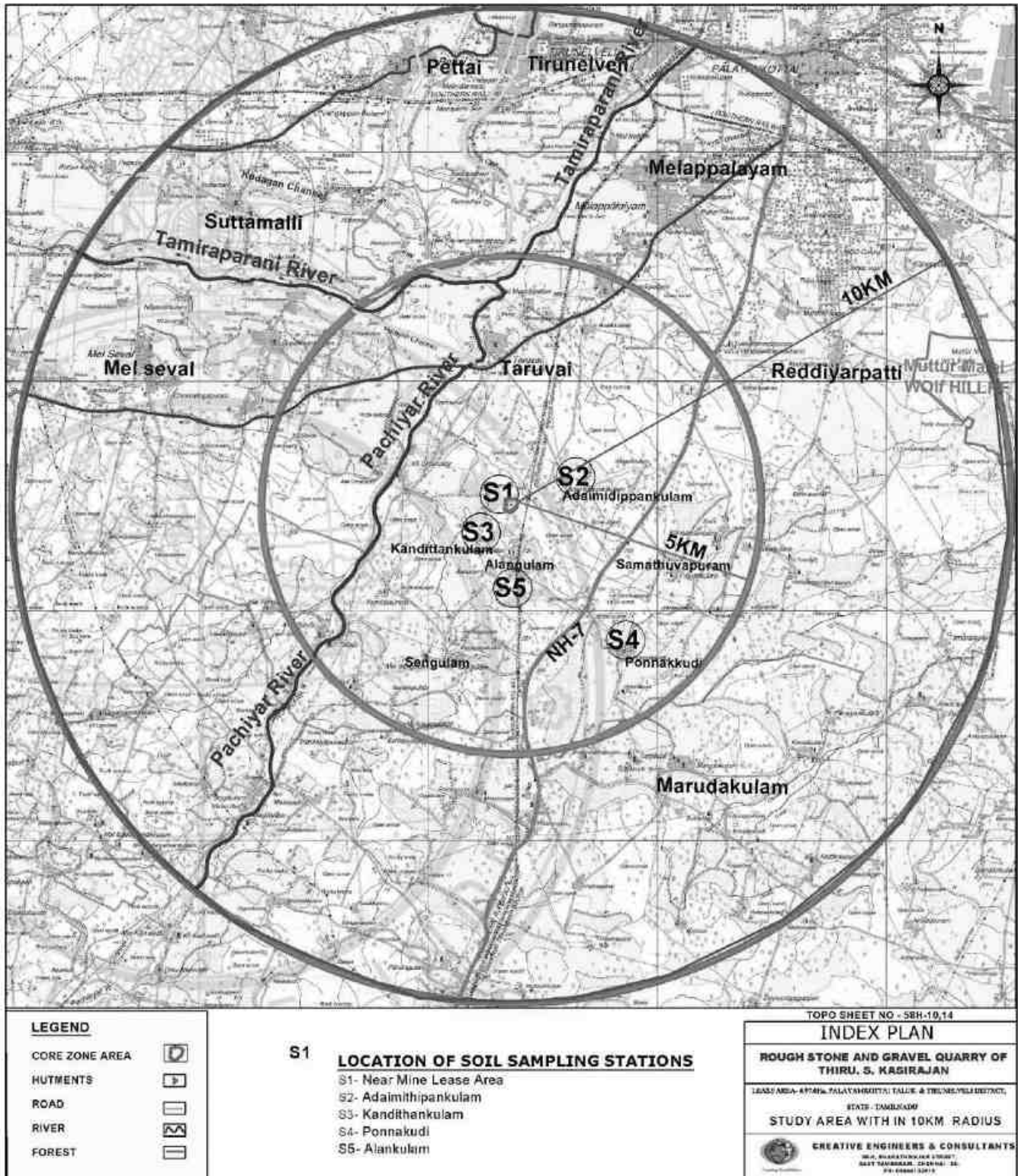
The four locations are:

- S1 - Near Mine Lease Area
- S2 - Adaimithipankulam
- S3 - Kandithankulam
- S4 – Ponnakudi
- S5 - Alankulam

These locations are shown in **Figure No – 3.12**

LOCATION OF SOIL SAMPLING STATIONS

Figure No – 3.12



3.3.5.3 Data Analysis:

Results of the soil samples show that the pH values were found to be 6.32 to 7.81 and Electrical Conductivity values were ranging between 46.72 – 120 µmhos/cm. Soils are generally clay Loam, sandy clay loam and silt clay loam types. Organic matter values were ranging between 0.72 – 1.32%.

Total Nitrogen values were ranging between 65.9 - 190mg/kg. Phosphorus values were ranging between 1.14 – 1.92µg/g. Potassium values were ranging between 670 - 1290mg/kg. Sodium values were ranging between 320 - 475mg/kg. Total Sulphur values were observed to be BDL. The soil quality data for the 5 samples collected and analyzed are provided in

Table no – 3.6.

SOIL QUALITY DATA

Table no – 3.6

Sl. No.	Parameters	Unit	S1- Near Mine Lease Area	S2- Adaimithip ankulam	S3- Kandithankulam	S4- Ponnakudi	S5- Alankulam
1	pH at 25°C	-	7.24	7.81	6.77	6.97	6.32
2	Electrical Conductivity	(µmhos/cm)	120	80.24	62.28	105.6	46.72
3	Dry matter content	%	98.59	98.35	96.56	95.78	96.98
4	Water Content	%	1.41	1.65	3.44	4.22	3.02
5	Organic Matter	%	1.32	0.72	0.89	0.98	1.07
6	Soil texture	-	SILT LOAM	SILTY CLAY LOAM	SILTY CLAY LOAM	SILTY CLAY LOAM	SILTY CLAY
7	Grain Size Distribution i. Sand	%	35.50	12.35	5.98	13.29	8.82
8	ii. Silt	%	49.31	60.49	64.15	47.55	46.57
9	iii. Clay	%	15.18	27.16	29.87	39.16	44.61
10	Phosphorous	µg/g	1.83	1.46	1.14	1.32	1.92
11	Sodium	mg/kg	410	370	320	390	475
12	Potassium	mg/kg	1180	670	768	925	1290
13	Total Nitrogen	mg/kg	190	120	95.3	65.9	82.6
14	Total Sulphur	%	BDL(D.L.0.02)	BDL(D.L.0.02)	BDL(D.L.0.02)	BDL(D.L.0.02)	BDL(D.L.0.02)

3.4 LAND ENVIRONMENT:

3.4.1 LAND USE PATTERN BASED ON SATELLITE IMAGERY STUDIES:

3.4.1.1 Land Use:

For preparing an impact statement, aspects of the land conditions are covered under land use. An industrial project / mine can cause changes in land use, soil process in different intensities depending upon the size of the project and distance involved between the industries and the area. Here, land use status for a radius of 10 km has been studied.

3.4.1.4 Data used and methodology:

For the present study on land use pattern of buffer area around the proposed stone and gravel quarry, an archived historical data of Landsat 8 data has been used as base data acquired on February 2021 (**Figure No.3.13**) has been used to generate the require landuse map showing their spatial pattern within the buffer area.

The table showing data used for generation of information on landuse and subsequent GIS analysis is given below (**Table No. 3.7**)

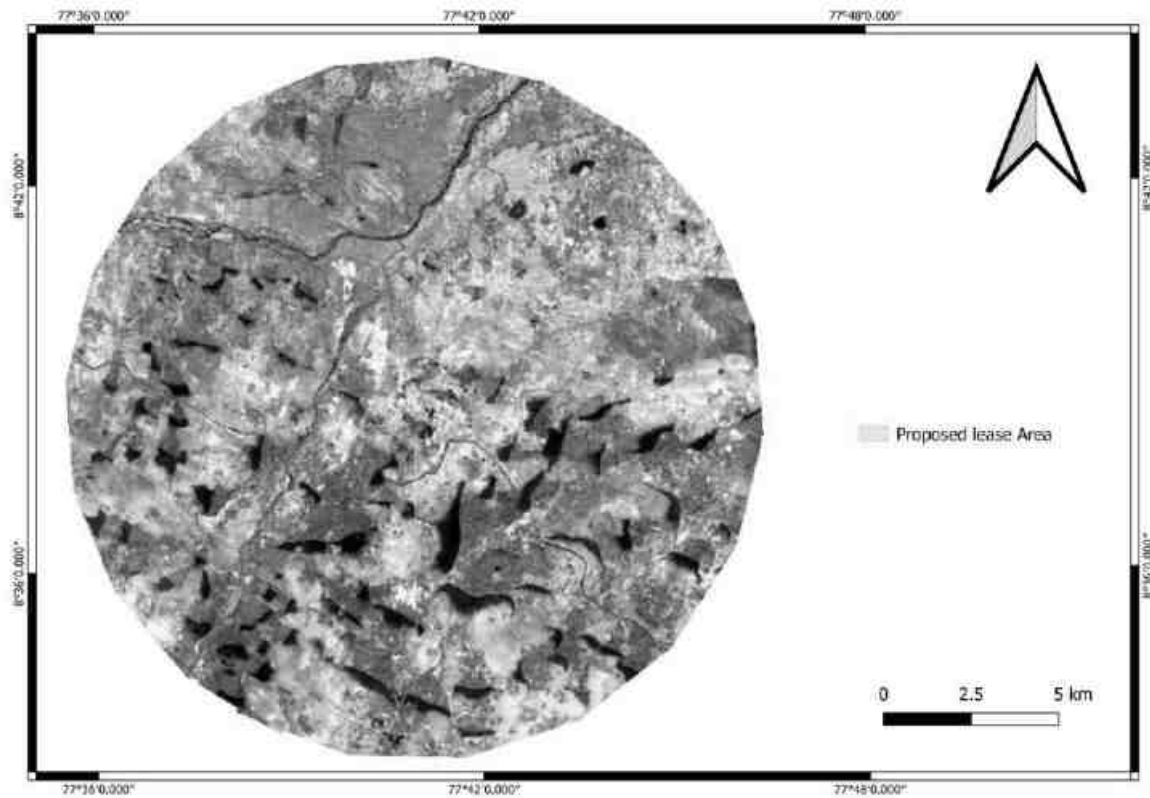
RS satellite image used for the present study Table No. 3.7

S.No	Type of Data	Date	Generated Map
1.	Landsat 8	April 2021	Landuse (LU) Map showing 10 Km around the ML area

Interpretation of satellite image requires understanding of relationship between image elements and their respective terrain elements. Since, in the present study, the landuse information is obtained using visual interpretation, an interpretation key is generated. The image elements such as color, tone, texture, size, shape and associated elements have been used to delineate various landuse categories. The landuse categorization and nomenclature used in the present study is based on the national level landuse classification system, which is adopted for the entire country as recommended by National Remote Sensing Centre (NRSC), Department of Space, Government of India (**Table No. 3.8**).

Figure No.3.13

LANDSAT 8 SATELLITE DATA OF THE STUDY AREA



Major Landuse units of the study area

Table No.3.8

S.No	Major Category	Landuse unit
1	Built-Up Land	Village Town Industrial / Vacant Area
2	Agricultural Land	Crop Land Fallow Land Plantation Farm Land
3	Forest Land	Open Scrub Forest
4	Waste Land Mining Area	Land With Scrub Land Without Scrub Barren / Rocky/ Stony Waste Quarries / Abandoned Quarries
5	Waterbodies	Tanks Rivers / Streams

Such LandUse and Land cover (LULC) categories have been verified using field check and identified sample sites within the buffer area, verified on field and transferred into gis geo-coordinates using observation coordinates received from hand held GPS (global positioning system) instrument. Thus, an interpreted final landuse map has been generated (**Figure No. 3.14**) using above such elaborate procedure and transformed into GIS environment for its spatial distribution and area estimation. Spatial nature and extent of various landuse categories within the buffer area is discussed is given below:

Figure No. 3.14

MAP SHOWING LAND USE CATEGORIES AROUND 10KM RADIAL BUFFER AND ITS ENVIRON

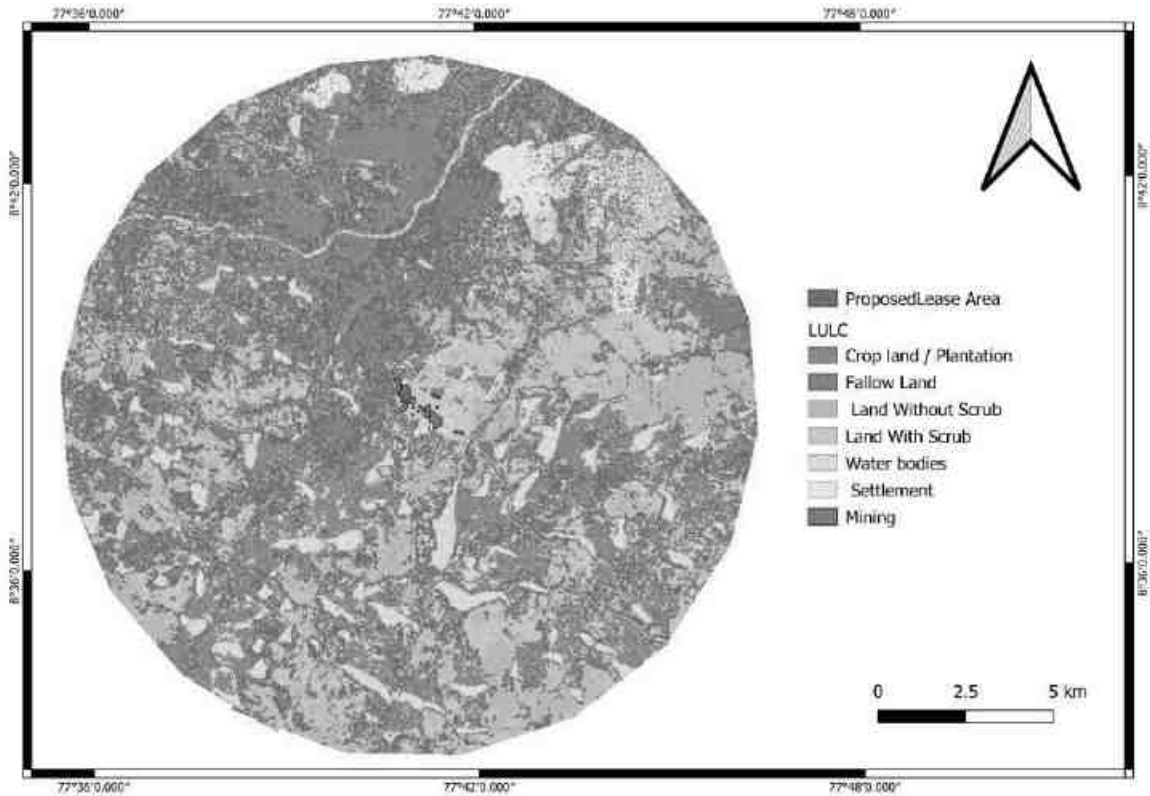


Table No. 3.9

Area Estimation of Landuse Categories around 10 Km buffer of Quarry ML area

S.No	Landuse Feature	Area (Sq.Km)	Percentage
01	Agriculture/ Crop	108.69	34.96
02	Fallow Land	71.60	23.04
03	Land Without Scrub	23.23	7.48
04	Land With Scrub	68.85	22.16
05	Water bodies	26.90	8.66
06	Settlement	11.05	3.56
07	Mining/Industries	0.43	0.14
	Total	310.75	

From the above table it is seen that 34.96 % of the study area is agriculture land and 23.04 % are fallow land. Land with scrub constitutes 22.16 %.

3.4.2 LAND USED BASED ON REVENUE RECORDS:

The study area falls in Tirunelveli, Ambasamudram, Palayamkottai, Nanguneri Taluk of Tirunelveli District, Tamilnadu state and the study area for the land use pattern (10 km radius) has been divided into four zones viz. Zone-I (0-2 km), Zone-II (2-5 km), Zone-III (5-10 km) and Zone-IV (0-10 km) respectively. The land use pattern of the study area falling within 10 km radius around the proposed project area is presented in **Table no - 3.10**.

Land use pattern of the study area falling within 10 km radius Table no – 3.10

Sl. No	Study Area	Total Geographical Area (in Hectares)	Forest Area (in Hectares)	Area under Non-Agricultural Uses (in Hectares)	Barren & Uncultivable Land Area (in Hectares)	Permanent Pastures and Other Grazing Land Area (in Hectares)	Land Under Miscellaneous Tree Crops etc. Area (in Hectares)	Cultural Waste Land Area (in Hectares)	Fallows Land other than Current Fallows Area (in Hectares)	Current Fallows Area (in Hectares)	Total Unirrigated Land Area (in Hectares)	Area Irrigated by Source (in Hectares)
1	0- 2 KM	0	0	0	0	0	0	0	0	0	0	0
2	2 - 5 KM	1455.47	0	343.39	198	28	2	55	295.54	304.2	15.98	213.36
3	5-10 KM	26231.67	263.86	6018.1	2106.01	315.48	155.3	3747.32	7091.12	1541.67	489.44	4503.37
4	0-10 KM	34950.03	278.02	8568.5	2677.51	427.68	218.49	4550.88	8266.69	2979.86	664.1	6318.3
		100.00	0.80	24.52	7.66	1.22	0.63	13.02	23.65	8.53	1.90	18.08

Forest area:

No forest land in the 10 km study area from the project site.

Area under non-agricultural uses:

About 8568.5 Ha (24.52 %) area is classified under non-agricultural area

Barren & un-cultivable Land Area

About 2677.51 Ha is un-cultivable which comprises about 7.66% of the total area

Permanent Pastures and Other Grazing Land Area

Permanent pastures and other grazing land area account for about 427.68 Ha (1.22%) of the total area

Land Under Miscellaneous Tree Crops etc

218.49 Ha (0.63 %) *of the total area has* miscellaneous tree crops

Culturable Waste Land:

This land includes the land which was cultivated sometime back and left vacant during the past 5 years in succession. Such lands may either be fallow or covered with shrubs, which are not put to any use and all grazing lands and village common lands are also included in this category. The study area comprises of about 4550.88 Ha (13.02%) of cultivable wasteland.

Fallow Land:

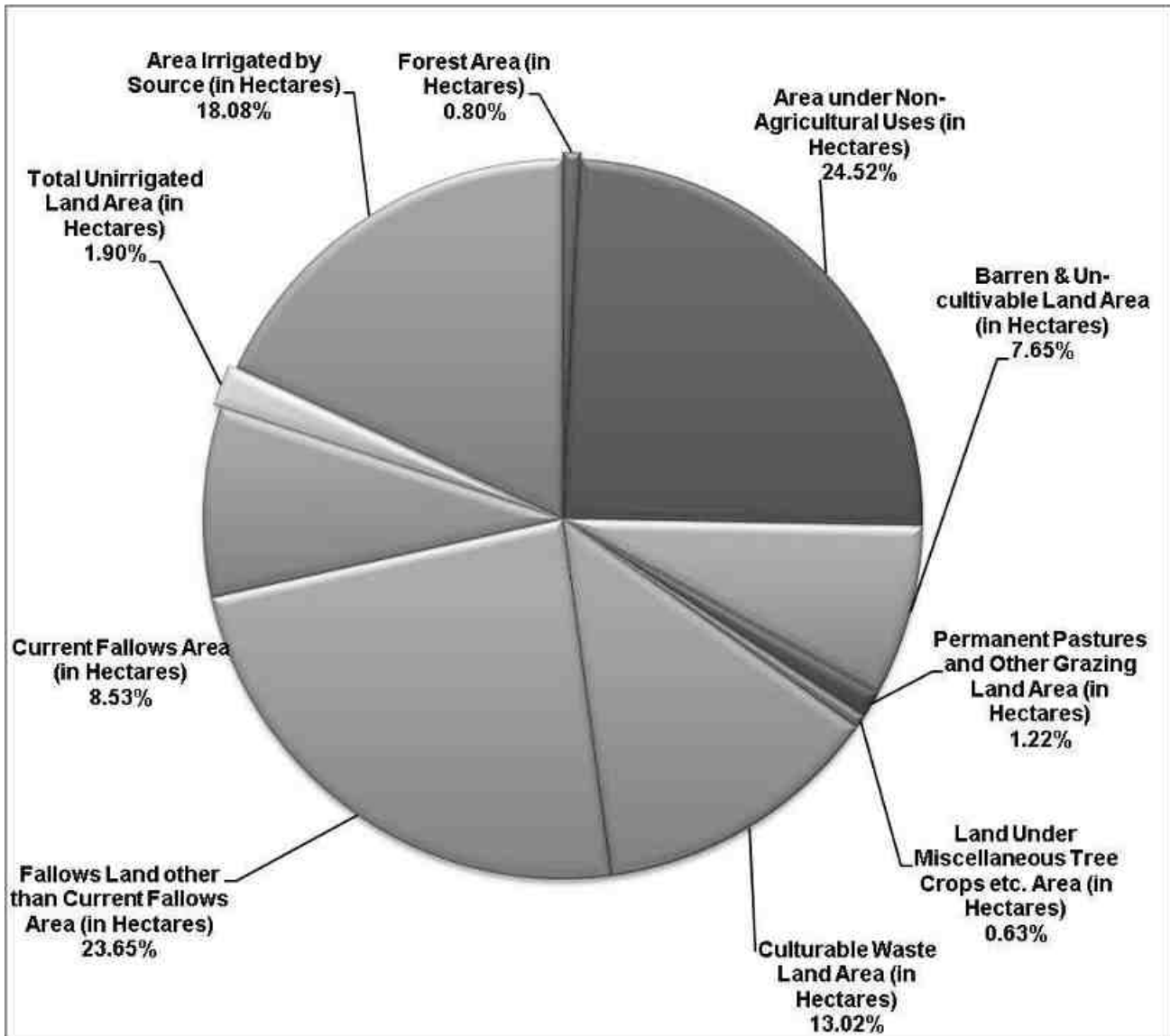
Fallow lands excluding current fallows occupy about 8266.69 (23.65%) of the total area of buffer zone and current fallows occupy 2979.86Ha (8.53%)

Unirrigated & Irrigated lands:

Total unirrigated land area occupies 664.1 ha (1.90%) and irrigated area occupies 6318.30 ha (18.08%)

The village-wise land use pattern is presented in **Annexure No 10**. Land use pattern within the buffer zone is shown as chart in **Figure No – 3.15**.

Figure no – 3.15



3.5 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.

3.5.1 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.

3.5.1.1 FLORISTIC COMPOSITION IN CORE ZONE:

The lease area is a non forest, private land with partly minedout area. The lease area has some bushes like *Prosopis juliflora*, *Calotropis gigantea*. etc. The detailed list of plants found in the core zone are given in **Table no – 3.11**.

Table no – 3.11

LIST OF FLORISTIC SPECIES FLORA IN THE CORE ZONE

Sl.No	Species Name	Common Name	Family
Trees			
1	<i>Prosopis juliflora</i>	Cimaikkaruvel	Fabaceae
Herbs			
1	<i>Acalypha indica L.</i>	Kupaimeni keerai	Amaranthaceae
2	<i>Achyranthes aspera L.</i>	Nayuruvi	Amaranthaceae
3	<i>Abutilon indicum (L.) Sweet</i>	Thuththi	Malvaceae

3.5.1.2 FLORISTIC SCENARIO IN BUFFER ZONE AREA:

The Dominated species are *Prosopis juliflora*, *Calotropis gigantean*, *Borassus flabellifer*, *Syzygium cumini*, *Ziziphus jujube*, *Abutilon indicum*, *Ficus benghalensis*, *Acacia nilotica*, *Jatropha glandulifera*, *Morinda tinctoria*, etc. The detailed list of plants found in the core zone is given in Table no – 3.12.

Table No. 3.12

List of Floristic Species in Buffer Zone

S.NO	BOTANICAL NAME	LOCAL NAME	FAMILY NAME
Trees			
1	<i>Casuarina equisetifolia L.</i>	Savukku	Casuarinaceae
2	<i>Acacia nilotica (L.) Wild. Ex. Delile</i>	Karuvelan	Fabaceae
3	<i>Zizyphus maurutiana</i>		Rhamnaceae
4	<i>Acacia planifrons</i>	Karuvelan	Fabaceae
5	<i>Punica grandam L.</i>	Madulai	Lythraceae
6	<i>Albizia amara</i>	Unja	Fabaceae
7	<i>Tamarindus indicus L.</i>	Puli	Fabaceae
8	<i>Albizia lebek L.</i>	Vaagai	Fabaceae
9	<i>Pongamia glabra (L.) Pierre</i>	Pongai	Fabaceae
10	<i>Annona squamosa L.</i>	Sithapalzham	Annonaceae
11	<i>Ziziphus jujuba</i>	Elanthai Pazham	Rhamnaceae
12	<i>Areca catechu L.</i>	Pakku maram	Arecaceae
13	<i>Artocarpus integrifolia Lam.</i>	Pala maram	Moraceae
14	<i>Citrus melenoxylon L.</i>	Lemon	Rutaceae
15	<i>Azadirachta indica (L.) Adr. Juss</i>	Vembu	Meliaceae
16	<i>Cocos nucifera L.</i>	Thennai	Arecaceae
17	<i>Borassus flabellifer L.</i>	Panai maram	Arecaceae

DRAFT EIA/EMP REPORT FOR ROUGHSTONE AND GRAVEL QUARRY OF THIRU.S.KASIRAJAN AT SURVEY NOS. 530/3A, 531/1A, 532, 533/1, 568/5A(P) AND 569/3A OVER AN AREA OF 4.97.0Ha IN THARUVAI VILLAGE, PALAYAMKOTTAI TALUK, TIRUNELVELI DISTRICT, TAMILNADU.

S.NO	BOTANICAL NAME	LOCAL NAME	FAMILY NAME
18	Phyllanthus embelica Gaertn.	Nelli	Phyllanthaceae
19	Terminalia bellerica Ruxb.	tanri	Combretaceae
20	Terminalia paniculata Ruxb.	Pumarutu	Combretaceae
21	Peltophorum pterocarpum (DC.) K.Heyne	Copper pod	Fabaceae
22	Delonix regia (Boj. Ex Hook) Raf.	Flame of Forest	Cesalpiniaceae
23	Mangifera indica L.	Mango	Anacardiaceae
24	Ficus bengalensis L.	Aalla maram	Moraceae
25	Eucaliptus lanciolatus Dehnh.	Thaila maram	Myrtaceae
26	Polyalthia longifolia Sonn.	Nettilingam	Annonaceae
27	Pterolobium indicum		Fabaceae
28	Ficus hispida L.	Arasa maram	Moraceae
29	Moringa olifera Lam.	Murungai	Moringaceae
30	Odaina wodiari L.	Othiyai	Fabaceae
31	Samanea saman (Jacq.) Merr.	Rain Tree	Fabaceae
32	Tectona grandis L.	Teak	Lamiaceae
Shrubs			
1	Acalypha wilkesiana L.	Copper leaf	Euphorbiaceae
2	Aerva scandens (L.) Juss. ex. Schult	Kulzhipoo	Amaranthaceae
3	Allamanda cathartica L.	Golden trumpet	Apocyanaceae
4	Allamanda violacea Graden & Field.	Violet allamanda	Apocyanaceae
5	Calotrophis gigantia (L.) R. Br.	Yerukku	Asclepiadaceae
6	Cassia auriculata L.	Avarampoo	Cesalpiniaceae
7	Datura metel L.	Oomaththai	Solanaceae
8	Dodonea viscosa L.	Virali	Sapindaceae
9	Duranta repens L.	Golden dew drop	Verbanaceae
10	Hibiscus rosa-sinensis L.	Sembaruthi	Malvaceae
11	Jatropha grandifera Roxb.	Oil plant	Euphorbiaceae
12	Lantana camara L.		Lythraceae
13	Lawsamia inermis L.	Maruthani	Lythraceae
14	Nerium olender L.	Arali	Apocyanaceae
15	Ocimum sanctum (L.) R.Br.	Thulasi	Amaranthaceae
16	Parthenium hysterophorus L.	Whiteweed	Asteraceae
17	Sida cordata (Burm. f.) Borss. Waalk.	Long-stalk sida	Malvaceae
18	Sida acuta L.f.	Sida	Malvaceae
Herbs			
1	Alternanthera versicolor (L.) R.Br ex DC.	Joy weed	Amaranthaceae
2	Amaranthus viridis (L.) R.Br.	Green Amaranth	Amaranthaceae
3	Phyllanthus niruri Schum & Thonn.	Kilzhanelli	Phyllanthaceae
4	Hemidesmus indicus Ruxb.	Nannari	Apocynaceae
5	Euphorbia zylanica L.	Kalika plant	Euphorbiaceae
6	Achyranthus aspera L.	Nayuruvi	Amaranthaceae

DRAFT EIA/EMP REPORT FOR ROUGHSTONE AND GRAVEL QUARRY OF THIRU.S.KASIRAJAN AT SURVEY NOS. 530/3A, 531/1A, 532, 533/1, 568/5A(P) AND 569/3A OVER AN AREA OF 4.97.0Ha IN THARUVAI VILLAGE, PALAYAMKOTTAI TALUK, TIRUNELVELI DISTRICT, TAMILNADU.

S.NO	BOTANICAL NAME	LOCAL NAME	FAMILY NAME
7	Tridax procumbens L.	Vettukkai poondu	Asteraceae
8	Tephrosia purpurea (L.)	Poondu sedi	Fabaceae
9	Acalipha indica L.	Kupaimeni keerai	Amaranthaceae
10	Solanum xanthocarpum	Kandangkathari	Solanaceae
11	Asperagus racemosus Wild.	Shatawari plant	Asparagaceae
12	Euphobia prostens Des Moul.	Crown of thorns	Euphorbiaceae
13	Helecteris isora L.	Vadampiri	Malvaceae
14	Gomphrena globosa L.	Vaadamalli	Amaranthaceae
15	Gynandropsis pentafilla L.	Ajagandha	Cleomaceae
16	Cleome viscosa L.	Ajagandha	Amaranthaceae
17	Boerhavia diffusa L.	Erect spiderling	Nyctaginaceae
18	Leucas aspera (Wild.) Link.	Thumbai	Lamiaceae
19	Luzula canprestris (L.) R.Br.	Field wood-rush	Asteraceae
20	Crotalaria juncea L	Vakkunnar	Fabaceae
Climbers			
1	Coccinia indica L.	Kovai	Cucubitaceae
2	Abrus precatorius L.	Indian licorice	Fabaceae
3	Cardiospermum halicacabum L.	Ballon plant	Sapindaceae
4	Citrullus colocynthis	Paeikkumati	Cucubitaceae
5	Cucurbita pepo L.	Poosani	Cucubitaceae
Grasses			
1	Cynodon dactylon (L.) Pers.		Poaceae
2	Kyllinga cylindrica (Jacq.) DC.		Cyperaceae
3	Chrysopogon zeylanicus (L.) R.Br.		Poaceae
Cactuses			
1	Agave Americana L.	Kaththalzhi	Asparagaceae
2	Euphorbia tirucalli L.	Thirukalli	Euphorbiaceae
Agricultural Crops			
1	Sesbania sesban L.	Agaththi	Fabaceae
2	Oryza sativa L.	Paddy	Poaceae
3	Saccharum officinarum L.	Karumbu	Poaceae
4	Musa acuminate L.		Musaceae
5	Sorghum vulgare L.	Solam	Poaceae
6	Cajanus cajan (L.)Millsp.	Dhuvarai	Fabaceae

3.5.1.3 FAUNA STUDY:

There is no Wild Life Sanctuary or National Park within the study area of 10 km. Domesticated animals like Cows, Buffalos, Dogs, Cats etc., are commonly found. The lease and 10 Km buffer zone does not fall in the Western Ghats ESA boundary. There is no Schedule I animals. The list of fauna within the study area is given in **Table No – 3.13**.

Table No – 3.13

LIST OF FAUNA IN THE BUFFER ZONE

S.No	Common Name	Scientific name	IWPA, Schedule
Mammals			
1	Indian Palm squirrel	Funambus palmarum	IV
2	Wild Boar	Sus scrofa cristatus	III
3	Bonnet macaque	Macaca radiata	II
4	Common Indian Hare	Lepus ruficaudatus	IV
5	Indian Grey Mongoose	Herpestes edwardsii	II
Birds			
7	Cattle Egret	Bubulcus ibis	IV
8	House Sparrow	Passer domesticus	IV
9	Common Crow	Corvus splendens	V
10	Black Drongo	Dicrurus macrocercus	IV
11	Spotted Dove	Streptopelia chinensis	IV
12	Indian Cuckoo	Cuculus micropterus	IV
13	Red-vented Bulbul	Pycnonotus cafer	IV
14	Indian Pond Heron	Ardeola grayii	IV
15	Common Myna	Acridotheres tristis	IV
16	Little Egret	Egretta garzetta	IV
17	Common Kingfisher	Alcedo atthis	IV
18	Common Babbler	Turdoides caudatus	IV
19	Rose-ringed Parakeet	Psittacula krameri	IV
Reptiles			
1	Garden Lizard	Calotes versicolor	IV
Amphibians			
1	Common Indian toad	Bufo melanostictus	IV

3.6 HYDROGEOLOGICAL STUDY:

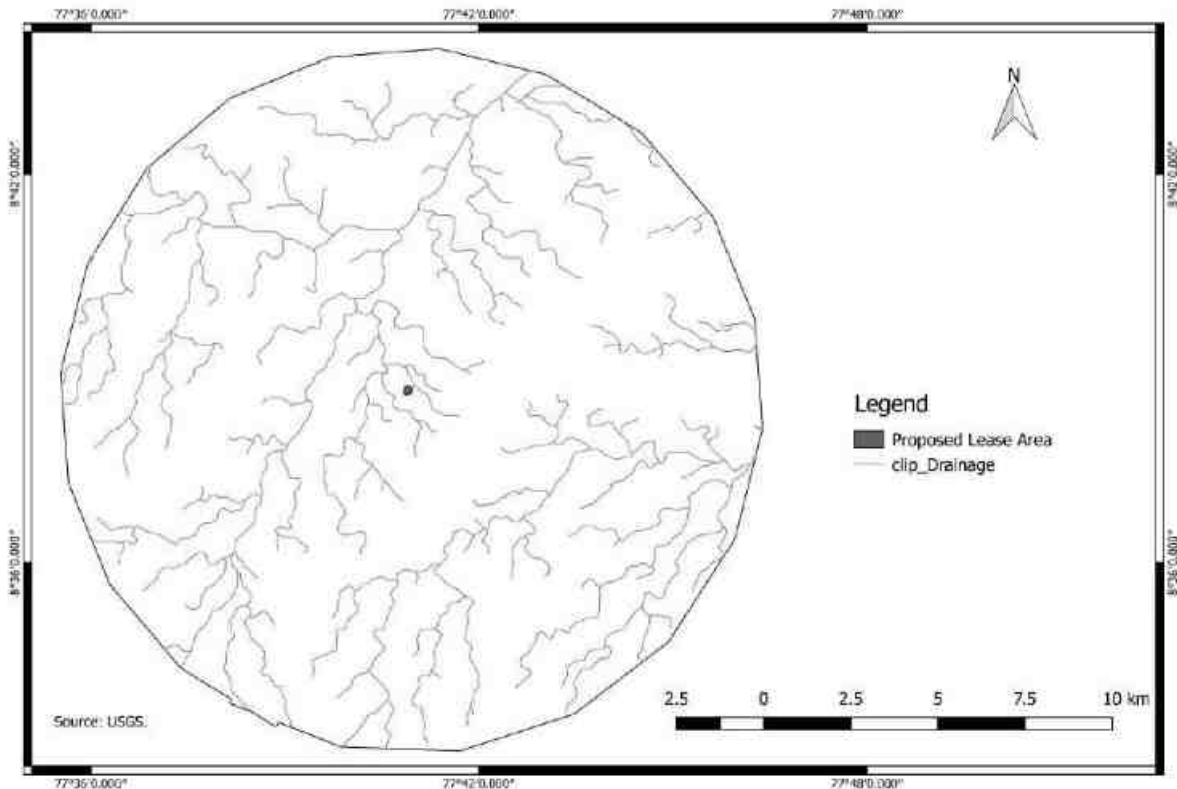
3.6.1 PHYSIOGRAPHY AND DRAINAGE:

The lease area is a barren, patta waste land which is covered with scrubs and thorny bushes and has mined out rock exposure. There is no major vegetation found in the lease area.

There are a few tanks located in the study area. The drainage map of the buffer zone is given below in **Figure No. 3.16**.

DRAINAGE MAP

Figure No. 3.16



GEOMORPHOLOGY

The buffer zone consists of different regions of varying geomorphologies.

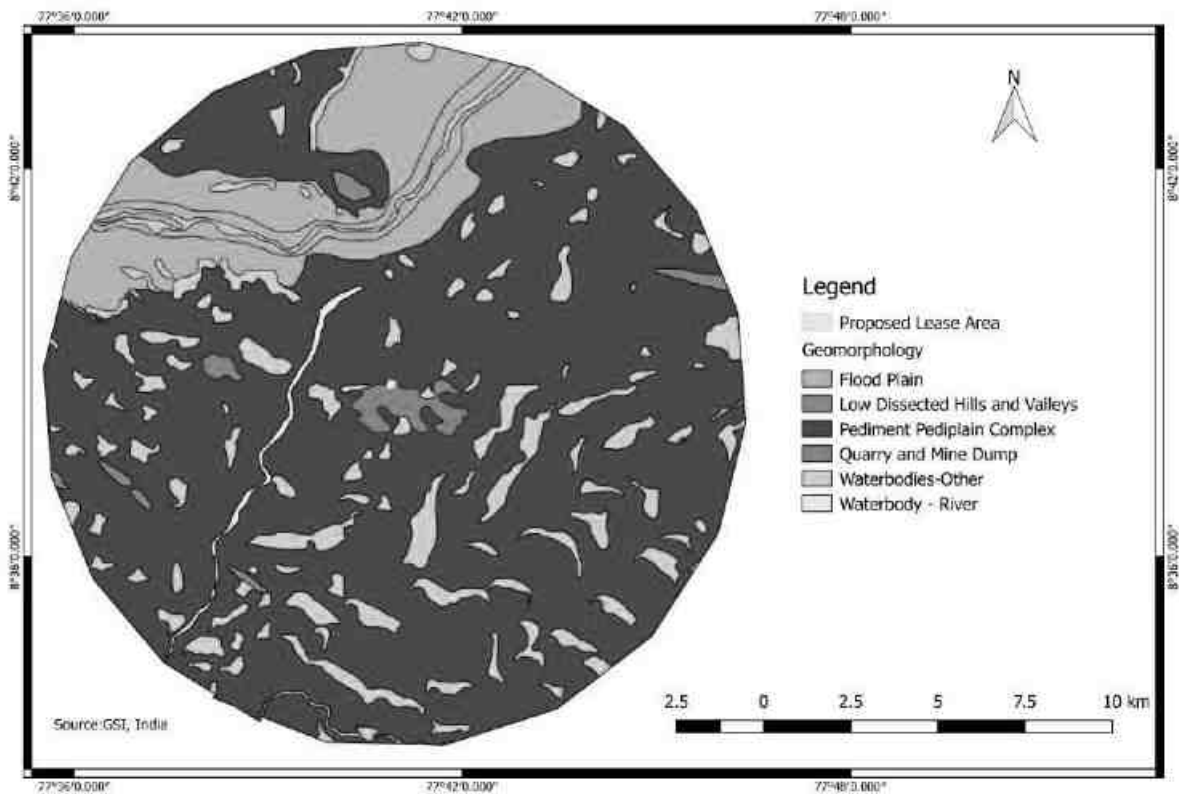
The main types found in the area are

- Pediment Pediplain complex
- Flood Plain
- Low Dissected Hills & Valleys

Pediment Pediplain complex is dominate the study area followed by Flood Plain, while the lease area falls in the Pediment Pediplain complex. Refer Figure 3.17 below:

Figure No- 3.17

GEOMORPHOLOGY OF THE STUDY AREA

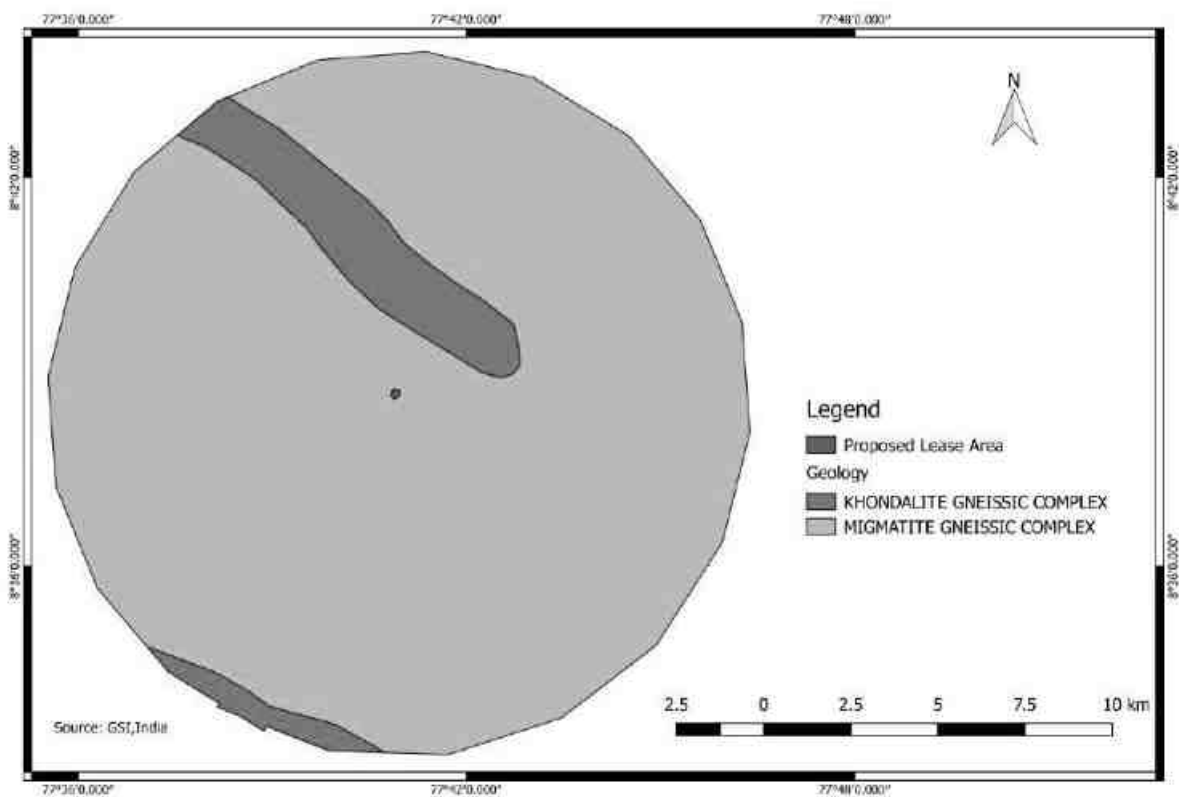


3.6.2 REGIONAL GEOLOGY:

The regional geology of the study area is shown below in Figure 3.18. The types of rock formation in the buffer zone is composed of Migmatite Gneissic complex followed by khondalite Gneissic complex. The lease area falls under Migmatite Gneissic complex category.

Figure No- 3.18

GEOLOGY OF THE STUDY AREA

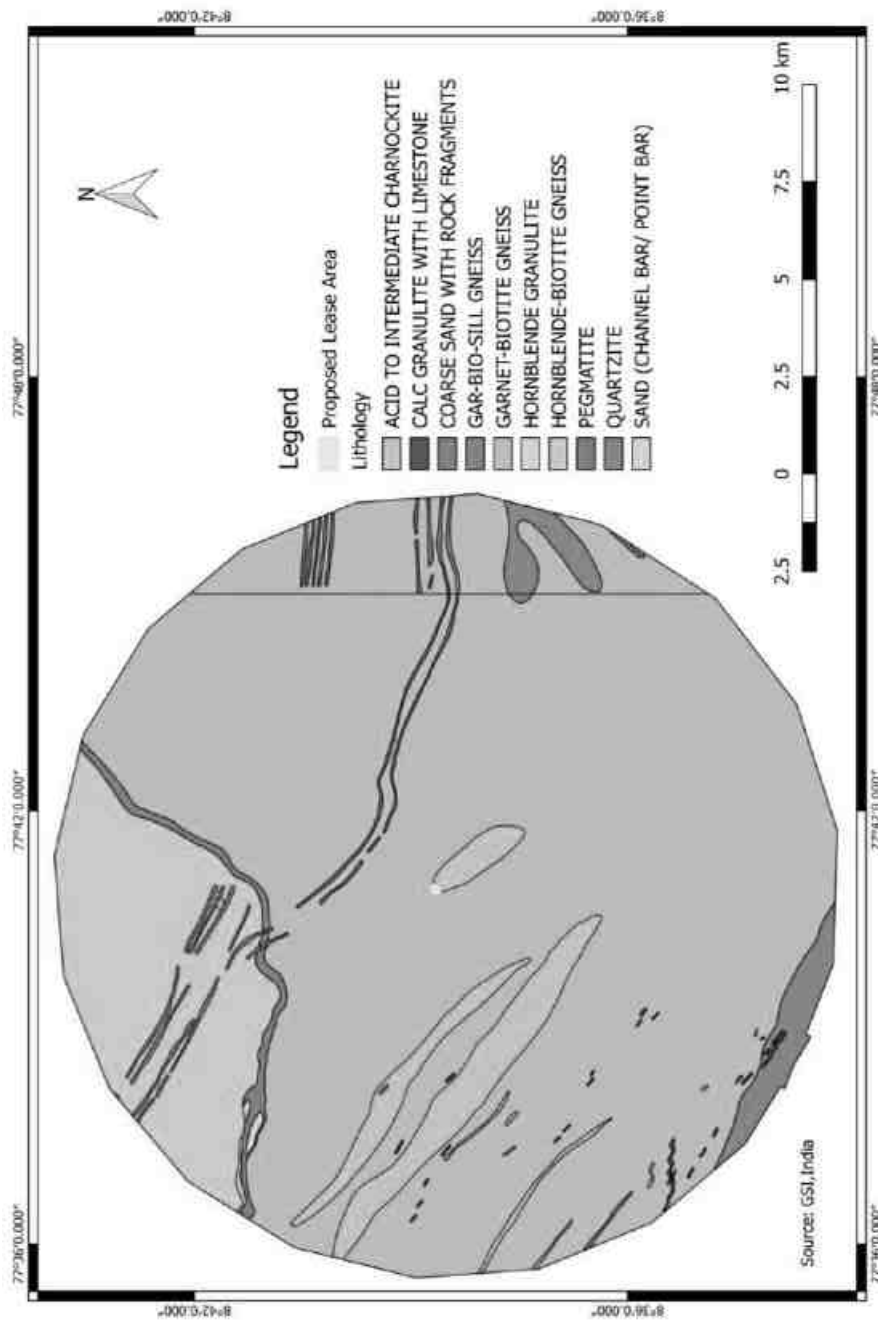


3.6.3 Lithology:

The study area is mainly dominated by Garnet Biotite Gneiss followed by hornblende Biotite Gneiss and Charnockite. lithology of Core & Buffer Zone map is given in (Figure No. 3.19)

Figure No- 3.19

LITHOLOGY BUFFER ZONE MAP

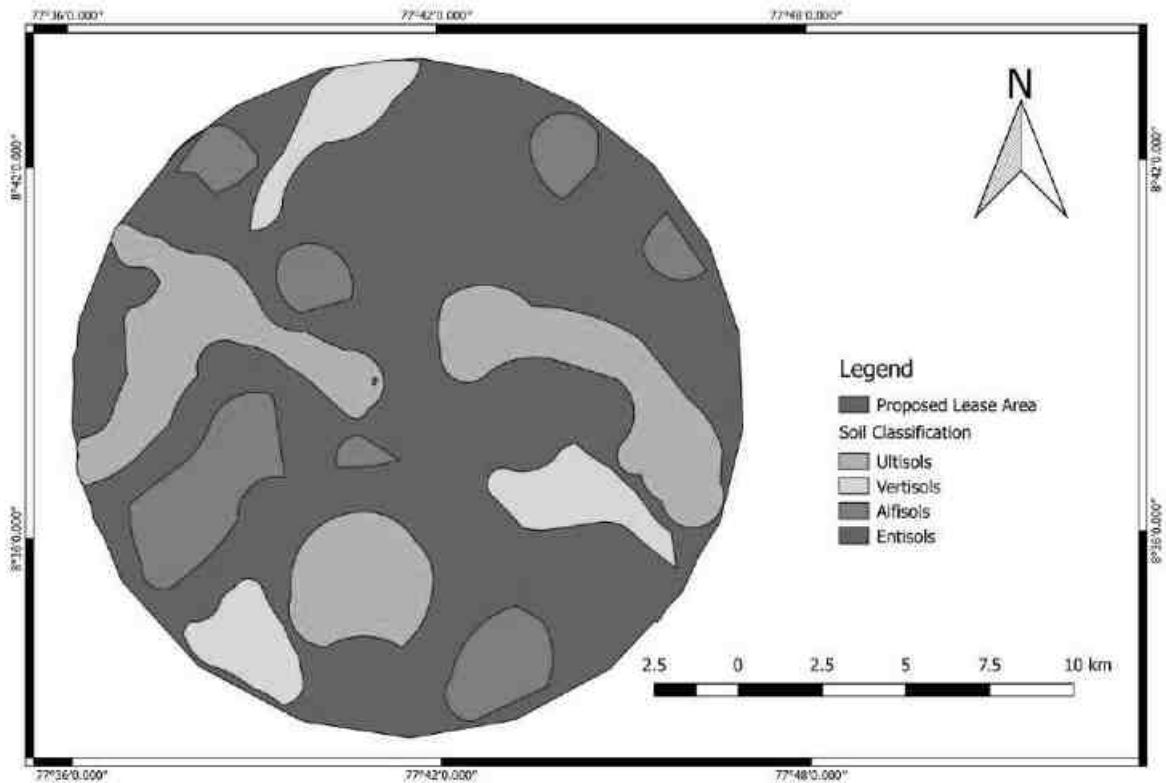


3.6.5 SOIL

The study area is characterized by Entisols, ultisols, Alfisols, and Vertisols. (Figure No. 3.20), the project area was dominated with ultisols type of soil and buffer zone was dominated with Entisols.

Figure No- 3.20

SOIL MAP



3.6.2 HYDROLOGICAL SCENARIO OF THE STUDY AREA:

The hydrological regime of the area is studied through various published documents, study of well and borewells in the area and discussion with the locals. From the study the following are observed:

General trend of depth to water level

Based on the depth to water level data obtained from the India-WRIS, Department of Water Resources, Ministry of Jal Shakti for Palayamkottai Block, Tirunelveli District, Tamil Nadu the following is observed.

Year	Depth to Water Level (m bgl)		Wells Monitored	
	Pre-Monsoon	Post-Monsoon	Pre-Monsoon	Post-Monsoon
2015	1.58-1.99	0.67-1.53	3	3
2016	1.87-2.1	2.17-5.31	3	3
2017	3.34 - 4.14	1.86-3.17	3	3
2018	1.49-2.7	1.95 -2.25	3	2
2019	7.86	0.53	1	1

Well inventory:

Study of the depth of water table in 6 wells and 2 borewells in the nearby areas show that the wells are as deep as 50ft to 60ft. Water level ranged from 25 feet to 45 feet. Bore wells are 250-300 ft deep , give better yield post monsoon whereas the yield becomes very less later.

In the study area, the shallow aquifer is developed through dug wells and deeper aquifer through tube wells. The groundwater has revealed that potential fractures are encountered at deeper levels

From the Geophysical survey, it is found that the subsurface litho units are gravel, weathered layers poorly fractured and terminated with hard and compact massive rocks with fully devoid of fractures.

The occurrence of groundwater mainly in the porous soil are weathered layers, very negligible amount of groundwater percolated through the poorly fractured layer, after that there is no existence of groundwater. Besides, the mining area consists of hard compact rock, no major water seepage within the mine is expected.

Published Government data shows the following :

Pre-monsoon Depth to water level (April) The depth to water level data and map shows that the pre-monsoon (April) depth to water level in project area ranges between 2.0 to 20.0 m bgl. **(Figure No.3.21)**

Post monsoon depth to water level (November): The data shows that depth to water level during post monsoon (November) varies from 2.0 to 5.0 m bgl in the wells monitored. **(Figure No.3.22)**

Figure No - 3.21

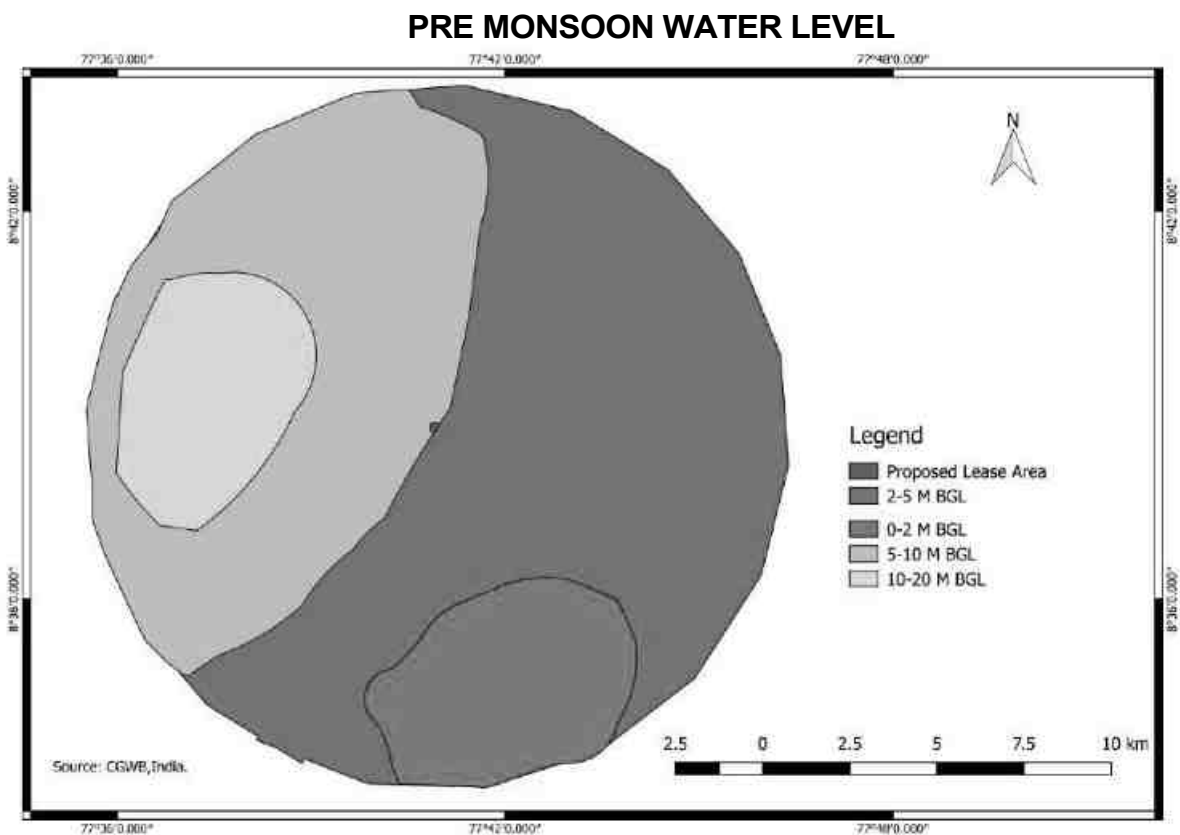


Figure No - 3.22

POST MONSOON WATER LEVEL

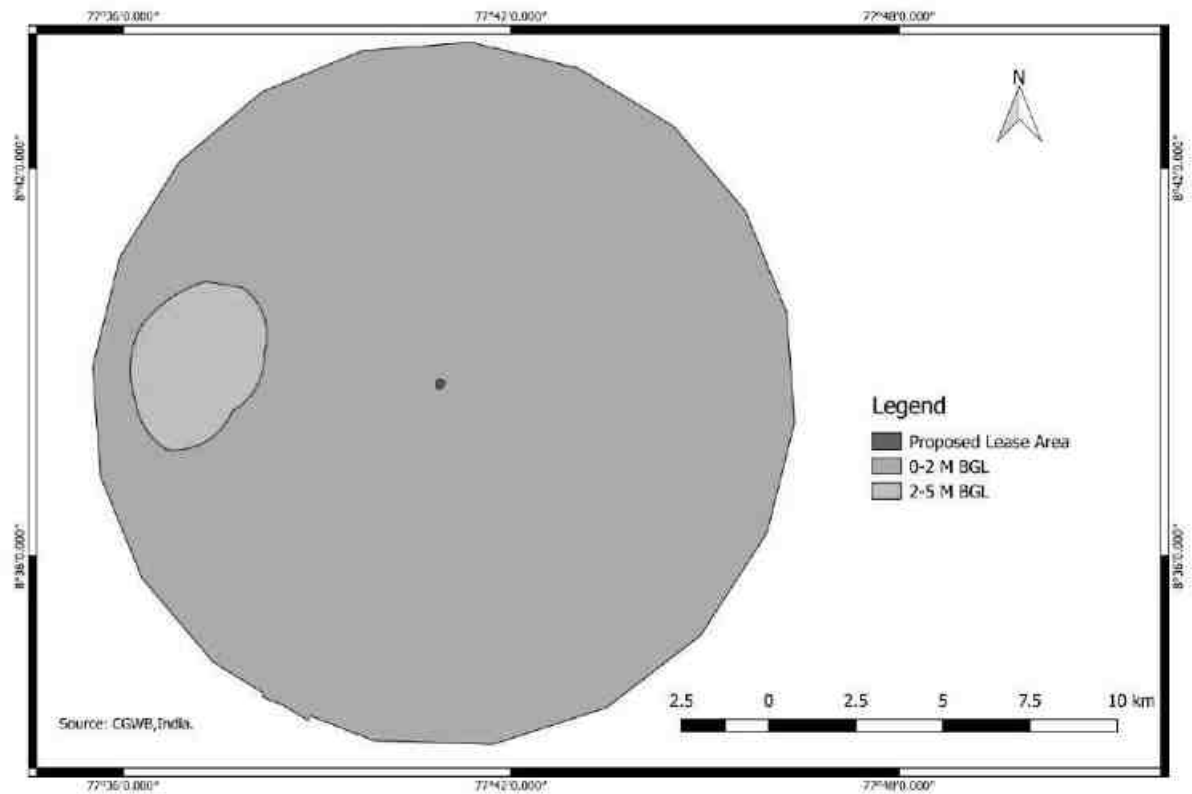
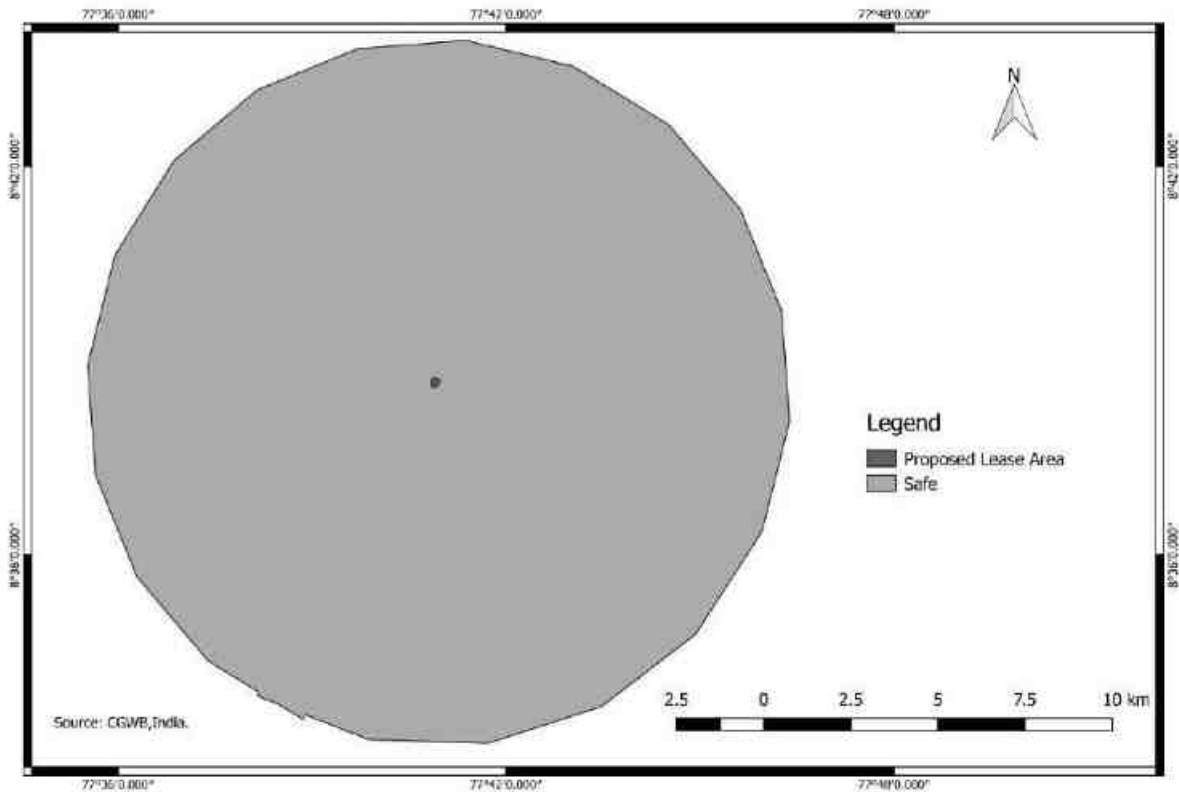


Figure No - 3.23

WATER LEVEL



Based on the report published by CGWB, Delhi, the stage of ground water development for this area falls in “Safe” category and its details are given in Para 4.3.3.1, Chapter – IV.

CHAPTER - IV

ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

CHAPTER-IV

ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 GENERAL

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.

4.2 AIR ENVIRONMENT:

4.2.1 IMPACTS DUE TO PROJECT OPERATION:

The existing ambient air quality in the area has been described in Chapter-III. 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:

Dust generation in the mine due to:

- ❖ Excavation of material.
- ❖ Movement of HEMM such as Excavators, tippers etc.
- ❖ Loading and unloading operation
- ❖ Transportation

Besides, Gas emission will occur as a result of operation of diesel driven mining equipment, compressors, transporting vehicles, etc.

Particulate matter smaller than 10 microns, referred to as PM₁₀, can settle in the bronchi and lungs and cause health problems like Bronchitis, Emphysema, Bronchial Asthma, Irritation of mucus membranes of eyes, etc. Particles smaller than 2.5 micrometers (PM_{2.5}), tend to penetrate into the lungs and very small particles (<100 nanometers) may pass through the lungs to affect other organs.

Besides the above mentioned fugitive dust emissions, atmospheric pollution can occur as a result of emission of SO₂, NO_x, CO etc., from diesel driven mining equipment, generator sets, etc. Larger suspended particles are generally filtered in the nose and throat and do not cause problems. Higher concentration of SO₂, NO_x, CO may cause some health effect on the human beings exposed to it.



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In case of this mine, the following measures will be adopted to control impact on the air quality due to mining operations in the lease area:

S.No	Activity	Consequence	Mitigation Measures
1	Drilling	Dust Emanation	Usage of Drill bits in good condition
			Coverin of drill holes with wet sag or use of water jet for dousing the cuttings.
			Provision of dust filters / mask to workers working at highly dust prone and affected areas.
2	Blasting	Instantaneous 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 emanation, Gaseous Emission	Proper maintenance of HEMM which reduces smoke generation
			Acoustic enclosures for operator cabin.
			Imparting sufficient training to operators on safety and environmental parameters.
			Proper maintenance of hauling equipments.
			Avoiding overloading of dumpers.
4	Transportation	Dust emanation, Gaseous Emission	Using sharp teeth for shovels and other soil excavation equipments, and their periodical replacements.
			Proper maintenance of haul road and other roads
			Avoiding overloading of tippers
			Covering of loaded tippers with tarpaulins during transportation
			Black topping of road wherever necessary
5	Others	Dust emanation, Gaseous Emission	Regular wetting of transport road using mobile water tanker.
			Development of greenbelt / barriers around mine in the safety zone and carrying out plantation within the lease area.

By adoption of all these measures, no major impact on air quality is envisaged due to this proposed opencast mining operation.

The impact on air quality due to the proposed project is estimated using AERMOD View Gaussian Plume Air Dispersion Model developed by Lakes Environmental Software which is



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based on steady state Gaussian plume dispersion. Details of the modeling study / estimation including the modeling technique and post project air quality values are elaborated in the following paras.

4.2.1.1 POLLUTANTS CONSIDERED FOR COMPUTATION:

The model simulations are done for the air pollutant arising from the mining operations, namely, PM₁₀, PM_{2.5}. **Ground Level Concentration (GLC)** have been computed using hourly meteorological data. The study details are as follows:

4.2.1.2 EMISSION SOURCES:

Pollution from the proposed project will arise mainly on account of mining and allied operations:

ACTIVITY	SOURCE TYPE
A. Mining operations	Open pit
B. Transportation	Line

EMISSION FACTORS

Quantification of particulate emissions has been carried out by the emission factor technique. Emission factor is a statistical average of the rate at which a pollutant is released during an activity. This factor when multiplied by the level of that activity in a given situation will give the overall effect. Fugitive emissions have been predicted by using standard equations given and suggested by AP-42, USEPA(1998), Coal S&T Project and for mining & allied activities and other factors. The modeling is done for the peak production to know the worst scenario. The details of the emission factors used for the same is provided below:

EMISSION RATES:

The peak production capacity is considered for calculation. Since there is no storage, dumping or stacking within the lease area, the excavated material will be directly transported to the customer.

Source wise Emission rate:

Based on the emission factors, after adopting necessary control measures like dust suppression, Proper maintenance of HEMM, using better quality diesel, using latest equipment, proper maintenance of roads, trained operators etc. the expected emission rate due to various operations in this project is calculated and is given below:



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EMISSION RATE MEASURES IN g/sec		
ACTIVITIES/POLLUTANTS	PM ₁₀	PM _{2.5}
Ore Loading	0.0921	0.0129
Drilling	0.4095	0.1638
Hauling inside lease area	0.4070	0.0584
Total	0.9086	0.2351

4.2.1.3 EMISSION SOURCE COORDINATES:

The center of mine was assumed (0, 0) in the mathematical modeling.

4.2.1.4 METEOROLOGICAL CONDITIONS USED IN PREDICTIONS:

The hourly meteorological data has been generated at the site for **summer Season, Mar 2021 – May 2021** and the same has been used in the predictions.

4.2.1.5 RESULTS AND DISCUSSIONS:

The results of the Peak GLC's for various environmental parameters are given below::

S.no	Parameters	Peak incremental concentration µg/m ³
1	PM ₁₀	7.07
2	PM _{2.5}	3.72

It is observed that the peak incremental concentration for PM₁₀, PM_{2.5} is occurring very near the source. At away from the source the values are getting reduced due to dispersion effects. No adverse effect in this front is envisaged. The Isopleths of PM₁₀, PM_{2.5} concentrations have been drawn and these are given in **Figure No – 4.1 to 4.2** The incremental and predicted concentrations at the locations of ambient air quality have been discussed in the following section.



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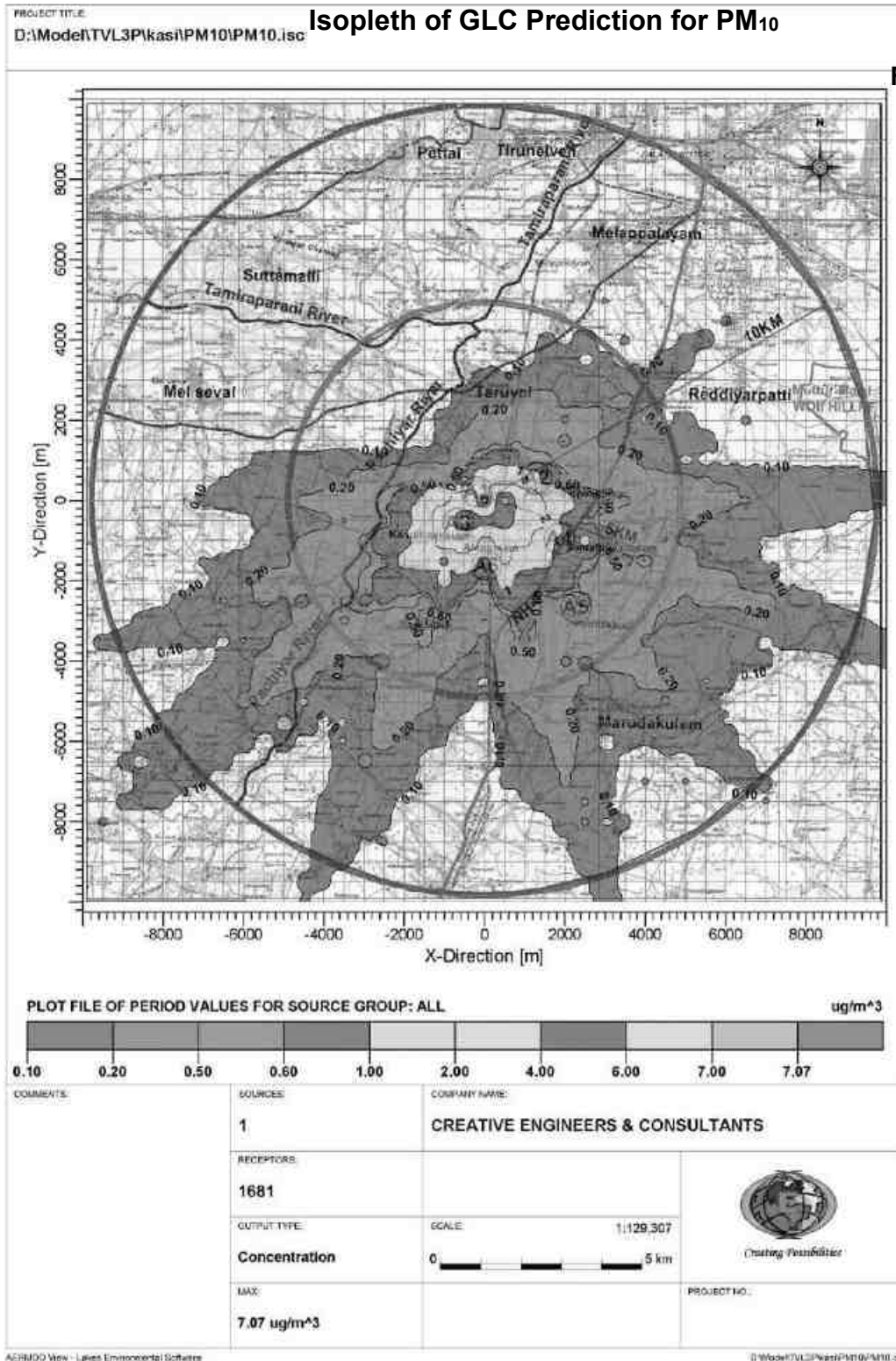
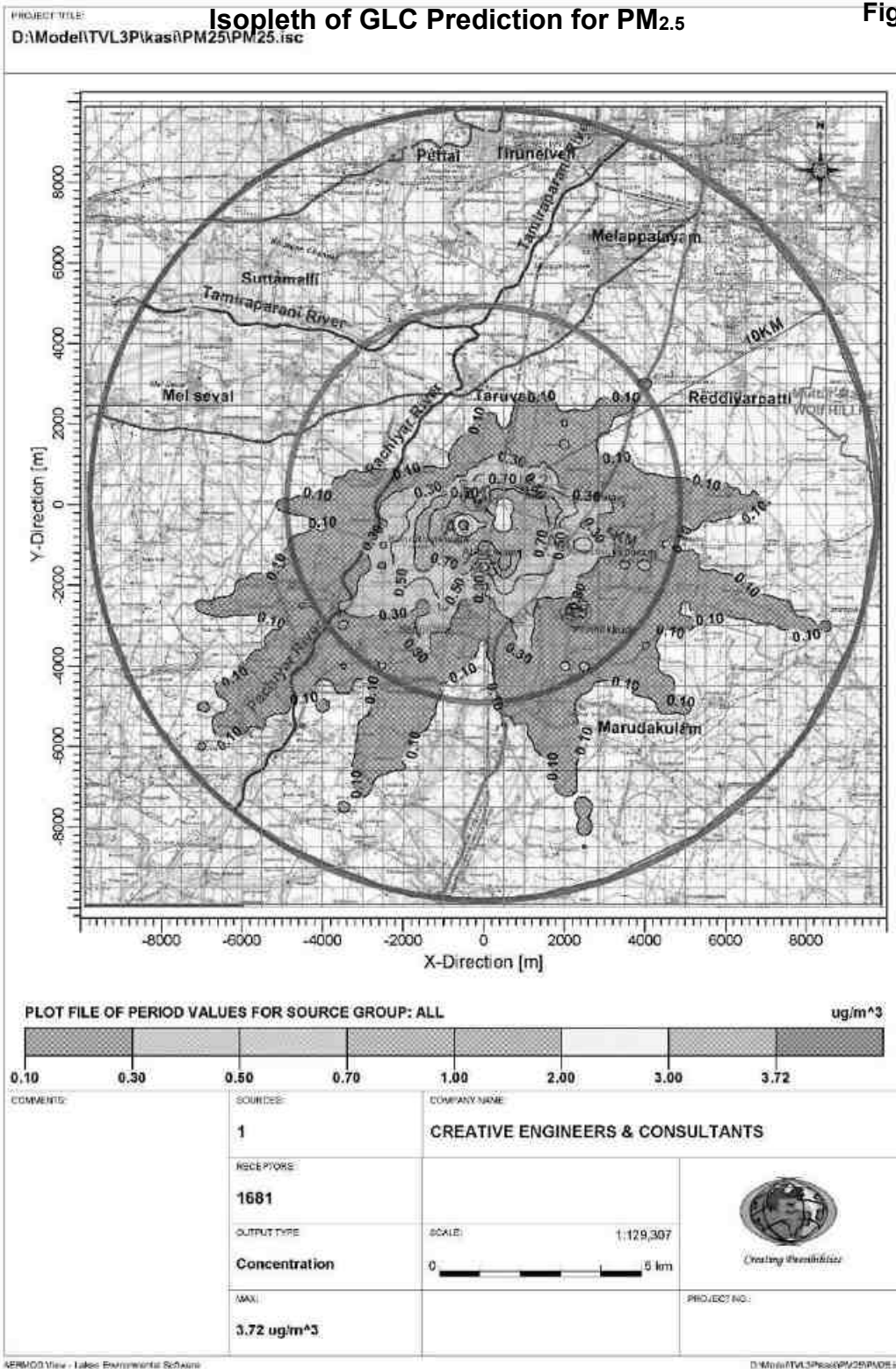


Figure No – 4.1



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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 - 4.1 to 4.2.**

Table No - 4.1

CONCENTRATIONS OF PM₁₀ AFTER PROJECT IMPLEMENTATION

Values in µg/m³

S. No	Location	Background Concentration	Predicted Incremental Concentration	Post Project Concentration	Statutory Limits
1	A1- Near Mine Lease Area	79.2	7.1	86.3	1200 µg/m ³ for particulate emissions
2	A2 - Adaimithipankulam	67.2	2.0	69.2	100
3	A3- Kandithankulam	71.3	2.5	73.8	
4	A4- Samathuvapuram	62.9	1.0	63.9	
5	A5- Ponnakudi	63.2	<1.0	64.2	
6	A6- Alankulam	61.1	1.0	62.2	

Table No - 4.2

CONCENTRATIONS OF PM_{2.5} AFTER PROJECT IMPLEMENTATION

Values in µg/m³

S. No	Location	Background Concentration	Predicted Incremental Concentration	Post Project Concentration	Statutory Limits
1	A1- Near Mine Lease Area	40.4	3.7	44.1	-
2	A2 - Adaimithipankulam	34.2	1.5	35.7	60
3	A3- Kandithankulam	34.6	2.0	36.6	
4	A4- Samathuvapuram	32.1	<1.0	33.1	
5	A5- Ponnakudi	32.6	<1.0	33.6	
	A6- Alankulam	31.6	<1.0	32.6	

It can be seen that the resultant added concentrations with baseline figures even at worst scenario, show that the values of ambient air quality with respect to PM₁₀ are in the range of 62.2 µg/m³ to 86.3 µg/m³ and with respect to PM_{2.5} are in the range of 32.6 µg/m³ to 44.1 µg/m³ which are within the statutory limits in each case. For preservation of environment in this mine strict enforcement of management schemes and regular air quality monitoring will be undertaken for taking corrective actions, as needed. By adopting the effective implementation of all the mitigative measures, no adverse impact on Air quality due to the mining operation in this lease area is expected.



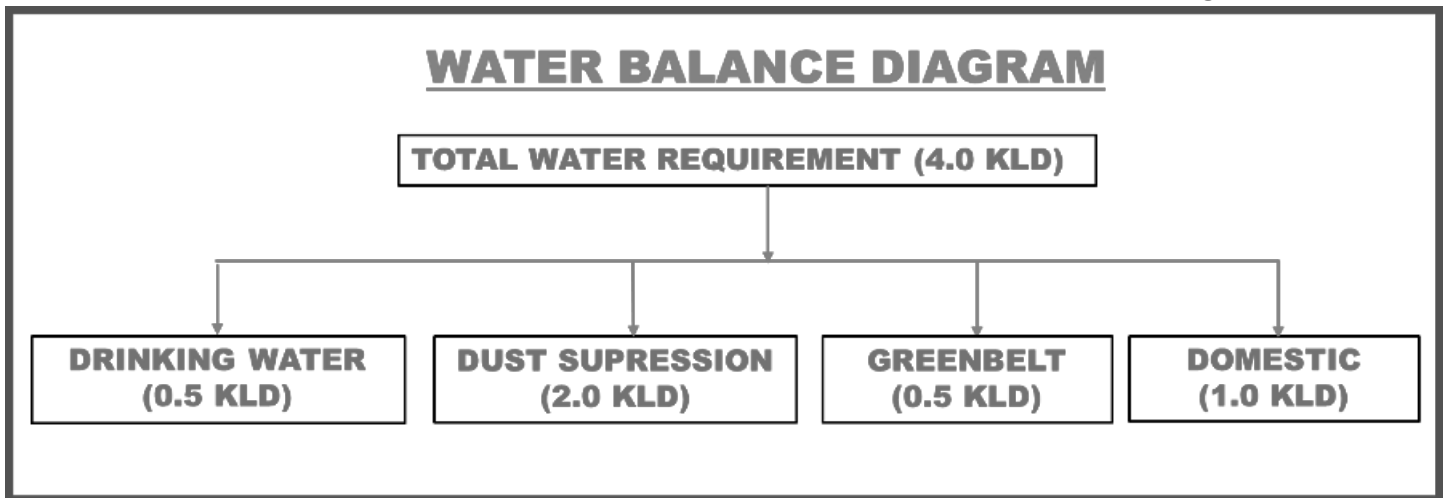
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4.3 WATER ENVIRONMENT:

4.3.1 WATER REQUIREMENT:

The total water requirement for this project will be 4.0 KLD comprising 0.5KLD drinking water, 2.0KLD for dust suppression, 0.5KLD for greenbelt, 1.0KLD for domestic use. 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 4.3**.

Figure No - 4.3



4.3.2 SOURCES OF WATER POLLUTION:

The existing water environment showing water quality at different sampling stations in the area has been described in Chapter-III.

Direct impact on human beings due to poor water quality consequent to mining operation can lead to various water borne diseases like diarrhea, jaundice, dysentery, typhoid, etc. Besides, the polluted water may not be useful for animal or human consumption, vegetation and may affect aquatic life, if effluents are not properly treated to remove the harmful pollutants.

The major sources of water pollution normally associated due to mining and allied operations are:

- a. Domestic effluent.
- b. Washouts from stockpile if any.
- c. Disturbance to drainage course in the project area
- d. Generation of mine pit water pumped out from deeper workings if any.



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4.3.3 TREATMENT SCHEME:

A. Generation of domestic effluent:

The domestic sewage to be generated from the project will be collected in septic tank with soak pits.

B. Washouts from overburden, ore stockpile, etc.

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.

The rain water falling in the quarry will be harvested in the sump at the lowest level of the quarry. This sump will act as a settling pond to prevent solids escaping along with discharge, before outlet. etc. Towards surface runoff management, a garland drain of length 880m will be constructed around the quarry and will be connected to a settling pond with silt traps. The supernatant clear water from the settling pond will be flow to the downstream users.

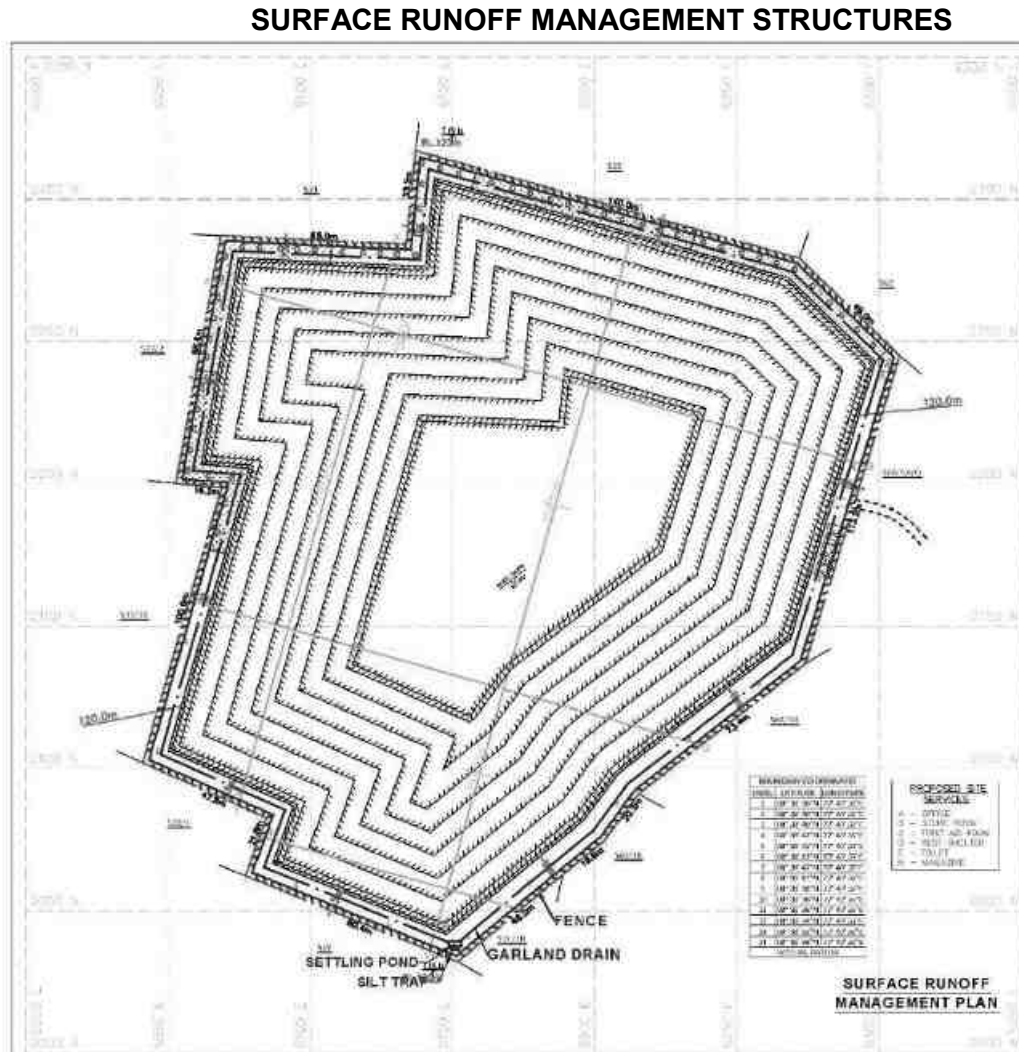
It is to be mentioned that during the earlier working, bund creation around the mine pit and garland drain development in major part of the area is already carried out. (Refer Photo below). This has to be further developed, renovated and strengthened.



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The surface runoff management structures diagram is given in **Figure No 4.4**

Figure No.4.4



C. Disturbance to drainage courses

There are no seasonal drainage courses nearby. Pond / eri located in the nearby area will be additionally strengthened and periodical desilting activities under CER activities will be carried out to augment the storage capacity of the tank. This being a mining project there will be no effluent generation or discharge. As such no major impact is envisaged on the nearby water bodies due to project operations.

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D. Generation of mine pit water pumped out from deeper workings if any

The occurrence and movement of groundwater in hard rock formations are restricted to the porous zones of weathered formations and the open systems of fractures, fissures and joints. Generally, in hard rock regions, occurrence of weathered thickness is discontinuous both in space and depth. Hence recharge of groundwater in hard rock formations is influenced by the intensity and depth of weathering. In the nearby region, the formations are compact with less intergranular porosity and fractures leading to less permeability and transmissivity values and as such the ground water level in this area is deep from surface. The mining area consists of hard compact rock, hence no major water seepage within the mine is expected from the periphery. From the nearby working quarries it is observed there are no seepages in the mine faces because of the hard rock formation. Similar situation is expected in this lease also.

4.3.3.1 STAGE OF GROUNDWATER DEVELOPMENT

Details of hydrological scenario of the study area were given in para 3.6, Chapter – III. Impact on the ground water regime due to this project is given below.

The groundwater resource data of Palayamkottai district was obtained from the data provided in the National Water Mission, Ministry of Jal Shakti, Department of Water Resources, RD & GR in the Ground water reports of Tamil Nadu Districts, Tirunelveli.

Ground Water Resources Estimation– Palayamkottai Taluk

In Ha-m

Net Groundwater Availability	Existing Gross Draft for Irrigation	Existing Gross Draft for Domestic and industrial water supply	Existing Gross Draft for all uses	Stage of Ground water Development (%)	Category of Block
811.75	172.80	8.91	181.71	22	Safe

From the table it is seen that the stage of groundwater development of Palayamkottai Taluk where the study area falls is 22%. 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.



4.3.4 REDUCING WATER CONSUMPTION OVER THE YEARS:

4.3.4.1 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.

4.3.4.2 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.

- a) Development of garland drain around the quarry connected to settling tank.
- b) Cleaning of drain periodically to prevent siltation
- c) The supernatant clear water from the settling pond will drain into the nearby channel
- d) Utilizing the rainwater harvested in the mine pit to meet the water requirement of the project.
- e) Excess water, if any in consultation with local villagers and in line with government practices shall be provided to the downstream users.

4.4 NOISE AND VIBRATION LEVELS:

4.4.1 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 tolerable limits. The impact prediction

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and control measure for noise environment due to mining and allied activities is described below:

4.4.1.1 IMPACT PREDICTION DUE TO NOISE:

Noise is one of the inevitable causes of pollution in mining operations, largely due to the extensive mechanization adopted. Besides, other operations such as drilling, blasting, movement of vehicles, etc., also produce noise of considerable magnitude in mining operations. The main sources of noise and expected levels are given below in **Table no – 4.3.**

Main Sources of Noise **Table no – 4.3**

Sl. No.	Source	Inside Cabin	Noise level at dB(A) 10 m. from source
1	Shovel	84-91	59-68
2.	Dumpers/Tippers	87-96	75-85
3.	Drill	88- 95	75-83

Prolonged exposure to a high noise level is harmful to the human auditory system and can create mental fatigue, rebellious attitude, annoyance and carelessness, which may lead to neglect of work and also result in accidents. The impact of noise level as per World Health Organization’s 1986 notification is given below in **Table No - 4.4.**

Impact of Noise Levels **Table no - 4.4**

NOISE LEVELS	ADVERSE EFFECTS
90-115 dB	Partial deafness and nervous irritability
> 115 dB	Permanent deafness
Impulsive noise (>90dB)	Frightens livestock grazing in the nearby areas

OSHA (Occupational Safety and Health Administration), USA and other similar organisations stipulate that noise level up to 90 dB(A) is acceptable for eight hours exposure Leq (Equivalent sound level) (8hrs) per day.

The Directorate General of Mines Safety, in circular No. DG (Tech)/18 of 1975, has prescribed the noise level in mining occupations (TLV) for workers, in an 8 hour shift period with unprotected ear as 90 dB(A) or less.



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The noise will be felt only near the active sources. There will be considerable reduction in the noise level due to the absorption factor, environmental surroundings and other attenuation factors. As far as absorption factor is concerned, If the ground cover is vegetated or has a soft texture, sound will decrease at the rate of 4.5 dB(A) every time the distance between the source and the observer is doubled. Besides, there will be shielding factor, which takes into account the environmental surroundings. With every 30m of dense land scape vegetation, 5 dB(A) of additional attenuation can be obtained up to a maximum of 10 dB(A). As such at away places the effect of noise will not be felt.

Anticipated noise levels resulting from operation of the various machineries like excavator, tippers, drill have been computed using point source model. Computation of cumulative noise levels at the nearby villages is made based on the assumption that there are no attenuation paths between the source and the boundary. Noise modeling is carried out using the following formula:

$Lp2 = Lp1 - 20 \log R2/R1$, Where, $Lp1$ and $Lp2$ are sound pressure levels at points located at distances $R1$ and $R2$ respectively from the source.

The study results are as follows:

SI.NO	Location	Baseline Day Eq.in dB(A)	Post project noise Eq in dB(A)	Limit dB(A) as per MoEF&CC
1.	North West Corner	43.1	60.4	90
2.	North East Corner	43.1	57.0	90
3	South East Corner	43.1	55.9	90
4	South West Corner	43.1	57.8	90
5	Adaimithipankulam	46.6	47.4	55
6	Kandithankulam	44.4	44.4	55
7	Samathuvapuram	42.2	43.4	55
8	Ponnakudi	41.5	41.9	55
9	Alankulam	45.0	45.4	55

From the studies, it is found that the predicted Noise Levels due to mining operations at the periphery of the mine lease itself will be less even without considering any attenuation factor. However, practically there will be attenuation due to vegetation etc., and as such there will not be any adverse noise propagation outside the lease boundary. Since the habitations are also



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away the effect of noise due to mining operations will not be felt at all in the surrounding villages.

4.4.1.2 CONTROL MEASURES FOR NOISE ENVIRONMENT:

Hence, by following mitigative measures for noise control, the impact on noise levels will be insignificant:

1. Planting rows of native trees along roads, around mine area and other noise generating centers to act as acoustic barriers.
2. Sound proof operator's cabin for equipments like shovel, tippers, etc.
3. Proper and regular maintenance of equipments may lead to less noise generation.
4. Providing in-built mechanism for reducing sound emissions.
5. Providing earplugs to workers exposed to higher noise level.
6. Conducting regular health check-up of workers including Audiometry test for the workers engaged in noise prone area.
7. Displaying the noise level status of operational machinery on the machines to know the extent of noise level and to control the time to which the worker is exposed to higher noise levels.

Further green belt and afforestation will be planned and executed to abate noise and dust propagation in the area.

4.4.2 IMPACT DUE TO GROUND LEVEL VIBRATIONAL EFFECTS AND AIR OVERPRESSURE WAVES ARISING FROM BLASTING OPERATIONS AND CONTROL MEASURES THEREON:

4.4.2.1 IMPACTS DUE TO GROUND VIBRATIONAL DUE TO BLASTING EFFECTS:

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.

In the proposed mine workings, blasting & vibration effects will be controlled by following measures.

- a) Optimum design for burden and spacing.
- b) Inclined drilling practice, whenever necessary.



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- c) Reducing explosive charge to minimum.
- d) Using milli second delay detonators, in combination with denoting fuse etc. This sequence of blasting reduces vibration to a large extent, thereby minimizing propagation of shock waves.
- e) Avoiding blasting in unfavorable weather condition

By adoption of above measures, it will be ensured that ground vibrational levels due to blasting will be maintained within the prescribed DGMS conditions of 10 mm/s for the domestic houses/structures.

4.4.2.2 PEAK PARTICLE VELOCITY ESTIMATION:

Vibrations due to blasting may cause damage to nearby structures, if appropriate control measures are not adopted. Flyrock is another possible damage causing outcome of blasting. There are many factors, which influence these, like long explosive column with little stemming column, improper burden, loose material or pebbles near holes and long water columns in the holes. The impact due to blasting vibration in the proposed Rough Stone quarry is calculated based on the following empirical equation (USBM) used for assessment of peak particle velocity (ppv) values at nearby locations:

$$V=500[R/Q^{0.5}]^{-1.6}$$

Where

V= Peak particle velocity in mm/s

Q=Maximum Instantaneous Charge (Kg)

R=Distance from charge(m)

The maximum charge to be used in this project is expected to be around 129.47 Kg/day. Based on the above formula, the expected PPV values at different nearby locations from the mine considering the maximum charge of 130 kg of explosive per blast and higher charge of 135 kg of explosive per blast is estimated to be as follows:

Sl.no	Location	Distance from the mine in meter	Expected PPV in mm/sec due to blasting		DGMS limit
			@130 kg	@ 135 kg	
1	Kandithankulam	800	0.56	0.57	10
2	Adaimithipankulam	1000	0.39	0.40	
3	Alankulam	1300	0.26	0.26	



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However, in the actual practice since blasting will be carried out with delay detonators, the charge per delay of blast will be very less and practically no vibration on these locations which are far away will be felt.

Comparison of the estimated ground vibrations with the limiting values prescribed by DGMS, Dhanbad (Circular No. 7 dated 29 -08-1997) which are given in **Table No 4.4** show that with the planned charge per blast round, even at the worst scenario, the vibrations will be within limit. Since, these values are under worst scenario, due to adoption of various mitigative measures, the actual values will be far less than this.

The following control measures will be planned to reduce ground vibratory conditions to sustainable statutory limits.

- Carrying out controlled blasting using Nonel milli second delay detonator.
- Optimum design for burden and spacing.
- Reducing explosive charge per delay to minimum.
- The peak particle velocity (PPV) of ground vibration will be kept below 10mm/s for 8-25hz frequency range through optimally controlled blasting techniques, after necessary field trials to ensure no impact on surrounding environs .
- Use of suitable initiating sequence and millisecond delay detonators.
- To contain fly rocks, stemming column to be less than burden of the hole. Blasting area will also be muffled, if necessary, to stop fly rocks propagation.
- Blasting will not be carried out when strong winds are. Blasting will be done during midday time and never at night.
- Proper care and supervision during blasting by a competent and experienced person to be carried out.
- Besides, different blasting time for the projects in the vicinity is suggested and the timing is to be mentioned in the display board in the respective mines entrance.

By adoption of above measures, it will be ensured that the ground level vibration due to blasting are maintained within the limits prescribed by DGMS, Dhanbad at the mining areas vide Circular No. 7 dated 29 -08-1997 as given in **Table No – 4.5**.



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Table No – 4.5

PERMISSIBLE PEAK PARTICLE VELOCITY (PPV) AT THE FOUNDATION LEVEL OF STRUCTURES IN MINING AREAS IN MM/SEC.

Type of structure	Dominant excitation frequency Hz		
	<8 Hz	8-25 Hz	>25 Hz
A. Buildings/structures not belonging to owner			
Domestic houses /structures (Kuchha brick and cement)	5	10	15
Industrial buildings (RCC and framed structures)	10	20	25
Objects of historical importance and sensitive structures.	2	5	10
B. Building belonging to owner with limited span of life			
Domestic houses/structures (Kuchha brick and cement)	10	15	25
Industrial buildings (RCC and framed structures)	15	25	50

4.5 IMPACT ON LAND ENVIRONMENT:

The entire mine lease area of 4.97.0 Ha is in the proponent's possession. The present land use pattern, and the post mining land use pattern is shown below.

Sl. No.	Land Use	Present Area (Hect)	Area in use during the quarrying period (Hect)
1.	Quarrying Pit	1.57.0	4.29.0
2.	Infrastructure	Nil	0.01.0
3.	Roads	0.01.0	0.02.0
4.	Green Belt	Nil	0.30.0
5.	Unutilized	3.39.0	0.35.0
	Total	4.97.0	4.97.0

At the end of the life of the mine, entire 4.29.0 Ha of mined out area will be left as water body. 0.02.0Ha will be the mine roads and 0.66.0Ha will be covered with vegetation.

4.5.1 LAND RECLAMATION:

Land Use during Post Operational Period

Table No – 4.6

S.No	Description	Land use (Ha.)			
		Plantation	Water body	Others	Total
1	Quarrying Pit	-	4.29	-	4.29
2	Infrastructure	0.01	-	-	0.01
3.	Roads	-	-	0.02	0.02



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4.	Green Belt	0.30	-	-	0.30
5	Undisturbed	0.35	-	-	0.35
	TOTAL	0.66	4.29	0.02	4.97

There is no waste generation anticipated in this quarry operation since the entire excavated material will be utilised. Hence, there is no external overburden dump involved. Ultimately the entire mined out area of 4.29 Ha will be left as water body. 0.02Ha will be the mine roads and 0.66 Ha will be covered with vegetation.

Entire mined out area will be properly fenced to prevent inadvertent entry of men and animals. In the post mining stage the rainwater harvested in the mined out void shall be utilized.

4.6 BIOLOGICAL ENVIRONMENT:

4.6.1 EXISTING FLORA AND FAUNA:

The core zone area is a hard rock formation area, with barren patches of shrubs and bushes. Details of flora/fauna pattern in core and buffer zones have been described in chapter - III.

4.6.2 IMPACT OF MINING ON BIOLOGICAL ENVIRONMENT:

The significance of impact on biological environment due to mining and allied activities on various fronts is described below:

S.No	ISSUES	OBSERVATIONS
1	Clearance of vegetation due to mining and allied activities	The lease area was partially mined out earlier during earlier lease period. No clearance of major vegetation is involved.
2	Retardation of tree growth, tip burning, etc, due to deposition of dust and the Particulate matter generated from the mining operation.	Necessary mitigative measures like dust suppression, proper maintenance of equipment's, roads will be carried out to prevent dust generation.
3	Proximity to national park/ wildlife sanctuary/reserve forest/mangroves/Coastline/estuary/sea	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.
4	Release of effluents into water body that also supplies water to wildlife	There is no proposal to discharge any effluent into nearby water bodies.
5	Proposed project could increase siltation that would affect nearby biodiversity area	Surface runoff management structures like garland drain, settling pond 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.
6	Activities of the project affects the breeding/nesting sites of birds and	In the present ML area there is no wetland. A migratory bird needs sufficient wetlands with sufficient food,



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	animals	shelter, roosting places and nesting places which is not possible here.
7	Located near an area populated by rare or endangered species	There are no Schedule 1 species.
8	Risk of fall/slip or cause death to wild animals due to project activities	In the post mining stage, barber wire fencing is proposed all around the mined out void to prevent falling of animals in the mine pits.
9	Project affects the forest-based livelihood/any specific forest product on which local livelihood depends	Not applicable
10	Project likely to affect migration routes	No migration routes are in the area.
11	Project likely to affect flora of an area, which have medicinal value	No such significantly important medicinal value species within the ML area and its nearby region.
12	The project likely to affect wetlands, fish breeding grounds, marine ecology	There are no any wetlands, fish breeding grounds, marine ecology nearby the ML area which will be affected due to this project.
13	Project affects the agricultural activities in the region.	Geologically the area in and around the lease area contains rocky formation and as such no major vegetation is observed nearby. However, patches of agricultural activities are observed in few places in the monsoon season near the river and tanks based on water availability which are away and will not be affected.

There are no migratory corridors, migratory avian-fauna, rare endemic and endangered species. Therefore there shall be no impacts due to mining activity on them. Even though there are no impact on bio diversity and flora/fauna status due to project operations, positive impacts will arise due to well-planned reclamation measures for restoration of land status in the area ultimately to productive land category with elaborately planned green belt development activities and along with creation of water resources in the abandoned pits.

4.6.3 CONTROL MEASURES FOR BIOLOGICAL ASPECTS:

To reduce the adverse effects on flora/fauna status of the area due to deposition of dust generated from mining operations, mobile water tanker systems will be ensured in all dust prone areas to arrest dust generation. Methodical and well-planned plantation scheme will be carried out depending upon the immediate need, priority and availability of land. The plantation will be done along the lease boundary in a phased manner.

4.6.4 GREEN BELT & PLANTATION:

Greenbelt / Plantation will be carried out to enhance the vegetative growth and aesthetic in the safety zone area.



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PROPOSED AFFORESTATION PROGRAMME FOR SCHEME PERIOD

Year	No. of trees proposed to be planted	Area to be covered (Ha)	Name of the species
I	212	0.132	Neem, Pungan, Poovarasu, Vagai etc..
II	212	0.132	
III	212	0.132	
IV	212	0.132	
V	212	0.132	
Total	1060	0.66	

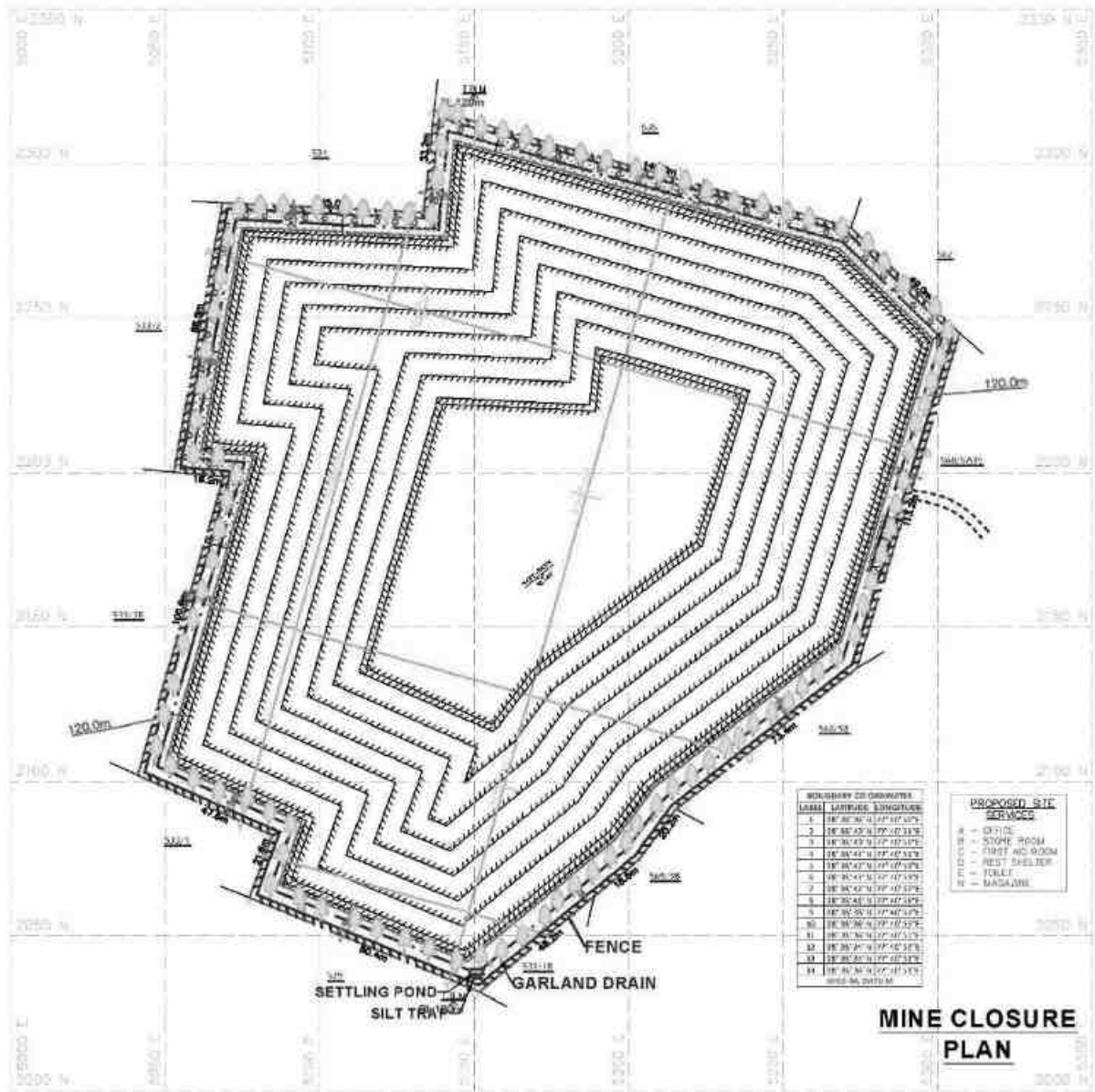
At the end of the life of the mine, entire 4.29.0 Ha of mined out area will be left as water body. 0.02.0Ha will be the mine roads and 0.66.0Ha will be covered with vegetation. The post mining land use plan showing afforestation and water body is shown in **Figure No- 4.5**.



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MINE CLOSURE PLAN

Figure No. 4.5



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4.7 SOCIO ECONOMIC ENVIRONMENT:

The entire lease area is a patta land in 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 quarry will employ about 36 persons directly and 50 persons indirectly. Besides through allied opportunities in logistics, trading, repairing works etc. good employment potential will arise in this area, 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 material.
- 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.

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

- ❖ Medical care system by way of conducting health camps etc.
- ❖ Improvement in nearby school facilities, providing education aids etc.
- ❖ Betterment of drinking water facilities.
- ❖ Benefit to the State and the Central governments through financial revenues by way of royalty, tax, duties, etc from this project directly and also indirectly.

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

Project Cost (Rs.)	Rs.1,09,98,000/-
CER Cost Requirement (2% of the Project Cost) (Rs.)	Rs. 2,19,960/-
Actual CER cost allocated (Rs.)	Rs.5,00,000/-

However, towards the socio economic development of the surrounding area, the proponent has earmarked an amount of Rs.5.0 Lakhs towards community development. The activities will be implemented in a phased manner in the following areas:

- Improved drinking water facility (RO Plant) & betterment of sanitation facilities in neary Government schools .
- Smart class facilities for nearby Government school.



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- Maintenance / Improvement in road facility.
- Desilting of village ponds.
- Assistance in conducting regular health camp, eye camp.

These activities shall be planned on a combined basis with the other nearby working quarries and crushers. The priority and need shall be finalized in consultation with the locals.

4.8 IMPACT AND REMEDIAL MEASURES FOR OCCUPATIONAL HEALTH AND SAFETY ASPECTS:

4.8.1 BASELINE STATUS:

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.

4.8.2 IMPACTS ON OCCUPATIONAL HEALTH DUE TO PROJECT OPERATIONS:

Anticipated occupational illness sequel to mining activities can be as follows:

- Dust related pneumonia
- Tuberculosis
- Rheumatic arthritis
- Segmental vibration
- Miner's Nystagamus

4.8.3 MITIGATIVE MEASURES FOR OCCUPATIONAL HEALTH:

To reduce pollution emanation from the project, following measures are being and will be taken:

- Water sprinkling on haul roads etc.
- Green belt creation to arrest dust and reduce noise propagation.
- Acceptance of good control measures for reducing air pollution, as mentioned earlier in the chapter.
- Control of noise levels through good preventive maintenance of machineries, green belt creation, provision of ear plug to workers, etc.



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- In addition to above measures, the following remedial steps are being and will be enforced to ensure minimization of occupational health and safety problems.
- Medical examination of workers at pre-entry level stage of workers, etc., by qualified doctors, with periodical examination of all workers/staff at least once a year, as per DGMS circulars.
- Regular awareness campaigns amongst staff and workers
- Staff will be provided with PPE to guard against excess noise levels, Dust generation and inhalation, etc., as per standards prescribed by DGMS.

4.8.4 MITIGATIVE MEASURES FOR SAFETY ASPECTS:

The following safety gadgets will be provided to the staff and workers based on their area of operation and work & requirement:

SI No	Safety Equipments
1.	Helmets
2.	Shoes
3.	Goggles
4.	Dust Mask
5.	Hand Gloves
6.	Reflective Jackets
7.	Ear Muffs
8.	Signal Lights/Flags

A total budgetary provision of Rs. 2 lakhs per annum under capital cost and Rs. 1 lakhs is allocated under recurring cost towards Occupational health and Safety Budget.

4.9 LOGISTICS SYSTEM OF THE AREA DUE TO THE PROJECT:

From this proposed quarry the entire output will be transported to the consumers like crusher units for producing stone aggregates of different sizes.

Sl.no	Particulars of activity	Quantity
A	Peak Rough stone Transported (m3/year)	155365
B	No of days in a year	300
C	Transport hours per day	8
D	Truck capacity in T	20
	Trips per hour	8 Trips/hr



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From the above table it is seen that the number of trips per hour works out to 8 trips/hr. The existing road can absorb this additional traffic due to this project. The following mitigative measures are suggested for mitigation of adverse impacts on the logistical aspect of the project:

- ❖ Water sprinkling on Rough stone in the transport vehicles before transporting, so that no dust nuisance during transport will arise.
- ❖ Water sprinkling using mobile water sprinkler in the unpaved transport road outside the lease area.
- ❖ Proper maintenance of transport roads
- ❖ Proper maintenance of transport vehicles.
- ❖ Avoiding overloading of material
- ❖ Covering of loaded vehicles with tarpaulins sheet if warranted.
- ❖ Limiting the travel speed

4.10 Waste Management:

4.10.1 Solid Waste due to mining activity

Since the entire mined out material will be used there will not be any solid waste generation from this project.

Liquid waste due to mining activity:

There is no process effluent generation from this mine. Hence no liquid waste is generated.

4.10.2 Hazardous waste management:

In this project the following management practices will be followed:

- Ensuring availability of different colour bins for collection of different types of waste.
- Storing of Hazardous waste material in a separate storage area with impervious containers for waste oil, oil contaminated clothes, used lead acid batteries, scraps, tyre storage etc.
- Ensure that there are no leakages/spillages of hazardous wastes.
- Ensuring that the fire extinguisher system is available at hazardous material storage area.

The hazardous waste if any will be disposed through authorized recyclers or re-processors periodically. The hazardous wastes will be transported in accordance with the provisions of rules. By effective implementation of above said mitigation measures no major impact due to Hazardous waste is expected.



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4.10.3 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.

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CHAPTER - V

ANALYSIS OF ALTERNATIVES (TECHNOLOGY & SITE)

CHAPTER – V

ANALYSIS OF ALTERNATIVES

5.1. ALTERNATE TECHNOLOGY:

This is a proposed Rough Stone Quarry in which Semi – Mechanized Open Cast mining will be carried out. It involves jack hammer drilling, blasting, excavation, loading and transportation of Rough stone to the crushing units. As this method is techno economically proven, consideration of an alternate technology is not warranted.

5.2. ALTERNATE SITE:

The mineral deposits are site specific in nature; hence question of seeking alternate site does not arise.

* * * * *



CHAPTER - VI

ENVIRONMENTAL MONITORING PROGRAMME

CHAPTER –VI

ENVIRONMENTAL MONITORING PROGRAMME

6.1. GENERAL

In this proposed project, appropriate environmental monitoring programme are framed. Regular, systematic and sustained programme schedules for implementation and monitoring of various control measures are devised with clear cut guidelines of various concerned plans for keeping a continuous surveillance on the various environmental quality parameters in the area.

The monitoring schedules are planned to aim at regular and systematic study of various pollution levels with respect to air and water quality, noise levels etc., to ensure that they conform to the standards laid down by the Environment Protection Act, 1986 and various Central and State Pollution Control Board Limits.

The various methodologies and frequency of studies of all environmental quality parameters will be as per prescribed norms laid down by MOEF&CC and State Pollution Control Board. This being a small quarry operation, the Mines in-charge will take care of all the environmental related works also.

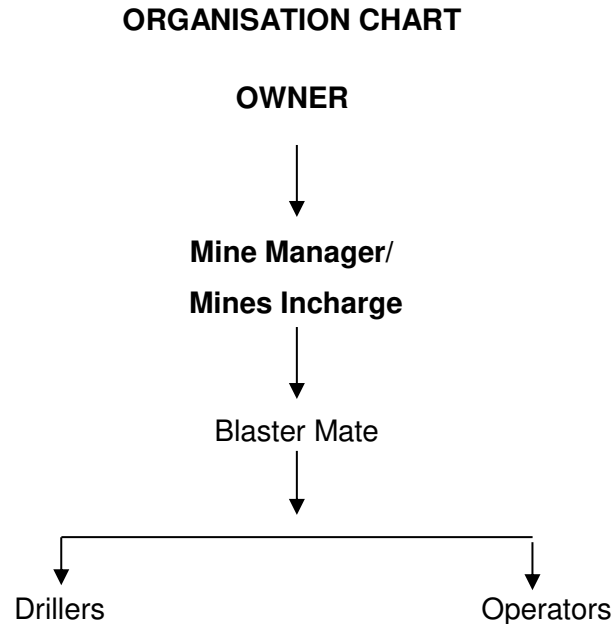
Environmental control measures include components like land degradation, air, water and soil quality, noise levels, afforestation measures, etc. For monitoring of environment over the life of the mine, a set of stations for study of quality parameters are fixed as per the actual requirements and prevailing conditions of environmental factors, as dictated from time to time, depending on the prevailing pollution levels.

The Mines Manager/Mine Incharge 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.



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The organizational chart for above division is given below:



The Mines Manager/Mines Incharge in the mine project site will be directly responsible for various environmental activities in the mine. The owner will correlate and oversee the environmental activities and their effective implementation in consonance with the guidelines in the EMP. The Mines Manager / Mines Incharge will oversee the environmental administration at the mine and he will directly supervise all activities of environmental administration on environmental issues. Necessary assistance from sub ordinates, external consultants and laboratories shall be taken.

Environmental control measures will span various factors like land degradation, air, water and soil quality, noise levels, effective land reclamation for excavated areas, afforestation measures, etc. The administrative functions are given below.

1. To observe the implementation of environmental control measures.
2. To study the effects of project activities on the environment.
3. To ensure implementation of Plantation Programme. Regular monitoring of survival rate of plants is carried out to achieve the desired result.



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4. To keep records of monitoring etc., in a systematic way, so as to facilitate easy access, when needed by statutory agencies, etc. Also send prescribed returns to statutory authorities.
5. To ensure that adequate fencing and plantation is carried out in the safety zones.
6. Conducting environmental studies and reporting to SPCB.
7. To interact and liaise with Government Departments.
8. To evaluate the performance of existing pollution control equipment and systems periodically and take timely action to keep the equipment at its optimum performance condition.
9. To take immediate preventive action in case of some unforeseen environmental pollution attributable to the project.
10. Conducting safety audits and programmes to create safety awareness in workers/ staff.
11. Conducting annual health audits to detect any health problems promptly in the workers/staff. This will reduce occupational health problems.
12. Imparting training on safety and conduct safety drills to educate employees. Firefighting equipment and system has to be kept in 'ready-to-fight' condition.
13. Carrying out socio economic study in the surrounding areas to find out the benefits derived by the society due to the project and also to fulfill the deficiency, if any, immediately.
14. Ensuring proper mine closure arrangements

6.2 MONITORING SCHEDULES FOR VARIOUS PARAMETERS

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. The monitoring schedules to be adopted in this quarry are given below.



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ENVIRONMENTAL MONITORING SCHEDULE

S.No	Environmental Parameters	Parameters to be monitored	Monitoring area coverage /locations	Frequency of monitoring
1	Air Quality	Sulphur dioxide (SO ₂), Oxides of Nitrogen (NO ₂), Respirable Particulate Matter (PM _{2.5} and PM ₁₀).	4 locations in the buffer zone and 2 work zone locations.	Once in a year in each location.
2	Water Quality	General, Physical, and chemical parameters	Ground Water samples (around the project area) and Mine Pit water samples	Once in a year
3	Water Table Fluctuations	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 a year
5	Vibration	Peak Particle Velocity	Mine periphery	Once in a year
6	Socio Economic Environment	Socio Economic Survey, Review of implementation of CER activities proposed	Buffer Zone	Yearly basis
7	Occupational Health	Occupational health survey to detect early incidence of diseases, Audiometry Test for workers in noise prone area and review of safety matters.	Staff and Workers involved in the project	Once in a year
8	Greenbelt	Maintenance	Within the lease area	Regularly

6.3 LEGISLATIVE AND REGULATORY FRAME WORK:

The project will have environmental policy declaring its responsibility and commitment to protect the environment and to ensure public safety. The existing policy will be available with all concerned officials of the plant.



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The following environmental standards as per methodologies prescribed, by MOEF/CPCB/TNPCB will be enforced in this project:

Standards	Issued By	Reference
National Ambient Air Quality Standards	Central Pollution Control Board	Table No. 6.1
Water quality standards per IS 10500:2012	Bureau of Indian Standards	Table No.6.2
Noise Standards	CPCB / MoEF&CC	Table No.6.3
Permissible Peak Particle Velocity	DGMS, Dhanbad	Table No.6.4

Table No - 6.1

[NOT III]—[TYPE 4] 3

NATIONAL AMBIENT AIR QUALITY STANDARDS
CENTRAL POLLUTION CONTROL BOARD
NOTIFICATION
New Delhi, the 18th November, 2009

No. B-29016/20/90/PC-I.—In exercise of the powers conferred by Sub-section (2) (b) of section 16 of the Air (Prevention and Control of Pollution) Act, 1981 (Act No.14 of 1981), and in supersession of the Notification No(s). S.O. 384(E), dated 11th April, 1994 and S.O. 935(E), dated 14th October, 1998, the Central Pollution Control Board hereby notify the National Ambient Air Quality Standards with immediate effect, namely:-

NATIONAL AMBIENT AIR QUALITY STANDARDS

S. No.	Pollutant	Time Weighted Averages	Concentration in Ambient Air		
			Industrial, Residential, Rural and Other Areas	Ecologically Sensitive Areas (notified by Central Government)	Methods of Measurement
(1)	(2)	(3)	(4)	(5)	(6)
1	Sulphur Dioxide (SO ₂), µg/m ³	Annual* 24 hours**	50 80	20 80	- Improved West and Gaeke - Ultraviolet fluorescence
2	Nitrogen Dioxide (NO ₂), µg/m ³	Annual* 24 hours**	40 80	30 80	- Modified Jacob & Hochheiser (Na-Arsenite) - Chemiluminescence
3	Particulate Matter (size less than 10µm) or PM ₁₀ , µg/m ³	Annual* 24 hours**	60 100	60 100	- Gravimetric - TOEM - Beta attenuation
4	Particulate Matter (size less than 2.5µm) or PM _{2.5} , µg/m ³	Annual* 24 hours**	40 60	40 60	- Gravimetric - TOEM - Beta attenuation
5	Ozone (O ₃), µg/m ³	8 hours** 1 hour**	100 180	100 180	- UV photometric - Chemiluminescence - Chemical Method
6	Lead (Pb), µg/m ³	Annual* 24 hours**	0.50 1.0	0.50 1.0	- AAS/ICP method after sampling on EPM 2000 or equivalent filter paper - ED-XRF using Teflon filter
7	Carbon Monoxide (CO), mg/m ³	8 hours** 1 hour**	02 04	02 04	- Non Dispersive Infra Red (NDIR) spectroscopy
8	Ammonia (NH ₃), µg/m ³	Annual* 24 hours**	100 400	100 400	- Chemiluminescence - Indophenol blue method



DRAFT EIA/EMP REPORT FOR ROUGHSTONE, JELLY AND GRAVEL QUARRY OF THIRU. S.KASIRAJAN AT SURVEY NO. 530/3A, 531/1A, 532, 533/1, 568/5A(P) AND 569/3A OVER AN AREA OF 4.97.0 HA IN THARUVAI VILLAGE, PALAYAMKOTTAI TALUK, TIRUNELVELI DISTRICT, TAMIL NADU.

(1)	(2)	(3)	(4)	(5)	(6)
9	Benzene (C ₆ H ₆) µg/m ³	Annual*	05	05	- Gas chromatography based continuous analyzer - Adsorption and Desorption followed by GC analysis
10	Benzo(a)Pyrene (BaP) - particulate phase only, ng/m ³	Annual*	01	01	- Solvent extraction followed by HPLC/GC analysis
11	Arsenic (As), ng/m ³	Annual*	06	06	- AAS /ICP method after sampling on EPM 2000 or equivalent filter paper
12	Nickel (Ni), ng/m ³	Annual*	20	20	- AAS /ICP method after sampling on EPM 2000 or equivalent filter paper

* Annual arithmetic mean of minimum 104 measurements in a year at a particular site taken twice a week 24 hourly at uniform intervals.

** 24 hourly or 08 hourly or 01 hourly monitored values, as applicable, shall be complied with 98% of the time in a year. 2% of the time, they may exceed the limits but not on two consecutive days of monitoring.

Note. — Whenever and wherever monitoring results on two consecutive days of monitoring exceed the limits specified above for the respective category, it shall be considered adequate reason to institute regular or continuous monitoring and further investigation.

SANT PRASAD GAUTAM, Chairman
[ADVT-III/4/18409/Exy.]

Note: The notifications on National Ambient Air Quality Standards were published by the Central Pollution Control Board in the Gazette of India, Extraordinary vide notification No(s). S.O. 384(E), dated 11th April, 1994 and S.O. 935(E), dated 14th October, 1998.



DRAFT EIA/EMP REPORT FOR ROUGHSTONE, JELLY AND GRAVEL QUARRY OF THIRU. S.KASIRAJAN AT SURVEY NO. 530/3A, 531/1A, 532, 533/1, 568/5A(P) AND 569/3A OVER AN AREA OF 4.97.0 HA IN THARUVAI VILLAGE, PALAYAMKOTTAI TALUK, TIRUNELVELI DISTRICT, TAMIL NADU.

Table No – 6.2

IS – 10500 :2012 STANDARDS

Table 1 Organoleptic and Physical Parameters
(Foreword and Clause 4)

Sl No.	Characteristic	Requirement (Acceptable Limit)	Permissible Limit in the Absence of Alternate Source	Method of Test, Ref to Part of IS 3025	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
i)	Colour, Hazen units, <i>Max</i>	5	15	Part 4	Extended to 15 only, if toxic substances are not suspected in absence of alternate sources
ii)	Odour	Agreeable	Agreeable	Part 5	a) Test cold and when heated b) Test at several dilutions
iii)	pH value	6.5-8.5	No relaxation	Part 11	—
iv)	Taste	Agreeable	Agreeable	Parts 7 and 8	Test to be conducted only after safety has been established
v)	Turbidity, NTU, <i>Max</i>	1	5	Part 10	—
vi)	Total dissolved solids, mg/l, <i>Max</i>	500	2 000	Part 16	—

NOTE — It is recommended that the acceptable limit is to be implemented. Values in excess of those mentioned under 'acceptable' render the water not suitable, but still may be tolerated in the absence of an alternative source but up to the limits indicated under 'permissible limit in the absence of alternate source' in col 4, above which the sources will have to be rejected.



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Table No – 6.2 contd.

Table 2 General Parameters Concerning Substances Undesirable in Excessive Amounts
(Foreword and Clause 4)

Sl No.	Characteristic	Requirement (Acceptable Limit)	Permissible Limit in the Absence of Alternate Source	Method of Test, Ref to	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
i)	Aluminium (as Al), mg/l, Max	0.03	0.2	IS 3025 (Part 55)	—
ii)	Ammonia (as total ammonia-N), mg/l, Max	0.5	No relaxation	IS 3025 (Part 34)	—
iii)	Anionic detergents (as MRAS) mg/l, Max	0.2	1.0	Annex K of IS 13428	—
iv)	Barium (as Ba), mg/l, Max	0.7	No relaxation	Annex F of IS 13428* or IS 15302	—
v)	Boron (as B), mg/l, Max	0.5	1.0	IS 3025 (Part 57)	—
vi)	Calcium (as Ca), mg/l, Max	75	200	IS 3025 (Part 40)	—
vii)	Chloramines (as Cl ₂), mg/l, Max	4.0	No relaxation	IS 3025 (Part 26)* or APHA 4500-Cl G	—
viii)	Chloride (as Cl), mg/l, Max	250	1 000	IS 3025 (Part 32)	—
ix)	Copper (as Cu), mg/l, Max	0.05	1.5	IS 3025 (Part 42)	—
x)	Fluoride (as F) mg/l, Max	1.0	1.5	IS 3025 (Part 60)	—
xi)	Free residual chlorine, mg/l, Min	0.2	1	IS 3025 (Part 26)	To be applicable only when water is chlorinated. Tested at consumer end. When protection against viral infection is required, it should be minimum 0.5 mg/l
xii)	Iron (as Fe), mg/l, Max	0.3	No relaxation	IS 3025 (Part 53)	Total concentration of manganese (as Mn) and iron (as Fe) shall not exceed 0.3 mg/l
xiii)	Magnesium (as Mg), mg/l, Max	30	100	IS 3025 (Part 46)	—
xiv)	Manganese (as Mn), mg/l, Max	0.1	0.3	IS 3025 (Part 59)	Total concentration of manganese (as Mn) and iron (as Fe) shall not exceed 0.3 mg/l
xv)	Mineral oil, mg/l, Max	0.5	No relaxation	Clause 6 of IS 3025 (Part 39) Infrared partition method	—
xvi)	Nitrate (as NO ₃), mg/l, Max	45	No relaxation	IS 3025 (Part 34)	—
xvii)	Phenolic compounds (as C ₆ H ₅ OH), mg/l, Max	0.001	0.002	IS 3025 (Part 43)	—
xviii)	Selenium (as Se), mg/l, Max	0.01	No relaxation	IS 3025 (Part 56) or IS 15303*	—
xix)	Silver (as Ag), mg/l, Max	0.1	No relaxation	Annex J of IS 13428	—
xx)	Sulphate (as SO ₄) mg/l, Max	200	400	IS 3025 (Part 24)	May be extended to 400 provided that Magnesium does not exceed 30
xxi)	Sulphide (as H ₂ S), mg/l, Max	0.05	No relaxation	IS 3025 (Part 29)	—
xxii)	Total alkalinity as calcium carbonate, mg/l, Max	200	600	IS 3025 (Part 23)	—
xxiii)	Total hardness (as CaCO ₃), mg/l, Max	200	600	IS 3025 (Part 21)	—
xxiv)	Zinc (as Zn), mg/l, Max	5	15	IS 3025 (Part 49)	—

NOTES

1 In case of dispute, the method indicated by * shall be the referee method.

2 It is recommended that the acceptable limit is to be implemented. Values in excess of those mentioned under 'acceptable' render the water not suitable, but still may be tolerated in the absence of an alternative source but up to the limits indicated under 'permissible limit in the absence of alternate source' in col 4, above which the sources will have to be rejected.



NOISE LEVEL STANDARDS

THE ENVIRONMENT (PROTECTION) RULES, 1986

Area Code	Category of Area	Limits in dB(A) Leq	
		Day Time	Night Time
(A)	Industrial area	75	70
(B)	Commercial area	65	55
(C)	Residential area	55	45
(D)	Silence Zone	50	40

Note :

1. Day time shall mean from 6 a.m. and 10.0 p.m.
2. Night time shall mean from 10.0 p.m. and 6 a.m.
3. Silence zone is an area comprising not less than 100 meters around hospitals, educational institutions, courts, religious places or any other area which is declared as such by the competent authority.
4. Mixed categories of areas may be average as one of the four above mentioned categories by the competent authority.

* dB(A) Leq denotes the time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.

A “decibel” is a unit in which noise is measured.

“A”, in dB(A) Leq, denotes the frequency weighting in the measurement of noise and corresponds to frequency response characteristics of the human ear.

Leq: It is energy mean of the noise level over a specified period.

Guidelines for permissible noise for industrial workers as laid down by Central Pollution Control Board

Exposure time (in hr. per day)	Limit in dB(A)
8	90
4	93
2	96
1	99
1/2	102
1/4	105
1/8	108
1/16	111
1/32	114



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Table No – 6.4

PERMISSIBLE PEAK PARTICLE VELOCITY (PPV) AT THE FOUNDATION LEVEL OF STRUCTURES IN MINING AREAS IN MM/SEC.

Type of structure	Dominant excitation frequency Hz		
	<8 Hz	8-25 Hz	>25 Hz
A. Buildings/structures not belonging to owner			
Domestic houses /structures (Kuchha brick and cement)	5	10	15
Industrial buildings (RCC and framed structures)	10	20	25
Objects of historical importance and sensitive structures.	2	5	10
B. Building belonging to owner with limited span of life			
Domestic houses/structures (Kuchha brick and cement)	10	15	25
Industrial buildings (RCC and framed structures)	15	25	50

6.4 ENVIRONMENTAL POLLUTION CONTROL COST ESTIMATE:

In this proposed quarry Implementation of mitigative measures, like provision of mobile water tankers, greenbelt plantation, monitoring of environmental parameters, providing safety gadgets etc involves capital as well as recurring expenses. The probable capital and recurring environmental control cost are calculated and given below **Table No – 6.5**

ENVIRONMENTAL CONTROL COST

Table No – 6.5
Rs. In lakhs

Sl. No	Activity	Capital cost	Recurring Cost /Annum
1	Mobile Water Sprinkling within lease area and transport road	-	20.00
2	Monitoring of Environmental quality	-	1.50
3	Creation of peripheral bund & Fencing	2.00	-
4	Green belt and afforestation	-	1.50
5	Occupational Health & Hygiene	2.00	1.00
6	Installation Surface Runoff Management structures	-	1.50
	Total	4.00	25.50

Towards EMP measures, Rs. 4.0 lakhs is allocated under capital cost. Besides, Rs. 25.50 lakhs per annum will be spent under recurring cost. All the recurring cost of



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maintenance of pollution control measures, environmental monitoring etc., will be met from revenue.

6.4. ENVIRONMENTAL POLICY OF THE QUARRY:

The proponent will frame an Environmental policy. The salient features of this policy will be.

- ❖ Ensuring risks-free and safe mining operations by following all Statutory rules and conditions.
- ❖ Ensuring environmental preservation by adoption of remedial measures for control of air, water quality, noise status, biological improvements, green belt creation, etc.,.
- ❖ Extending CER activities to cater to the needs of local community for various benefits like improvement of physical and social infrastructures for the welfare of local community.
- ❖ Ensuring that all mining operations such as deployment of HEMM, conduct of drilling and blasting operations, etc are strictly conducted keeping with regulatory standards & maintaining safe working environment in the area.
- ❖ Providing periodical training on safety, Health, & Environment to all employers.
- ❖ Any infringement / violation of any rule or unsafe mining operations should be reported mines manager, should be reported by the foremen/ blaster mate etc, who will take immediate corrective measures for avoiding major disasters. The report will ultimately reach the owner through upwardly hierarchical communicative channels from the lowest level to superior levels in a quick time bound duration.
- ❖ The mines manager will exercise overall control over entire mining and connected operations and all infringements / violations on any count pertaining to unsafe operations, environmental degradation, etc, should be brought to the notice of the owner of the quarry. Remedial measures for such violations and deviations should be taken care by the mines manager to avoid any hazards or disasters in the mine and nearby areas. The persons responsible for such violations will be punished through appropriate disciplinarily penal actions.



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- ❖ The EC conditions and stipulations will be strictly observed by Mines manager of the mine in various issues like prescribed environmental monitoring schedules conducting of vibratory studies due to blasting, creation of green belt, management of mined area, occupational health review, etc.
- ❖ Penalty actions will be taken by the proponent in cases of continuous negligence resulting in violations deviations in this respect.
- ❖ A time schedule of once in 90 days for review of all operational factors as mentioned above is to be enforced, for proper and quick corrective actions needed in the matter.

* * * * *



CHAPTER - VII

ADDITIONAL STUDIES

CHAPTER-VII

ADDITIONAL STUDIES

7.1. GENERAL:

The additional studies covered for this EIA / EMP report are:

1. Public consultation of the project as per MoEF&CC mandates.
2. Cumulative Impact Study
3. Risk Assessment
4. R&R Plan
5. Mine closure planning

7.2. 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.

7.3 CUMULATIVE IMPACT STUDY:

As mentioned earlier, Roughstone, Jelly and Gravel quarry of Thiru. S.Kasirajan in Tharuvai Village, Palayamkottai Taluk, Tirunelveli District, Tamil Nadu.. The details of the other quarries located within the 500m radius of the project (**Annexure-9**) has been provided below:



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DETAILS OF QUARRIES WITHIN 500m RADIUS

Table No.7.1

.No	Name and address of the lessee	Quarry location	Extent	Lease Period
a. Existing Quarries				
1	P.Marimuthu, S/o.Petchi Thevar, 1/3A, Kasba Melbagam, Ponnagudi, Palayamkottai, Tirunelveli.	S.F.No.522/1, 2, 534 & 535 (P), Tharuvai village	4.73.5ha	Proceedings Rc.No.M1/36802/2016 dated 22.03.2018 for a period 5 years from 19.04.2018 to 18.04.2023
2	S.Sankar, S/o.R.Subramaniam, 131/1, APT Road, Erode.	S.F.No.524 (P), Tharuvai village	1.60.0ha	Proceedings Rc.No.M1/43375/2015 dated 31.03.2018 for a period 5 years from 17.04.2018 to 16.04.2023
3	Tvl.Sri Durgambika Blue Metals, 1A/115, Kandithankulam, Tirunelveli.	S.F.No.570 (P), Tharuvai village	1.38.5ha	Proceedings Rc.No.M3/6065/2019 dated 02.03.2018 for a period 5 years from 24.07.2018 to 16.04.2023
a. Abandoned Quarries				
1	S.Subbaiah, S/o.Sorna Thevar	S.F.No.568/1 & 569/1B, Tharuvai village	2.63.5ha	Proceedings Rc.No.M1/41558/2011 dated 20.01.2012 for a period 5 years from 07.02.2012 to 06.02.2017
b. Proposed Quarries				
1	S.Kasirajan, 760, Bazaar Street, Seevalaperi, Palayamkottai Taluk, Tirunelveli	S.F.No.530/3A, 531/1A, 532, 533/1, 568/5A (P) & 569/3A, Tharuvai village	4.97.0ha	Proposed Quarry
2	Tvl.Sri Durgambika Blue Metals, Prop.Thiru.S.Subash Chandra Bose, No.1A/115, Kadithankulam, Tharuvai Village, Palayamkottai Taluk, Tirunelveli	S.F.No.570 (P) & 571 (P), Tharuvai village	1.95.5ha	Proposed Quarry

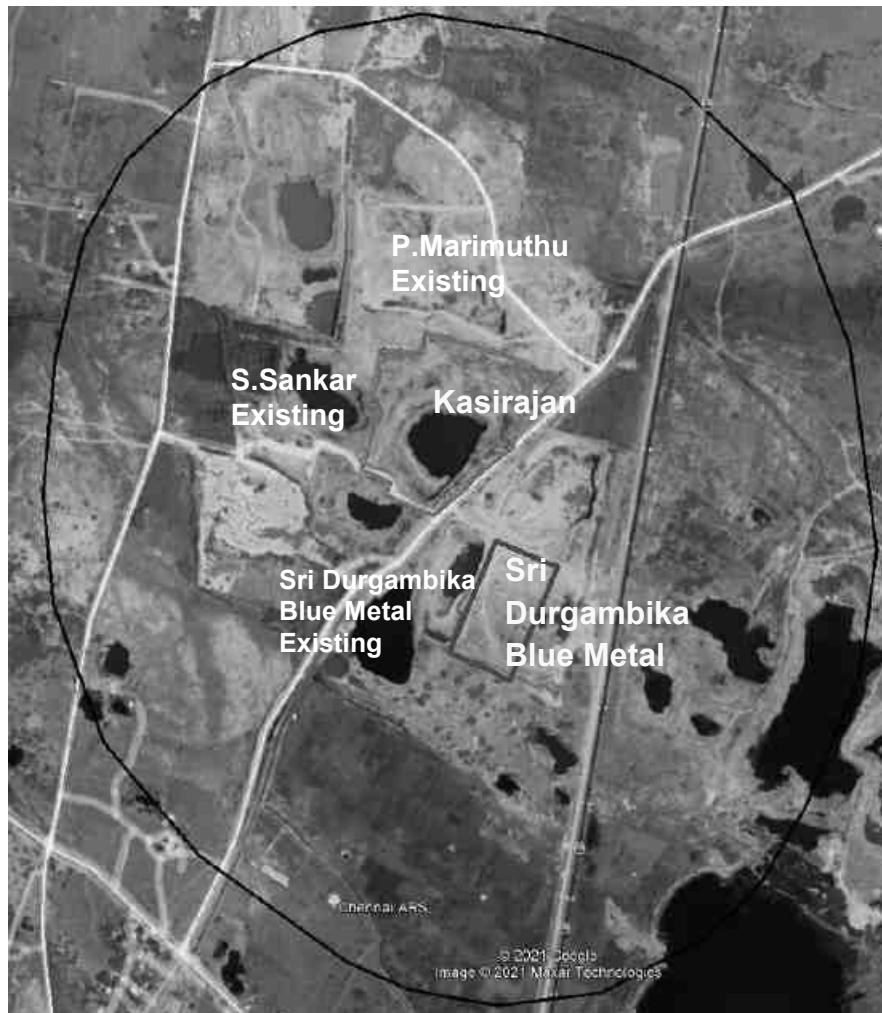
From that above it is seen that, although the individual lease area of this project is less than 5 Ha, the other existing and proposed quarries within the 500m radius along with this subject project works out to >5 Ha. A Cumulative impact study is conducted to determine the impact of the existing and proposed quarries on the environment. A map showing the existing and proposed quarries located near the lease area is provided Figure No.7.1 given below:



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VICINITY MAP

Figure No.7.1



The baseline monitoring carried out for this project reflects the cumulative impact of these existing quarries. Considering that the lease period of the existing quarries will be coming to an end shortly, the proposed quarries of Thiru S.Kasirajan and Tvl. Sri Durgambika Blue Metals will serve as a replacement for the existing quarries to ensure meeting the present roughstone demands.

7.3.2 DETAILS OF PROPOSED QUARRIES

For proposed quarries of Thiru S.Kasirajan and, Tvl. Sri Durgambika Blue Metals the cumulative impact of these proposed quarry operations on the environment is studied and provided below.

The salient details of these two proposed quarries are provided below:



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1	Proponent Name	Thiru S.Kasirajan	Tvl. Sri Durgambika Blue Metals
2	Project Location		
a	Survey No.	530/3A,531/1A, 532, 533/1, 568/5A(P) and 569/3A	570(P) & 571(P)
b	Village	Tharuvai	Tharuvai
c	Taluk	Palayamkottai	Palayamkottai
d	District	Tirunelveli	Tirunelveli
e	State	Tamil Nadu	Tamil Nadu
3	Lease Area	4.97.0 Ha	1.95.5Ha
4	Precise Area Letter No.	Rc.No.M1/36182/2018 dated 21.05.2019	Rc.No.M3/10059/2020 dated 11.09.2020
5	Production Capacity	7,57,111m ³ of Rough Stone and 47,076m ³ of Weathered Rock and 24,080m ³ of Gravel upto a restricted depth of 54m for the period of Five years.	2,81,575m ³ of Rough Stone, 14,620 m ³ of weathered rock formation and 15,136m ³ of gravel upto a restricted depth of 37m for the period of Five years
6	Method of mining	Opencast semi mechanized mining using jackhammer drilling, blasting, excavation through excavator & mineral transport through tippers	
6	Lease Period	5 Years	5 Years
7	Ultimate Pit Depth	54m	37m
8	Project cost	Rs.1,09,98,000/-	Rs.77,27,000/-
9	CER budget	Rs.5,00,000/-	Rs.3,00,000/-
10	Environmentally sensitive features	Nil	Nil

The cumulative combined impact anticipated due to mining and allied activities in both the proposed quarries are determined for Air, Noise, Vibration, Water, Logistical, Socio Economic and Land Environment. Details of the same are provided below:

7.3.2.1 AIR ENVIRONMENT:

The mining and allied activities particularly excavation, hauling, loading and un loading etc. lead to emission of particulate matter. However, effective mitigative measures are provided in the EIA/EMP report to obviate these effects. The cumulative impact on ambient air quality for PM₁₀ and PM_{2.5} due to the operations of both these proposed projects are predicted based on Air Quality Model simulations. The modeling is done for the peak production to know the worst scenario.

The cumulative peak Ground Level Concentration (GLC) after effective implementation of various mitigative measures have been computed and given below:



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CUMULATIVE PEAK INCREMENTAL CONCENTRATION ($\mu\text{g}/\text{m}^3$)

Activity	With Control Measures
PM ₁₀	14.06
PM _{2.5}	6.19

The cumulative Isopleths of PM₁₀, PM_{2.5} concentrations have been drawn and these are given in **Figure No – 7.2 to 7.3.**



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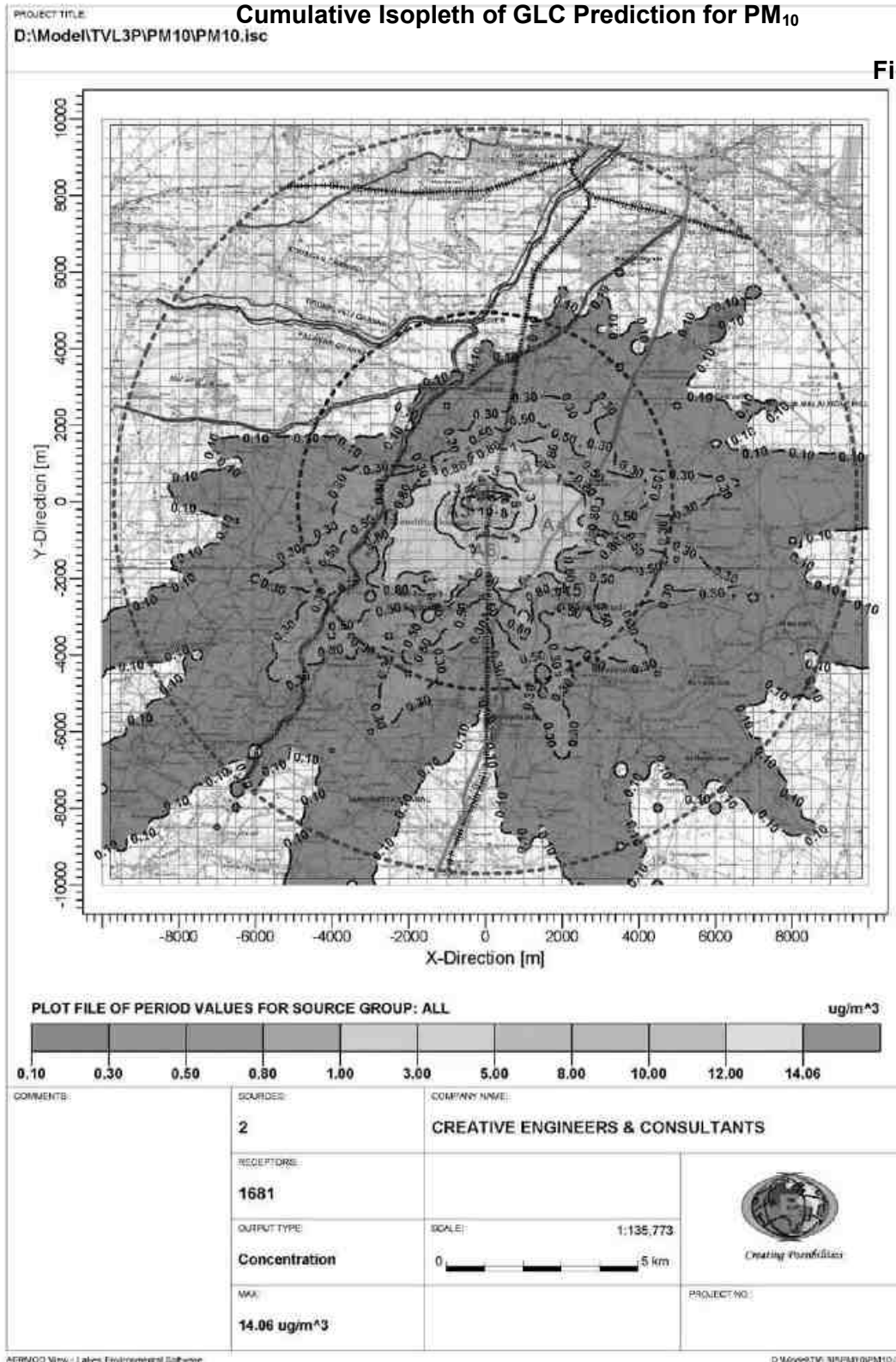


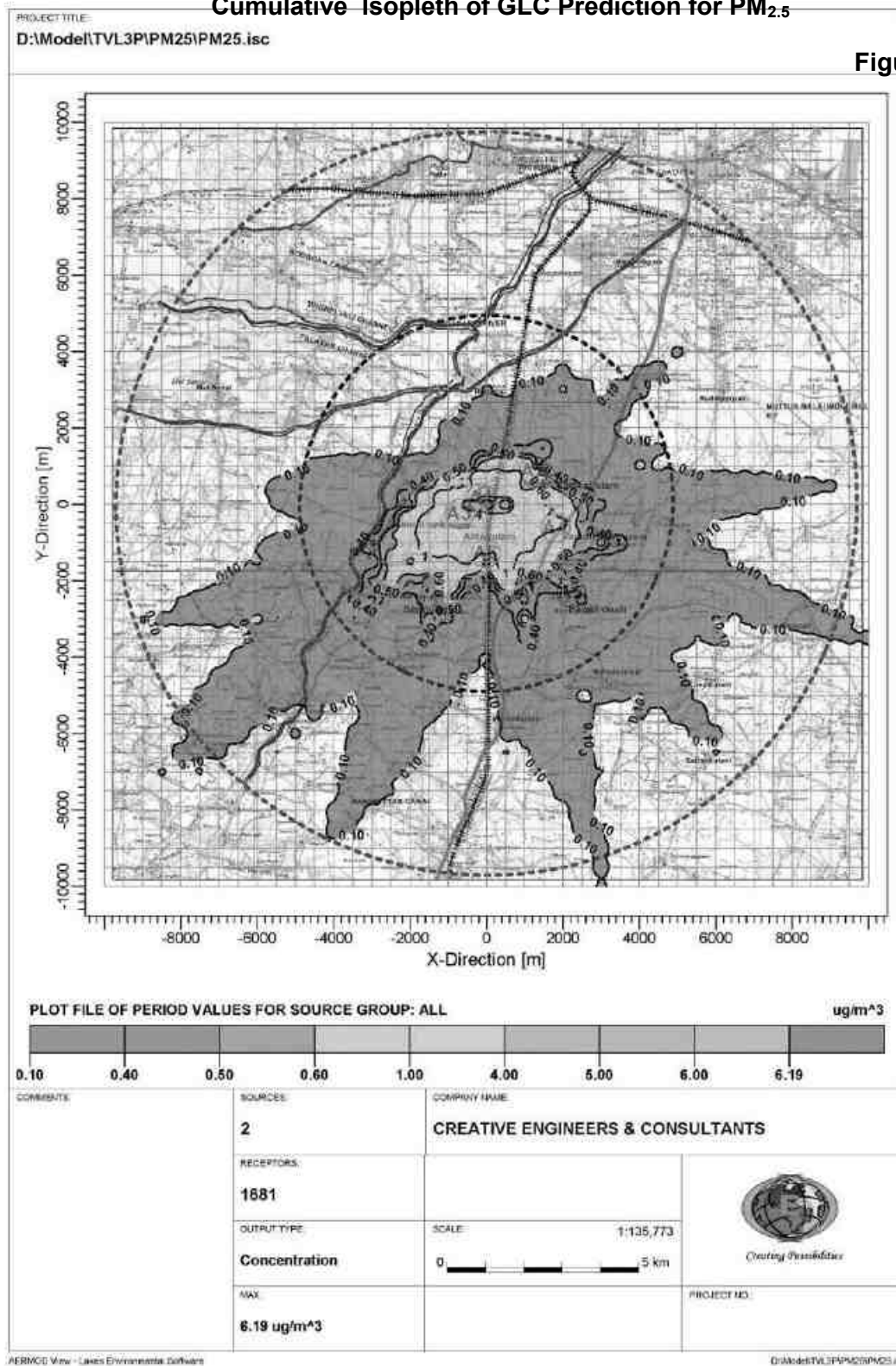
Figure No – 7.2



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Cumulative Isopleth of GLC Prediction for PM_{2.5}

Figure No – 7.3



DRAFT EIA/EMP REPORT FOR ROUGHSTONE, JELLY AND GRAVEL QUARRY OF THIRU. S.KASIRAJAN AT SURVEY NO. 530/3A, 531/1A, 532, 533/1, 568/5A(P) AND 569/3A OVER AN AREA OF 4.97.0 HA IN THARUVAI VILLAGE, PALAYAMKOTTAI TALUK, TIRUNELVELI DISTRICT, TAMIL NADU.

It is observed that the peak incremental concentration for PM₁₀, PM_{2.5} is occurring very near the source. At away from the source the values are getting reduced due to dispersion effects. The incremental and predicted concentrations at the locations of ambient air quality have been discussed below.

PREDICTED AMBIENT AIR QUALITY:

The cumulative combined post project Concentrations of PM₁₀, PM_{2.5}, (GLC) (base line + incremental) after adopting necessary control measures is given below:

CONCENTRATIONS OF PM₁₀ AFTER PROJECT IMPLEMENTATION

Values in µg/m³

S. No	Location	Background Concentration	Predicted Incremental Concentration	Post Project Concentration	Statutory Limits
1	A1- Near Mine Lease Area	79.2	14.0	93.2	1200 µg/m ³ for particulate emissions
2	A2 - Adaimithipankulam	67.2	1.5	68.7	100
3	A3- Kandithankulam	71.3	5.0	76.3	
4	A4- Samathuvapuram	62.9	2.0	64.9	
5	A5- Ponnakudi	63.2	1.0	64.2	
6	A6- Alankulam	61.1	2.5	63.6	

CONCENTRATIONS OF PM_{2.5} AFTER PROJECT IMPLEMENTATION

Values in µg/m³

S. No	Location	Background Concentration	Predicted Incremental Concentration	Post Project Concentration	Statutory Limits
1	A1- Near Mine Lease Area	40.4	6.2	46.6	-
2	A2-Sirudamur village	34.2	1.0	35.2	60
3	A3-Patta village	34.6	4.0	38.6	
4	A4-Madhur village	32.1	1.0	33.1	
5	A5- Arunkundram Village	32.6	<1.0	33.6	
6	A6- Sirumailur village	31.6	1.5	33.1	

It can be seen that the resultant added concentrations with baseline figures even at worst scenario and cumulative impact of both the projects show that the values of ambient air quality with respect to PM₁₀ are in the range of 63.6 µg/m³ to 93.2 µg/m³ and with respect to PM_{2.5} are in the range of 33.1 µg/m³ to 46.6µg/m³ which are within the statutory stipulations in respective case.



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7.3.2.2 WATER ENVIRONMENT:

The quantum of water required for both these projects are very less and total to 7.0 KLD comprising 4.0 KLD for Quarry of Thiru S.Kasirajan and 3.0 KLD for Quarry of Tvl. Sri Durgambika Blue Metals. 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 later.

The mining area consists of hard compact rock, hence no major water seepage within the mine is expected from the periphery. From the nearby working quarries it is observed there are no seepages in the mine faces because of the hard rock formation. The ground water table in this area is very deep. Hence, ground water intersection is not envisaged and ground water will not be affected appreciably due to the quarrying operation.

Besides, the stage of groundwater development of Palayamkottai Taluk where the study area falls is 22% as per the National Water Mission, Ministry of Jal Shakti, Department of Water Resources, RD & GR in the Ground water reports of Tamil Nadu Districts, Tirunelveli. 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.

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

There are no seasonal drainage courses nearby. Pond / eri located in the nearby area will be additionally strengthened and periodical desilting activities under CER activities will be carried out to augment the storage capacity of the tank.

7.3.2.3 NOISE ENVIRONMENT:

Post project noise in the core zone has already been provided under para 4.4, Chapter-IV where it is seen that the predicted Noise Levels due to mining operations at the periphery of the mine lease itself will be less even without considering any attenuation factor. However, practically there will be attenuation due to vegetation etc., and as such there will not be any adverse noise propagation outside the lease boundary. Hence, the cumulative post project noise in the nearby villages has been carried out using the following formula and the results are given below:

$$Lp2 = Lp1 - 20 \log R2/R1$$



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Where, Lp1 and Lp2 are sound pressure levels at points located at distances R1 and R2 respectively from the source.

SI.NO	Location	Baseline Day Eq.in dB(A)	Cumulative Post project noise Eq in dB(A)	Limit dB(A) as per MoEF&CC
1	Adaimithipankulam	46.6	47.7	55
2	Kandithankulam	44.4	44.6	55
3	Samathuvapuram	42.2	44.1	55
4	Ponnakudi	41.5	42.2	55
5	Alankulam	45.0	45.7	55

It is seen that the post project concentration in the nearby villages are within the statutory limits of 55dB(A). Besides it is proposed to carry out various mitigative measures such as carrying out greenbelt and afforestation to act as acoustic barriers.

7.3.2.4 VIBRATION:

By Carrying out controlled blasting using Nonel milli second delay detonator, Optimum design for burden and spacing & reducing the explosive charge per delay to minimum in both the projects no adverse impact due to blasting vibration is expected.

Besides, different blasting time for both the projects is suggested and the timing is to be mentioned in the display board in the mines entrance.

7.3.2.5 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:

Details	Thiru S.Kasirajan	Tvl.Sri Durgambika Blue Metals
Peak Material Transported (m3/year)	155365	58,050
No of days in a year	300	300
Transport hours per day	8	8
Truck capacity in T	20	20
Trips per hour	8 Trips/hr	3 Trips/hr

The total trips from these projects there will be about 11 trips per hour. 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.



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7.3.2.6 CUMULATIVE IMPACT ON SOCIO ECONOMIC ENVIRONMENT:

Both lease areas are Patta land. 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 proposed 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 3.0 lakhs for Tvl.Sri Durgambika Blue Metals and Rs.5.0 lakhs for Thiru S. Kasirajan quarry has been earmarked separately.

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.

7.3.2.7 CUMULATIVE IMPACT ON LAND ENVIRONMENT:

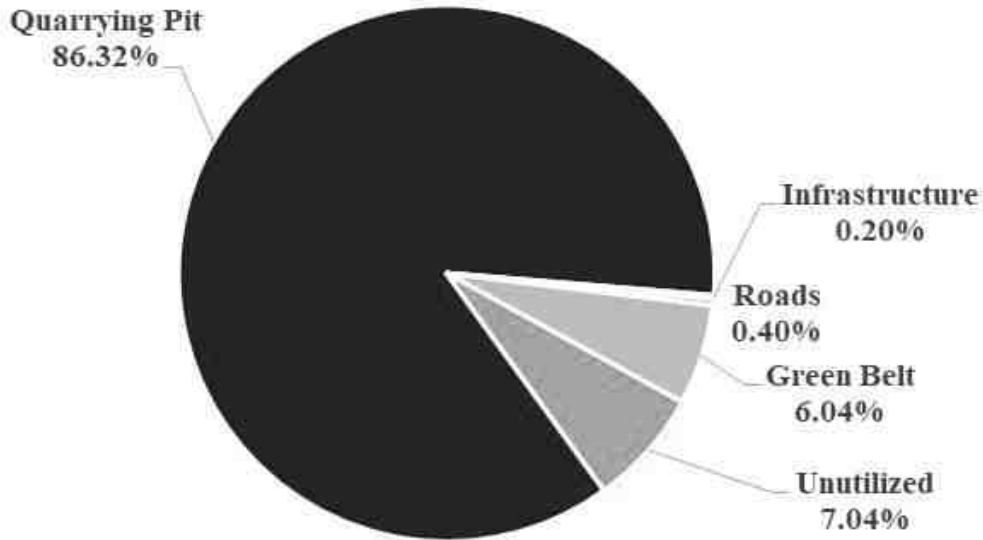
The entire mine lease area of **Thiru S.Kasirajan** of 4.97.0 Ha is a patta land. At the end of the life of the mine, entire 4.29.0 Ha of mined out area will be left as water body. 0.02.0Ha will be the mine roads and 0.66.0Ha will be covered with vegetation.

The entire mine lease area of **Tvl Sri Durgambika Blue Metals** of 1.95.5 Ha is a patta land. At the end of the life of the mine, entire 1.51.0Ha of mined out area will be left as water body. 0.01.0Ha will be the mine roads and 0.43.5Ha will be covered with vegetation.

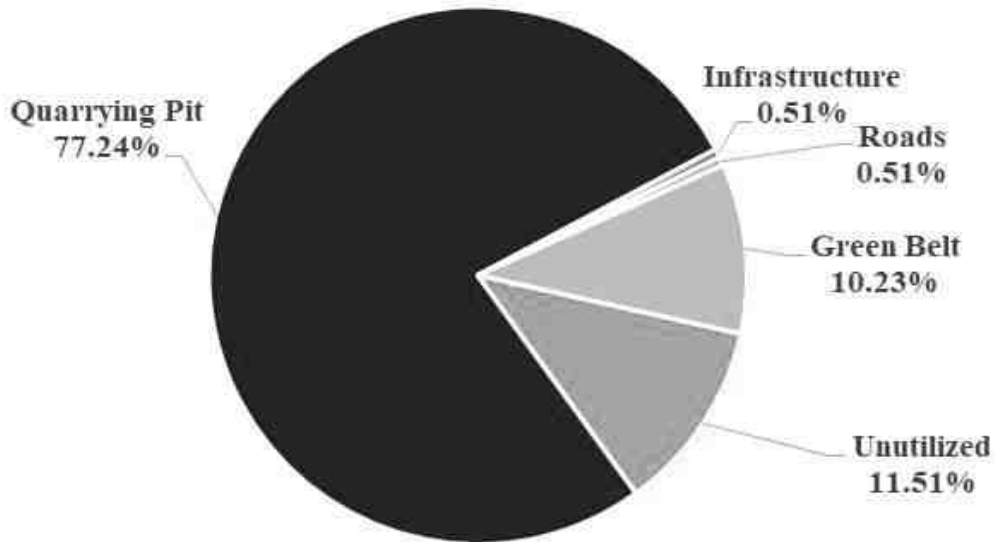
For both projects, in the post mining stage it will be ensured that the entire mined out area will be properly fenced to prevent inadvertent entry of men and animals. The rainwater harvested in the mined out void shall be utilized to meet the water requirement.



POST MINING LAND USE - THIRU S.KASIRAJAN



POST MINING LAND USE - SRI DURGAMBIKA BLUE METALS



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7.4. RISK ASSESSMENT:

For the various risks, likely to arise, detailed analysis of causes and control measures is given in below:

S.No	Factors	Causes of risks	Control measures
1.	Removal of material	a) Bench may slide due to its unconsolidated nature. b) Vibration due to movement of vehicles in the benches.	Overall bench slope angle will be maintained optimally as per DGMS requirement. Working bench width will be more than bench height.
2.	Drilling	a)Due to high pressure of compressed air hoses may burst. b) Down the hole drill rod may break due to improper maintenance of rod.	<ul style="list-style-type: none"> • Periodical preventative maintenance and replacement of worn out accessories in the compressor and drill equipment. • As per manufacturers recommendation rod to be replaced and bits will be changed.
3.	Blasting	a)Fly rock, ground vibration, noise etc. b) Improper charging of explosives	<ul style="list-style-type: none"> • Burden and spacing will be kept optimum on trial basis. • Explosive charge per delay will be minimized. • Delay detonators will be used.
4.	Excavation	a)Hauling and loading equipment are in such proximity while excavation b)Swinging of bucket over the body of tipper c) Driving of unauthorized person	<ul style="list-style-type: none"> • Operator shall not operate the machine when person & vehicles are in such proximity. • Shall not swing the bucket over the cab and operator leaves the machine after ensuring the bucket is on ground. • Shall not allow any unauthorized person to operate the machine by effective supervision.
5.	Transportation	a)Operating the vehicle "nose to tail" b) Overloading of material c) While reversal & overtaking of vehicle d) Operator of truck leaving his cabin when it is loaded	<ul style="list-style-type: none"> • It will be ensured that all these causes will be nullified by giving training to the operators. • No over loading will be done. • Audio visual reverse horn shall be provided. • Proper training will be given.



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S.No	Factors	Causes of risks	Control measures
6.	Fire due to electricity and Oil	a)Due to the short circuit of cables & other electrical parts b) Due to the leakage of inflammable liquid like diesel, oil etc.	<ul style="list-style-type: none"> • Electrical parts shall be cleaned frequently with the help of dry air blower • All fastening parts and places will be tightening. Suitable fire suppression equipment shall be provided.
7.	Natural calamities	Unexpected happenings	The mine management is capable to deal with the situation.

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.

7.5 REHABILITATION AND RESETTLEMENT (R & R) PLAN:

The mining activities will be carried out within the mine lease area only. The entire mine lease area of 4.97.0 Ha is a patta land. There is no population within the ML area. Hence, the question of R& R does not arise.

7.6 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. 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 4.8**

* * * * *



CHAPTER - VIII

PROJECT BENEFITS

CHAPTER-VIII

PROJECT BENEFITS

The proposed Roughstone, Jelly and Gravel Quarry of Thiru S.Kasirajan will improve physical and social infrastructures in the area like:

- Employment to 36 people
- Financial gains for the governments, through collection of various taxes like royalty, GST, etc.,
- Increase in General Awareness of the People.
- Continual improvements of the local amenities for the local society
- Improvement of the General Living Standard of the People in the Vicinity
- Overall Improvement in HDI (Human Development Index)
- Growth of Allied Industries in the Area.
- Improvement in Per Capita Income.
- Providing certain facilities for the local schools and panchyats

In short, the proposed quarry will benefit this region in the fields of employment opportunities, improved per capita income for local people, improved social welfare facilities in respect of education, medical systems, infrastructural build-up, etc in its own way.

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.5.00 Lakhs for various activities under CER. The activities will be implemented once the mining operations commence. From the CER activities allocated for various social welfare activities, the villages near the lease area will be benefited.

* * * * *



CHAPTER - IX

ENVIRONMENTAL COST BENEFIT ANALYSIS

CHAPTER – 9

ENVIRONMENTAL COST BENEFIT ANALYSIS

Appendix-III of the MoEF notification S.O. 1533 dated 14.09.2006, which describes the generic structure of Environmental Impact Assessment document, states that the chapter ‘ Environmental cost benefit analysis’ is applicable if it is recommended during scoping stage.

ToR for this project has been received from SEIAA, Tamil Nadu vide their letter no. SEIAA-TN/F.No.7174/SEAC/ToR-841/2020 dated 17.02.2021. Environmental cost benefit analysis is not prescribed in the terms of reference. Hence, it is not applicable for this project.

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CHAPTER - X

ENVIRONMENTAL MANAGEMENT PLAN

CHAPTER - X

ENVIRONMENTAL MANAGEMENT PLAN

10.1 INTRODUCTION:

In this proposed quarry, good practices of Environmental Management plan will be ensured to keep all the environmental parameters of the project in respect of ambient air quality, water quality, socio-economic improvement standards, biological quality of the area, etc, well within statutory sustainable limits prescribed by CPCB, MOEF&CC and SPCB.

10.2 ENVIRONMENTAL MANAGEMENT PLAN:

10.2.1 Brief:

The well planned and systematic monitoring systems and well-conceived and efficient Environment Management Plan will be followed promptly and attentively to ensure that during the project operations, the various environmental parameters, are well within the statutorily sustainable limits. Its details are briefly given below:

10.2.2 Air Quality:

Frequent water spraying, Regular wetting of transport road will be done using mobile water tanker. Other control measures like covering of drill holes with wet cloth for dust suppression, Proper maintenance of haul road and other roads, covering of transport trucks with tarpaulin etc. will also be done. Elaborate green belt cover will be developed around mine periphery and in safety zone as described in Chapter-IV. Overloading of tippers will be avoided to stop spillages. Good preventive maintenance will be practiced in case of HEMM to reduce gaseous pollutants.

10.2.3 Water Environment:

Surface runoff management structures like garland drain of 880m length which is connected to a settling pond will be constructed around the quarry to collect the rain water. The supernatant clear water from the settling pond will be provided to nearby downstream users. Towards rainwater harvesting, the rainwater harvested in the mine will be used to meet the water requirements during mining and excess water in consultation with villagers and inline with

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Government practices will be out in to the nearby stream or shall be distributed to the nearby villages as per their need.

The bunds of the nearby tank will be additionally strengthened and periodical desilting activities under CER activities will be carried out to augment the storage capacity of the tank. There is no proposal to discharge any effluent into this water body. Its details are provided in Chapter-IV.

10.2.4 Noise Environment:

Control measures adopted and to be continued is as follows:

- ❖ Noise protectors, insulation of operator cabins, installation of silencers in machineries, etc.
- ❖ Provision of ear plugs to workers in higher noise prone areas, etc.
- ❖ Provision of adequate green belt around mine areas to prevent noise propagation. More details in this connection are given in Chapter-IV.

10.2.5 Biological Environment:

Good green belt cover as described in Chapter-IV will be created in mine periphery to boost the biological, visual and aesthetic outlook of the area.

10.2.6 Socio-Economic Environment:

The proposed project operation will provide positive impacts in the region on the employment area as well as on physical and social infrastructural status. Many other tangible benefits will be gained by the local people in the surrounding areas due to ancillary units, trading operations, contractual needs, casual labor, green belt development, etc. Towards the socio economic development of the surrounding area, the proponent has earmarked an amount of Rs.5.00 Lakhs under Corporate Environmental Responsibility. Elaborate details in this respect are given in Chapter-IV.

10.3 ENVIRONMENTAL MONITORING AND ADMINISTRATIVE ASPECTS:

A properly planned post-project environmental monitoring schedule forms an essential part of the Environmental Management Plan of a project and has a vital role in its success. In this project, environmental monitoring is accorded a prime position, details of which are given in



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Chapter-VI. The action plan for monitoring consists of monitoring of following environmental components.

- ❖ Ambient air quality comprising fugitive and gaseous components.
- ❖ Ground water quality and behavior.
- ❖ Ambient noise levels in mine area and vicinity
- ❖ Monitoring of green belt cover growth and assessing survival rates especially in the initial three years of plantation
- ❖ Monitoring of occupational health of staff and workers
- ❖ Monitoring of CER activities.

10.4 CONCLUSION:

A meticulously well planned Environmental Management Plan, with various programme schedules and timely execution objectives, as above, will ensure that the future environmental quality in the area will be maintained within statutory limits. The environmental management strategy as explained above will prove that industrial growth, if properly planned with all environmental concerns and appropriate remedial measures can go a long way to improve life pattern and living conditions of the local community around the project.

* * * * *



CHAPTER-XI

SUMMARY AND CONCLUSION

CHAPTER - XI

SUMMARY & CONCLUSION

11.1 BACKGROUND OF PROJECT PROPONENT & PROJECT:

11.1.1 GENERAL:

Thiru.S.Kasirajan proposes to operate a **Rough Stone, Jelly and Gravel Quarry** at Survey No. 530/3A,531/1A, 532, 533/1, 568/5A(P) and 569/3A over an area of 4.97.0 Hectares in Tharuvai Village, Palayamkottai Taluk, Tirunelveli District, Tamil Nadu and has initiated action towards obtaining environmental clearance. Entire lease area is a patta land in proponent's possession.

Although the individual lease area of this project is less than 5 Ha, the other existing quarries and proposed quarries within the 500m radius along with this subject project works out to > 5 Ha and as such this proposal is considered under Cluster Category – B1 and as per MoEF & CC notification necessitates preparation of EIA/EMP report and public hearing. This cluster includes the nearby proposed Roughstone, Jelly and Gravel Quarry of Tvl.Sri Durgambika Blue Metals at Survey No. 570(P) & 571(P) over an area of 1.95.5 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 7.3, Chapter-VII**.

The boulders produced from this lease will be transported by tippers to the needy crusher/other buyers. The top overburden in the form of Gravel will be loaded into tipper and marketed to needy customers on payment of necessary Seigniorage Fees to Government.

This draft EIA/EMP report will be exposed to public hearing, as per rules and procedures in this respect, as per the EIA notification 2006. The opinions, concerns and objections, if any, of the surrounding public and other stake holders connected, will be taken into consideration and compliance report thereon will be submitted to SEIAA, Tamilnadu in the final EIA/EMP report.

11.1.2 LEASE & OTHER APPROVALS:

Precise area communication letter was obtained from the District Collector, Tirunelveli vide Rc.No.M1/36182/2018 dated 21.05.2019. **(Annexure-1)**

Mine plan for this project was approved by Assistant Director, Geology & Mining, Tirunelveli vide Rc.No.M1/36182/2018, dated 22.07.2019. **(Annexure-2)**

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ToR for this project has been received from SEIAA, Tamil Nadu vide their letter No. SEIAA-TN/F.No.7174/SEAC/ToR-841/2020 dated 17.02.2021 for a production capacity of 7,57,111m³ of Rough Stone and 47,076m³ of Weathered Rock and 24,080m³ of Gravel upto a restricted depth of 54m for the period of Five years.

11.2 BRIEF PROJECT PROFILE:

11.2.1 PROJECT PROFILE & SALIENT ASPECTS:

S.No	Particulars	Details and aerial distance
1.	Name of the Project	Rough Stone, Jelly and Gravel Quarry of Thiru.S.Kasirajan
2.	Location of the project	Tharuvai Village, Palayamkottai Taluk, Tirunelveli District, Tamil Nadu
3.	Mining Lease area (ML area)	4.97.0 Ha
4.	Latitude & Longitude	Latitude : 08°38'34"N to 08°38'43"N Longitude : 77°40'50"E to 77°40'58"E
5.	Topography	Plain
6.	Type of land	Patta land .
7.	Temperature °C (Mean Minimum & Mean Maximum)	22.9°C and 33.5°C
8.	Average Annual rainfall	879mm
9.	Nearest Highway	(NH-7) Tirunelveli – Kanniyakumari - 2.1km – SE (SH-40) Tirunelveli – Pattamadai – 2.6km – N
10.	Nearest Railway station	Sengulam – 4.0 km (SE)
11.	Nearest Airport	Tuticorin – 40.0 km (NE)
12.	Nearest Major water bodies	Tank - 720m – (SE) Pachaiyar River 2.2km – (W) Palayan Channel 3.1km – (W) Tambraparni River 4.4km – (NW) Tirunelveli Channel 4.7km – (NW) Manimuttar Canal 8.8km – (S) Kodagan Channel 6.5km- (NW) Nainarkulam Channel 7.3km – (N)
13.	Environmental sensitive areas, Protected areas as per Wildlife Protection Act, 1972 (Tiger reserve, Elephant reserve, Biospheres, National	Nil within 10km radius.



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	parks, Wildlife sanctuaries, community reserves and conservation reserves)	
14.	Reserved / Protected Forests	Muttur Malai Woif Hill R F – 8.4km - NE
15.	Nearest Town	Tirunelveli – 8.8km (N)
16.	Nearest villages	Kandithankulam – 850m (S)
17.	Seismic Zone	Area falls in Zone – II (Least Active)

11.2.2 PROJECT DESCRIPTION:

S.No	Particulars	Details																															
1.	Geological resources																																
2.	Mineable reserves	Type of reserves	Rough stone (Cum)	Weathered Rock (cum)	Gravel (cum)																												
		Geological reserves	27,81,184	99,328	49,664																												
		Mineable reserves (upto 59m)	7,72,636	47,076	24,080																												
		Mineable reserves (upto 54m)	7,57,111	47,076	24,080																												
3.	Five Year Production Capacity	<table border="1"> <thead> <tr> <th>Year</th> <th>Roughstone (m3)</th> <th>Weathered Rock (m3)</th> <th>Gravel (m3)</th> </tr> </thead> <tbody> <tr> <td>I</td> <td>153762</td> <td>47076</td> <td>24080</td> </tr> <tr> <td>II</td> <td>154557</td> <td>--</td> <td>--</td> </tr> <tr> <td>III</td> <td>155365</td> <td>--</td> <td>--</td> </tr> <tr> <td>IV</td> <td>155113</td> <td>--</td> <td>--</td> </tr> <tr> <td>V</td> <td>138314</td> <td>--</td> <td>--</td> </tr> <tr> <td>Total</td> <td>757111</td> <td>47076</td> <td>24080</td> </tr> </tbody> </table>				Year	Roughstone (m3)	Weathered Rock (m3)	Gravel (m3)	I	153762	47076	24080	II	154557	--	--	III	155365	--	--	IV	155113	--	--	V	138314	--	--	Total	757111	47076	24080
Year	Roughstone (m3)	Weathered Rock (m3)	Gravel (m3)																														
I	153762	47076	24080																														
II	154557	--	--																														
III	155365	--	--																														
IV	155113	--	--																														
V	138314	--	--																														
Total	757111	47076	24080																														
4.	Lease period	5 years																															
5.	Total Waste	There is no waste generation anticipated in this quarry operation since the entire excavated material will be utilized.																															
6.	Method of mining	Quarry operations involve jack hammer drilling, blasting, excavation, loading and transportation of Roughstone to needy buyers.																															
7.	Bench parameters	Bench height - 7 m, bench widths - 7m																															
8.	Ultimate mine depth	54m for the period of Five years.																															
9.	Ore end use	The overburden in the form of Gravel will be loaded into tipper and marketed to needy customers on payment of																															



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		necessary Seigniorage Fees to Government. The excavated rough stone will be excavated and loaded into tipper to the needy buyers.
10.	Manpower	36 persons (Direct & Indirect)
11.	Water Requirement & source	Total - 4.0KLD. The required water will be procured from outside agencies initially. Later, water collected in the mine pit will be used to meet the needs.
12.	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.
13.	Site services	This is a proposed project. Site services like mine office, first aid room, rest shelters, toilets etc. will be provided as semi-permanent structures.
14.	CER Budget	Rs. 5.0 Lakhs
15.	Project cost	Rs. 1,09,98,000/- (Operational + Fixed asset + EMP cost)

11.3 EXISTING ENVIRONMENTAL SCENARIO:

11.3.1 GENERAL:

The studies and data collection have been carried out systematically and meticulously as per relevant IS codes, CPCB and MoEF&CC guidelines and as per approved ToR during **Summer Season, March 2021 to May 2021**) For the purpose of this study, the area has been divided into two zones, namely, core and buffer zones. Core zone is considered as the total lease area, while buffer zone encompasses an area of 10 km radius distance from the periphery of core zone.

11.3.2 SOCIO-ECONOMIC STATUS:

i. Core Zone:

The total mine lease area of 4.97.0 Ha. Entire ML area is a Patta land with no forest or agricultural area involved.

ii. Buffer Zone:

Based on 2011 census data, in the 10km radius there are 45 Rural villages from Four Taluks namely Tirunelveli, Ambasamudram, Palayamkottai, Nanguneri, and 4 urban areas of



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two taluks namely, Gopalamudram (TP), Pathamadai (TP), Melacheval (TP) of Ambasamudram Taluk and Tirunelveli (M Corp.) of Tirunelveli Taluk.

The distribution of population is as below:

- Male - 306370 (49.47%)
- Female - 312992(50.53%).
- Total - 619362
- Scheduled caste - 14.93%
- Scheduled tribes - 0.33%
- Total literacy rate in the area - 79.99% of the people are literate and 20.01% of the people are illiterate.

The occupational structure of the area is as below:

- Total main workers - 224560 (36.30%)
- Total marginal workers - 26074 (4.20%)
- Total non-workers - 368728 (59.50%)

11.3.2.1 SAMPLE SURVEY:

6 villages were visited for conducting sample Village survey on all socio-economic aspects and requirements of the people. The existing socio-economic scenario is studied and CER activities are also suggested to the proponent. The study details are given in **Para 3.2.4, Chapter – III.**

11.3.3 EXISTING ENVIRONMENTAL QUALITY:

11.3.3.1 Micro-Meteorology:

<u>METEOROLOGICAL DATA</u>			
1	Season/ Period	Summer Season, March 2021 to May 2021)	
2	Location	Near Mine Lease Area	
3	DATA DESCRIPTION		
	PARAMETERS	MINIMUM	MAXIMUM
	Temperature in °c	23.9	40.2
	Humidity in %	33.0	99
	Wind speed in km/hr	<1.8	29.9
	Predominant wind direction from	W,NW (Refer Figure No - 3.6B)	



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11.3.3.2 Ambient Air Quality:

The ambient air quality data for PM₁₀, PM_{2.5}, SO₂, NO₂, CO studied at 6 locations as per prescribed guidelines/ methods. The AAQ monitored data for all locations for above parameters are shown in below.

Season: Summer Season, March 2021 to May 2021)

Values in µg/m³

S. No	PARAMETERS	Cat.* (R,I,S)	PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)
1	CORE ZONE (1 Location)	I	60.2 to 79.2	31.2 to 40.4	5.1 to 7.8	8.2 to 10.6
2	BUFFER ZONE (5 Locations)	R	49.9 to 71.3	24.1 to 34.6	4.3 to 7.1	6.4 to 10.1
CPCB LIMITS			PM₁₀	PM_{2.5}	SO₂	NO₂
2009 Notification		I & R	100	60	80	80
		S	100	60	80	80

* Note: Category - R - Residential, I - Industrial, S – Sensitive
BDL- Below Detectable Limit, DL- Detectable Limit.

Conclusion: The existing Ambient Air Quality levels in the monitored locations for PM₁₀, PM_{2.5}, SO₂ and NO₂ are within the prescribed CPCB limits of 100 µg/m³, 60 µg/m³, 80 µg/m³ & 80 µg/m³. The CO values in all locations were found to be below detectable limit (DL – 1144 µg/m³). Silica values in the study area are found to be below detectable limit (Detection limit – 0.05mg/m³) which is well within the prescribed limit of 5mg/m³. The AAQ monitored data for all locations for above parameters are shown in Figure No – 3.8, Chapter - III.

11.3.3.3 Water Environment:

Parameter	No of Samples – 12 samples					Season: Summer Season, March 2021 to May 2021)				
	pH	EC (µmhos/cm)	TDS (mg/L)	Chloride (mg/L)	Total Hardness (mg/L)	Total Alkalinity (mg/L)	Sulphate (mg/L)	Iron (mg/L)	Nitrate (mg/L)	Fluoride (mg/L)
BUFFER ZONE (6 Locations)	7.01 to 7.82	605.8 to 1217	364 to 736	56.7 to 212	160 to 492	160 to 314	20.6 to 173	0.02 to 0.14	BDL to 2.28	0.25 to 0.66
Limits* Permissible	6.5-8.5	-	2000	1000	600	600	400	0.3	45	1.5

Conclusion: The water quality of the collected ground water samples were found to be within the prescribed permissible limits of IS: 10500:2012 Norms for Drinking in the absence of an alternative source*. The results of the ground water quality analysis are shown in **Table No - 3.2.**, Chapter - III.



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11.3.3.4 Noise Environment:

No of locations – 8		Season: Summer Season, March 2021 to May 2021)		
Noise Level In dB(A)	Core Zone dB(A) (1 Location)	*Work zone exposure limit dB(A)	Buffer Zone dB(A) (5 Locations)	MOEF&CC Norms dB(A)
Day Equivalent	43.1	90	41.5 to 46.6	55
Night Equivalent	37.9		37.0 to 39.8	45

*Permissible noise for industrial workers as laid down by CPCB (at 8 hrs Exposure Time)
Conclusion: While comparing with the MoEF&CC Norms, the monitored ambient noise levels are within the limit values for Residential areas.

11.3.3.5 Soil Quality:

Parameter	pH	Electrical Conductivity µmhos/cm	Soil Type	Organic matter content %	Total Nitrogen mg/kg	Phosphorus mg/kg	Sodium mg/kg	Potassium mg/kg
Core Zone	7.24	120	Silt Loam	1.32	190	1.83	410	1180
Buffer Zone	6.32 – 7.81	46.72 – 105.6	Silty Clay Loam	0.72– 1.07	65.9 - 120	1.14 - 1.92	320 - 475	670 - 1290

6. Conclusion: The soil quality data for the 7 samples collected and analyzed are provided in **Table No – 3.4.**

11.3.4 LAND ENVIRONMENT:

For the present study on land use pattern in the study area, remote sensing satellite data have been used. The area estimated of land use categories around the 10km buffer zone is provided below:

S.No	Landuse Feature	Area (Sq.Km)	Percentage
01	Agriculture/ Crop	108.69	34.96
02	Fallow Land	71.60	23.04
03	Land Without Scrub	23.23	7.48
04	Land With Scrub	68.85	22.16
05	Water bodies	26.90	8.66
06	Settlement	11.05	3.56
07	Mining/Industries	0.43	0.14
	Total	310.75	



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From the above table it is seen that 34.98 % of the study area is agriculture land and 23.04 % are fallow land. Land with scrub constitutes 22.16 %. Details are given in **Para 3.4, Chapter – III.**

11.3.5 BIOLOGICAL ENVIRONMENT:

11.3.5.1 Flora:

The lease area is a non forest, private land with partly mined out area. The lease area has some bushes like *Prosopis juliflora*, *Calotropis gigantea*. etc. In the study area, the Dominated species are *Prosopis juliflora*, *Calotropis gigantea*, *Borassus flabellifer*, *Syzygium cumini*, *Ziziphus jujube*, *Abutilon indicum* *Ficus benghalensis*, *Acacia nilotica*, *Jatropha glandulifera*, *Morinda tinctoria*, etc. No Wild Life Sanctuary or National Park within the study area of 10 km. Domesticated animals and common birds are observed in the study area. The detailed list of fauna Species in the buffer zone is given in **Table No - 3.16, Chapter - III.**

11.3.6 HYDROLOGICAL STUDY:

The lease area is a barren, patta waste land which is covered with scrubs and thorny bushes and has mined out rock exposure. There is no major vegetation found in the lease area. There are few tanks located in the study area.

The general trend of depth to water level for Palayamkottai Block was obtained from the data obtained from India-WRIS, Department of Water Resources, Ministry of Jal Shakti for Palayamkottai Block, Tirunelveli District, Tamil Nadu.

Study of the depth of water table in 6 wells and 2 borewells in the nearby areas show that the wells are as deep as 50ft to 60ft. Water level ranged from 25 feet to 45 feet. Bore wells are 250-300 ft deep , give better yield post monsoon whereas the yield becomes very less later. From the Geophysical survey, it is found that the subsurface litho units are gravel, weathered layers poorly fractured and terminated with hard and compact massive rocks with fully devoid of fractures.

In the study area, the shallow aquifer is developed through dug wells and deeper aquifer through tube wells. The groundwater has revealed that potential fractures are encountered at deeper levels. The occurrence of groundwater mainly in the porous soil are weathered layers, very negligible amount of groundwater percolated through the poorly fractured layer, after that



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there is no existence of groundwater. Besides, the mining area consists of hard compact rock. In the exposed mine faces in the nearby worked out pits, it is observed that there is no major seepage of water in to the mine pit. Similar trend is expected in this mine also.

11.4 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES:

11.4.1 GENERAL:

This is a proposed project and Semi – Mechanized Open Cast mining will be carried out to quarry out Rough Stone & Gravel. 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.

11.4.2 AIR ENVIRONMENT:

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:

Dust generation in the mine due to:

- ❖ Excavation of material.
- ❖ Movement of HEMM such as Excavators, tippers etc.
- ❖ Loading and unloading operation
- ❖ Transportation

Particulate matter smaller than 10 microns, referred to as PM₁₀, can settle in the bronchi and lungs and cause health problems like Bronchitis, Emphysema, Bronchial Asthma, Irritation of mucus membranes of eyes, etc. Particles smaller than 2.5 micrometers (PM_{2.5}), tend to penetrate into the lungs and very small particles (<100 nanometers) may pass through the lungs to affect other organs.

Besides the above mentioned fugitive dust emissions, atmospheric pollution can occur as a result of emission of SO₂, NO_x, CO etc., from diesel driven mining equipment, generator sets, etc. Larger suspended particles are generally filtered in the nose and throat and do not cause problems. Higher concentration of SO₂, NO_x, CO may cause some health effect on the human beings exposed to it.

In case of this mine, the following measures will be adopted to control impact on the air quality due to mining operations in the lease area:



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S.No	Activity	Consequence	Mitigation Measures
1	Drilling	Dust Emanation	Usage of Drill bits in good condition
			Coverin of drill holes with wet sag or use of water jet for dousing the cuttings.
			Provision of dust filters / mask to workers working at highly dust prone and affected areas.
2	Blasting	Instantaneous 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 emanation, Gaseous Emission	Proper maintenance of HEMM which reduces smoke generation
			Acoustic enclosures for operator cabin.
			Imparting sufficient training to operators on safety and environmental parameters.
			Proper maintenance of hauling equipments.
			Avoiding overloading of dumpers.
4	Transportation	Dust emanation, Gaseous Emission	Using sharp teeth for shovels and other soil excavation equipments, and their periodical replacements.
			Proper maintenance of haul road and other roads
			Avoiding overloading of tippers
			Covering of loaded tippers with tarpaulins during transportation
5	Others	Dust emanation, Gaseous Emission	Black topping of road wherever necessary
			Regular wetting of transport road using mobile water tanker.
			Development of greenbelt / barriers around mine in the safety zone and carrying out plantation within the lease area.

By adoption of all these measures, no major impact on air quality is envisaged due to this proposed opencast mining operation.

The impact on air quality due to the proposed project is estimated using AERMOD View Gaussian Plume Air Dispersion Model developed by Lakes Environmental Software which is based on steady state Gaussian plume dispersion.



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Ground Level Concentration (GLC) have been computed using hourly meteorological data due to various project operation after adopting necessary control measures. The resultant added concentrations with baseline figures, show that the values of ambient air quality with respect to PM₁₀ are in the range of 62.2 µg/m³ to 86.3 µg/m³ and with respect to PM_{2.5} are in the range of 32.6 µg/m³ to 44.1 µg/m³ which are within the statutory limits.

For preservation of environment in this mine strict enforcement of management schemes will be undertaken for taking corrective actions, as needed. By adopting the effective implementation of all the mitigative measures, no adverse impact on Air quality due to the mining operation in this lease area is expected.

11.4.3 WATER ENVIRONMENT:

The total water requirement for this project will be 4.0 KLD comprising 0.5KLD drinking water, 2.0KLD for dust suppression, 0.5KLD for greenbelt, 1.0KLD for domestic use. 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 major sources of water pollution normally associated due to mining and allied operations generally are:

- A. Domestic effluent.
- B. Washouts from overburden, ore stockpile, etc.
- C. Disturbance to drainage course in the project area
- D. Generation of mine pit water pumped out from deeper workings if any.

The mitigation measures for each aspect is given below:

- A. The domestic sewage to be generated from the project will be collected in septic tank with soak pits.
- B. Since the entire material from the quarry face will be directly dispatched to the consumers, there will not be any stockpiles. The rain water falling in the quarry will be harvested in the sump at the lowest level of the quarry. This sump will act as a settling pond to prevent solids escaping along with discharge, before outlet. etc. Towards surface runoff management, a garland drain of length 880m will be constructed around the quarry and will be connected to a settling pond with silt traps. The supernatant clear water from the settling pond will be flow to the downstream users. It is to be mentioned that during the earlier working bund



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creation around the mine pit and garland drain development in major part of the area is already carried out.

- C. There are no seasonal drainage courses nearby. Pond / eri located in the nearby area will be additionally strengthened and periodical desilting activities under CER activities will be carried out to augment the storage capacity of the tank. This being a mining project there will be no effluent generation or discharge. As such no major impact is envisaged on the nearby water bodies due to project operations.
- D. The occurrence and movement of groundwater in hard rock formations are restricted to the porous zones of weathered formations and the open systems of fractures, fissures and joints. Generally, in hard rock regions, occurrence of weathered thickness is discontinuous both in space and depth. Hence recharge of groundwater in hard rock formations is influenced by the intensity and depth of weathering. In the nearby region, the formations are compact with less intergranular porosity and fractures leading to less permeability and transmissivity values and as such the ground water level in this area is deep from surface. The mining area consists of hard compact rock, hence no major water seepage within the mine is expected from the periphery. From the nearby working quarries it is observed there are no seepages in the mine faces because of the hard rock formation. Similar situation is expected in this lease also.

Stage of Groundwater Development:

The groundwater resource data of Palayamkottai district was obtained from the data provided in the National Water Mission, Ministry of Jal Shakti, Department of Water Resources, RD & GR in the Ground water reports of Tamil Nadu Districts, Tirunelveli. It is seen that the stage of groundwater development of Palayamkottai district where the study area can be categorized as 'Safe' from ground water development point of view.

11.4.4 NOISE ENVIRONMENT:

In mining, the major source of noise will be from the operations such as, Excavation, loading & unloading & movement of vehicles, etc. will produce noise of considerable magnitude. The Directorate General of Mines Safety, in circular No. DG (Tech)/18 of 1975, has prescribed the



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noise level in mining occupations (TLV) for workers, in an 8 hour shift period with unprotected ear as 85 dB(A) or less.

The production quantity is low and hence few equipment's only will be used . Besides, the noise will be felt only near the active sources. Anticipated noise levels resulting from operation of the various machineries like excavator, dumpers, drill have been computed using point source model.

From the studies, it is found that the predicted Noise Levels due to mining operations at the periphery of the mine lease itself will be less even without considering any attenuation factor. However, practically there will be attenuation due to vegetation etc., and as such there will not be any adverse noise propagation outside the lease boundary. Since the habitations are also away the effect of noise due to mining operations will not be felt at all in the surrounding villages. Hence, by following mitigative measures for noise control, the impact on noise levels will be insignificant:

- Planting rows of native trees along roads, around mine area and other noise generating centers to act as acoustic barriers.
- Sound proof operator's cabin for equipments like shovel, tippers, etc.
- Proper and regular maintenance of equipments may lead to less noise generation.
- Providing in-built mechanism for reducing sound emissions.
- Providing earplugs to workers exposed to higher noise level.
- Conducting regular health check-up of workers including Audiometry test for the workers engaged in noise prone area.
- Displaying the noise level status of operational machinery on the machines to know the extent of noise level and to control the time to which the worker is exposed to higher noise levels.
- Further green belt and afforestation will be planned and executed to abate noise and dust propagation in the area.

11.4.5. 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



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column, improper burden, loose material or pebbles near the holes and long water column in the hole.

In the proposed mine workings, blasting & vibration effects will be controlled by following measures.

- Carrying out controlled blasting using Nonel milli second delay detonator.
- Optimum design for burden and spacing.
- Reducing explosive charge per delay to minimum.
- The peak particle velocity (PPV) of ground vibration will be kept below 10mm/s for 8-25hz frequency range through optimally controlled blasting techniques, after necessary field trials to ensure no impact on surrounding environs .
- Use of suitable initiating sequence and millisecond delay detonators.
- To contain fly rocks, stemming column to be less than burden of the hole. Blasting area will also be muffled, if necessary, to stop fly rocks propagation.
- Blasting will not be carried out when strong winds are.
- Proper care and supervision during blasting by a competent and experienced person to be carried out.

By adoption of above measures, it will be ensured that ground vibrational levels due to blasting will be maintained within the prescribed DGMS conditions of 10 mm/s for the domestic houses/structures.

Besides, different blasting time for the projects in the vicinity is suggested and the timing is to be mentioned in the display board in the respective mines entrance.

11.4.6 IMPACT ON LAND ENVIRONMENT:

The entire mine lease area of 4.97.0 Ha is in the proponent's possession. There is no waste generation anticipated in this quarry operation since the entire excavated material will be utilized. At the end of the life of the mine, entire 4.29.0 Ha of mined out area will be left as water body. 0.02.0Ha will be the mine roads and 0.66.0Ha will be covered with vegetation. Entire mined out area will be properly fenced to prevent inadvertent entry of men and animals. In the post mining stage the rainwater harvested in the mined out void shall be utilized.



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11.4.7 BIOLOGICAL ENVIRONMENT:

No major clearance of vegetation is involved in this project. Necessary mitigative measures like dust suppression, proper maintenance of equipment's, greenbelt and plantation etc., will be carried out to prevent dust generation & any further impact on the vegetation Greenbelt / Plantation will be carried out to enhance the vegetative growth and aesthetic in the safety zone area. In the post mining stage, an area of 0.66.0Ha will be covered with vegetation

11.4.8 SOCIO ECONOMIC ENVIRONMENT:

The entire lease area is a patta land in 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 36 persons directly and 50 persons indirectly. Besides, through allied opportunities in logistics, trading, repairing works etc. good employment potential will arise in this internal rural backward area, which will provide raising income levels and standards of living in the area through various service related activities connected with the project operations. Towards the socio economic development of the surrounding area, the proponent has earmarked an amount of Rs.5 Lakhs under Corporate Environmental Responsibility. The activities identified under CER will be implemented in a phased manner in the following areas:

- Improved drinking water facility (RO Plant) & betterment of sanitation facilities in neary Government schools .
- Smart class facilities for nearby Government school.
- Maintenance / Improvement in road facility.
- Desilting of village ponds.
- Assistance in conducting regular health camp, eye camp.

These activities shall be planned on a combined basis with the other nearby working quarries and crushers. The priority and need shall be finalized in consultation with the locals.

11.4.9 OCCUPATIONAL HEALTH AND SAFETY ASPECTS:

In order to ensure minimisation of occupational health and safety problems in the project operation, the following preventive remedial measures will be effectively exercised in the project operations, so as to comply with applicable standards.



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- Medical examination of workers at pre-entry level stage of workers, etc., by qualified doctors, with periodical examination of all workers/staff at least once a year, as per DGMS circulars.
- Regular awareness campaigns amongst staff and workers
- Staff will be provided with PPE to guard against excess noise levels, Dust generation and inhalation, etc., as per standards prescribed by DGMS.

11.4.10 IMPACT ON LOCAL LOGISTICAL SYSTEM DUE TO PROJECT:

From this proposed quarry the entire output will be transported to the consumers like external crusher units for producing stone aggregates of different sizes or construction of roads, bridges, buildings and other buyers etc. From this lease, there will be 8 trips per hour. The transport route can absorb this additional traffic due to this project. The following mitigative measures are suggested for mitigation of adverse impacts on the logistical aspect of the project:

- ❖ Water sprinkling on Rough stone in the transport vehicles before transporting, so that no dust nuisance during transport will arise.
- ❖ Proper maintenance of transport roads
- ❖ Proper maintenance of transport vehicles.
- ❖ Avoiding overloading of material
- ❖ Covering of loaded vehicles with tarpaulins sheet if warranted.

11.4.11 WASTE MANAGEMENT:

Since the entire mined out material will be used there will not be any solid waste generation from this project. There is no process effluent generation from this mine. Hence no liquid waste is generated.

The hazardous waste generated in this mine will be stored in a separate storage area with impervious containers for waste oil, oil contaminated clothes, used lead acid batteries, scraps, tyre storage etc. It will be disposed through authorized recyclers or re-processors periodically. The hazardous wastes will be transported in accordance with the provisions of rules. By effective implementation of above said mitigation measures no major impact due to Hazardous waste is expected.

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.



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11.5 ENVIRONMENTAL MONITORING PROGRAMME:

In this proposed project, appropriate environmental monitoring programme are framed. Regular, systematic and sustained programme schedules for implementation and monitoring of various control measures are devised with clear cut guidelines of various concerned plans for keeping a continuous surveillance on the various environmental quality parameters in the area.

The Mines Manager/Mine Incharge 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.

Implementation of mitigative measures, like Mobile water sprinkler, greenbelt plantation, monitoring of environmental parameters, providing safety gadgets etc involves capital as well as recurring expenses. Towards EMP measures, Rs. 4.0 lakhs is allocated under capital cost. Besides, Rs. 25.50 lakhs per annum will be spent under recurring cost. All the recurring cost of maintenance of pollution control measures, environmental monitoring etc., will be met from revenue.

The proponent will frame an Environmental policy. The salient features considered for framing the Policy of the company is described in **Chapter - VI**.

11.6 ADDITIONAL STUDIES:

The additional studies covered for this EIA / EMP report are:

1. Public consultation of the project as per MoEF&CC mandates.
2. Cumulative Impact Study
3. Risk Assessment
4. R&R Plan
5. Mine closure planning

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



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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.

Elaborate description in respect of Risk Assessment and Mine closure plan are given in **Chapter - VII.**

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. The baseline monitoring carried out for this project reflects the cumulative impact of these existing quarries and other activities.

Air Quality Model simulations are carried out for PM₁₀ and PM_{2.5}. It can be seen that the resultant added concentrations with baseline figures even at worst scenario and cumulative impact of both the projects show that the values of ambient air quality with respect to PM₁₀ is in the range of 63.6 µg/m³ to 93.2 µg/m³ and with respect to PM_{2.5} are in the range of 33.1 µg/m³ to 46.6µg/m³ which are within the statutory stipulations in respective case.

The quantum of water required for both these projects is 7.0 KLD comprising 4.0 KLD for Quarry of Thiru S.Kasirajan and 3.0 KLD for Quarry of Tvl. Sri Durgambika Blue Metals. 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 later.

The mining area consists of hard compact rock, hence no major water seepage within the mine is expected from the periphery. From the nearby working quarries it is observed there are no seepages in the mine faces because of the hard rock formation. The ground water table in this area is very deep. Hence, ground water intersection is not envisaged and ground water will not be affected appreciably due to the quarrying operation.

There are no seasonal drainage courses nearby. Pond / eri located in the nearby area will be additionally strengthened and periodical desilting activities under CER activities will be carried out to augment the storage capacity of the tank.

Cumulative Noise modeling has been carried out to determine the post project noise levels due to the mining operations of the 2 proposed quarries and it is seen that that the post project



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concentration in the nearby villages are within the statutory limits of 55dB(A). Besides it is proposed to carry out various mitigative measures such as carrying out greenbelt and afforestation to act as acoustic barriers.

By Carrying out controlled blasting using Nonel milli second delay detonator, Optimum design for burden and spacing & reducing the explosive charge per delay to minimum in both the projects no adverse impact due to blasting vibration is expected.

Besides, different blasting time for both the projects is suggested and the timing is to be mentioned in the display board in the mines entrance.

The mining operations in the 2 proposed 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 3.0 lakhs for Tvl.Sri Durgambika Blue Metals and Rs.5.0 lakhs for Thiru S. Kasirajan quarry has been earmarked separately.

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 total trips from these projects there will be about 11 trips per hour. 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.

Both lease areas are Patta land. There are no habitations or hutments in the core zone area and no rehabilitation or resettlement problems will arise.

For Quarry of Thiru S.Kasirajan, at the end of the life of the mine, 4.29.0 Ha of mined out area will be left as water body. 0.02.0Ha will be the mine roads and 0.66.0Ha will be covered with vegetation.

For the quarry of Tvl.Sri Durgambika Blue Metals, at the end of the life of the mine, entire 1.51.0Ha of mined out area will be left as water body. 0.01.0Ha will be the mine roads and 0.43.5Ha will be covered with vegetation.

For both projects, in the post mining stage it will be ensured that the entire mined out area will be properly fenced to prevent inadvertent entry of men and animals. The rainwater harvested in the mined out void shall be utilized to meet the water requirement.



DRAFT EIA/EMP REPORT FOR ROUGHSTONE, JELLY AND GRAVEL QUARRY OF THIRU. S.KASIRAJAN AT SURVEY NO. 530/3A, 531/1A, 532, 533/1, 568/5A(P) AND 569/3A OVER AN AREA OF 4.97.0 HA IN THARUVAI VILLAGE, PALAYAMKOTTAI TALUK, TIRUNELVELI DISTRICT, TAMIL NADU.

Considering that the lease period of the existing quarries will be coming to an end in due course, the proposed quarries of Thiru S.Kasirajan and Tvl.Sri Durgambika Blue Metals will serve more as a replacement for the existing quarries to ensure meeting the present roughstone demands.

11.7 CONCLUSION:

By systematic and scientific mining adhering to all the statutory norms and enforcing and strictly implementing the above said mitigation measures mentioned in this report, shall ensure that the future environmental quality in the area will be maintained within statutory limits. The environmental management strategy as explained above will prove that industrial growth, if properly planned with all environmental concerns and appropriate remedial measures can go a long way to improve life pattern of the local community around the project in additional to meeting the construction material requirement.

* * * * *



CHAPTER - XII

DISCLOSURE OF CONSULTANTS ENGAGED

DRAFT EIA/EMP REPORT FOR ROUGHSTONE, JELLY AND GRAVEL QUARRY OF THIRU. S.KASIRAJAN AT SURVEY NO. 530/3A, 531/1A, 532, 533/1, 568/5A(P) AND 569/3A OVER AN AREA OF 4.97.0 HA IN THARUVAI VILLAGE, PALAYAMKOTTAI TALUK, TIRUNELVELI DISTRICT, TAMIL NADU.

CHAPTER - XII

DISCLOSURE OF CONSULTANTS ENGAGED

Creative Engineers & Consultants, Chennai – 600 059, is an **ISO 9001:2015** certified organization with **NABL** accredited testing laboratory and **NABET** accredited consultancy. Team of people in the organization are given below:

EXPERT NAME	QUALIFICATION	POSITION	EXPERIENCE
Mr. P. Giri	AMIE (Mining)	EIA Coordinator & Functional area Expert (AP,NV,HW),	Over 30 years of experience in EIA/EMP report, mine plan preparation, including modeling
Mr. K. Shankar	M.Sc (Geology). PGMEMG	Functional area Expert (GEO, HG, SHW, RH) & IBM approved RQP.	Over 25 years of experience in EIA/EMP report, Mine plan, hydrological report preparation
Dr. N. Radhakrishnan	M.Sc., M.Tech., Ph.D	Functional area Expert (Land use)	Over 25 years of experience in using the advanced spatial analysis techniques in GIS environment. Specialized in Spatial Information Technology and Applications (remote sensing, GIS)
Mr.S.S.Rajendran	M.Sc. (Pharmaceutical Chemistry)	Lab head	More than 9 years of experience in Environmental laboratory.
Mrs. V. Sivaranjani	M.Sc. (Env. Sci.)	Functional Area Expert (AQ,WP)	More than 8 years of experience in preparation of EIA / EMP reports
Mr. R. Babu raj	M.A (Sociology), B.Com(Y.L&Cost), ITI, Advance Diploma in Computer application	Functional Area Expert (Socio Economy)	Over 15 years of experience in dispersion modeling, computer applications. Specialized in CAD and computer software, applications. 5years experience



DRAFT EIA/EMP REPORT FOR ROUGHSTONE, JELLY AND GRAVEL QUARRY OF THIRU. S.KASIRAJAN AT SURVEY NO. 530/3A, 531/1A, 532, 533/1, 568/5A(P) AND 569/3A OVER AN AREA OF 4.97.0 HA IN THARUVAI VILLAGE, PALAYAMKOTTAI TALUK, TIRUNELVELI DISTRICT, TAMIL NADU.

EXPERT NAME	QUALIFICATION	POSITION	EXPERIENCE
			in the field of socio economy and its allied report preparation.
Mr. B. Govindaraman	B.Sc.	Field technician	Over 20 years of field monitoring & data collection experience
Dr.B.Swamynathan	M.Sc (Ecology & Environmental Sciences), M.Phill (Botany), Ph.D (Ecology & Environmental Sciences)	Functional Area Expert (EB, SC,AP, LU)	More than 6 years of experience in Environment and allied fields.
Ms. G. Sandhya	B. Tech Chemical Engineering	Functional Area Associate (AQ, WP)	Over 3 years experience in preparation of EIA/EMP reports




Annexure – VII

Declaration by Experts contributing to the EIA Report for

Rough Stone, Jelly and Gravel Quarry of Thiru.S.Kasirajan at Survey No. 530/3A,531/1A, 532, 533/1, 568/5A(P) and 569/3A over an area of 4.97.0 Hectares in Tharuvai Village, Palayamkottai Taluk, Tirunelveli District. I, hereby, certify that I was a part of the EIA team in the following capacity that developed the above EIA.

EIA coordinator:




Name: **P.Giri**






Signature and Date: 

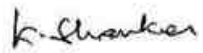

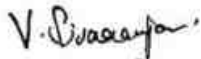


Period of involvement: **September 2019 onwards**


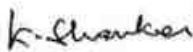
Contact information: **09444133619, 044-22395170**

Functional area experts:

S. No.	Functional areas	Name of the expert/s	Involvement (period and task**)	Signature and date
1	AP*	P.Giri	<ul style="list-style-type: none"> • Identification of baseline monitoring stations and study of the monitored data with respect to the applicable standards. • Identification of sources of air pollution comprising dust, gaseous emission due to mining & other activities • Identification of Impacts & suggestion of mitigation measures Period: September 2019 onwards	
		B.Swamynathan	<ul style="list-style-type: none"> • Data interpretation of Micro meteorological data for wind rose. • Identification of polluting source and suggestion of suitable mitigation measures. Period: March 2021 onwards	
2	WP*	V.Sivaranjani	<ul style="list-style-type: none"> • Identification of baseline monitoring stations and study of the monitored data with respect to the applicable standards. • Identification of Water requirement & Source • Preparation of water balance diagram • Identification of Water polluting sources • Impact of the project on the water quality, both surface and groundwater • Suggestion of Mitigation measures to control water pollution Period: March 2021 onwards	

S. No.	Functional areas	Name of the expert/s	Involvement (period and task**)	Signature and date
		G.Sandhya- FAA	<ul style="list-style-type: none"> Assisting FAE with identification of impact of the project on the water quality and suggestion of suitable mitigation measures. Associated with FAE in preparation of sections relevant to WP functional area in the EIA/EMP report. Period: March 2021 onwards	
3	SHW*	P.Giri	<ul style="list-style-type: none"> Quantification of mineral & waste from mining operation Waste disposal method evaluation Providing dump management plan Providing Surface Runoff Management Structure Requirements. Identification of Hazardous waste and its details of disposal Period: September 2019 onwards	
4	SE*	R.Baburaj	<ul style="list-style-type: none"> Identification of villages in the study area and finalization of demographic profile of the villages within the study area. Preparation of sections relevant to SE functional area in the EIA/EMP report Period: March 2021 onwards	
5	EB*	B.Swamynathan	<ul style="list-style-type: none"> Perusal of existing data relevant to this project. Studying the details of flora and fauna, separately for core, buffer zone and forest area based on primary field survey. Identification of species Indicating the Schedule of the fauna present in the study area Assessment of impact on Biological environment and suggestion of mitigative measures Collecting & providing details of existing and proposed Green belt development /plantation in the core zone Period: March 2021 onwards	
6	HG*	K.Shankar	<ul style="list-style-type: none"> Study of existing surface drainage arrangements in the core and buffer zone, impact due to mining on these drainage courses and suggestion of mitigative measures Perusal of site specific ground water table details for the core zone and the study area. Studied the hydrological aspects of surface and groundwater in study area Study about impact on the hydrology due to mining 	

S. No.	Functional areas	Name of the expert/s	Involvement (period and task**)	Signature and date
			<p>operation</p> <ul style="list-style-type: none"> • Suggesting mitigative measures like RWH for enhancement of ground water level <p>Period: March 2021 onwards</p>	
7	GEO*	K.Shankar	<ul style="list-style-type: none"> • Study of geology of the ML area and the surrounding areas. • Provide details about Mineral composition <p>Period: March 2021 onwards</p>	
8	SC*	B.Swamynathan	<ul style="list-style-type: none"> • Study of soil profile • Assessment of Impact on soil and suggesting plantation scheme. <p>Period: March 2021 onwards</p>	
9	AQ*	V.Sivaranjani	<ul style="list-style-type: none"> • Quantification of emission particulars • Air quality modelling for post project impact on the air quality prediction of the study area. <p>Analysis of the Isopleth generated</p> <ul style="list-style-type: none"> • Arriving at the post project cumulative concentration at the AAQ monitoring locations <p>Period: March 2021 onwards</p>	
		G.Sandhya-FAA	<ul style="list-style-type: none"> • Assisting FAE calculation of the emission rates • Preparation of meteorological data in suitable form for input into the model • Simulation of model for generation of Isopleth and data interpretation. • Studying the impact on AAQ monitoring locations due to the generated emissions. • Associated with FAE in preparation of sections relevant to AQ functional area in the EIA/EMP report. <p>Period: March 2021 onwards</p>	
10	NV*	P.Giri	<ul style="list-style-type: none"> • Identification of baseline monitoring stations and study of the monitored data with respect to the applicable standards. • Predict the noise level and vibration level due to proposed mining operation based on scientific evaluation. • Suggesting the Mitigation measures to control noise pollution • Suggesting the Mitigation measures to control ground vibration <p>Period: September 2019 onwards</p>	

S. No.	Functional areas	Name of the expert/s	Involvement (period and task**)	Signature and date
11	LU	B.Swamynathan	<ul style="list-style-type: none"> • Collection of Remote sensing satellite data to study the land use pattern. • Primary field survey and limited field verification • Preparation of Land use map using Satellite data of the project area separately for the core zone and the buffer zone and providing the land use pattern. <p>Period: March 2021 onwards</p>	
12	RH*	K.Shankar	<ul style="list-style-type: none"> • Identified Major risks involved in the project Mitigation measures suggested to avoid risk. • Preparation of onsite and offsite emergency management plan <p>Period: March 2021 onwards</p>	

*One TM against each FAE may be shown

**Please attach additional sheet if required

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

I, **P.Giri** hereby, confirm that the above mentioned experts prepared the EIA report for **Rough Stone, Jelly and Gravel Quarry of Thiru.S.Kasirajan at Survey No. 530/3A,531/1A, 532, 533/1, 568/5A(P) and 569/3A over an area of 4.97.0 Hectares in Tharuvai Village, Palayamkottai Taluk, Tirunelveli District.**

I also confirm that EIA Coordinator (EC) has gone through the report, and the consultant organization shall be fully accountable for any misleading information. It is certified that no unethical practices, plagiarism involved in carrying out the work and external data / text has not been used without proper acknowledgement while preparing this EIA report.

Signature:



Name: **P.Giri**

Designation: **Chief Executive**

Name of the EIA consultant organization: **Creative Engineers & Consultants, Chennai – 59**

NABET Certificate No. & Issue Date: **No- NABET/EIA/2023/RA 0187 & date Dec 18th, 2020**



Quality Council of India



National Accreditation Board for
Education & Training

CERTIFICATE OF ACCREDITATION

Creative Engineers and Consultants, Chennai

9B/4, Bharathwajar Street, East Tambaram, Chennai-600059

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

Sl. No.	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1	Mining of minerals- opencast only	1	1 (a) (i)	A
2	Thermal power plants	4	1 (d)	A
3	Mineral beneficiation	7	2 (b)	A
4	Cement plants	9	3 (b)	A

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in RAAC minutes dated Nov 20, 2020 posted on QCI-NABET website.

The Accreditation shall remain in force subject to continued compliance to the terms and conditions mentioned in QCI-NABET's letter of accreditation bearing no. QCI/NABET/ENV/ACO/20/1575 dated Dec 18, 2020. The accreditation needs to be renewed before the expiry date Creative Engineers and Consultants, Chennai following due process of assessment.

Sr. Director, NABET
Dated: Dec 18, 2020

Certificate No.
NABET/EIA/2023/RA 0187

Valid till
March 23, 2023

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



ANNEXURES

Rc.No.M1/36182/2018

District Collector's Office,
Tirunelveli.

dated. 21.05.2019.

Notice

Sub: Mines and Quarries - Minor Minerals -
Roughstone, Jelly and Gravel - Tirunelveli District
- Palayamkottai Taluk - Tharuvai Village - SF.
Nos: 530/3A, 531/1A, 532, 533/1, 568/5A(P) and
569/3A - over an extent of 4.97.0 hectares of
patta lands - Quarry lease application
preferred by Thiru.S.Kasirajan - Precise area
communicated - Approved Mining Plan and
Environmental clearance - Called for - Reg.

- Ref:**
- 1) Quarry lease application preferred by Thiru.S.Kasirajan, dated: 31.08.2019.
 - 2) The Assistant Collector, Tirunelveli Letter No. A5/5567/2018, Dated: 28.02.2019.
 - 3) Inspection report of the Assistant Geologist of Geology and Mining, Tirunelveli, Dated: 05.03.2019.

Thiru.S.Kasirajan, S/o. Subbiah, 760, Bazaar Street, Seevalaperi, Palayamkottai Taluk, Tirunelveli District has preferred an application for grant of quarry lease for quarrying Roughstone, Jelly and Gravel over an extent of 4.97.0 hectares of patta lands in SF.Nos. 530/3A(0.54.5), 531/1A(1.64.0), 532(1.65.0), 533/1(0.63.0), 568/5A(P)(0.46.5) and 569/3A(0.04.0) of Tharuvai Village, Palayamkottai Taluk, Tirunelveli District for a period of 5 years under Rule 19 (1) of Tamil Nadu Minor Mineral Concession Rules, 1959 vide reference 1st cited.

2) The Assistant Collector, Tirunelveli and the Assistant Geologist, Tirunelveli furnished their reports in the reference 2nd and 3rd cited

respectively and recommended for grant of quarry lease in the applied area subject to certain conditions.

3) Based on the recommendations of the Assistant Collector, Tirunelveli and the Assistant Geologist of Geology and Mining, Tirunelveli, the quarry lease application preferred by the applicant for grant of quarry lease for quarrying roughstone, jelly and gravel in the subject area has been considered for grant for a period of 5 years and precise area is hereby communicated over an extent of 4.97.0 hectares of patta land in SF. Nos.530/3A(0.54.5), 531/1A(1.64.0), 532(1.65.0), 533/1(0.63.0), 568/5A(P)(0.46.5) and 569/3A(0.04.0) of Tharuvai Village, Palayamkottai Taluk, Tirunelveli District under Rule 41 (4) Tamil Nadu Minor Mineral Concession Rules, 1959 with a direction to the applicant to produce mining plan for approval of the Deputy Director of Geology and Mining subject to the following conditions.

- i. A safety distance of 7.5 metres should be provided to the adjoining pattadars' lands.
- ii. No hindrance shall be caused to the adjacent pattadars, lands and public while carrying out quarrying operations.
- iii. No dimensional blocks with a size of 30c.m x 30c.m x 30cm suitable for polishing shall be produced.


4) In view of the above, you are hereby directed to submit mining plan duly prepared by a Recognized Qualified Person in respect of the precise area communicated for approval of the Deputy Director of Geology and Mining, Tirunelveli within a period of 90 days

from the date of receipt of this notice as required under rule 41 (5) of Tamil Nadu Minor Mineral Concession Rules, 1959.

5) You are further directed to produce Approved Mining Plan and Environmental Clearance obtained from the State Level Impact Assessment Authority (SEIAA) / District Level Environment Impact Assessment Authority (DEIAA) as required under Rule 42 of Tamil Nadu Minor Mineral Concession Rules, 1959 for grant of quarry lease for quarrying Roughstone, Jelly and Gravel in respect of the precise area communicated.

Sd/-Shilpa Prabhakar Satish,
District Collector,
Tirunelveli

// Forwarded / By Order//


for District Collector,
Tirunelveli

To

Thiru.S.Kasirajan,
S/o.Subbiah,
760, Bazaar Street,
Seevalaperi,
Palayamkottai Taluk,
Tirunelveli District.

From

Thiru.A.Arumuganainar, M.Sc.,
Deputy Director,
Department of Geology and Mining,
Tirunelveli.

To

Thiru.S.Kasirajan,
S/o.Subbaiah,
760, Bazaar Street,
Seevalaperi,
Palayamkottai Taluk,
Tirunelveli District.

Rc. No. M1/36182/2018, dated. 22.07.2019

Sir,

Sub : **Mines and Minerals** - Minor Mineral - Roughstone, Jelly & Gravel - Tirunelveli District - Palayamkottai Taluk - Tharuvai Village - SF. Nos. 530/3A, 531/1A, 532, 533/1, 568/5A(P) and 569/3A - over an extent of 4.97.0 hectares of patta lands - Quarry lease application preferred by Thiru.S.Kasirajan - precise area communicated - draft mining plan submitted - Approval accorded - Reg.

- Ref :**
- 1) Quarry lease application preferred by Thiru.S.Kasirajan, dated: 31.08.2019.
 - 2) Ministry of Environment and Forest, Government of India, Office Memorandum No. L-1011/47/20112 -IA-11(M), dated: 18.05.2012.
 - 3) Commissioner of Geology and Mining, Chennai letter Rc.No.3868/LC/2012, dated: 19.11.2012 & 07.11.2014.
 - 4) G.O. (Ms). No. 79, Industries (MMC1), Department, dated: 06.04.2015.
 - 5) This office Notice No. M1/36182/2018, dated: 25.05.2019.
 - 6) Letter dated. 11.07.2019 received from the applicant.

Thiru.S.Kasirajan has preferred and application for grant of quarry lease for quarrying Roughstone, Jelly and Gravel over an extent of 4.97.0 hectares of patta land in SF. Nos. 530/3A, 531/1A, 532, 533/1,

568/5A(P) and 569/3A of Tharuvai Village, Palayamkottai Taluk, Tirunelveli District for a period of 5 years under Rule 19 (1) of Tamil Nadu Minor Mineral Concession Rules, 1959 vide reference 1st cited.

2) In the reference 5th cited, precise area has been communicated by the District Collector directing the applicant to submit draft Mining Plan duly prepared by Qualified Person for approval of the Deputy Director of Geology and Mining, Tirunelveli within 90 days from the date of receipt of the notice as required under Rule 41 (5) of Tamil Nadu Minor Mineral Concession Rules, 1959.

3) In response to the precise area communicated, the applicant has submitted three copies of draft Mining Plan duly prepared by a Qualified Person and requested for approval of the same vide reference 6th cited.

4) The contents of the draft Mining Plan submitted in respect of the precise area communicated have been verified with reference to field conditions. The co-ordinates of all the corners of the lease applied area were verified with the Global Positioning System (GPS) and the same are found to be correct. All the conditions stipulated in the precise area communicated have been incorporated in the Mining Plan. The required safety distance of 7.5 metres for the adjacent patta lands have been clearly demarcated.

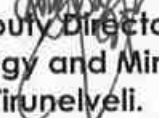
5) In exercise of the powers vested under sub rule (2) and (5) of Rule 41 of Tamil Nadu Minor Mineral Concession Rules, 1959, I hereby approve the mining plan subject to the following conditions:-

- (i) The mining plan is approved without prejudice to any other order or direction from any court of contempt jurisdiction.
- (ii) The mining plan is approved without prejudice to any other Law applicable to the quarry lease from time to time whether such laws are made by the Central Government, State Government or any other authority.
- (iii) The approval of the mining plan does not in any way imply the approval of the Government in terms of any other provisions of the Mines and Minerals (Development and Regulation) Act 1957, or any other connected laws including Forest (Conservation) Act, 1980, Forest Conservation Rules, 1981, Environment Protection Act, 1980, Indian Explosives Act, 1884 (Central Act IV of 1884) and the Rules made there under and the Tamil Nadu Minor Mineral Concession Rules, 1959.
- (iv) Quarrying operations should be carried out in accordance with the Approved Mining Plan.
- (v) The applicant is entitled for production of 24,080 cubic meters of Gravel and 8,19,712 cubic meters of Roughstone for a period of 5 years as per the Approved Mining Plan.
- (vi) A safety distance of 7.5 meters should be provided to the adjoining patta lands.
- (vii) No hindrance shall be caused to the adjoining pattadars' lands while carrying out quarrying operations.
- (viii) No dimensional blocks with a size of 30c.m x 30c.m x 30cm suitable for polishing shall be produced.
- (ix) Waste materials generated during quarrying operation shall be dumped within the area granted under quarry lease.

6) As directed by the District Collector in the reference 3rd cited, you are hereby requested to produce Environmental Clearance obtained

from the District Level Environmental Impact Assessment Authority (DEIAA) / State Level Environment Impact Assessment Authority (SEIAA) as applicable under Rule 42 of Tamil Nadu Minor Mineral Concession Rules, 1959 for grant of quarry lease, in respect of the precise area communicated.

Encl: Approved Mining Plan.


**Deputy Director,
Geology and Mining,
Tirunelveli.**

Copy submitted to:

The Chairman
State Level Environmental
Impact Assessment Authority,
Chennai.

POPULATION BREAKUP & LITERACY LEVEL WITHIN THE BUFFER ZONE AS PER 2011 CENSUS

Annexure - 3

Sl.No	No. of Villages	Name of village	Rural / urban	HOUSEHOLDS	POPULATION			POPULATION BELOW 6 AGE GROUP			SCHEDULE CASTE			SCHEDULE TRIBE			LITERATES			ILLITERATES		
					TOTAL	MALE	F.MALE	TOTAL	MAL E	F.MAL E	TOTAL	MAL E	F.MAL E	TOTAL	MAL E	F. MAL E	TOTAL	MAL E	F.MAL E	TOTAL	MAL E	F.MAL E
0.-2 km, Palayamkottai Sub-District, Tirunelveli District																						
1	1	Tharuvai	Rural	1574	6126	3054	3072	713	378	335	1818	927	891	184	89	95	4301	2298	2003	1825	756	1069
		total (A)		1574	6126	3054	3072	713	378	335	1818	927	891	184	89	95	4301	2298	2003	1825	756	1069
2.-5 km Tirunelveli Sub-District, Tirunelveli District																						
2	1	Karungadu	Rural	186	686	331	355	63	30	33	376	179	197	0	0	0	444	248	196	242	83	159
Tirunelveli Sub-District, Tirunelveli District																						
3	1	Melathiruvengadanathapuram	Rural	717	2659	1315	1344	327	167	160	1706	842	864	0	0	0	1803	993	810	856	322	534
4	2	Kilathiruvengadanathapuram	Rural	67	279	143	136	42	17	25	269	137	132	0	0	0	172	109	63	107	34	73
5	3	Munnirpallam	Rural	1928	7183	3567	3616	855	474	381	991	489	502	59	34	25	5174	2756	2418	2009	811	1198
6	4	Araikulam	Rural	239	827	409	418	93	48	45	7	3	4	0	0	0	641	340	301	186	69	117
7	5	Kongandanparai	Rural	329	1203	581	622	113	66	47	180	87	93	0	0	0	1036	499	537	167	82	85
8	6	Melathidiyur	Rural	266	3040	1876	1164	100	42	58	221	122	99	0	0	0	2782	1780	1002	258	96	162
9	7	Gangainadarkulam	Rural	25	73	31	42	11	5	6	0	0	0	0	0	0	50	21	29	23	10	13
10	8	Thidiyur	Rural	493	2007	994	1013	204	100	104	77	41	36	0	0	0	1454	769	685	553	225	328
11	9	Sengulam	Rural	682	2692	1336	1356	285	146	139	380	183	197	0	0	0	2091	1106	985	601	230	371
12	10	Ponnakkukdi	Rural	435	1631	815	816	207	99	108	292	145	147	14	9	5	1191	640	551	440	175	265
13	11	Pudukkulam	Rural	591	2163	1089	1074	195	111	84	156	83	73	0	0	0	1550	857	693	613	232	381
Ambasamudram Sub-District, Tirunelveli District																						
14	1	Gopalamudram (TP)	Urban	2890	10694	5338	5356	1144	597	547	2593	1269	1324	15	9	6	8269	4355	3914	2425	983	1442
		total (B)		8848	35137	17825	17312	3639	1902	1737	7248	3580	3668	88	52	36	26657	14473	12184	8480	3352	5128
5.-10 km, Tirunelveli Sub-District, Tirunelveli District																						
15	1	Thiruppani Karisalkulam	Rural	839	3052	1477	1575	353	182	171	1121	541	580	0	0	0	2122	1135	987	930	342	588
16	2	Palavoor	Rural	515	1925	947	978	222	108	114	378	180	198	0	0	0	1298	718	580	627	229	398
17	3	Kondanagaram	Rural	563	2055	1022	1033	224	111	113	527	264	263	2	2	0	1362	759	603	693	263	430
18	4	Suttamalli	Rural	3017	10954	5441	5513	1129	595	534	1823	904	919	13	6	7	8692	4527	4165	2262	914	1348
19	5	Narasinganallur	Rural	854	3183	1611	1572	351	190	161	993	495	498	68	36	32	2231	1235	996	952	376	576
20	6	Pettai	Rural	603	2345	1182	1163	238	127	111	260	124	136	0	0	0	1994	1036	958	351	146	205
21	7	Thenpathu	Rural	458	1766	901	865	202	103	99	1186	613	573	0	0	0	1432	759	673	334	142	192
22	8	Tirunelveli (M Corp.)	Urban	120466	473637	233659	239978	46624	23894	22730	62393	30480	31913	1509	745	764	385976	2E+05	187231	87661	34914	52747
Palayamkottai Sub-District, Tirunelveli District																						
23	1	Uthamapandiyankulam	Rural	132	547	264	283	67	38	29	36	14	22	0	0	0	384	189	195	163	75	88
24	2	Parpakulam	Rural	321	1182	584	598	155	72	83	734	363	371	0	0	0	775	437	338	407	147	260
25	3	Nochikulam	Rural	697	2670	1303	1367	269	114	155	295	139	156	11	5	6	2117	1097	1020	553	206	347
26	4	Krishnapuram	Rural	484	1820	900	920	220	99	121	371	191	180	0	0	0	1314	704	610	506	196	310

Sl.No	No. of Villages	Name of village	Rural / urban	HOUSEHOLDS	POPULATION			POPULATION BELOW 6 AGE GROUP			SCHEDULE CASTE			SCHEDULE TRIBE			LITERATES			ILLITERATES		
					TOTAL	MALE	F.MALE	TOTAL	MALE	F.MALE	TOTAL	MALE	F.MALE	TOTAL	MALE	F.MALE	TOTAL	MALE	F.MALE	TOTAL	MALE	F.MALE
27	5	Kunnathur	Rural	558	2067	1020	1047	252	119	133	1153	576	577	0	0	0	1389	768	621	678	252	426
28	6	Reddiarpatti	Rural	1330	5166	2629	2537	577	298	279	1270	678	592	70	35	35	3983	2154	1829	1183	475	708
29	7	Muthur	Rural	823	3173	1547	1626	339	167	172	1722	834	888	0	0	0	2162	1158	1004	1011	389	622
30	8	Kuravankulam	Rural	17	75	43	32	7	4	3	0	0	0	0	0	0	53	34	19	22	9	13
31	9	Itteri	Rural	226	824	391	433	86	42	44	171	76	95	0	0	0	489	262	227	335	129	206
32	10	Sivandipatti	Rural	906	3454	1703	1751	431	214	217	468	214	254	0	0	0	2329	1258	1071	1125	445	680
Ambasamudram Sub-District, Tirunelveli District																						
33	1	Thiruviruttanpuli	Rural	1001	4026	2014	2012	452	236	216	161	81	80	19	11	8	3151	1612	1539	875	402	473
34	2	Pungadaiyankulam	Rural	198	776	418	358	97	58	39	66	38	28	0	0	0	637	353	284	139	65	74
35	3	Karisalpatti	Rural	490	1897	938	959	199	106	93	98	51	47	0	0	0	1594	789	805	303	149	154
36	4	Ulagankulam	Rural	653	2679	1347	1332	290	156	134	176	87	89	0	0	0	2056	1073	983	623	274	349
37	5	Venkatarengapuram	Rural	287	1105	560	545	128	71	57	168	86	82	0	0	0	894	458	436	211	102	109
38	6	Pathamadai (TP)	Urban	4166	16625	8106	8519	1960	996	964	2179	1040	1139	26	14	12	12645	6559	6086	3980	1547	2433
39	7	Melacheval (TP)	Urban	2181	8435	4196	4239	884	481	403	2496	1214	1282	21	10	11	6424	3424	3000	2011	772	1239
Nanguneri Sub-District, Tirunelveli District																						
40	1	Poolam	Rural	685	2758	1379	1379	284	145	139	829	419	410	0	0	0	2302	1181	1121	456	198	258
41	2	Thottakudi	Rural	1085	4297	2204	2093	367	186	181	799	392	407	0	0	0	3374	1833	1541	923	371	552
42	3	Alwaneri	Rural	686	2643	1310	1333	276	138	138	157	74	83	7	4	3	1996	1049	947	647	261	386
43	4	Paruthipadi	Rural	744	2738	1345	1393	299	159	140	746	370	376	0	0	0	1859	1003	856	879	342	537
44	5	Deivanayagaperi	Rural	223	831	432	399	98	62	36	40	18	22	0	0	0	547	306	241	284	126	158
45	6	Karanthaneri	Rural	921	3529	1735	1794	432	215	217	303	150	153	31	16	15	2447	1306	1141	1082	429	653
46	7	Srivaramangaipuram	Rural	36	116	53	63	4	3	1	0	0	0	0	0	0	92	44	48	24	9	15
47	8	Kallikulam	Rural	770	2986	1472	1514	392	179	213	119	61	58	14	9	5	2311	1197	1114	675	275	400
48	9	Kilakaduvetti	Rural	718	2699	1326	1373	276	145	131	193	87	106	0	0	0	1995	1024	971	704	302	402
49	10	Inam Idaiyankulam	Rural	20	64	32	32	11	5	6	0	0	0	0	0	0	49	25	24	15	7	8
		total (C)		147673	578099	285491	292608	58195	29818	28377	83431	40854	42577	1791	893	898	464475	2E+05	224264	113624	45280	68344
		Grand Total (A+B+C)		158095	619362	306370	312992	62547	32098	30449	92497	45361	47136	2063	1034	1029	495433	3E+05	238451	123929	49388	74541

*Source: District Primary Census Abstract, Tirunelveli District of Tamilnadu State-2011

OCCUPATIONAL STRUCTURE WITHIN THE BUFFER ZONE AS PER 2011 CENSUS

Sl.No	No. of Villages	Name of village	Rural / urban	MAIN WORKERS		CULTIVATORS		AGRI LABOURS		HOUSE HOLD		OTHERS		MARGINAL WORKERS		NON WORKERS	
				MALE	F.MALE	MALE	F.MALE	MALE	F.MALE	MALE	F.MALE	MALE	F.MALE	MALE	F.MALE	MALE	F.MALE
0.-2 km, Palayamkottai Sub-District, Tirunelveli District																	
1	1	Tharuvai	Rural	1691	1196	220	97	323	248	16	180	1132	671	51	104	1312	1772
		total (A)		1691	1196	220	97	323	248	16	180	1132	671	51	104	1312	1772
2.-5 km Tirunelveli Sub-District, Tirunelveli District																	
2	1	Karungadu	Rural	14	5	1	0	1	0	0	1	12	4	190	207	127	143
Tirunelveli Sub-District, Tirunelveli District																	
3	1	Melathiruvengadanathapuram	Rural	454	194	115	54	66	20	5	5	268	115	317	404	544	746
4	2	Kilathiruvengadanathapuram	Rural	80	52	26	12	29	22	1	5	24	13	5	2	58	82
5	3	Munnirpallam	Rural	1763	938	85	36	82	49	228	371	1368	482	313	345	1491	2333
6	4	Araikulam	Rural	212	136	1	1	3	2	8	49	200	84	7	2	190	280
7	5	Kongandanparai	Rural	343	312	7	2	5	3	1	3	330	304	10	15	228	295
8	6	Melathidiyur	Rural	224	163	55	11	26	21	4	66	139	65	57	94	1595	907
9	7	Gangainadarkulam	Rural	10	6	1	0	0	0	0	0	9	6	8	8	13	28
10	8	Thidiyur	Rural	604	339	177	25	219	191	10	59	198	64	5	6	385	668
11	9	Sengulam	Rural	753	513	187	86	248	196	13	118	305	113	17	15	566	828
12	10	Ponnakkukdi	Rural	443	201	78	13	81	90	5	12	279	86	5	44	367	571
13	11	Pudukkulam	Rural	441	274	66	29	122	97	3	76	250	72	170	186	478	614
Ambasamudram Sub-District, Tirunelveli District																	
14	1	Gopalamudram (TP)	Urban	2708	1702	426	153	798	555	76	661	1408	333	545	515	2085	3139
		total (B)		8049	4835	1225	422	1680	1246	354	1426	4790	1741	1649	1843	8127	10634
5.-10 km, Tirunelveli Sub-District, Tirunelveli District																	
15	1	Thiruppani Karisalkulam	Rural	782	617	149	69	152	130	27	197	454	221	120	73	575	885
16	2	Palavoor	Rural	594	424	123	31	332	246	11	69	128	78	11	26	342	528
17	3	Kondanagaram	Rural	501	376	49	26	157	74	7	150	288	126	94	72	427	585
18	4	Suttamalli	Rural	2841	1418	198	67	424	282	50	363	2169	706	367	364	2233	3731
19	5	Narasinganallur	Rural	827	484	37	19	106	64	23	151	661	250	117	106	667	982
20	6	Pettai	Rural	643	221	82	10	31	22	10	53	520	136	10	10	529	932
21	7	Thenpathu	Rural	358	269	53	29	96	89	2	21	207	130	145	87	398	509
22	8	Tirunelveli (M Corp.)	Urban	120226	48726	1682	406	3386	2129	2982	15932	112176	30259	7484	6035	105949	185217
Palayamkottai Sub-District, Tirunelveli District																	
23	1	Uthamapandiyankulam	Rural	159	44	48	9	2	0	0	7	109	28	1	4	104	235
24	2	Parpakulam	Rural	354	191	21	10	12	5	1	25	320	151	2	40	228	367
25	3	Nochikulam	Rural	707	414	14	1	20	10	126	157	547	246	62	52	534	901
26	4	Krishnapuram	Rural	437	96	62	2	12	2	13	14	350	78	58	22	405	802
27	5	Kunnathur	Rural	421	213	46	24	23	18	2	51	350	120	186	249	413	585
28	6	Reddiarpatti	Rural	1117	519	44	20	77	39	48	107	948	353	311	136	1201	1882
29	7	Muthur	Rural	806	497	283	206	167	179	11	7	345	105	117	101	624	1028

Sl.No	No. of Villages	Name of village	Rural / urban	MAIN WORKERS		CULTIVATORS		AGRI LABOURS		HOUSE HOLD		OTHERS		MARGINAL WORKERS		NON WORKERS	
				MALE	F.MALE	MALE	F.MALE	MALE	F.MALE	MALE	F.MALE	MALE	F.MALE	MALE	F.MALE	MALE	F.MALE
30	8	Kuravankulam	Rural	26	13	11	0	7	2	0	10	8	1	0	0	17	19
31	9	Itteri	Rural	147	76	28	16	11	9	5	6	103	45	94	109	150	248
32	10	Sivandipatti	Rural	763	292	100	30	191	137	40	28	432	97	253	197	687	1262
Ambasamudram Sub-District, Tirunelveli District																	
33	1	Thiruviruttanpuli	Rural	1106	893	151	29	380	87	27	568	548	209	193	199	715	920
34	2	Pungadaiyankulam	Rural	234	150	46	1	127	65	7	71	54	13	0	0	184	208
35	3	Karisalpatti	Rural	422	210	94	9	165	67	5	70	158	64	81	34	435	715
36	4	Ulagankulam	Rural	718	465	119	27	279	76	23	283	297	79	50	22	579	845
37	5	Venkatarengapuram	Rural	315	194	48	9	148	68	22	85	97	32	8	11	237	340
38	6	Pathamadai (TP)	Urban	3974	1946	428	58	720	345	150	869	2676	674	512	327	3620	6246
39	7	Melacheval (TP)	Urban	2348	1495	404	87	980	689	71	478	893	241	177	164	1671	2580
Nanguneri Sub-District, Tirunelveli District																	
40	1	Poolam	Rural	559	318	98	27	260	217	9	10	192	64	303	231	517	830
41	2	Thottakudi	Rural	644	480	104	28	255	294	4	19	281	139	622	628	938	985
42	3	Alwaneri	Rural	696	346	195	30	177	186	24	34	300	96	80	123	534	864
43	4	Paruthipadi	Rural	735	439	175	57	335	279	14	43	211	60	86	237	524	717
44	5	Deivanayagaperi	Rural	76	59	19	2	4	2	0	28	53	27	160	97	196	243
45	6	Karanthaneri	Rural	656	419	160	60	259	206	13	61	224	92	309	222	770	1153
46	7	Srivaramangaipuram	Rural	24	13	10	0	8	7	2	4	4	2	17	39	12	11
47	8	Kallikulam	Rural	763	423	167	28	328	183	42	160	226	52	105	96	604	995
48	9	Kilakaduvetti	Rural	691	364	370	100	191	162	13	41	117	61	80	78	555	931
49	10	Inam Idaiyankulam	Rural	9	6	4	2	3	1	1	2	1	1	10	11	13	15
		total (C)		145679	63110	5622	1529	9825	6371	3785	20174	126447	35036	12225	10202	127587	219296
		Grand Total (A+B+C)		155419	69141	7067	2048	11828	7865	4155	21780	132369	37448	13925	12149	137026	231702

*Source: District Primary Cences Absract, Tirunelveli District of Tamilnadu State-2011

EDUCATIONAL FACILITIES AND CBO's WITHIN THE STUDY AREA (As Per Census Data 2011)

Sl.No	No. of Villages	Name of village	Educational Facilities (A(1)/ NA(2))	Govt Pre - Primary School (Nursery/LKG/UKG) (Numbers)	Govt Primary School (Numbers)	Govt Middle School (Numbers)	Govt Secondary School (Numbers)	Govt Senior Secondary School (Numbers)	Govt Arts and Science Degree College (Numbers)	Govt Engineering College (Numbers)	Govt Medicine College (Numbers)	Govt Management Institute (Numbers)	Govt Polytechnic (Numbers)	Govt Vocational Training School/ITI (Numbers)	Government Non Formal Training Centre (Numbers)	Government School For Disabled (Numbers)
0.-2 km,Palayamkottai Sub-District, Tirunelveli District																
1	1	Tharuvai	1	3	3	1	1	0	0	0	0	0	0	0	1	0
2.-5 km Tirunelveli Sub-District, Tirunelveli District																
2	1	Karungadu	1	1	1	0	0	0	0	0	0	0	0	0	1	0
Tirunelveli Sub-District, Tirunelveli District																
3	1	Melathiruvengadanathapuram	1	3	3	0	0	0	0	0	0	0	0	0	1	0
4	2	Kilathiruvengadanathapuram	1	1	1	0	0	0	0	0	0	0	0	0	1	0
5	3	Munnirpallam	1	5	4	2	2	1	0	0	0	0	1	0	1	0
6	4	Araikulam	1	1	1	0	0	0	0	0	0	0	0	0	1	0
7	5	Kongandanparai	1	1	1	1	0	0	0	0	0	0	0	0	1	0
8	6	Melathidiyur	1	1	1	0	0	0	0	0	0	0	0	0	1	0
9	7	Gangainadarkulam	2	0	0	0	0	0	0	0	0	0	0	0	0	0
10	8	Thidiyur	1	3	4	0	0	0	0	0	0	0	0	0	1	0
11	9	Sengulam	1	2	4	2	0	0	0	0	0	0	0	0	1	0
12	10	Ponnakkukdi	1	1	2	0	0	0	0	0	0	0	0	0	1	0
13	11	Pudukkulam	1	1	5	0	0	0	0	0	0	0	0	0	1	0
5.-10 km, Tirunelveli Sub-District, Tirunelveli District																
14	1	Thiruppani Karisalkulam	1	3	2	0	0	0	0	0	0	0	0	0	1	0
15	2	Palavoor	1	1	2	0	0	0	0	0	0	0	0	0	1	0
16	3	Kondanagaram	1	1	1	0	0	0	0	0	0	0	0	0	1	0
17	4	Suttamalli	1	9	4	2	1	0	0	0	0	0	0	0	1	0
18	5	Narasinganallur	1	3	1	1	1	0	0	0	0	0	0	0	1	0
19	6	Pettai	1	1	1	0	0	0	0	0	0	0	0	0	1	0
20	7	Thenpathu	1	2	2	0	0	0	0	0	0	0	0	0	1	0
Palayamkottai Sub-District, Tirunelveli District																
21	1	Uthamapandiyankulam	1	1	1	0	0	0	0	0	0	0	0	0	1	0
22	2	Parpakulam	1	2	0	0	0	0	0	0	0	0	0	0	0	0
23	3	Nochikulam	1	1	1	0	0	0	0	0	0	0	0	0	1	0
24	4	Krishnapuram	1	1	1	0	0	0	0	0	0	0	0	0	1	0
25	5	Kunnathur	1	1	1	0	0	0	0	0	0	0	0	0	1	0
26	6	Reddiarpatti	1	2	2	1	1	1	0	0	0	0	0	0	1	0
27	7	Muthur	1	3	3	1	0	0	0	0	0	0	0	0	1	0
28	8	Kuravankulam	2	0	0	0	0	0	0	0	0	0	0	0	0	0
29	9	Itteri	1	2	2	0	0	0	0	0	0	0	0	0	1	0
30	10	Sivandipatti	1	1	4	2	0	0	0	0	0	0	0	0	1	0
Ambasamudram Sub-District, Tirunelveli District																
31	1	Thiruviruttanpuli	1	5	4	0	0	0	0	0	0	0	0	0	1	0
32	2	Pungadaiyankulam	1	1	2	1	0	0	0	0	0	0	0	0	1	0
33	3	Karisalpatti	1	3	3	1	1	1	0	0	0	0	0	0	1	0
34	4	Ulagankulam	1	2	1	0	0	0	0	0	0	0	0	0	1	0
35	5	Venkatarengapuram	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Nanguneri Sub-District, Tirunelveli District																
36	1	Poolam	1	1	1	0	0	0	0	0	0	0	0	0	1	0
37	2	Thottakudi	1	1	3	1	1	1	0	0	0	0	0	0	1	0
38	3	Alwaneri	1	3	5	0	0	0	0	0	0	0	0	0	1	0
39	4	Paruthipadi	1	3	4	1	0	0	0	0	0	0	0	0	1	0

Sl.No	No. of Villages	Name of village	Educational Facilities (A(1)/ NA(2))	Govt Pre - Primary School (Nursery/LKG/UKG) (Numbers)	Govt Primary School (Numbers)	Govt Middle School (Numbers)	Govt Secondary School (Numbers)	Govt Senior Secondary School (Numbers)	Govt Arts and Science Degree College (Numbers)	Govt Engineering College (Numbers)	Govt Medicine College (Numbers)	Govt Management Institute (Numbers)	Govt Polytechnic (Numbers)	Govt Vocational Training School/ITI (Numbers)	Government Non Formal Training Centre (Numbers)	Government School For Disabled (Numbers)
40	5	Deivanayagaperi	1	1	1	0	0	0	0	0	0	0	0	0	1	0
41	6	Karanthaneri	1	5	5	1	1	0	0	0	0	0	0	0	1	0
42	7	Srivaramangaipuram	1	1	1	0	0	0	0	0	0	0	0	0	1	0
43	8	Kallikulam	1	3	0	0	0	0	0	0	0	0	0	0	0	0
44	9	Kilakaduvetti	1	2	0	0	0	0	0	0	0	0	0	0	0	0
45	10	Inam Idaiyankulam	2	0	0	0	0	0	0	0	0	0	0	0	0	0

*Source: District Primary Cences Absract, Tirunelveli District of Tamilnadu State-2011

MEDICAL FACILITIES WITHIN THE STUDY AREA (As Per Census Data 2011)

Sl.No	No. of Villages	Name of village	Medical Facilities (A(1)/NA(2))	Community Health Centre (Numbers)	Primary Health Centre (Numbers)	Primary Health Sub Centre (Numbers)	Maternity And Child Welfare Centre (Numbers)	TB Clinic (Numbers)	Hospital Allopathic (Numbers)	Hospital Alternative Medicine (Numbers)	Dispensary (Numbers)	Veterinary Hospital (Numbers)	Mobile Health Clinic (Numbers)	Family Welfare Centre (Numbers)
0-2 km, Palayamkottai Sub-District, Tirunelveli District														
1	1	Tharuvai	1	0	0	3	0	0	0	0	0	1	0	0
2.-5 km Tirunelveli Sub-District, Tirunelveli District														
2	1	Karungadu	2	0	0	0	0	0	0	0	0	0	0	0
Tirunelveli Sub-District, Tirunelveli District														
3	1	Melathiruvengadanathapuram	2	0	0	0	0	0	0	0	0	0	0	0
4	2	Kilathiruvengadanathapuram	2	0	0	0	0	0	0	0	0	0	0	0
5	3	Munnirpallam	1	0	1	1	1	1	0	0	1	0	0	1
6	4	Araikulam	2	0	0	0	0	0	0	0	0	0	0	0
7	5	Kongandanparai	1	0	0	1	0	0	0	0	0	0	0	0
8	6	Melathidiyur	1	0	0	1	0	0	0	0	0	0	0	0
9	7	Gangainadarkulam	2	0	0	0	0	0	0	0	0	0	0	0
10	8	Thidiyur	1	0	0	1	0	0	0	0	0	0	0	0
11	9	Sengulam	1	0	0	1	0	0	0	0	0	0	0	0
12	10	Ponnakkukdi	2	0	0	0	0	0	0	0	0	0	0	0
13	11	Pudukkulam	2	0	0	0	0	0	0	0	0	0	0	0
5.-10 km, Tirunelveli Sub-District, Tirunelveli District														
14	1	Thiruppani Karisalkulam	1	0	0	1	0	0	0	0	0	0	0	0
15	2	Palavoor	2	0	0	0	0	0	0	0	0	0	0	0
16	3	Kondanagaram	2	0	0	0	0	0	0	0	0	0	0	0
17	4	Suttamalli	1	0	2	1	2	2	0	0	2	0	0	2
18	5	Narasinganallur	1	0	0	1	0	0	0	0	0	1	0	0
19	6	Pettai	2	0	0	0	0	0	0	0	0	0	0	0
20	7	Thenpathu	2	0	0	0	0	0	0	0	0	0	0	0
Palayamkottai Sub-District, Tirunelveli District														
21	1	Uthamapandiyankulam	2	0	0	0	0	0	0	0	0	0	0	0
22	2	Parpakulam	2	0	0	0	0	0	0	0	0	0	0	0
23	3	Nochikulam	1	0	0	1	0	0	0	0	0	0	0	0
24	4	Krishnapuram	2	0	0	0	0	0	0	0	0	0	0	0
25	5	Kunnathur	2	0	0	0	0	0	0	0	0	0	0	0
26	6	Reddiarpatti	1	1	1	1	1	1	0	0	1	1	0	1
27	7	Muthur	1	0	0	1	0	0	0	0	0	0	0	0
28	8	Kuravankulam	2	0	0	0	0	0	0	0	0	0	0	0
29	9	Itteri	2	0	0	0	0	0	0	0	0	0	0	0
30	10	Sivandipatti	1	0	0	1	0	0	0	0	0	0	0	0
Ambasamudram Sub-District, Tirunelveli District														
31	1	Thiruviruttanpuli	1	0	0	1	0	0	0	0	0	0	0	0
32	2	Pungadaiyankulam	1	0	1	1	1	1	0	0	1	0	0	1
33	3	Karisalpatti	1	0	1	1	1	1	0	0	1	0	0	1
34	4	Ulagankulam	2	0	0	0	0	0	0	0	0	0	0	0
35	5	Venkatarengapuram	2	0	0	0	0	0	0	0	0	0	0	0
Nanguneri Sub-District, Tirunelveli District														
36	1	Poolam	2	0	0	0	0	0	0	0	0	0	0	0
37	2	Thottakudi	1	0	0	1	0	0	0	0	0	0	0	0
38	3	Alwaneri	2	0	0	0	0	0	0	0	0	0	0	0
39	4	Paruthipadi	1	0	0	1	0	0	0	0	0	0	0	0

Sl.No	No. of Villages	Name of village	Medical Facilities (A(1)/NA(2))	Community Health Centre (Numbers)	Primary Health Centre (Numbers)	Primary Health Sub Centre (Numbers)	Maternity And Child Welfare Centre (Numbers)	TB Clinic (Numbers)	Hospital Allopathic (Numbers)	Hospital Alternative Medicine (Numbers)	Dispensary (Numbers)	Veterinary Hospital (Numbers)	Mobile Health Clinic (Numbers)	Family Welfare Centre (Numbers)
40	5	Deivanayagaperi	2	0	0	0	0	0	0	0	0	0	0	0
41	6	Karanthaneri	1	0	0	1	0	0	0	0	0	0	0	0
42	7	Srivaramangaipuram	2	0	0	0	0	0	0	0	0	0	0	0
43	8	Kallikulam	1	0	0	1	0	0	0	0	0	0	0	0
44	9	Kilakaduvetti	2	0	0	0	0	0	0	0	0	0	0	0
45	10	Inam Idaiyankulam	2	0	0	0	0	0	0	0	0	0	0	0

*Source: District Primary Cences Absract, Tirunelveli District of Tamilnadu State-2011

Note : A: Available, NA- Not Available

INFRASTRUCTURAL FACILITIES AVAILABLE IN THE STUDY AREA (As Per Census Data 2011)

Sl. No	No. of Villages	Name of village	Tap Water-Treated (Status A(1)/NA(2))	Covered Well (Status A(1)/NA(2))	Hand Pump (Status A(1)/NA(2))	Tube Wells/Bore hole (Status A(1)/NA(2))	Spring (Status A(1)/NA(2))	River/Canal (Status A(1)/NA(2))	Tank/Pond/Lake (Status A(1)/NA(2))	Post Office (Status A(1)/NA(2))	Sub Post Office (Status A(1)/NA(2))	Post And Telegraph Office (Status A(1)/NA(2))	Telephone (landlines) (Status A(1)/NA(2))	Mobile Phone Coverage (Status A(1)/NA(2))	Public Bus Service (Status A(1)/NA(2))	Railway Station (Status A(1)/NA(2))	Commercial Bank (Status A(1)/NA(2))	Cooperative Bank (Status A(1)/NA(2))	Agricultural Credit Societies (Status A(1)/NA(2))
0.-2 km, Alangulam Sub-District, Tirunelveli District																			
1	1	Tharuvai	1	1	1	1	2	1	1	2	1	2	1	1	1	2	2	2	2
2.-5 km Tirunelveli Sub-District, Tirunelveli District																			
2	1	Karungadu	1	2	1	2	2	2	2	2	2	2	1	1	1	2	2	2	2
Tirunelveli Sub-District, Tirunelveli District																			
3	1	Melathiruvengadanathapuram	1	1	1	1	2	2	2	2	1	2	1	1	1	2	2	2	2
4	2	Kilathiruvengadanathapuram	1	2	2	2	2	2	2	2	2	2	1	1	2	2	2	2	2
5	3	Munnirpallam	1	1	1	1	2	1	2	1	1	1	1	1	1	2	2	1	1
6	4	Araikulam	1	2	2	2	1	2	2	2	2	2	1	1	1	2	2	2	2
7	5	Kongandanparai	1	2	1	1	2	2	2	2	1	2	1	1	1	2	2	2	2
8	6	Melathidiyur	1	1	1	2	2	2	2	2	2	2	1	1	1	2	2	2	2
9	7	Gangainadarkulam	1	2	2	2	2	2	2	2	2	2	1	1	1	2	2	2	2
10	8	Thidiyur	1	2	2	1	2	2	2	2	1	2	1	1	1	2	2	2	2
11	9	Sengulam	1	2	2	2	2	2	2	2	1	2	1	1	1	1	2	2	2
12	10	Ponnakkukdi	1	2	1	1	2	2	2	2	1	2	1	1	1	2	2	2	2
13	11	Pudukkulam	1	2	1	1	2	2	2	2	2	2	1	1	1	2	2	2	2
5.-10 km, Tirunelveli Sub-District, Tirunelveli District																			
14	1	Thiruppani Karisalkulam	1	2	1	1	2	2	2	2	1	2	1	1	1	2	2	2	2
15	2	Palavoor	1	1	2	2	2	2	2	2	1	2	1	1	1	2	2	2	2
16	3	Kondanagaram	1	2	1	1	2	2	2	2	2	2	1	1	1	2	2	2	2
17	4	Suttamalli	1	2	1	1	2	2	2	1	2	1	1	1	1	2	2	2	1
18	5	Narasinganallur	1	2	1	1	2	2	2	2	1	2	1	1	1	2	2	2	2
19	6	Pettai	1	2	2	2	2	2	2	2	2	2	1	1	1	2	2	2	2
20	7	Thenpathu	1	2	1	1	2	2	2	2	2	2	1	1	2	1	2	2	2
Palayamkottai Sub-District, Tirunelveli District																			
21	1	Uthamapandiyankulam	2	2	1	1	2	2	2	2	2	2	1	1	1	2	2	2	2
22	2	Parpakulam	1	2	1	1	2	2	2	2	2	2	1	1	2	2	2	2	2
23	3	Nochikulam	1	2	1	1	2	2	2	2	2	2	1	1	2	2	2	2	2
24	4	Krishnapuram	1	2	1	1	2	2	2	2	2	2	1	1	2	2	2	2	2
25	5	Kunnathur	1	2	2	1	2	2	2	2	1	2	1	1	1	2	2	2	2
26	6	Reddiarpatti	1	2	1	1	2	2	2	2	1	2	1	1	1	2	2	1	1
27	7	Muthur	1	1	1	1	2	2	2	2	1	2	1	1	1	2	2	2	2
28	8	Kuravankulam	1	2	2	2	2	2	2	2	2	2	1	1	1	2	2	2	2
29	9	Itteri	2	2	1	1	2	2	2	2	2	2	1	1	1	2	2	2	2

Sl. No	No. of Villages	Name of village	Tap Water-Treated (Status A(1)/NA(2))	Covered Well (Status A(1)/NA(2))	Hand Pump (Status A(1)/NA(2))	Tube Wells/Bore hole (Status A(1)/NA(2))	Spring (Status A(1)/NA(2))	River/Canal (Status A(1)/NA(2))	Tank/Pond/Lake (Status A(1)/NA(2))	Post Office (Status A(1)/NA(2))	Sub Post Office (Status A(1)/NA(2))	Post And Telegraph Office (Status A(1)/NA(2))	Telephone (landlines) (Status A(1)/NA(2))	Mobile Phone Coverage (Status A(1)/NA(2))	Public Bus Service (Status A(1)/NA(2))	Railway Station (Status A(1)/NA(2))	Commercial Bank (Status A(1)/NA(2))	Cooperative Bank (Status A(1)/NA(2))	Agricultural Credit Societies (Status A(1)/NA(2))
30	10	Sivandipatti	1	1	1	1	2	2	2	2	1	2	1	1	1	2	2	2	1
Ambasamudram Sub-District, Tirunelveli District																			
31	1	Thiruviruttanpuli	1	2	1	1	2	2	2	2	1	2	1	1	1	2	1	2	2
32	2	Pungadaiyankulam	1	2	2	2	2	2	2	2	2	2	1	1	1	2	1	2	2
33	3	Karisalpatti	1	2	1	1	2	2	2	2	1	2	1	1	1	2	2	2	2
34	4	Ulagankulam	1	1	1	1	2	2	2	2	2	2	1	1	1	1	1	2	2
35	5	Venkatarengapuram	1	2	1	1	2	2	2	2	2	2	1	1	1	2	2	2	2
Nanguneri Sub-District, Tirunelveli District																			
36	1	Poolam	1	1	1	1	2	2	2	2	2	1	1	1	2	2	2	2	2
37	2	Thottakudi	1	1	1	1	2	2	2	2	1	2	1	1	2	2	2	1	2
38	3	Alwaneri	1	2	1	1	2	2	2	2	1	2	1	1	1	2	2	2	2
39	4	Paruthipadi	1	2	1	1	2	2	1	2	1	1	1	1	1	2	2	1	2
40	5	Deivanayagaperi	1	2	2	2	2	2	2	2	1	2	1	1	1	2	2	2	2
41	6	Karanthaneri	1	2	2	1	2	2	2	2	1	2	1	1	1	2	2	2	2
42	7	Srivaramangaipuram	2	2	2	1	2	2	2	2	2	2	1	1	1	2	2	2	2
43	8	Kallikulam	1	1	2	1	2	2	2	2	1	2	1	1	1	2	2	2	2
44	9	Kilakaduvetti	1	1	2	1	2	2	2	1	2	1	1	1	1	2	2	1	1
45	10	Inam Idaiyankulam	1	2	2	2	2	2	2	2	2	2	1	1	1	2	2	2	2

*Source: District Primary Census Abstract, Sivakasi District of Tamilnadu State-2011

Note : A: Available, NA- Not Available

LAND USE PATTERN OF THE STUDY AREA WITHIN 10 KM RADIUS AROUND THE PROPOSED PROJECT AREA

Sl.No	No. of Villages	Name of village	Total Geographical Area (in Hectares)	Forest Area (in Hectares)	Area under Non-Agricultural Uses (in Hectares)	Barren & Un-cultivable Land Area (in Hectares)	Permanent Pastures and Other Grazing Land Area (in Hectares)	Land Under Miscellaneous Tree Crops etc. Area (in Hectares)	Culturable Waste Land Area (in Hectares)	Fallows Land other than Current Fallows Area (in Hectares)	Current Fallows Area (in Hectares)	Total Unirrigated Land Area (in Hectares)	Area Irrigated by Source (in Hectares)
0-2 km, Palayamkottai Sub-District, Tirunelveli District													
1	1	Tharuvai	1684.59	0	484	10	10	35	7	463.21	353.01	7.76	314.61
		total (A)	1684.59	0	484	10	10	35	7	463.21	353.01	7.76	314.61
2-5 km Tirunelveli Sub-District, Tirunelveli District													
2	1	Karungadu	184.17	0	51.46	0	0	0	0	0.96	1.05	0	130.7
Tirunelveli Sub-District, Tirunelveli District													
3	1	Melathiruvengadanathapuram	298.47	0	93	2	0	0	69	0.87	12.23	0.89	120.48
4	2	Kilathiruvengadanathapuram	138.82	0	68	0	0	0	0	0	4.84	0.55	65.43
5	3	Munnirpallam	1455.47	0	343.39	198	28	2	55	295.54	304.2	15.98	213.36
6	4	Araikulam	93.45	0	44.52	1.13	0	0	1.45	0	0	26.05	20.3
7	5	Kongandanparai	236.16	0	106	0	0	0	93	0	3.62	0.45	33.09
8	6	Melathidiyur	647.6	0	175	5	0	0	160	81.56	158.64	0.86	66.54
9	7	Gangainadarkulam	33.41	0	15	0	0	0	8	10.41	0	0	0
10	8	Thidiyur	529.86	0	187	3	0	0	0	47.52	5.71	0.9	285.73
11	9	Sengulam	1155.1	0	383	310	50	25	50	67.83	16.52	46.69	206.06
12	10	Ponnakkukdi	891.25	14.16	280.03	2.37	14.2	1.19	0.11	39.21	335.44	73.41	131.13
13	11	Pudukkulam	1370.01	0	320	40	10	0	360	168.46	242.93	1.12	227.5
		total (B)	7033.77	14.16	2066.4	561.5	102.2	28.19	796.56	712.36	1085.18	166.9	1500.32
5.-10 km, Tirunelveli Sub-District, Tirunelveli District													
14	1	Thiruppani Karisakulam	887.45	0	262.26	10.05	0	16.2	195.61	160.67	0	0.7	241.96
15	2	Palavoor	459.4	0	70.48	64.61	32.6	52.6	0	92.31	13.52	0.91	132.37
16	3	Kondanagaram	989.02	0	389.42	36.12	18.95	4.72	6.35	381.49	0	0.53	151.44
17	4	Suttamalli	766.16	0	88.75	60.4	0	0	35.05	20.03	67.12	236.3	258.51
18	5	Narasinganallur	691.26	0	371.92	159.67	14.52	20.13	0	4.17	0	33.15	87.7
19	6	Pettai	255.55	0	30.5	0	0	0	0	0	46.14	9.92	168.99
20	7	Thenpathu	277.23	0	36.82	0	0	0	0.02	0	50.07	6.21	184.11
Palayamkottai Sub-District, Tirunelveli District													
21	1	Uthamapandiyankulam	128.81	0	37	2	0	0	0	0	63.79	0.49	25.53
22	2	Parpakulam	421.55	0	80.5	0	0	0	124.85	117.34	0	38.39	60.47
23	3	Nochikulam	242.81	0	105	10	0	0	12	8.11	3.4	0.41	103.89
24	4	Krishnapuram	905.24	0	174	15	8	0	18	455.26	157.92	0.15	76.91
25	5	Kunnathur	292.27	0	37	0	5	0	0	138.21	4.39	0.64	107.03
26	6	Reddiarpatti	822.48	0	581.98	102.59	0	0	0	102.59	29.13	0.01	6.18
27	7	Muthur	1815.02	240.82	279.47	89.45	0	0	0	1007.51	0	94.68	103.09
28	8	Kuravankulam	122.66	0	42	0	0	0	3	33.26	28.02	6.23	10.15
29	9	Itteri	760.18	0	158	105	160	0	37	156.97	20.82	2.97	119.42
30	10	Sivandipatti	1930.93	0	275	80	5	0	1182.4	0	0	7.24	381.29
Ambasamudram Sub-District, Tirunelveli District													
31	1	Thiruviruttanpuli	1165.36	0	174.65	160.61	0	31.16	447.19	147.55	7.82	13.96	182.42
32	2	Pungadaiyankulam	736.65	0	225.2	0	0	9.48	52.6	344.21	0	10.84	94.32
33	3	Karisalpatti	492.29	0	93.48	256.12	0	0.08	18.87	41.05	4.63	3.01	75.05
34	4	Ulagankulam	668.81	0	455.2	25	14.82	15.93	5.15	27.67	59.73	0	65.31
35	5	Venkatarengapuram	328.11	0	65.27	1.6	0	0.78	81.38	49.76	0	1.43	127.89
Nanguneri Sub-District, Tirunelveli District													
36	1	Poolam	1576.96	0	423.38	160.55	2.33	0	272.13	304.29	54.31	0.13	359.84
37	2	Thottakudi	1378.38	0	416.19	0	3.15	0	146.92	568.75	0	0.7	242.67
38	3	Alwaneri	1375.25	0	425.62	0	0	0.28	328.41	287.51	129.47	0.13	203.83

Sl.No	No. of Villages	Name of village	Total Geographical Area (in Hectares)	Forest Area (in Hectares)	Area under Non-Agricultural Uses (in Hectares)	Barren & Un-cultivable Land Area (in Hectares)	Permanent Pastures and Other Grazing Land Area (in Hectares)	Land Under Miscellaneous Tree Crops etc. Area (in Hectares)	Culturable Waste Land Area (in Hectares)	Fallows Land other than Current Fallows Area (in Hectares)	Current Fallows Area (in Hectares)	Total Unirrigated Land Area (in Hectares)	Area Irrigated by Source (in Hectares)
39	4	Paruthipadi	1877.12	0	180.67	39.98	30	0	85.35	1365.4	0	3.8	171.92
40	5	Deivanayagaperi	48.25	0	28.92	0	0	0	0.8	5.3	0	0	13.23
41	6	Karanthaneri	1954.7	23.04	6.86	460.15	19.51	0	458.41	0	702.64	3.07	281.02
42	7	Srivaramangaipuram	150.78	0	11.24	0	0	0	133.25	0	0	4.09	2.2
43	8	Kallikulam	1458.26	0	247.2	116.14	0	1.4	33.62	838.1	18.17	8.3	195.33
44	9	Kilakaduvetti	1229.15	0	238.54	150.18	1.6	2.52	68	433.61	70.96	0.92	262.82
45	10	Inam Idaiyankulam	23.58	0	5.58	0.79	0	0.02	0.96	0	9.62	0.13	6.48
		total (C)	26231.67	263.86	6018.1	2106.01	315.48	155.3	3747.32	7091.12	1541.67	489.44	4503.37
		Grand Total (A+B+C)	34950.03	278.02	8568.5	2677.51	427.68	218.49	4550.88	8266.69	2979.86	664.1	6318.3

*Source: District Primary Cences Absract, Tirunelveli District of Tamilnadu State-2011

From

Thiru.A.Arumuganainar,M.Sc.,
Joint Director/
Assistant Director(i/c),
Geology and Mining,
Tirunelveli.

To

The Chair Person,
SEIAA, Tamil Nadu,
3rd Floor, Panagal Maligai,
No. 1, Jeenis Road,
Saidapet, Chennai - 15.

Rc. No.M1/36182/2018, dated: 23.11.2020

Sir,

Sub: Mines and Minerals - Minor Mineral -
Roughstone, Jelly and Gravel - Tirunelveli
District - Palayamkottai Taluk - Tharuvai Village -
SF.Nos. 530/3A, 531/1A, 532, 533/1, 568/5A(P) &
569/3A - over an extent of 4.97.0 hectares of
patta lands - Quarry lease application
preferred by Thiru.S.Kasirajan - Certain
Particulars requested - for obtaining
Environmental Clearance - furnished - reg.

- Ref:**
1. Quarry lease application preferred by Thiru.S.Kasirajan, dated: 31.08.2018.
 2. This office Notice No. M1/36182/2018, dated. 21.05.2019.
 3. Mining Plan Approval letter No. M1/36182/2018, dated. 22.07.2019.
 4. Letter dated: 22.07.2019 received from Thiru.S.Kasirajan.
 5. G.O (Ms) No. 169, Industries (MMC-1) Department dated. 04.08.2020.

Thiru.S.Kasirajan has preferred an application for grant of quarry lease for quarrying Roughstone, Jelly and Gravel over an extent of 4.97.0 hectares of patta land in SF.Nos. 530/3A, 531/1A, 532, 533/1, 568/5A(P) & 569/3A of Tharuvai Village, Palayamkottai Taluk, Tirunelveli District for a period of 5 years under Rule 19 (1) of Tamil Nadu Minor Mineral Concession Rules, 1959 vide reference 1st cited.

Pit No	Length (max) in m	Width (max) in m	Depth (max) in m
I	114	98	24m Below Ground Level
II	78	58	14m Below Ground Level

- iii. As Per the Previous Approved Mining Plan / EC in the applied mining lease area and the mining activities was stopped on 05.05.2018. The quantity granted and excavated are given below.


Environmental Clearance	Proceedings & Lease Period	Depth as per approved mining plan	Actual depth of mining achieved	Permitted Quantity as per approved mining plan		Quantity transport permit issued / transported	
				Rough stone (cbm)	Gravel (cbm)	Rough stone (cbm)	Gravel (cbm)
SEIAA, TN/F.N o. 692/ EC / 1(a) / 100/2013, dt. 05.03.2013	M1/5115/201 2. dt. 06.05.2013 for a period from 06.05.2013 to 05.05.2018 of 3 years.	30m	24m	7,46,825		271080	

- iv. In this connection it is informed that, the following quarries are located within 500m radius from the proposed area for clearance.

Sl. No.	Name of the Lessee	Village & SF. No.	Extent - Hectares	Lease status
1. Existing quarries				
1.	P.Marimuthu, S/o.Petchi Thevar, 1/3A, Kasba Mel Bagam , Ponnagudi, Palayamkottai, Tirunelveli.	Tharuvai(V) & 522/1, 522/2, 534, 535(P)	4.73.5	Proceeding No. M1/36802/2016, dt.22.03.2018 for a period 5 years from 19.04.2018 to 18.04.2023
2.	S.Sankar, S/o.R.Subramaniam, 131/1, APT Road, Erode District	Tharuvai(V) & 524(P)	1.60.0	Proceeding No. M1/43375/2015, dt.31.03.2018 for a period 5 years from 17.04.2018 to 16.04.2023
3.	Tvl. Sri Durgambika Blue Metals, 1A/115, Kandithankulam, Tharuvai, Tirunelveli	Tharuvai(V) & 570(P)	1.38.5	Proceeding No. M3/6065/2019, dt.02.03.2019 for a period 5 years from 24.07.2018 to 16.04.2023
Total extent of existing quarries			7.72.0	
2. Abandoned quarries				
1.	S.Subbaiah, S/o.Sorna Thevar,	Tharuvai (v) & 568/1 & 569/1B	2.63.5	Proceeding No. M1/41558/2011, dt.20.01.2012 for a period 5 years from 07.02.2012 to 06.02.2017.
Total extent of abandoned quarries			2.63.5	

3. proposed quarries				
2.	S.Kasirajan, 760, Bazaar Street, Seevalaperi, Palayamkottai Taluk, Tirunelveli.	Tharuvai(v) & 530/3A, 531/1A, 532, 533/1, 568/5A(P) & 569/3A	4.97.0	Proposed quarry
Total extent of Proposed quarries			4.97.0	
Grand total extent of all quarries			15.32.5	

6. In view of the above it is recommended that Environmental Clearance may be issued in favour of the applicant subject to the usual terms and conditions.


**Joint Director/
Assistant Director(i/c),
Geology and Mining,
Tirunelveli.**


23/1/20