# EXECUTIVE SUMMARY

# MANGAMMALPURAM SAND QUARRY

S.F. No: 217 (Part)

**Extent: 20.00.0 Ha**

(For Resorting the Functional Efficiency of Coleroon River)

Mangammalpuram Village, Lalgudi Taluk, Tiruchirapalli District

NON-FOREST LAND/ GOVERNMENT LAND / FRESH MINE/ MINOR MINERAL/ 'B1' CATEGORY

As per TOR vide
Lr No. SEIAA-TN/F.No.9283/SEAC/ToR-1220/2022 Dated: 22.08.2022

**Project Proponent**

**The Executive Engineer**
Water Resources Department
Mining and Monitoring Division,
Tiruchirappalli District, Tamil Nadu State - 620 020

**Environmental Consultant**

**GEO EXPLORATION AND MINING SOLUTIONS**

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Accredited for sector 1 Category 'A' & 38 Category 'B'
Certificate No : NABET/EIA/2225/RA 0276
Phone: 0427-2431989,
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**Baseline Monitoring Season – December 2022 to February 2023**

**ENVIRONMENTAL LAB**

**EHS 360 LABS PRIVATE LIMITED**

(Approved by ISO/IEC 17025:2017)

10/2, Ground Floor, 50th Street, 7th Avenue, Ashok Nagar, Chennai – 600 083, Tamil Nadu, India.

## 1. INTRODUCTION

Environmental Impact Assessment (EIA) is the management tool to ensure the sustainable development and it is a process, used to identify the environmental, social and economic impacts of a project prior to decision-making. It is a decision-making tool, which guides the decision makers in taking appropriate decisions for any project. EIA systematically examines both beneficial and adverse consequences of the project and ensures that these impacts are taken into account during the project designing. It also reduces conflicts by promoting community participation, information, decision makers and helps in developing the base for environmentally sound project.

Whenever floods and consequent damages occurred it was resorted to increase the bund level to restore the carrying capacity of river. It was never thought of quarrying river due to the enormous cost, it requires and the problem of ways and means to dispose the desilted sand. Consequence of this Change in river regime and reduction in carrying capacity of the Coleroon river, the shoals in the rivers, divert the flow of water resulting in bund erosion and consequent breaches, which lead to loss of property and lives.

Solution to the above problem is to desilt the sand and shoals in Coleroon River by expending huge amount. Alternatively, the economical solution to this problem is to quarry the sand to remove the shoals. This option would not yield net revenue to the state Exchequer apart from making available the important construction material for infrastructure development at a reasonable price to the common people.

The project proponent, Executive Engineer, Water Resources Department, Mining and Monitoring division applied for Sand quarry lease over an extent of 20.00.0 Ha in Mangammalpuram Village, Lalgudi Taluk, Tiruchirapalli District, Tamil Nadu. The application was processed by the Department of Geology and Mining, Tiruchirapalli and passed precise area communication letter vide Rc.No 700/2021/Mines, dated 22.02.2022 to obtain Mining plan and Environmental Clearance from the SEIAA, Tamil Nadu. The mining plan was prepared and got approval from the Assistant Director, Department of Geology and Mining, Tiruchirapalli vide Rc.No 700/2021/Mines, Dated 12.05.2022.

The proponent has obtained necessary statutory clearances from the Department of Geology and Mining, Tiruchirapalli District, Tamil Nadu (Statutory Clearance Documents are enclosed along with Mining plan as Annexure No III).

Proponent applied for ToR for Environmental Clearance to SEIAA, Tamil Nadu and obtained ToR vide letter no. SEIAA-TN/F.No.9283/SEAC/ToR-1220/2022 Dated: 22.08.2022 for carrying out EIA and EMP studies.

The proponent has engaged M/s. Geo Exploration and Mining Solutions, Salem, Tamil Nadu for carrying out EIA / EMP Study. The Baseline Monitoring study has been carried out during winter

season (December 2022 to February 2023). This EIA Report is prepared in compliance with ToR obtained vide Lr No. SEIAA-TN/F.No. 9283/SEAC/ToR-1220/2022 Dated: 22.08.2022.

## 2 PURPOSE OF THE REPORT

The Ministry of Environment and Forests, Govt. of India, through its EIA notification S.O. 1533(E) of 14th September 2006 and its subsequent amendments as per Gazette Notification S.O. 3977 (E) of 14th August 2018, Mining Projects are classified under two categories i.e., A (> 100 Ha) and B (≤ 100 Ha), and Schematic Presentation of Requirements on Environmental Clearance of Minor Minerals including cluster situation in Appendix–XI.

Now, as per Order Dated: 04.09.2018 & 13.09.2018 passed by Hon'ble National Green Tribunal, New Delhi in O.A. No. 173 of 2018 & O.A. No, 186 of 2016 and MoEF & CC Office Memorandum F. No. L-11011/175/2018-IA-II (M) Dated: 12.12.2018 clarified the requirement for EIA, EMP and therefore, Public Consultation for all areas from 5 to 25 ha falling in Category B- 1 and appraised by SEAC/ SEIAA as well as for cluster situation.

Now, as per Gazette Notification S.O. 1886 (E) of 20th April 2022, Mining Projects are classified under two categories i.e. A (>250 Ha) and B (≤ 250 Ha),

"All mining lease area in respect of minor mineral mining leases and ≤ 250 ha mining lease area in respect of major mineral mining lease other than coal"

The proposed project is categorized under category "B1" Activity 1(a) (Total Extent of the area is >5 Ha) and will be considered at SEIAA – TN after conducting Public Hearing and Submission of EIA/EMP Report for Grant of Environmental Clearance..

**"""Draft EIA report prepared on the basis of ToR Issued for carrying out public hearing for the grant of Environmental Clearance from SEIAA, Tamil Nadu""**

### 1.1 IDENTIFICATION OF PROJECT AND PROJECT PROPONENT –

| Name and Location of the project | Project proponent address |
|---|---|
| Mangammalpuram Sand Quarry S.F.No.217Part), Mangammalpuram Village Lalgudi Taluk, Tiruchirappalli District, Tamil Nadu state | The Executive Engineering, Water Resource Department, Mining and Monitoring Division, Tiruchirappalli – 620 020 |

BRIEF DESCRIPTION OF THE PROJECT

**TABLE 2.2 SALIENT FEATURES OF THE PROPOSAL PROJECT**

| DESCRIPTION | DETAILS |
|---|---|
| Name of the project | Mangammalpuram Sand Quarry |
| Name of Mineral | Sand |
| S.F. No's and Village | S.F.No. 217 (Part), Mangammalpuram Village |
| Extent | 20.00.0 ha |
| Classification of Land | Government Land<br>Water Resource Department, Mining and Monitoring Division, Tiruchirappalli |
| Taluk | Lalgudi |

| | | |
|---|---|---|
| District | Tiruchirappalli | |
| State | Tamil Nadu | |
| Latitude Between | 10°51'02.8306"N to 10°51'17.1354"N | |
| Longitude Between | 78°52'16.3469"E to 78°52'43.8956"E | |
| Toposheet No | 58- J/13 | |
| Topography of the area | The topography of the area is almost plain topography with shoals of Sands having gentle slope towards East side. Highest Elevation between: 50.99m to 53.87m AMSL | |
| Life of Mine | 2 years | |
| Geological Reserves | 10,00,000m3 of Sand | |
| Mineable Reserves | 5,00,000m3 of Sand | |
| Yearwise Production (2 Years) | 1st Year | 3,00,000m3 |
| | 2nd Year | 2,00,000m3 |
| Mining Method | Opencast Mechanized Method of Mining without Drilling and Blasting | |
| Proposed depth of mining for this plan period | 2.5m (1.5m abl + 1m bbl) | |
| Ultimate Pit Dimension | 800m (Length) X 300m X 2.5m (Depth) (1.5m abl + 1m bbl) | |
| Employment Potential | 38 Nos | |
| Ground Water table | 11-16 m BGL | |
| Ground Water Table Intersection | Quarrying operation will be carried out well above the ground water table, hence ground water will not be affected by proposed mining. | |
| Drainage Pattern | The drainage pattern of the area is dendritic. | |
| Water Requirement & Source | Total water requirement for dust suppression, Greenbelt and drinking is 3.0 KLD. Water will be sourced from nearby villages by water tankers and drinking water will be sourced from approved water vendors. | |
| 500m Radius Letter from the Assistant Director, Tiruchirappalli District | Existing Quarry (24.00.0ha) - 1 No<br>Expired/Abandoned Quarries - Nil<br>Proposed Quarry (20.00.0ha) - 1 No | |
| Project Cost | Rs 89,93,000 /- | |

## 2.2 STATUTORY DETAILS

- Precise Area Communication letter issued by District Collector, Tiruchirapalli vide Letter No. 700/2021/Mines Dated 22.02.2022 for preparation of Mining Plan and for Obtaining Prior-Environmental Clearance.
- The Mining Plan was prepared under Rule 41 & 42 of Tamil Nadu Minor Mineral Concession Rules, 1959 and the approved by Deputy Director of Geology and Mining, Tiruchirapalli District vide Letter No: 700/2021/Mines Dated 12.05.2022
- The proposed project falls under "B1" Category as per Order Dated: 04.09.2018 & 13.09.2018 passed by Hon'ble National Green tribunal, New Delhi in O.A. No. 173 of 2018 & O.A. No, 186 of 2016 and MoEF & CC Office Memorandum F. No. L-11011/175/2018-IA-II (M) Dated: 12.12.2018
- The proponent applied for ToR for Prior Environmental Clearance vide online Proposal No. No.SIA/TN/MIN/ 77336/2022 dated: 27.05.2022

## 3 PROJECT DESCRIPTION

This project is proposed to excavate 5,00,000m3 of Sand by Opencast Mechanized Mining Method without drilling and blasting. Sand will be transported by 10/20 Tonnes. The sand will be loaded directly to the trucks/ lorries to nearby approved Government Sand Depot for Transportation to the needy customers, hence no mineral processing is involved.

The Trucks are loaded by excavators in direct supervision of the Assistant/ Junior Engineers Water Resources Department. The Competent Statutory Mines foreman will also be deployed for the Safety movement of vehicles inside the quarry. The sand is soft and fragile in nature and proposed to excavate 2.5m (1.5m abl + 1m bbl).).

**Table 3.1 SITE CONNECTIVITY TO THE PROJECT AREA**

| | |
|---|---|
| Nearest Roadway | Nearest National Highway (NH-81) Trichy – Chidambaram – 7.0km - North West<br>The Nearest State Highway (SH-22) Trichy – Kumbakonam – 1.2km- South |
| Nearest Village | Anbil – 1.5km - Northeast |
| Nearest Town | Lalgudi – 6.5km- North West |
| Nearest Railway | Lalgudi Railway station – 6.5km- North West |
| Nearest Airport | Trichy Airport – 20 km – Southwest |
| Seaport | Tuticorin – 255 Km-Southwest |

**Table 3.2 OPERATIONAL DETAILS OF LEASE APPLIED AREA**

| Description | Sand Quantity in $m^3$ |
|---|---|
| Geological Resources | 10,00,000 |
| Mineable Reserves | 5,00,000 |
| Yearwise Production | 5,00,000 |
| Peak Production Proposed | 3,00,000 |
| Peak Production per Day | 1200 |

Source: Approved Mining plan of respective quarry leases

**FIGURE – 1: GOOGLE IMAGE SHOWING APPLIED QUARRY LEASE AREA**

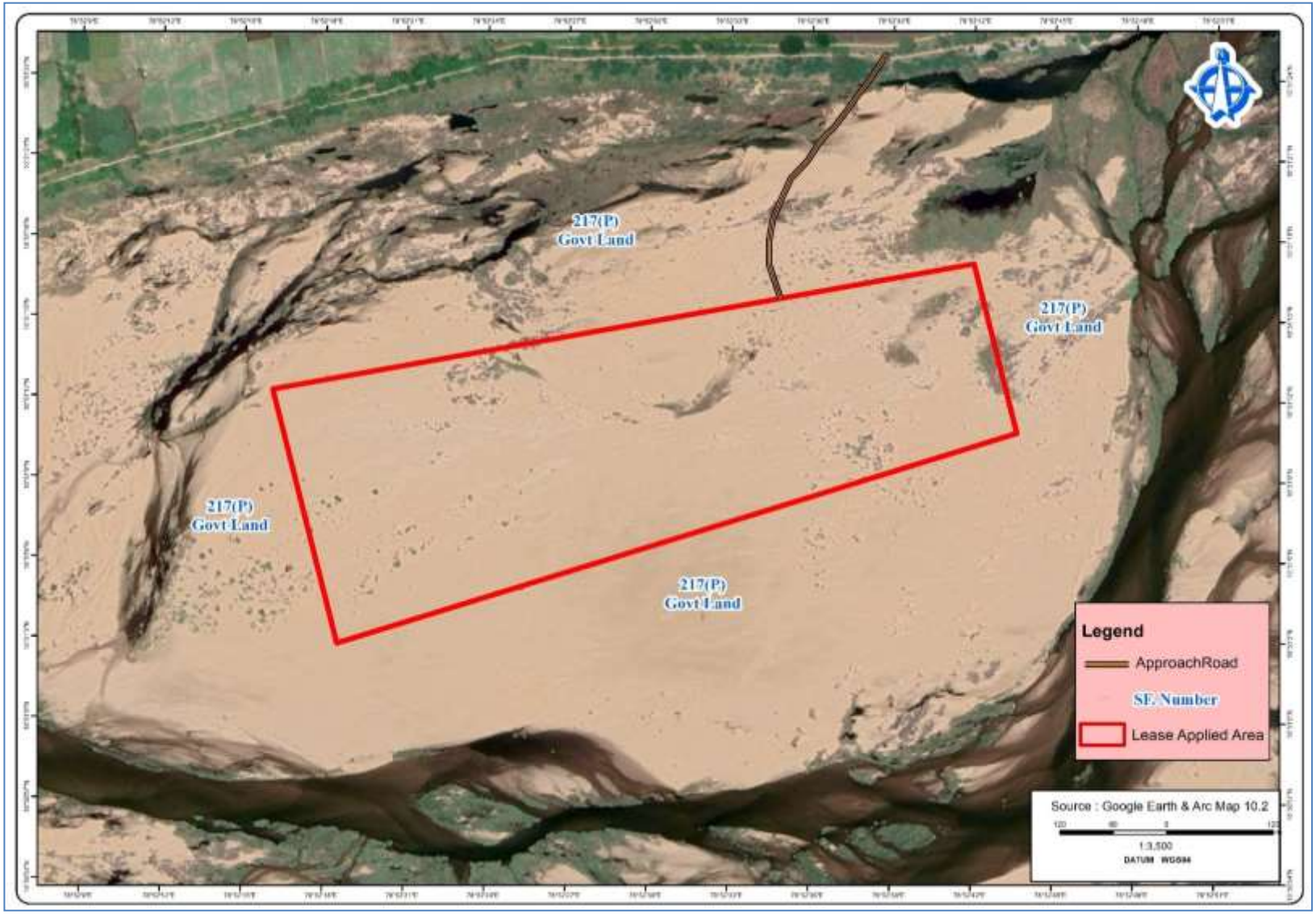


**FIGURE –2: GOOGLE IMAGE SHOWING CLUSTER (500 m QUARRIES)**

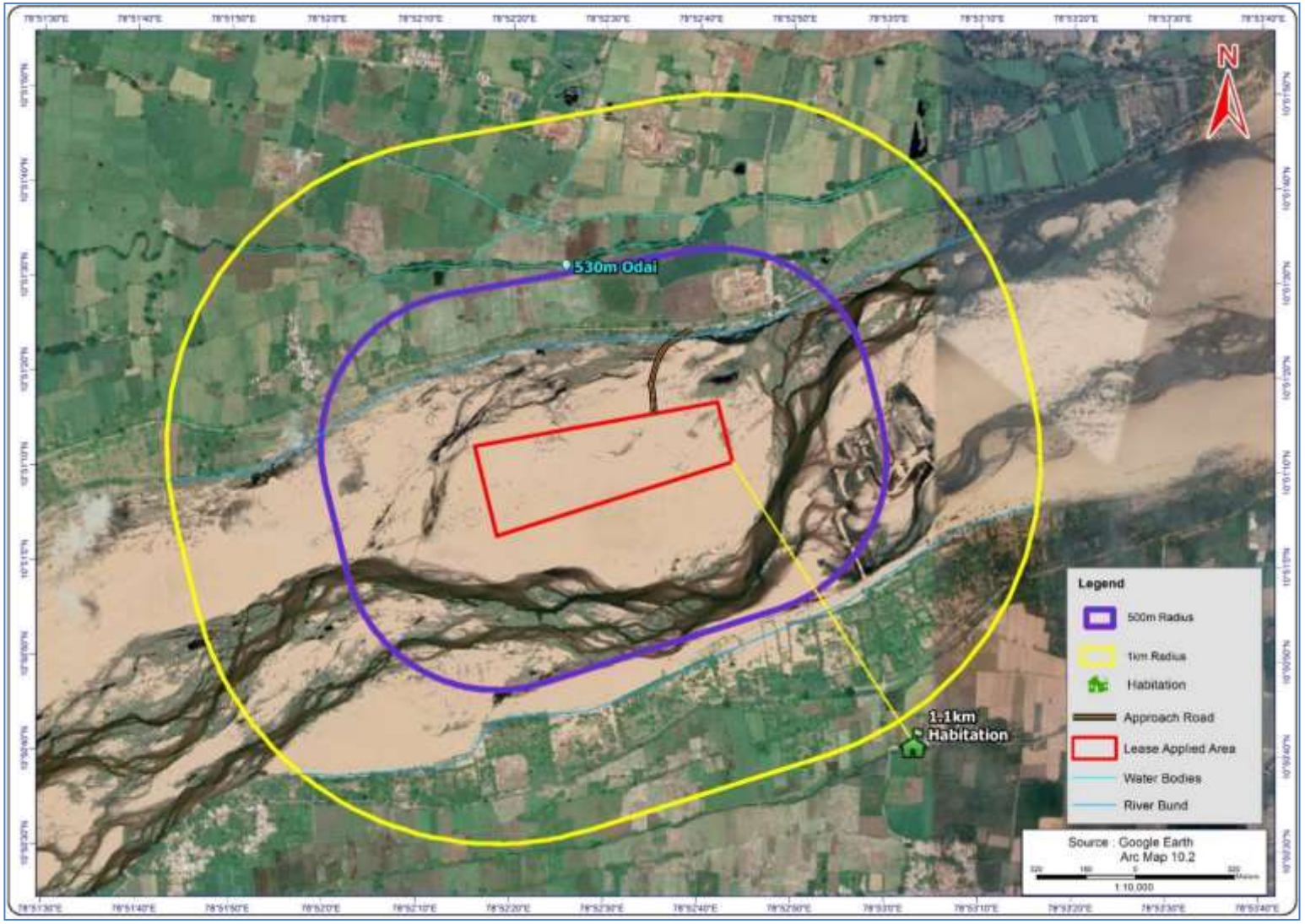


**FIGURE – 3: TOPOSHEET MAP COVERING 10 KM RADIUS**

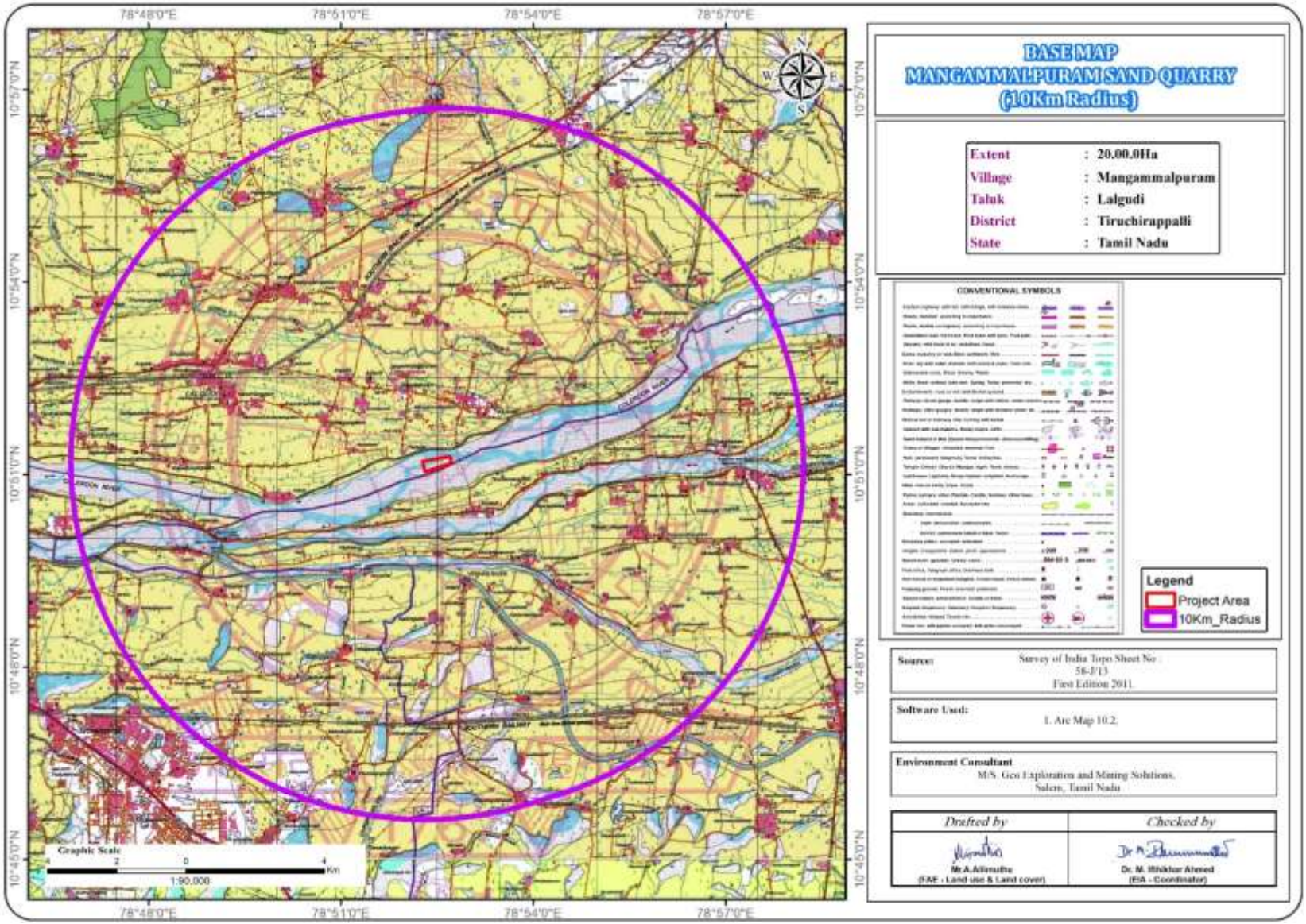
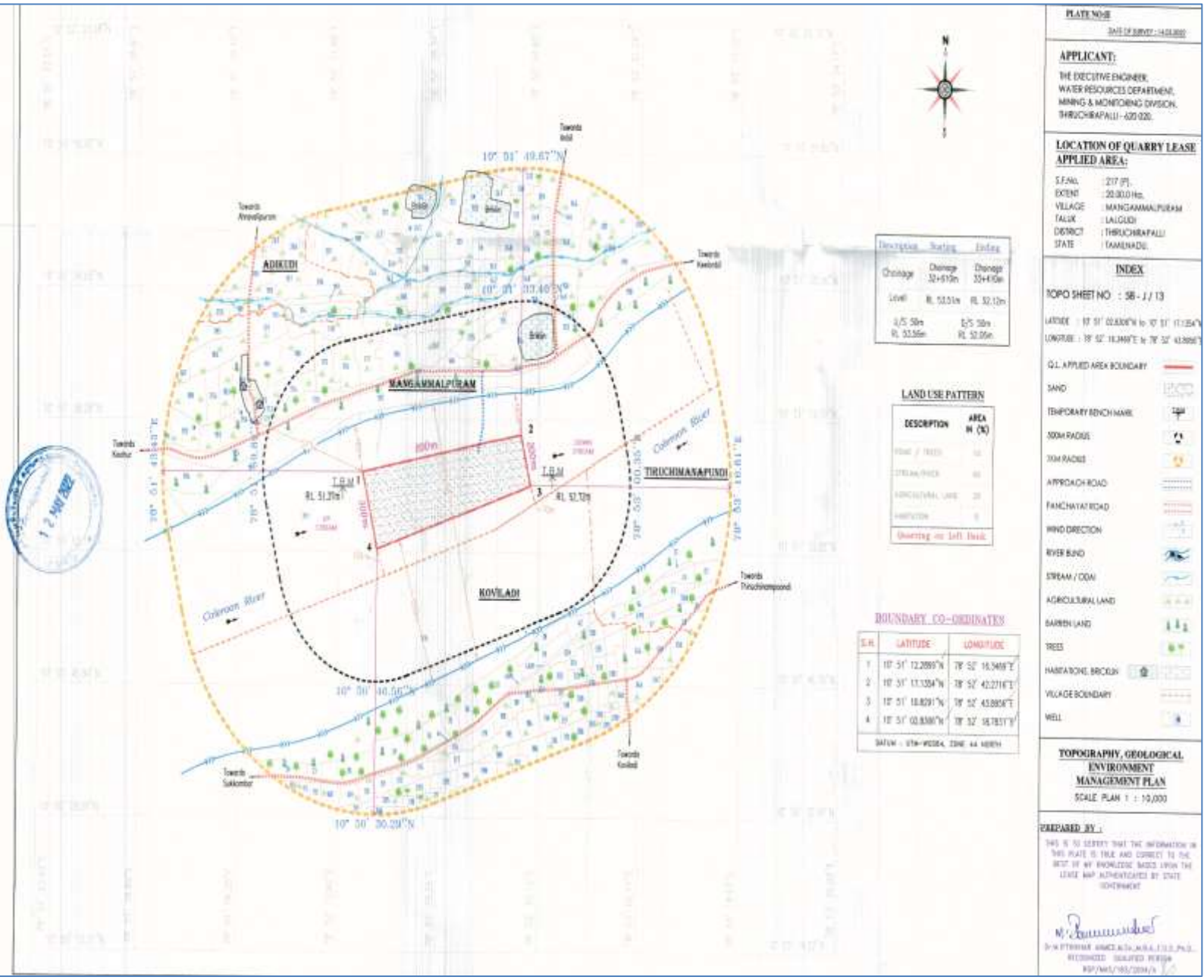


**FIGURE – 4: Topography, Geological Plan**



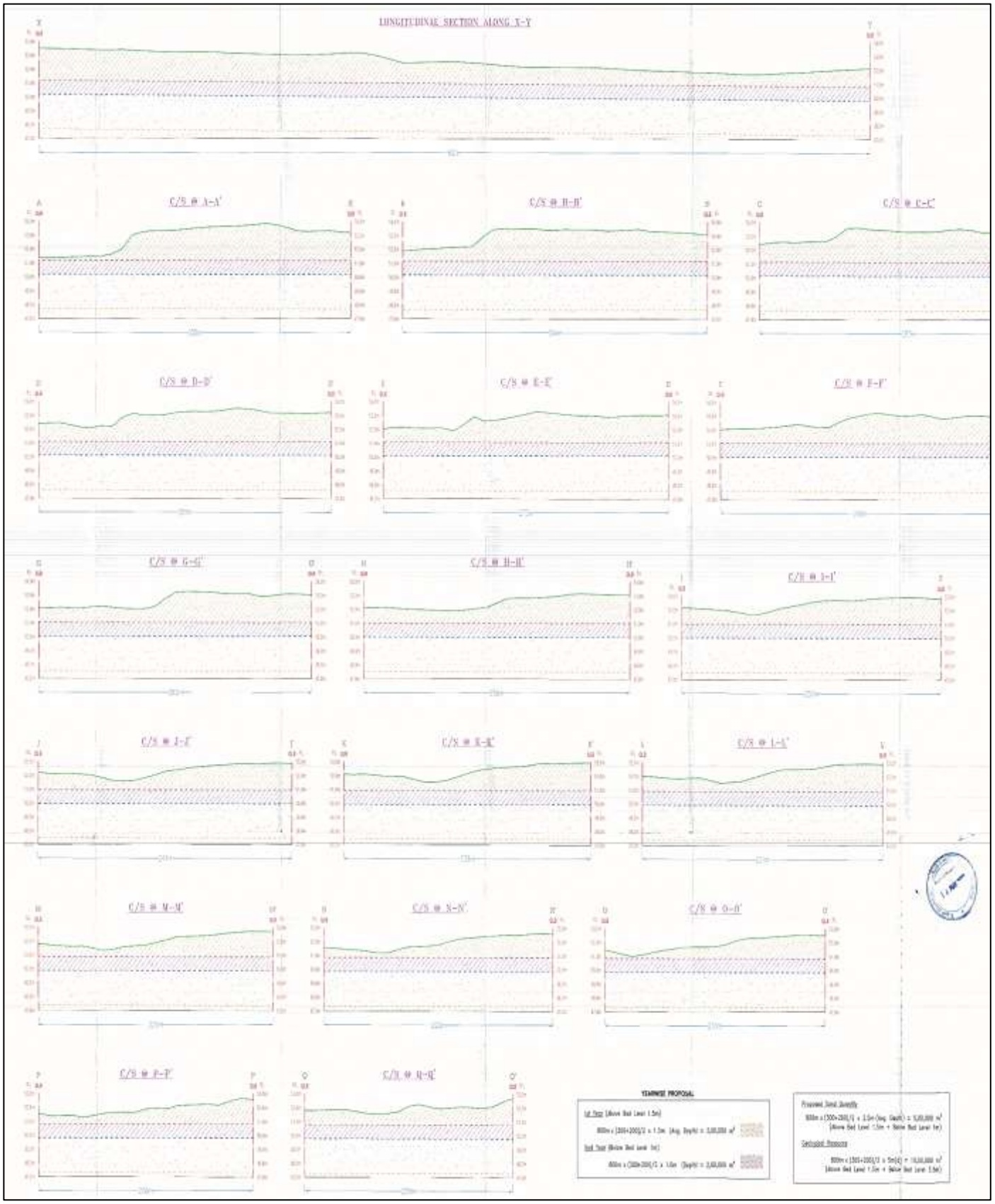

LONGITUDINAL SECTION ALONG X-Y
C/S @ A-A'
C/S @ B-B'
C/S @ C-C'
C/S @ D-D'
C/S @ E-E'
C/S @ F-F'
C/S @ G-G'
C/S @ H-H'
C/S @ I-I'
C/S @ J-J'
C/S @ K-K'
C/S @ L-L'
C/S @ M-M'
C/S @ N-N'
C/S @ O-O'
C/S @ P-P'
C/S @ Q-Q'
TENDER PROPOSAL

**FIGURE –6: PHOTOGRAPHS OF THE PROJECT AREA**




## 3.2 METHOD OF MINING

Opencast method of shallow mining is proposed. Initially to approach the proposed site a temporary road will be formed by using of Gravel mixed with bio-degradable materials and formed a grit around the sand desilting site to move the vehicles easily. During forming the approach road and grit, necessary temporary pipes will be provided wherever necessary for free flow of water to downstream. After forming this approach roads, the trucks/ lorries are allowed for transportation after paying the necessary fees to the Government bodies. In this process contract labours from neighboring villages are engaged for the purpose of maintaining the approaches. Regulating the vehicle movements, assisting to take levels, issuing of permits etc., to regulate the desilting operation in a scientific and systematic manner. The sand will be loaded directly to the trucks / Lorries for transportation to the needy customers and the Silt will be directly loaded to the trucks / Lorries for transportation to the nearby Farmers for Agriculture purpose with free of cost. Hence, no mineral processing is involved.

The trucks are loaded by excavators in direct supervision of the Assistant / Junior Engineers Public Works Department. The competent statutory mines foreman will also be deployed for the safety movement of vehicles inside the quarry.

After that the loaded vehicles are allowed to go out only after covering the sand and silt load properly by tarpaulin to avoid any spillage.

**.Table 3.3..PROPOSED MACHINERY DEPLOYMENT**

| Sl.No. | Machinery | Numbers of Units | Capacity | Make | Motive Power |
|---|---|---|---|---|---|
| 1 | Excavator attached with bucket | 3 | 0.90$m^3$ | TATA Hitachi | Diesel Drive |
| 2 | Tipper | 15 | 10/20 tons | Tata | Diesel Power |

## 3.3 CONCEPTUAL MINING PLAN/ FINAL MINE CLOSURE PLAN

The sand deposit is soft & fragile in nature and occurring as a layer of around 5 thickness it is proposed to excavate 2.5m (1.5m abl + 1m bbl). After the completion of quarrying operation the land will be got natural replenishment in the upcoming rainy seasons

## 4.0 DESCRIPTION OF THE ENVIRONMENT

The baseline environment quality represents the background environmental scenario of various environmental components such as Land, Water, Air, Noise, Biological and Socio-economic status of the study area. Field monitoring studies to evaluate the base line status of the project site were carried out covering December 2022 – February 2023 with CPCB guidelines. Environmental data has been collected with reference to cluster quarries by EHS 360 LABS PRIVATE LIMITED (Approved by ISO/IEC 17025:2017), Laboratory, for the below attributes-

**Table 4.1.ENVIRONMENT MONITORING ATTRIBUTES**

| Attribute | Parameters | Frequency of monitoring | No. of locations | Protocol |
|---|---|---|---|---|
| Land-use | Land-use Pattern within 10 km radius of the study area | Data's from census handbook 2011 and from the satellite imagery | Study Area | Satellite Imagery Primary Survey |
| Soil Characteristics | Physio-Chemical Characteristics | Once during the study period | 6 (1 core & 5 buffer zone) | IS 2720 Agriculture Handbook - Indian Council of Agriculture Research, New Delhi |
| Water Quality | Physical, Chemical and Bacteriological Parameters | Once during the study period | 6 (2 surface water & 4 ground water) | IS 10500& CPCB Standards |
| Meteorology | Wind Speed<br>Wind Direction<br>Temperature<br>Cloud cover<br>Dry bulb temperature<br>Rainfall | 1 Hourly Continuous Mechanical/Automatic Weather Station | 1 | Site specific primary data& Secondary Data from IMD Station |
| Ambient Air Quality | PM10<br>PM2.5<br>SO2<br>NOX<br>CO | 24 hourly twice a week (December 2022 to February 2023) | 8 (1 core & 7 buffer) | IS 5182 Part 1-23 National Ambient Air Quality Standards, CPCB |

| | | | | |
|---|---|---|---|---|
| Noise Levels | Ambient Noise | Hourly observation for 24 Hours per location | 8 (1 core & 7 buffer) | IS 9989 As per CPCB Guidelines |
| Ecology | Existing Flora and Fauna | Through field visit during the study period | Study Area | Primary Survey by Quadrate & Transect Study Secondary Data – Forest Working Plan |
| Socio Economic Aspects | Socio–Economic Characteristics, Population Statistics and Existing Infrastructure in the study area | Site Visit & Census Handbook, 2011 | Study Area | Primary Survey, census handbook & need based assessments. |

Source: On-site monitoring/sampling by EHS 360 Labs Private Limited Laboratories in association with GEMS

* All monitoring and testing are been carried out as per the Guidelines of CPCB and MoEF & CC.

## 4.2 LAND ENVIRONMENT

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

**Table 4.2: Land Use / Land Cover Table 10 Km Radius**

| S.No | Classification | Area_Ha | Area_% |
|---|---|---|---|
| BUILTUP | | | |
| 1 | Builtup Urban | 387.86 | 1.20 |
| 2 | Builtup Rural | 1303.02 | 4.02 |
| 3 | Builtup Mining | 382.24 | 1.18 |
| AGRICULTURAL LAND | | | |
| 4 | Crop Land | 21878.78 | 67.56 |
| 5 | Agricultural Plantation | 1172.66 | 3.62 |
| 6 | Fallow Land | 1909.52 | 5.90 |
| BARREN/WASTELAND | | | |
| 7 | Scrub Land | 126.45 | 0.39 |
| 8 | Salt Affected Area | 26.01 | 0.08 |
| WETLANDS/WATERBODIES | | | |
| 9 | Waterbodies | 5198.66 | 16.05 |
| Total | | 32385.20 | 100.00 |

Source: Bhuvan Land use/ Land Cover Data

**Interpretation:**

- Built-up area = 1690.88ha ie., 5.22 %
- Agriculture land = 24960.97 ha ie., 77.08 %
- Barren land = 152.45 ha ie., 0.47 %
- Mining area = 382.24ha ie., 1.18 %

Total Mining area in the study area is 382.24 Ha ie.,1.18%. This proposed project area occupies 5.23 % overall area. This small percentage of Mining Activities shall not have any significant impact on the environment.

## 4.3 SOIL ENVIRONMENT

**Physical Characteristics**

The physical properties of the soil samples were examined for texture, bulk density, porosity and water holding capacity. The soil texture found in the study area is Clay to Sandy Soil and Bulk Density of Soils in the study area varied between 1.07 – 1.26 g/cc. The Water Holding Capacity and Porosity of the soil samples is found to be medium i.e. ranging from 39.7 to 45.4.

**Chemical Characteristics**

- The nature of soil is slightly alkaline to strongly alkaline in nature with pH range 8.01 to 8.88
- The available Nitrogen content range between 349 mg/kg to 580 kg/ha
- The available Phosphorus content range between 1.13 to 2.1 kg/ha
- The available Potassium range between 27.7 to 50.2 mg/kg

Whereas, the micronutrient as zinc (Zn), iron (Fe) and copper (Cu) were found in the range of 1.01 to 2.51 mg/kg; 1.03 to 2.32 mg/kg and ND

Wilting co efficient in significant level would mean that the soil would support the vegetation. The soil properties in the buffer zone reveal that the soil can sustain vegetation. If amended suitability the core area can also withstand plantation.

## . 4.4 WATER ENVIRONMENT

The water resources, both surface and groundwater play a significant role in the development of the area. The purpose of this study is to assess the water quality characteristics for critical parameters and evaluate the impacts on agricultural productivity, domestic community usage, recreational resources and aesthetics in the vicinity. The water samples were collected and transported as per the norms in pre-treated sampling cans to laboratory for analysis..

**water**

pH varied from 7.44 to 7.89 while turbidity found within the standards. Total Dissolved Solids varied from 611 to 640 mg/l and Chloride varied between 143mg/l and 180.3 mg/l. Nitrates varied from 8.1 to 10.3 mg/l, while sulphates varied from 62.1 to 73.0 mg/l.

**Ground water**

The pH of the water samples collected ranged from 7.11 to 7.77 and within the acceptable limit of 6.5 to 8.5. pH, Sulphates and Chlorides of water samples from all the sources are within the limits as per the Standard. On Turbidity, the water samples meet the requirement. The Total Dissolved Solids were found in the range of 559 – 723 mg/l in all samples. The Total hardness varied between 151.97 mg/l – 210.15 mg/l for all samples. On Microbiological parameters, the water samples from all the locations meet the requirement. The parameters thus analyzed were compared with IS 10500:2012.

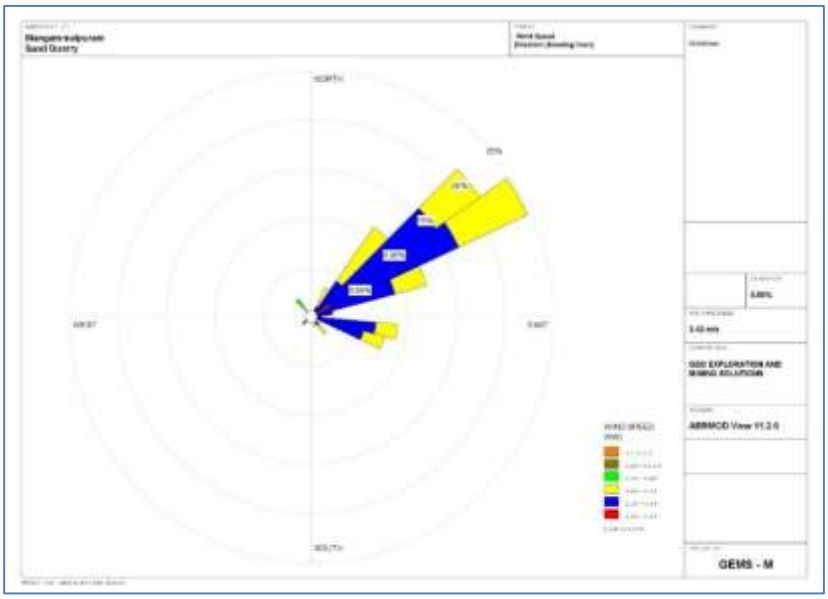
The quality of the surface and Ground water does not have any heavy metal concentration, acidic, Sulphur or suspended solid particles.

## 4.5 AIR ENVIRONMENT

The prime objective of the ambient air quality study is to assess the existing air quality of study area and its conformity to NAAQS. The observed sources of air pollution in the study area are industrial, traffic and domestic activities. The baseline status of the ambient air quality has been established through a scientifically designed ambient air quality monitoring network considering the followings:

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

**FIGURE – 6: WIND ROSE DIAGRAM**




## 4.6 SUMMARY OF AMBIENT AIR QUALITY

The results of ambient air quality monitoring for the period (December 2022 to February 2023) are presented in the report. Data has been complied for three months.

As per monitoring data, PM10 ranges from 35.6 µg/m3 to 45.8 µg/m3, PM2.5 data ranges from 18.2 µg/m3 to 26.8 µg/m3, SO2 ranges from 5.1 µg/m3 to 7.9 µg/m3 and NO2 data ranges from 19.4 µg/m3 to 25.8 µg/m3. The concentration levels of the above criteria pollutants were observed to be well within the limits of NAAQS prescribed by CPCB.

The minimum & maximum concentrations of PM10 were found to be 36.6 µg/m3 in Sirumayankudi East village & 45.8 µg/m3 in Project area respectively. The minimum & maximum concentrations of PM2.5 were found to be 18.2 µg/m3 in Sirumayankudi East village & 26.8 µg/m3 in Project area respectively

## 4.7 NOISE ENVIRONMENT

Ambient noise levels were measured at 8 (eight) locations around the project area. Noise levels recorded in core zone during day time is 42.3 dB (A) Leq and during night time were from 35.0dB (A) Leq. Noise levels recorded in buffer zone during day time were from 38.6 – 41.6 dB (A) Leq and during night time were 35.2 – 37.9 dB (A) Leq.

The values of noise observed in some of the areas are primarily due to movement of vehicles and other anthropogenic activities. Thus, the noise level for Industrial and Residential area meets the requirements of CPCB

## 4.8 ECOLOGICAL ENVIRONMENT

There is no schedule I species of animals observed within study area as per Wildlife Protection Act 1972 as well as no species is in vulnerable, endangered or threatened category as per IUCN. There is no endangered red list species found in the study area. Hence this small mining operation over short period of time will not have any significant impact on the surrounding flora and fauna

## 4.9 SOCIO ECONOMIC ENVIRONMENT

- Based on the data, following inferences could be drawn:
- Total literacy rate in the study area is 85%.
- The study area had good educational facilities. The overall status depicts that the education is limited to primary and middle level.
- The schedule tribe community forms 0.19% and Scheduled Caste forms 23% of the total population of study area.
- The Other Population forms 76% of the total population of study area.

- The study area is well connected by District/Village Road.
- The study area not well health facilities of primary level.
- Considering the above facts, the proposed project will boost the socio-economic development activities in the area and hence will leave positive impact.
- The core area not good mobile connectivity. Buffer area is well connectivity.

## 5. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

In order to maintain the environmental commensuration with the mining operation, it is essential to undertake studies on the existing environmental scenario and assess the impact on different environmental components. This would help in formulating suitable management plans for sustainable resource extraction. Based on the baseline environmental status at the existing mine site, the environmental factors that are likely to be affected (Impacts) are identified, quantified and assessed. The various anticipated impacts will be on.

### 5.1 LAND ENVIRONMENT:

**ANTICIPATED IMPACT**

The total project area is 20.00.0 ha is proposed for quarrying activity (Excavation). The proposed area is Coleroon River land. The mining activity is proposed to a maximum depth of 2.5m (1.5m abl + 1m bbl).

Due to mining operation, there is no remarkable impact on environment, except land degradation within project area. No release of toxic elements into the ground. No adverse impact is anticipated on land use of buffer zone associated due to the mining activity, as all the activities will be confined within the project area. The quarrying operations will impact the land usage and land aesthetics of project area. The land degradation is unavoidable during quarry activities like excavation, mineral handling etc.

**MITIGATION MEASURES**

Due to the mining operation the land will get positive impact, the main aim of the mining operation is to restore the functional efficiency of the river.

### 5.2 WATER ENVIRONMENT

The impact due to quarrying on the water quality is expected to be insignificant because of no use of chemicals or hazardous substances during quarrying process. The quarrying activity will not intersect ground water table as the maximum depth of the quarry is 2.5m (1.5m abl + 1m bbl) and the water table in the area is 11m bgl..

**MITIGATION MEASURES**

The quarrying operation is restricted well above the water table. The water table will not be intersected during mining in the riverbed. There is no proposal of any stream modification/diversion due to this mining activity hence there will be no any impact on flow of the river:

## 5.3 AIR ENVIRONMENT

Quarrying Operations will be to carried out by opencast method without involving drilling and blasting, dust particles are generated only due to Excavation, Loading, handling of mineral and transportation. The air quality in the study area depends upon the nature and concentration of emissions and meteorological conditions. Prediction of impacts on air environment has been carried out taking into consideration proposed production of 5,00,000m3 of sand on air environment and net increase in emissions by Open pit source modeling in AERMOD Software.

The air borne particulate matter is the main air pollutant in this opencast mining. The mining operation will be carried out using Hydraulic Excavators for the excavation of Sand.

The major air pollutants due to mining activity includes: -

- Particulate Matter (Dust) of various sizes.
- Gases, such as, Sulphur Dioxide, Oxides of Nitrogen, Carbon Monoxide etc., from vehicular exhaust.
- Dust is the single air pollutant observed in the open cast mines. Diesel operating vehicles produce NOX, SO2 and CO emissions, usually at low levels. Dust can be of significant nuisance surrounding land users and potential health risk in some circumstances

**MITIGATION MEASURES**

In the study area adequate control measures will be implemented at the time of quarrying operation. Mitigation Measures suggested for air pollution controls are based on the baseline ambient air quality of the area. From the point of view of maintenance of an acceptable ambient air quality in the region, it is desirable that air quality is monitored on a regular basis to check compliance of standards as prescribed by regulatory authorities. In case of non-compliance, appropriate mitigated measures need to be checked.

The following additional measures will also be adopted such as:

- Water sprinkling on haul roads, service roads will help in reducing considerable dust pollution
- Closed Cabins with AC for shovel and dumpers and dust masks to workers will be provided
- Weekly maintenance of quarrying equipment’s will be carried out

- Transport of sand in trucks covered with tarpaulin.
- Information on wind direction and meteorology will be considered while planning, so that pollutants, which cannot be fully suppressed by engineering technique, will be prevented from reaching the nearby agriculture area.
- Comprehensive green belt in the river bund will be carried out to reduce to propagation of fugitive dust emissions in order to create clean and healthy environment.
- The vehicles and machinery will be kept in well maintained condition so that emissions will minimize
- PPE will be provided to all workers
- Regular health check–up of workers and nearby villagers in the near vicinity of the project area will be carried out and also yearly occupational health assessment of employees will be carried out as per DGMS Guidelines.
- Ambient Air Quality Monitoring will be conducted on half-yearly basis to assess the quality of ambient air.

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## 5.4 NOISE ENVIRONMENT

Noise pollution is mainly due to operation like drilling & blasting and plying of trucks & HEMM. In this mining operation drilling and blasting is not involved hence noise is only due to the movement of HEMM and tippers.

These activities will not cause any problem to the inhabitants of this area because there is no human settlement in close proximity to the project area. Noise modelling has been carried out considering blasting and compressor operation (Drilling) and transportation activities.

Predictions have been carried out to compute the noise level at various distances around the working pit due to these major noise-generating sources. Noise modelling has been carried out to assess the impact on surrounding ambient noise levels.

For hemispherical sound wave propagation through homogeneous loss free medium, one can estimate noise levels at various locations at different sources using model based on first principle.

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**MITIGATION MEASURES**

- Provision of earplugs to workers exposed to high noise generating activities. Workers and operators at work site will be provided with earmuffs
- Noise generated by the machinery will be reduced by proper lubrication of the machinery and other equipment
- Conducting periodical medical checkup of all workers for any noise related health problems.
- Proper training to personnel to create awareness about adverse noise level effects

- Periodic noise monitoring at suitable locations in the mining area and nearby habitations to assess efficacy of adopted control measures

### 5.5 BIOLOGICAL ENVIRONMENT

The impact on biodiversity is not anticipated as there are no Wild life sanctuaries, Eco sensitive zone within the radius of 10Km from the project site. The impact on biodiversity is difficult to quantify because of its diverse and dynamic characteristics.

There are no migratory corridors, Migratory avian-fauna, and rare endemic and endangered species. There are no wild animals in the area. No breeding and nesting site were identified in project site. No National Park and Wildlife Sanctuary found within 10km radius. The low concentrations of NOx due to mine operation of the proposed quarry will have insignificant impact on ambient air quality and NOx concentration will remain within the NAAQ standards and will not have an impact on the biological environment.

Mining activities generally result in the deforestation, Land degradation, Water, Air and Noise pollution that directly or indirectly affect the faunal and floral status of the project area.
However, occurrence and magnitude of these impacts are entirely dependent upon the project location, mode of operation and technology involved.

## Anticipated impacts and mitigation measures:

- The proposed project of riverbed sand mining shall be carried out on the riverbed of the Kollidam River. There are no trees in the project area. The project shall also not lead to any change in land use and will be replenished every year after successive rains. The proposed mining activity, which although is an economically gainful activity, also constitutes river training work. There shall be negligible air emissions or effluents from the project site during the loading of the truck. This shall be a temporary effect and not anticipated to affect the surrounding Vegetation significantly.
- Animals are sensitive to noise and avoid human territory. The project stretch of the river is not an identified drinking water point for the animals. However, any animal desirous of accessing the river can continue to do so upstream or downstream of the stretch during the mining activities, as there will not be any damming or diverting of water. Hence, no significant impact is anticipated from the proposed project.
- To reduce the adverse effects on flora/fauna status of the area due to deposition of dust generated from mining operations, water sprinkling systems will be installed in all dust prone areas to arrest dust generation. Methodical and well-planned plantation scheme will be carried out
- The river bund will be utilized for Greenbelt development with native species like Neem, coconut, Pungan etc.,

- Development of dense poly-culture plantation using local flora species in the mining area at conceptual stage.
- There's no breeding/ nesting sites of birds and animals in the nearby areas

To control the dust deposition in the nearby lands and vegetation, water will be sprinkled in the haul road, approach road and dust prone areas.

Systematic plantation will be carried out in the phased manner in every year. Three tier plantations will be carried out to arrest the dust.

## 5.6 SOCIO ECONOMIC ENVIRONMENT

The socio-economic impacts of quarrying operation are many. Impacts of a mine project may be positive or Negative. The adverse impacts attribute to physical displacement due to land acquisition, which is followed by loss of livelihood, mental agony, changes in social structure, and risk to food security etc.,

The villages and their inhabitants in the buffer zone will not be disturbed from their settlements due to the mining operations. There is no habitation within the project area and within the radius of 500m from the periphery of the project site. Therefore, neither villages nor any part of village or any hamlet will be disturbed during the short period of the mine. Regular medical checkup / eye-camps will be organized for the villagers. This quarry project will provide job opportunities to 38 workers directly and 20 workers indirectly. Employed for mining work earning wages as per the minimum wages act applicable for un-skilled, semi-skilled and highly skilled categories.

## ANALYSIS OF ALTERNATIVES (TECHNOLOGY AND SITE)

The mining project is site specific and this is specific project for restoring the functional efficiency of river and no alternate sites are proposed. Consideration of alternatives to a project proposal is a requirement of EIA process. There is no ore beneficiation, mineral processing proposed in the project. The entire quarried out sand will be directly located tippers and will be sent to Government Stock yard unit.

No workshops, housing, colonies are proposed within the project area. The workers are being employed from the nearby community/ villages; hence, there is no impact on selection of alternates.

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## 6.1 ENVIRONMENT MONITORING PROGRAM

The sampling and analysis of the environmental attributes will be as per the guidelines of Central Pollution Control Board (CPCB)/Ministry of Environment, Forest and Climate Change (MoEF & CC).

The environmental monitoring for the quarry operations will be conducted as follows:

- Micro-Meteorological data
- Ambient Air Quality
- Water quality and water level
- Ambient and work zone Noise levels
- Soil Quality and
- Greenbelt Development

With the knowledge of baseline conditions and continuous post project monitoring, the levels of various environmental attributes can serve as an indicator for any deterioration in environmental conditions due to mining operations and suitable mitigation steps could be taken in time to safeguard the environment.

### 6.2 POST ENVIRONMENTAL CLEARANCE MONITORING SCHEDULE

| S. No. | Environment Attributes | Location | Monitoring | | Parameters |
|---|---|---|---|---|---|
| | | | Duration | Frequency | |
| 1 | Air Quality | 2 Locations (1 Core & 1 Buffer) | 24 hours | Once in 6 months | Fugitive Dust, PM2.5, PM10, SO2 and NOx. |
| 2 | Meteorology | At mine site before start of Air Quality Monitoring & IMD Secondary Data | Hourly / Daily | Continuous online monitoring | Wind speed, Wind direction, Temperature, Relative humidity and Rainfall |
| 3 | Water Quality Monitoring | 2 Locations (1SW & 1 GW) | - | Once in 6 months | Parameters specified under IS:10500, 1993 & CPCB Norms |
| 4 | Noise | 2 Locations (1 Core & 1 Buffer) | Hourly – 1 Day | Once in 6 months | Leq, Lmax, Lmin, Leq Day & Leq Night |
| 5 | Soil | 2 Locations (1 Core & 1 Buffer) | – | Once in six months | Physical and Chemical Characteristics |
| 6 | Greenbelt | Within the Project Area | Daily | Monthly | Maintenance |

## 7 ADDITIONAL STUDIES

### 7.1 DISASTER MANAGEMENT PLAN

The Disaster Management Plan is aimed to ensure safety of life, protection of environment, protection of installation, restoration of production and salvage operations in this same order of priorities.

The objective of the Disaster Management Plan is to make use of the combined resources of the mine and the outside services to achieve the following

- Rescue the affected and provide medical treatment of casualties;
- Safeguard other people;
- Minimize damage to property and the environment;
- Initially contain and ultimately bring the incident under control;

- Secure the safe rehabilitation of affected area; and
- Preserve relevant records and equipment for the subsequent inquiry into the cause and circumstances of the emergency.

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**7.2 RISK ASSESSMENT**

Risk assessment is a process whereby risks are analyzed, assessed and risk management priorities are evaluated. It is defined as the characterization of the potential adverse effect to human health & environment due to environmental hazards.

Risk assessments will help the mine operators to identify high, medium and low risk levels. Risk assessments will help to prioritize risks and provide information on the probability of harm arising and severity of harm by understanding the hazard, combine assessments of probability and severity to produce an assessment of risk and it is used in the assessment of risk as an aid to decision making.

Any mines have dangers or risk like fires, inundation, failure of machinery, which need to be investigated, addressed and mitigated. Preliminary Risk assessment is based on the philosophy that "Prevention is better than cure". The mining operations will be carried out under supervision of statutory personnel's as per provisions of MCR 1960, MCDR 1988, Mines Rules 1955, Mines Act 1952 & strictly following safety aspects as per MMR 1961 monitored by Directorate General of Mines safety.

Table 7.1 Risk Assessment & Control Measures

| S. No | Risk factors | Causes of risk | Control measures |
|---|---|---|---|
| 1 | Transportation | Potential hazards and unsafe workings contributing to accident and injuries<br><br>Overloading of material<br><br>While reversal & overtaking of vehicle<br><br>Operator of truck leaving | ▪ Before commencing work, drivers personally check the dumper/truck/tipper for oil(s), fuel and water levels, tyre inflation, general cleanliness and inspect the brakes, steering system, warning devices including automatically operated audio-visual reversing alarm, rear view mirrors, side indicator lights etc., are in good condition.<br>▪ Not allow any unauthorized person to ride on the vehicle nor allow any unauthorized person to operate the vehicle.<br>▪ Concave mirrors should be kept at all corners<br>▪ All vehicles should be fitted with reverse horn with one spotter at every tipping point<br>▪ Loading according to the vehicle capacity |

| | | | |
|---|---|---|---|
| | | his cabin when it is loaded. | ▪ Periodical maintenance of vehicles as per operator manual |
| 2 | Natural calamities | Unexpected happenings | ▪ Escape Routes will be provided to prevent inundation of storm water<br>▪ Fire Extinguishers & Sand Buckets |

## 8. PROJECT BENEFITS

This Sand Quarry project aims to restore the functional efficiency of the Coleroon River by excavating 2,00,000m3 of Sand for a period of one year. This will reduce demand and supply gap in the construction industries.

The enhancement of production will result the following benefits.

- Improvement in Physical Infrastructure.
- Improvement in Social infrastructure.
- Increase in Employment Potential.
- Revenue to Both Central Govt. & State Govt.
- Post mining Enhancement of Green cover.

Supply – Demand chain of cement will be maintained without demand to the state

## 9. ENVIRONMENT MANAGEMENT PLAN

The Environment Monitoring Cell discussed formed by the mine management will ensure effective implementation of environment management plan and to ensure compliance of environmental statutory guidelines through Mine Management Level.

The said team will be responsible for:

- Monitoring of the water/ waste water quality, air quality and solid waste generated
- Analysis of the water and air samples collected through external laboratory
- Implementation and monitoring of the pollution control and protective measures/ devices which shall include financial estimation, ordering, installation of air pollution control equipment, waste water treatment plant, etc.
- Co-ordination of the environment related activities within the project as well as with outside agencies
- Collection of health statistics of the workers and population of the surrounding villages
- Green belt development

- Monitoring the progress of implementation of the environmental monitoring programme
- Compliance to statutory provisions, norms of State Pollution Control Board, Ministry of Environment and Forests and the conditions of the environmental clearance as well as the consents to establish and consents to operate.

## 10. CONCLUSION

It can be concluded from overall assessment of the impacts, in terms of positive and negative effects on various environmental components, that the mining activities will not have any adverse effect on the surrounding environment.

To mitigate any impacts due to the mining activities, a well-planned EMP and a detailed post project monitoring system is provided for regular monitoring and immediate rectification at site. Due to the cluster quarrying activities, socio economic conditions in and around the project site will be improved substantially. Hence, the Prior Environmental Clearance shall be granted at the earliest